GM47/GM48

C E

The product described in this manual conforms to the Radio and Telecommunications Terminal Equipment (R&TTE) directive 99/5/EC with requirements covering EMC directive 89/336/EEC and Low Voltage directive 73/23/EEC. The product fulfils the requirements according to 3GPP TS 51.010-1, EN 301 489-7 and EN60950.

SAR statement: This product is intended to be used with the antenna or other radiating element at least 20 cm away from any part of the human body.

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Contents

Part 1: Overview

1. Introduction

1.1 Target Users

GM47 and GM48 modules are designed to be integrated into machine-to-machine or man-to-machine communications applications. They are intended to be used by manufacturers, system integrators, applications developers and developers of wireless communications equipment.

1.2 Prerequisites

It is assumed that the person integrating the GM47 or GM48 into an application has a basic understanding of the following:

- GSM networking;
- Wireless communication and antennas (aerials);
- AT commands;
- ITU-T standard V.24/V.28;
- Micro controllers and programming;
- Electronic hardware design.

1.3 Manual Structure

The manual is composed of four parts:

Part 1- Overview

This section provides a broad overview of the GM47/GM48 family and includes a list of abbreviations used in the manual.

Part 2 - Developer's Kit

This section lists the contents of the whole development kit and provides the information to setup and use the equipment.

Part 3 - Integrating the Module

This section describes each of the signals available on the GM47/GM48 modules, along with mechanical information. The section also provides you with design guidelines and explains what is needed to commercialise an application from a regulatory point of view.

Part 4 - Using AT Commands

This section lists all the AT commands relevant to the GM47 and GM48, including their required parameters. The purpose of part 4 is to give you detailed information on the function of the AT command set.

2. GM47/GM48 Modules

2.1 About the GM47/GM48 Family

Two modules make up the family; GM47 and GM48, for use in the 900/1800 MHz and 850/1900 MHz GSM bands respectively.

Note! As the characteristics of the modules are quite similar, this manual only refers to the GM48 where a difference exists; by default all other references are to the GM47.

The products belong to a new generation of Sony Ericsson modules, and are intended to be used in machine-to-machine applications and man-to-machine applications. They are used when there is a need to send and receive data (by SMS, CSD, HSCSD, or GPRS), and make voice calls over the GSM network.

GM47 modules are not "stand alone" devices; they are used as the engine in an application created by the customer. A typical application, involves a micro-controller and GM47 module, in which the micro-controller sends AT commands to the module via an RS232 communications link.

2.2 GM47 in a Communication System

Figure 2.1 illustrates the main blocks of a wireless communication system using the GM47. It also shows the communication principles of the system. The definitions in the figure, as used elsewhere in this manual, are in accordance with the recommendations of GSM 07.07.

- The MS (mobile station) represents the GM47 module plus SIM card. The module excluding SIM card, is known as the ME (mobile equipment).
- The TE (terminal equipment) is a micro-controller (i.e., a computer) and is a part of the application.
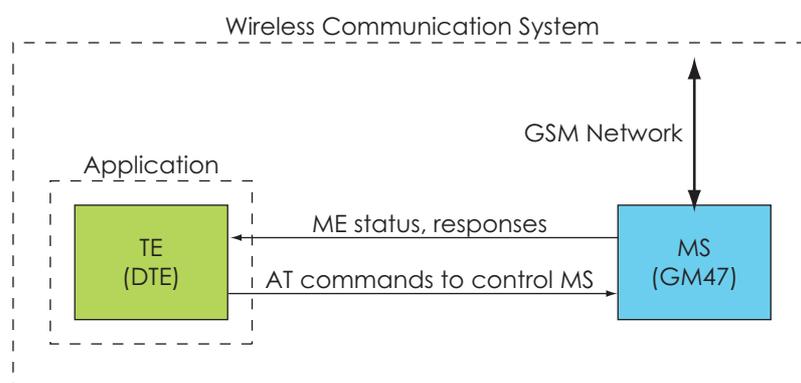
Figure 2.1 Main Blocks in a Wireless System

In accordance with the recommendations of ITU-T (International Telecommunication Union - Telecommunications Standardisation Sector) V.24, the TE communicates with the MS over a serial interface.

The functions of the GM47 follow the recommendations provided by ETSI (European Telecommunications Standards Institute) and ITU-T.

ETSI specifies a set of AT commands for controlling the GSM element of the module; these commands are supplemented by Sony Ericsson specific commands.

To find out how to work with AT commands, see "Part 4: Using AT Commands", page 79.

Figure 2.2 illustrates the interface between the module and the application. The entire System Connector Interface is described in detail in "System Connector Interface", page 41.
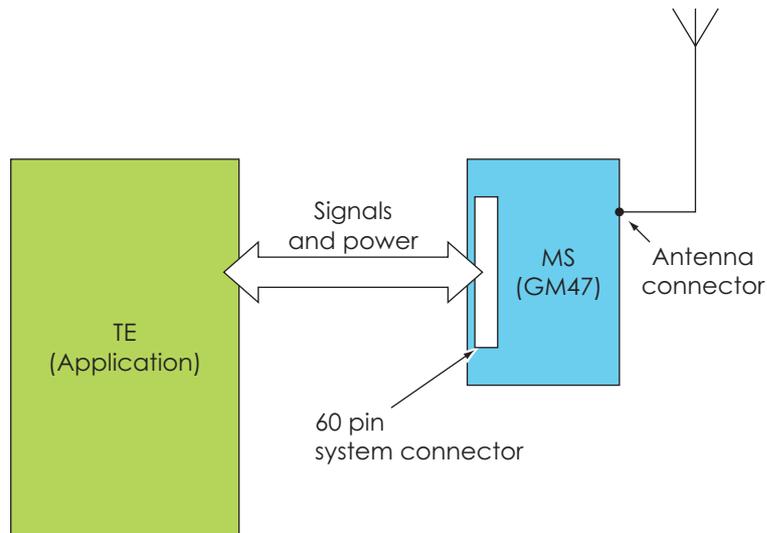
Figure 2.2 The Interface between the Module and the Application

Note!   ITU-T standards define TE and TA as DTE (Data Terminal Equipment) and DCE (Data Circuit Terminating Equipment) respectively.

2.3 Features

The module performs a set of telecom services (TS) according to GSM standard phase 2+, ETSI and ITU-T. The functions of the module are implemented by issuing AT commands over a serial interface.

2.3.1 Types of Mobile Station

GM47 and GM48 are dual band mobile stations with the characteristics shown in the tables below.

GM47	GSM 900	E-GSM 900	GSM 1800
Frequency Range (MHz)	TX: 890-915￼RX: 935-960	TX: 880-890￼RX: 925-935	TX: 1710-1785￼RX: 1805-1880
Channel spacing	200 kHz		200 kHz
Number of channels	173 carriers *8 (TDMA)￼GSM: channels 1 to 124￼E-GSM: channels 975 to 1023		374 carriers *8 (TDMA)￼DCS: channels 512 to 885
Modulation	GMSK		GMSK
TX phase accuracy	< 5º RMS phase error (burst)		< 5º RMS phase error (burst)
Duplex spacing	45 MHz		95 MHz
Receiver sensitivity at antenna connector	< −102 dBm		< −102 dBm
Transmitter output power at antenna connector	Class 4￼2W (33 dBm)		Class 1￼1W (30 dBm)
Automatic hand-over between GSM 900 and GSM 1800			

GM48	GSM 850	GSM 1900
Frequency Range (MHz)	TX: 824-849￼RX: 869-894	TX: 1850-1910￼RX: 1930-1990
Channel spacing	200 kHz	200 kHz
Number of channels	123 carriers *8 (TDMA)￼GSM: channels 128 to 251	298 carriers *8 (TDMA)￼PCS: channels 512 to 810
Modulation	GMSK	GMSK
TX Phase Accuracy	< 5º RMS phase error (burst)	< 5º RMS phase error (burst)
Duplex spacing	45 MHz	80 MHz
Receiver sensitivity at antenna connector	< −102 dBm	< −102 dBm
Transmitter output power at antenna connector	Class 5￼0.8W (29 dBm)	Class 1￼1W (30 dBm)
Automatic hand-over between GSM 850 and GSM 1900		

2.3.2 Short Message Service

The module supports the following SMS services:

- Sending; MO (mobile-originated) with both PDU (protocol data unit) and text mode supported.

- Receiving; MT (mobile-terminated) with both PDU and text mode supported.

- CBM (cell broadcast message); a service in which a message is sent to all subscribers located in one or more specific cells in the GSM network (for example, traffic reports).

- SMS STATUS REPORT according to GSM 03.40.

- SMS COMMAND according to GSM 03.40.

The maximum length of an SMS message is 160 characters when using 7-bit encoding. For 8-bit data, the maximum length is 140 characters. The module supports concatenated messages to extend this function. It is disabled if CNMI 3,2 is set (See "AT+CNMI New Message Indications to TE", page 264).

2.3.3 Voice Calls

The GM47 offers the capability of mobile originated and mobile terminated voice calls, as well as supporting emergency calls. Multi-party, call waiting and call deflection features are available. Some of these features are network-operator specific.

For the inter-connection of audio, the module offers both single ended and balanced analogue input and output lines. Direct interface to the digital PCM (pulse code modulation) bus used within the module is available, thus by-passing the internal analogue circuitry.

2.3.4 Data

The module supports the following data protocols:

- GPRS (General Packet Radio Service)
  Modules are Class B terminals, which provide simultaneous activation and attachment of GPRS and GSM services. GM47 modules are GPRS 4+1 enabled devices, which are capable of transmitting in one timeslot per frame (up link), and receiving at a maximum of four timeslots per frame (down link).

- CSD (Circuit Switched Data)
  GM47 modules are capable of establishing a CSD communication at 9.6kbps.

- HSCSD (High Speed Circuit Switched Data).
  GM47 supports HSCSD communication, with one timeslot per frame capacity in the up link and two timeslots per frame capacity in the down link (2+1).

2.3.5 SIM Card

An external SIM card with 3 V or 5 V technology, can be connected to the module via its 60-pin system connector.

2.3.6 Average Power Consumption

		Idle Mode	Transmit/Operation
GSM850 and GSM900	Voice/CSD	<5mA	<250mA (<2A peak)
	Data (GPRS 4+1)	<5mA	<350mA (<2A peak)
GSM1800 and GSM1900	Voice/CSD	<5mA	<250mA (<1.75A peak)
	Data (GPRS 4+1)	<5mA	<350mA (<1.75A peak)

Note! The power consumption during transmission is measured at maximum transmitted power.

2.3.7 Other Features

These include:
- 07.10 multiplexing.
- GPS interoperability.
- SIM application tool kit.

2.4 Service and Support

2.4.1 Web Pages

Visit our web site for the following information:
- where to buy modules or for recommendations concerning accessories and components;
- the telephone number for customer support in your region;
- FAQs (frequently asked questions).

The web site address is:

http://www.sonyericsson.com/M2M

2.4.2 Integrator's Manual

This manual provides you with all of the information you need to integrate the module into your application.

2.4.3 Developer's Kit

Sony Ericsson provides the opportunity for designers to test the module on a limited scale using its Developer's Kit. The kit includes the necessary accessories (software and hardware) required to build and test an application. It includes the following:

• GSM module, GM47 or GM48;

• This integrator's manual;

• Software developer's kit and manual;

• Developer's kit hardware.

All the user needs to provide, is a computer or micro-controller and the expertise to use AT commands.

2.5 Precautions

GM47 and GM48 modules are static sensitive devices (SSDs). Normal SSD procedures for electronic devices should be used when handling the modules. In "Part 3: Integrating the Module", page 37 you will find more information about safety and product care. Do not exceed the environmental and electrical limits as specified in "Technical Data", page 75.

3. Abbreviations

Abbreviation	Explanations
CBM	Cell Broadcast Message
CBS	Cell Broadcast Service
CSD	Circuit Switched Data
DCE	Data Circuit Terminating Equipment
DTE	Data Terminal Equipment
DTMF	Dual Tone Multi Frequency
EFR	Enhanced Full Rate
EMC	Electro-Magnetic Compatibility
ETSI	European Telecommunication Standards Institute
FR	Full Rate
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global System for Mobile Communication
HR	Half Rate
HSCSD	High Speed Circuit Switched Data
ITU-T	International Telecommunication Union - Telecommunications Standardisation Sector
ME	Mobile Equipment
MO	Mobile Originated
MS	Mobile Station
MT	Mobile Terminated
PCM	Pulse Code Modulation
PDU	Protocol Data Unit
RLP	Radio Link Protocol
RF	Radio Frequency
RTC	Real Time Clock
SDP	Service Discovery Protocol
SIM	Subscriber Identity Module
SMS	Short Message Service

Abbreviation	Explanations
TA	Terminal Adapter
TE	Terminal Equipment
THD	Third Harmonic Distortion
TS	Telecom Services

Part 2: Developer's Kit

1. Introduction

1.1 Overview

The developer's kit is designed to get you started quickly. It contains all the hardware you will need to begin the development of an application. The only items you need to provide are; a computer or micro controller, a SIM card and network subscription, and a knowledge of programming with AT commands.

Note!   Before connecting up and using the developer's kit, we strongly recommend you read "Part 3: Integrating the Module", page 37 and all of this section. There are many switches, jumpers and connector options in the developer's kit. A knowledge of the functionality of the GM47 module is therefore essential before you start altering the hardware settings.

The main hardware in the developer's kit is a screened box, containing a board onto which you plug the GM47 module. Connectors, switches, jumpers and SIM card holder are provided to allow you to configure and access all the functions of the module.

1.2 Contents of the Kit

Please take the time to check the contents of your kit against the list shown below. If any of the items are missing contact your supplier immediately.

Developer's kit - Part Number DPY 102 218

Contents:

Description	Product Number	Qty
Radio modem: GM47 module or GM48 module	DPY 102 201 DPY 102 204	1
GM47/GM48 developer's kit (screened box and development board)	KRY 101 1907	1
Switched mode PSU 12V d.c.	EPA-121DA-12	1
UK mains plug	EN90POWERLEADUK	1
European mains plug	EN90POWERLEADEU	1

LZT 123 7263 R1C

Description	Product Number	Qty
Cable with connector/cable serial 9-9 PIN	DB9(M)-DB9(F)	1
Portable handsfree	2002-1-24	1
Quad band antenna	RG174	1
Data carrier/CD-ROM containing: Software Manual; Integrator's Manual	LZY 213 1319	1

1.3 General Functioning of the Kit

The following block diagrams are provided to help you understand the general principles of operation of the developer's kit.

You have the following options as shown in Figure 1.1:

- Connect the GM47 internally, direct to J4 or position it externally and connect to J10 via a flat cable.

- Use the kit's connectors to access and control the GM47 (all switches and jumpers in their default positions).

- Access and control the GM47 directly via J12 and a flat cable. This allows you to selectively bypass any circuits contained on the board, and test your own application.
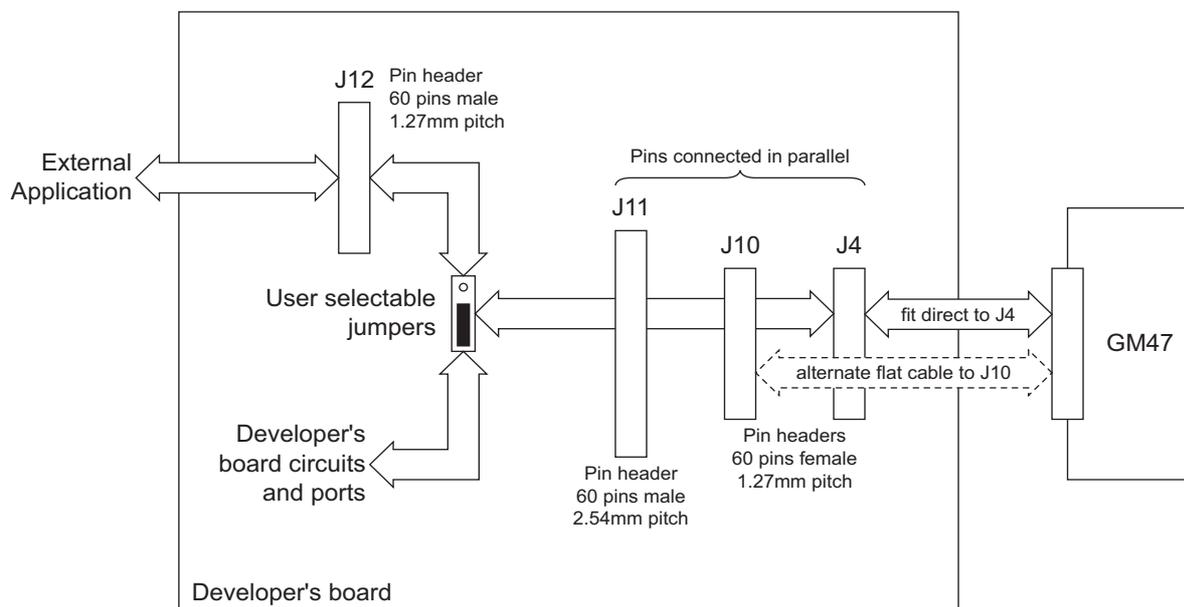
Figure 1.1 Module connections to the developer's board

Figure 1.2 shows the various on-board voltages and how they are fed to the GM47 and other circuitry. The developer's board is powered by an external power supply connected to Vcc.
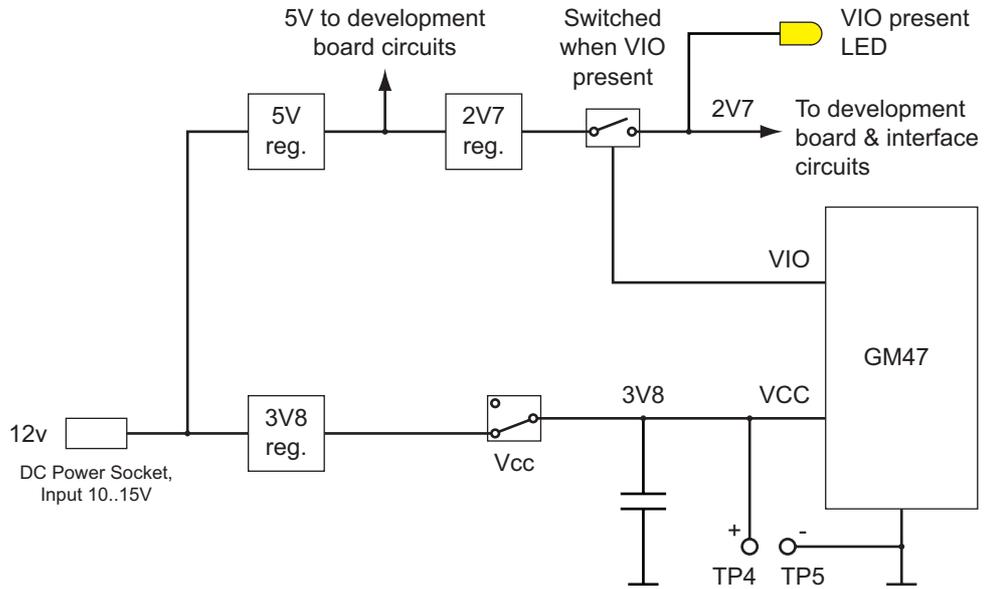
Figure 1.2 Power supply connection and the on-board voltages

Figure 1.3, Figure 1.4 and Figure 1.5 show how various signals are routed on the developer's board. Thicker lines indicate multiple signals.
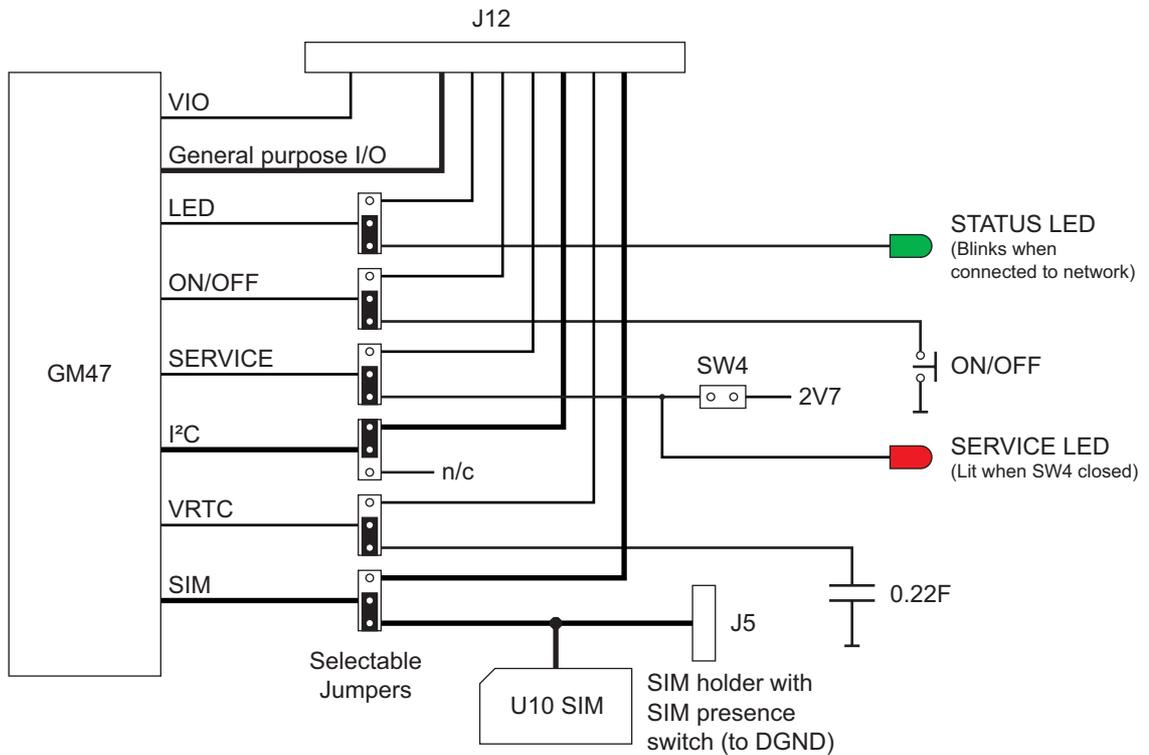
Figure 1.3 Miscellaneous signals, connection and routing
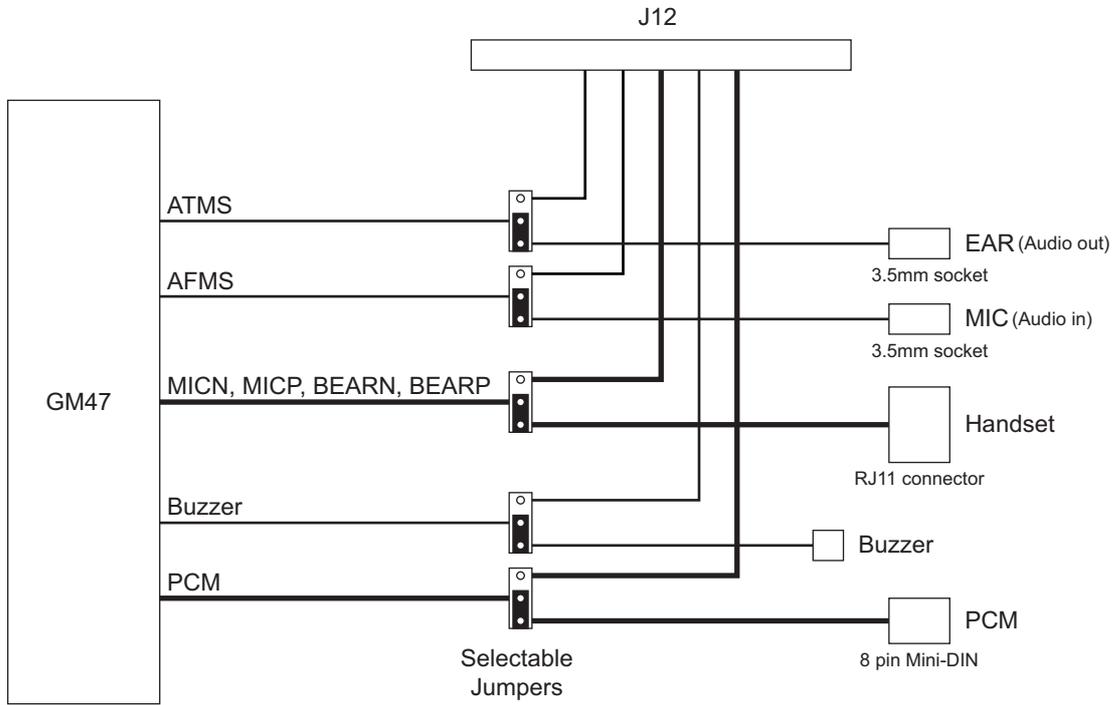
Figure 1.4 Audio signals, connection and routing
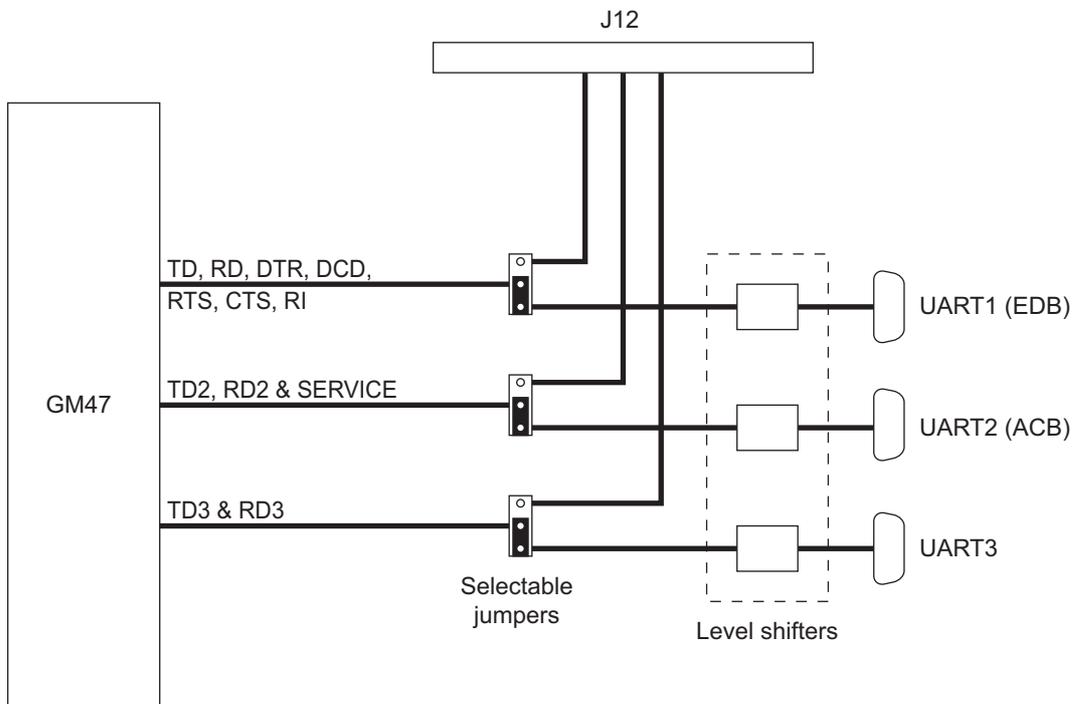
Figure 1.5 Comms signals, connection and routing

2. Using the Developer's Kit

This section provides you with the information needed to setup and use the developer's kit. Before changing switch and jumper settings, refer to "2.3 Jumpers, Switches and Connectors", page 32.

Front and rear views of the developer's kit are shown below. To access the inside, remove the 8 screws on the top of the box and the cover plate.
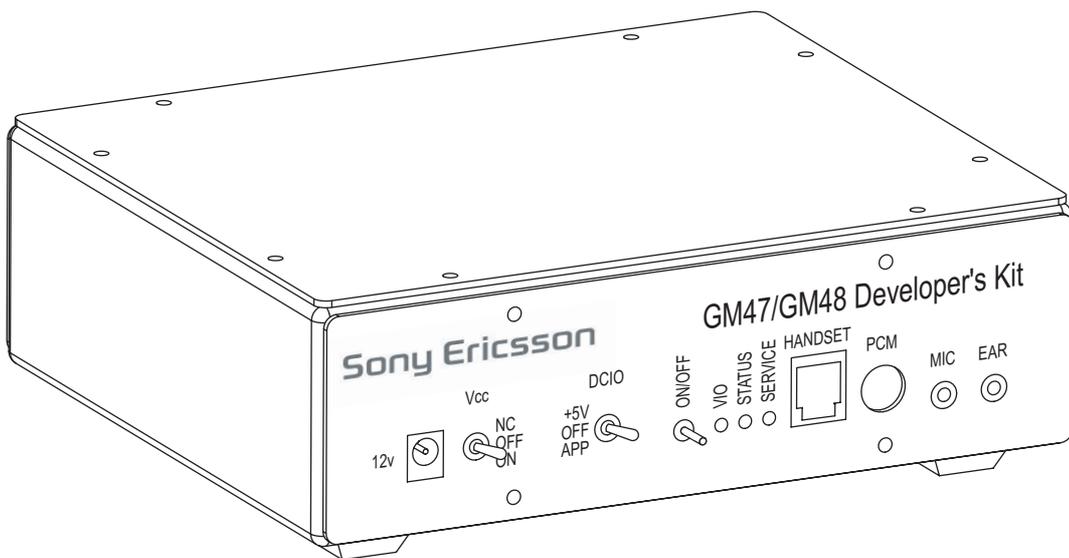
Figure 2.1 Front view
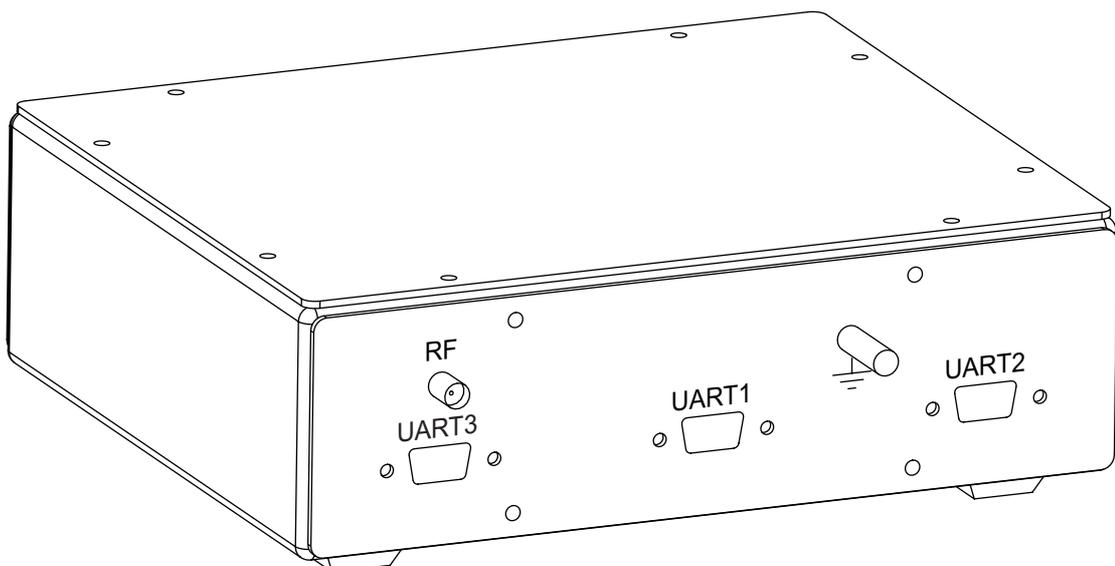
Figure 2.2 Rear view

2.1 Start up Check List

To use the developer's kit in standard format check the following:

- With the case lid removed, make sure the GM47 module is plugged into J4 and the RF lead is connected to the rear of the module;
- Add your SIM card;
- Check the jumpers are in their default positions. Refer to Figure 2.3;
- Connect the serial cable between your computer and UART1 on the rear panel;
- Connect the antenna to the RF connector on the rear panel;
- Connect the audio equipment if required;
- Plug the external power supply into the socket marked 12v on the front panel;
- Switch Vcc to ON;
- Push ON/OFF for at least 2 seconds until the yellow VIO LED is on.

Your developer's kit should now be operational and ready to receive AT commands.

2.2 Developer's Board Overlay

Figure 2.3 shows the developer's board, including the position of all the connectors, switches and jumpers (default positions). You will notice that many jumpers are labelled "SW". This is because the board was previously fitted with DIL switches.
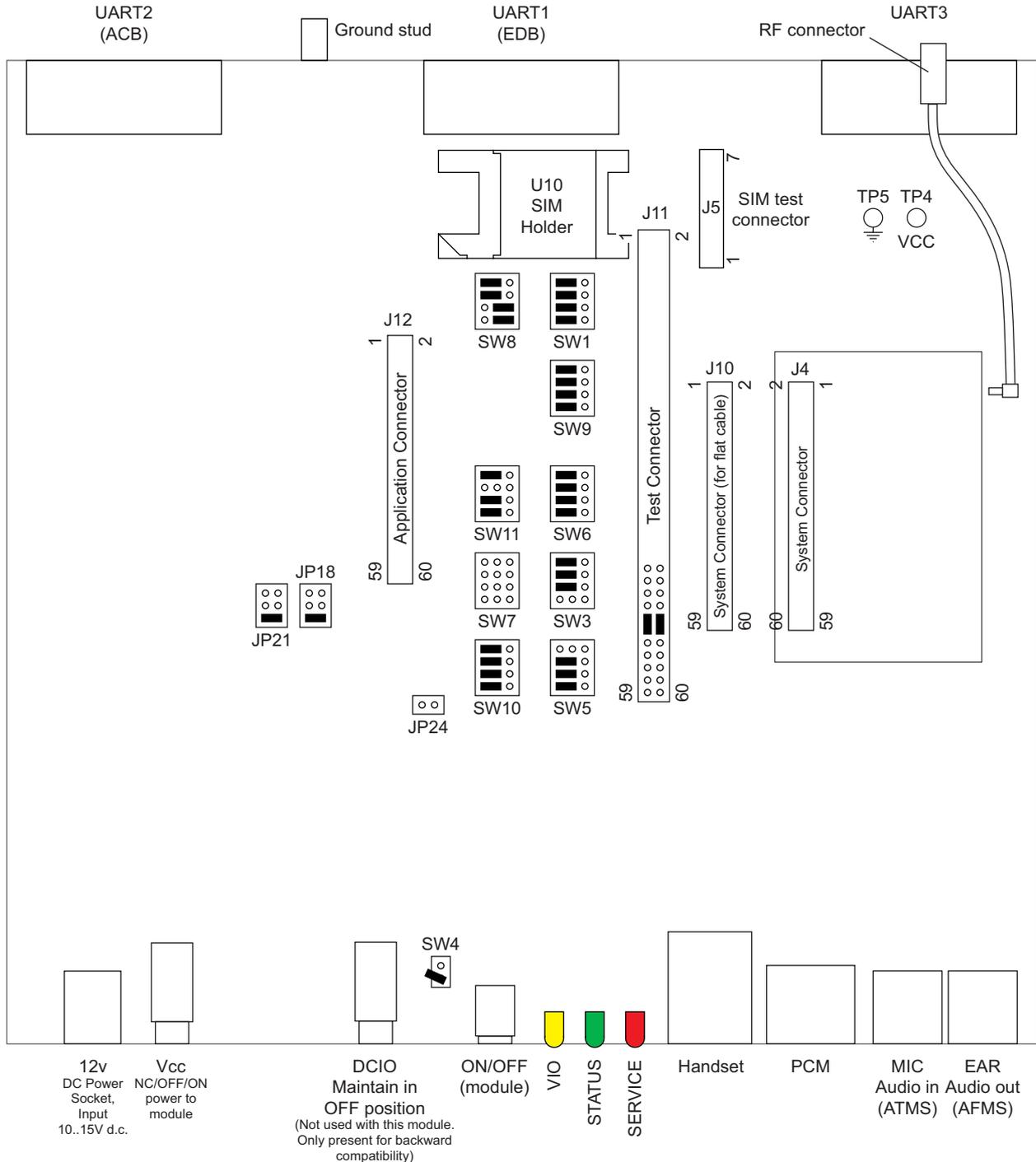
Figure 2.3 Developer's board overlay

2.3 Jumpers, Switches and Connectors

You will notice that many jumpers are labelled "SW". This is because the board was previously fitted with DIL switches. All jumpers are located on the developer's board (see "Developer's board overlay", page 31).

Jumper	Signal	Setting	
JP18	TD	Maintain jumper in lower default position	
JP21	RD	Maintain jumper in lower default position	
JP24	Reserved for future use	MUST remain open to prevent damage to the module. As an extra precaution, maintain DCIO in the OFF position	
SW4	SERVICE	Connect the pins using the floating connector ONLY when programming the module or logging data	
SW1, SW3, SW5, SW6, SW7, SW8, SW9, SW10, SW11, J11 links	See diagram below	Default positions shown below. Move any "SW" jumper to the right-hand position to divert the signal to connector J12. Remove the J11 links to bypass J8, J9 or CP1 and process audio signals externally	
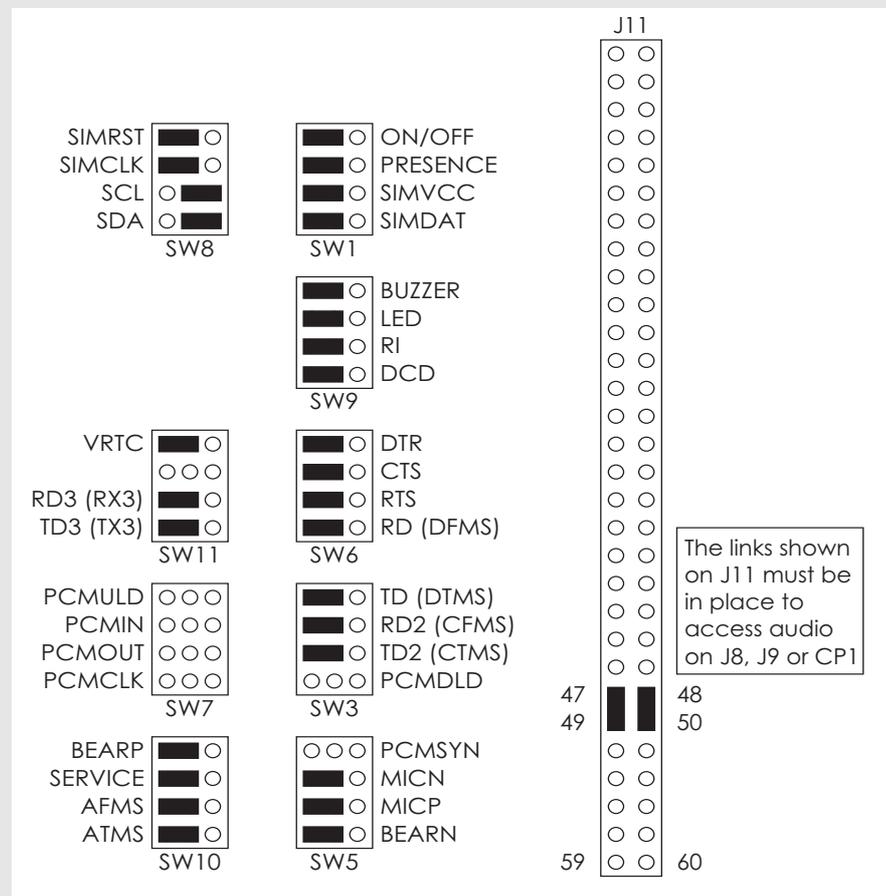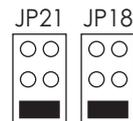
All switches are mounted on the front panel of the developer's box.

Switch	Description	Operation
Vcc	Toggle switch	Switches power from external power supply to module. Has three positions; NC, OFF and ON. Switch to ON to connect power to the module
ON/OFF	Push button switch	Switches module on and off. To power up the module, push button for at least 2 seconds, until the yellow VIO LED is on. Repeat the process to turn the module off
DCIO	Toggle switch	Maintain in OFF position. Included only for backwards compatibility

Connector	Description	Connections
UART1 (EDB)	9-way D socket (accessible on the rear panel)	Full 9-pin RS232 communication port. Used during run-time to communicate with the module (AT-commands, data transmission, etc.) DCD—1, 6, RD—2, RTS—7, TD—3, CTS—8, DTR—4, RI—9, 5
UART2 (ACB)	9-way D socket (accessible on the rear panel)	3 line RS232 communications port (+SERVICE). Used during service and maintenance operations. Also used to download new software to the module 1, 6, RD2—2, SERVICE—7, TD2—3, 8, 4, 9, 5
UART3	9-way D socket (accessible on the rear panel)	3 line serial port. RS232 levels 1, 6, RD3—2, 7, TD3—3, 8, 4, 9, 5
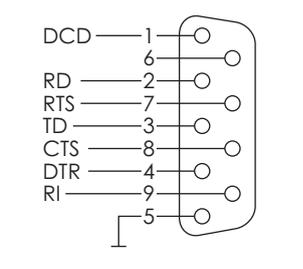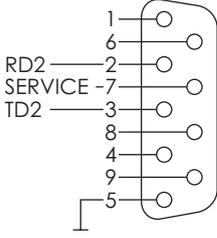
Connector	Description	Connections
Handset	RJ11 socket	Connector for a standard telephone handset. As PCM paths are open inside the module, a default short circuit is made between PCMDLD-PCMIN and PCMULD-PCMOUT signals on test connector J11 to enable analogue audio in downlink and uplink directions. Jumpers are in place between pins 48 & 50 and between pins 47 & 49

Pin #   Signal
1   MICN
2   BEARN
3   BEARP
4   MICP

PCM	8 pin mini-DIN connector	Carries PCM signals

Pin #   Signal
1   VIO (2.75V d.c. output)
2   PCMULD
3   PCMDLD
4   PCMCLK
5   PCMSYNC
6   DGND
7   PCMIN
8   PCMOUT
9   DGND

J4	SYSTEM connector	Allows direct connection of the module to the development board (see Figure 2.3, page 31)
J5	SIM card test connector	Connector to gain access to the SIM card signals, which are connected in parallel with U10

Pin #   Signal
1   SIMVCC
2   SIMRST
3   SIMCLK
4   SIMDAT
5   SIMPRESENCE
6   SIMGND
7   SIMGND

U10	SIM Holder	Connector for SIM card. Signals are also present at test connector J5, described above
EAR	3.5mm 2-pole jack socket	Audio output (unbalanced) or Audio From Mobile Station (AFMS). Make sure jumpers are in place between pins 48 & 50 and between pins 47 & 49

ground   signal
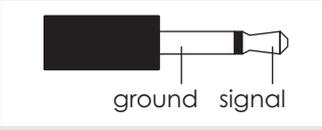
MIC	3.5mm 2-pole jack socket	Audio input (unbalanced) or Audio To Mobile Station (ATMS). Signal source must be AC-coupled as a bias voltage for electret microphones is provided (2.0 - 2.5V d.c.). Make sure Jumpers are in place between pins 48 & 50 and between pins 47 & 49

Connector	Description	Connections
J10	SYSTEM connector	For optional flat cable connection between the module and the development board (see Figure 2.3, page 31)
J11	TEST connector	60 pin, 2.54mm pitch, dual row pin header that carries all signals present at the system connector of the module. Used for easy testing of the signals (see Figure 2.4, page 36)
J12	Application connector	For flat cable connection between a host application and the module. Most of the signals pass through jumpers that allow the developer to select whether a specific signal is routed to/from the development board or to/from the host application. If no application is connected to J12, these jumpers (SW1, SW3, SW5, SW6, SW7, SW8, SW9, SW10 & SW11) serve as on/off switches for the module signals (see Figure 2.3, page 31)
12v	2.1mm DC Power Socket	Allows connection of an external power supply. Between 10V and 15V d.c. at 6 watts is required
RF	SMA panel socket	Connect the supplied antenna
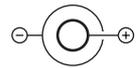
2.4 System Connector Pin Assignments

Refer to the table below when monitoring signals on, or connecting to, J10, J11 or J12. The table shows the system-connector pin assignments for the GM47 module.

J10, J11 & J12 pin numbering viewed from the front of the developer's box
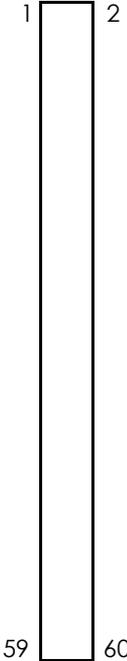
1	VCC	DGND	2
3	VCC	DGND	4
5	VCC	DGND	6
7	VCC	DGND	8
9	VCC	DGND	10
11	VCC	DGND	12
13	Reserved for future use	ON/OFF	14
15	SIMVCC	SIMPRESENCE	16
17	SIMRST	SIMDAT	18
19	SIMCLK	DAC	20
21	IO1	IO2	22
23	IO3	IO4	24
25	VRTC	ADC1	26
27	ADC2	ADC3	28
29	SDA	SCL	30
31	BUZZER	OUT5	32
33	LED	VIO	34
35	TX_ON	RI	36
37	DTR	DCD	38
39	RTS	CTS	40
41	TD (DTMS)	RD (DFMS)	42
43	TD3 (TX3)	RD3 (RX3)	44
45	TD2 (CTMS)	RD2 (CFMS)	46
47	PCMULD	PCMDLD	48
49	PCMOUT	PCMIN	50
51	PCMSYNC	PCMCLK	52
53	MICP	MICN	54
55	BEARP	BEARN	56
57	AFMS	SERVICE	58
59	ATMS	AGND	60

Figure 2.4 System connector pin assignments

Part 3: Integrating the Module

1. Mechanical Description

1.1 Interface Description

The pictures below show the mechanical design of the GM47 along with the positions of the different connectors and mounting holes. The GM47 is protected with AISI 304 stainless steel covers that meet the environmental and EMC requirements.
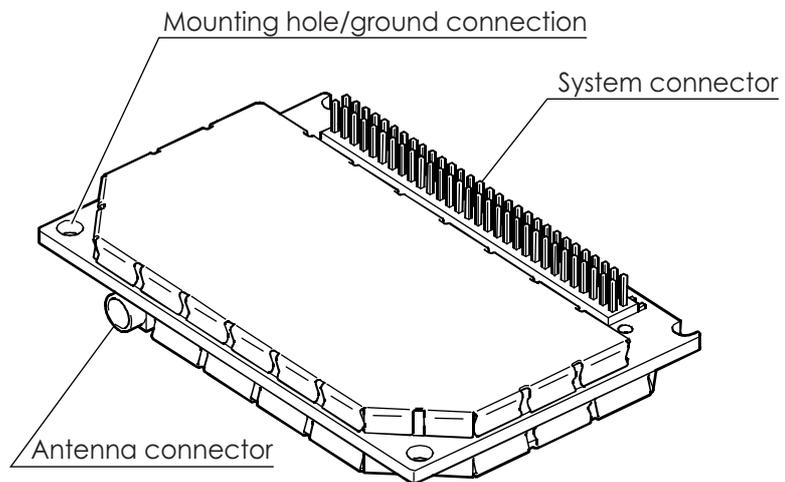
Figure 1.1 GM47 viewed from below
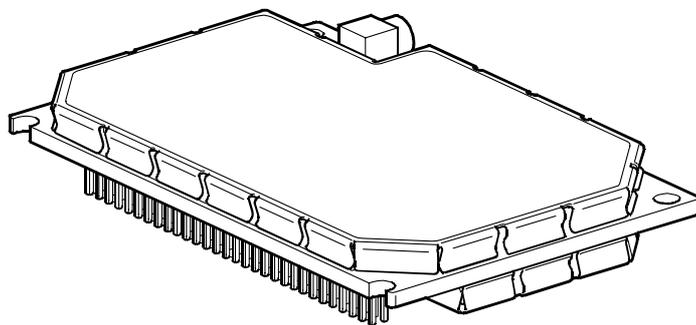
Figure 1.2 GM47, viewed from above

Please note the following:

- Mounting holes positioned at the corners make it possible to securely bolt the module into your application.

LZT 123 7263 R1C

- Keypad, display, microphone, speaker and battery are not part of the module.
- The SIM card is mounted in your application, external to the module.
- The System Connector is a 60-pin, standard 0.05 in (1.27 mm) pitch type. The pins and their electrical characteristics are described in "2. System Connector Interface", page 41.
- Information about the Antenna Connector is found in "3. Antenna Connector", page 68.

1.2 Physical Dimensions
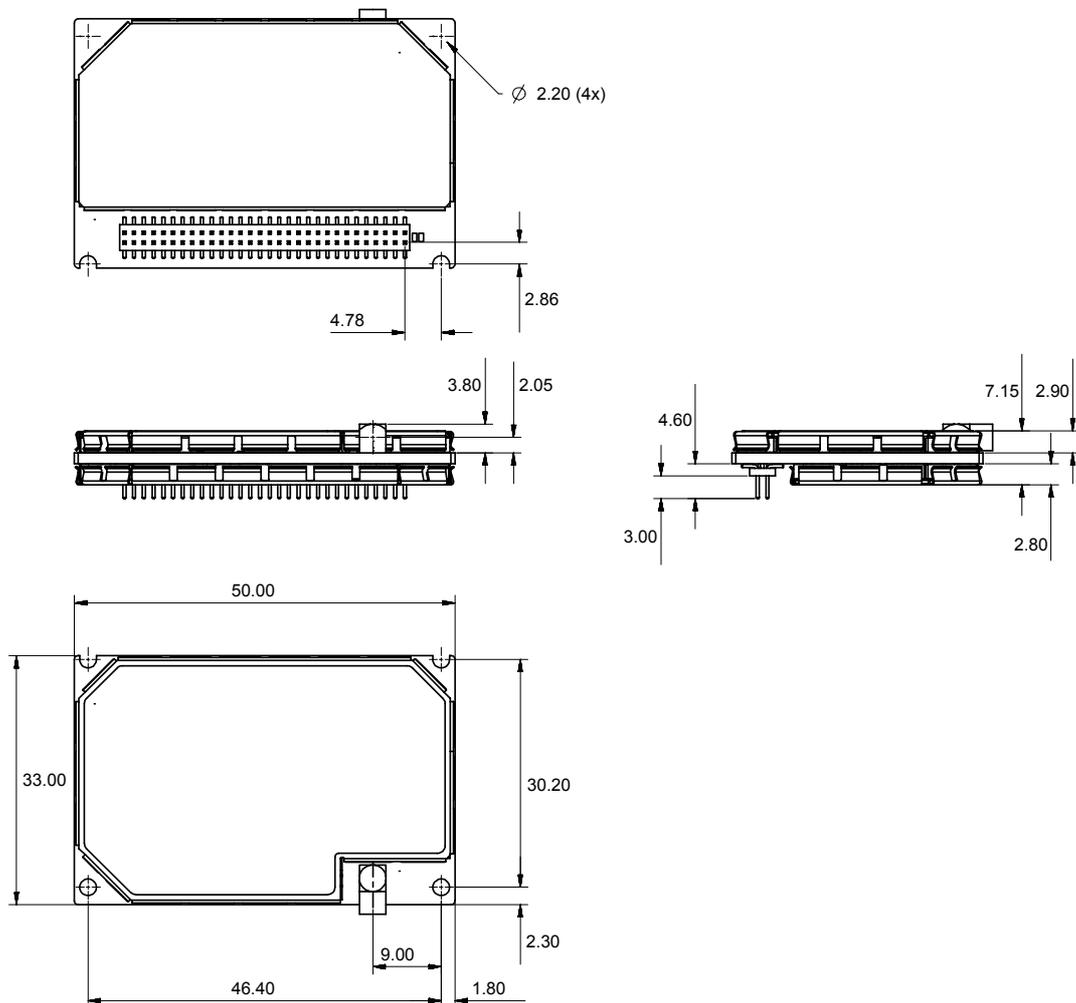
Figure 1.3 Dimensions of the GM47

Measurements are given in millimetres. See also "Technical Data", page 75.

2. System Connector Interface

2.1 Overview

Electrical connections to the module (except the antenna), are made through the System Connector Interface. The system connector is a 60-pin, standard 0.05 in (1.27 mm) pitch device.

The system connector allows both board-to-board and board-to-cable connections to be made. Use a board-board connector to connect the module directly to a PCB, and a board-cable connector to connect the module via a cable.

Figure 2.1 below shows the numbering of the connector pins.

A ground connection is provided at the mounting hole next to the RF connector on the module as shown below. Connect this ground point to the DGND pins of the module by the shortest, low-impedance path possible. The purpose of this connection is to allow any ESD picked up by the antenna to bypass the module's internal ground path.
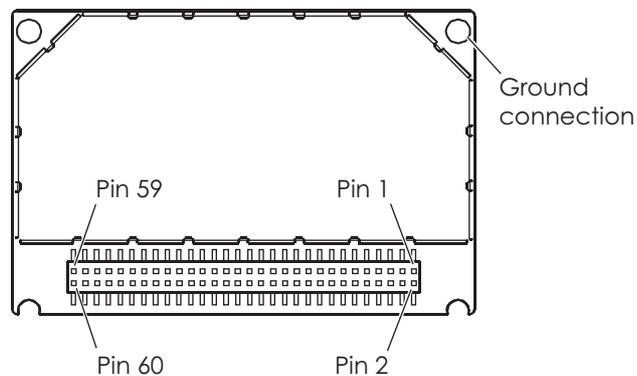
Figure 2.1 GM47, viewed from underneath

The following table gives the pin assignments for the system connector interface and a short description for each signal.

Note! Under the heading "Dir" in the table, module input and output signals are indicated by the letters I and O respectively.

Pin	Signal Name	Dir	Signal Type	Description
1	VCC	-	Supply	Power supply
2	DGND	-	-	Digital ground
3	VCC	-	Supply	Power supply
4	DGND	-	-	Digital ground
5	VCC	-	Supply	Power supply
6	DGND	-	-	Digital ground
7	VCC	-	Supply	Power supply
8	DGND	-	-	Digital ground
9	VCC	-	Supply	Power supply
10	DGND	-	-	Digital ground
11	VCC	-	Supply	Power supply
12	DGND	-	-	Digital ground
13	Reserved for future use			
14	ON/OFF	I	Internal pull up, open drain	Turns the module on and off. Former WAKE_B
15	SIMVCC	-	Digital 3V/5V	SIM card power supply. Power output from module for SIM Card
16	SIMPRESENCE	I	Internal pull up, open drain	SIM Presence A "1" indicates that the SIM is missing; a "0" that it is inserted
17	SIMRST	O	Digital 3V/5V	SIM card reset
18	SIMDATA	I/O	Digital 3V/5V	SIM card data
19	SIMCLK	O	Digital 3V/5V	SIM card clock
20	DAC	O	Analogue	Digital to analogue converter
21	IO1	I/O	Digital 2.75	General purpose input/output 1
22	IO2	I/O	Digital 2.75	General purpose input/output 2
23	IO3	I/O	Digital 2.75	General purpose input/output 3
24	IO4	I/O	Digital 2.75	General purpose input/output 4
25	VRTC	I	Supply 1.8V	Supply for real time clock
26	ADC1	I	Analogue	Analogue to digital converter 1
27	ADC2	I	Analogue	Analogue to digital converter 2

Pin	Signal Name	Dir	Signal Type	Description
28	ADC3	I	Analogue	Analogue to digital converter 3
29	SDA	I/O	2.75, internal pull up	I^2C data
30	SCL	O	2.75, internal pull up	I^2C clock
31	BUZZER	O	Digital 2.75	Buzzer output from module
32	OUT5	O	Digital 2.75	Programmable output 5
33	LED	O	Digital 2.75	Flashing LED
34	VIO	O	Power Out 2.75V	Module power indication. VIO is a 2.75V at 75mA output supply that can be used to power external circuitry that interfaces to the GM47
35	TX_ON	O	Digital 2.75	This output indicates when the GSM module is going to transmit the burst
36	RI	O	Digital 2.75	Ring Indicator (UART1)
37	DTR	I	Digital 2.75	Data Terminal Ready (UART1)
38	DCD	O	Digital 2.75	Data Carrier Detect (UART1)
39	RTS	I	Digital 2.75	Request To Send (UART1)
40	CTS	O	Digital 2.75	Clear To Send (UART1)
41	TD	I	Digital 2.75	Transmitted Data (UART1). Data from DTE (host) to DCE (module). Former DTMS
42	RD	O	Digital 2.75	Received Data (UART1). Data from DCE (module) to DTE (host). Formerly DFMS
43	TD3	I	Digital 2.75	UART3 transmission
44	RD3	O	Digital 2.75	UART3 reception
45	TD2	I	Digital 2.75	UART2 transmission. Used for flashing the memory. Former CTMS
46	RD2	O	Digital 2.75	UART2 Reception. Used for flashing the memory. Former CFMS
47	PCMULD	I	Digital 2.75	DSP PCM digital audio input
48	PCMDLD	O	Digital 2.75	DSP PCM digital audio output
49	PCMOUT	O	Digital 2.75	Codec PCM digital audio output
50	PCMIN	I	Digital 2.75	Codec PCM digital audio input
51	PCMSYNC	O	Digital 2.75	DSP PCM frame sync
52	PCMCLK	O	Digital 2.75	DSP PCM clock output
53	MICP	I	Analogue	Microphone Input positive
54	MICN	I	Analogue	Microphone Input negative
55	BEARP	O	Analogue	Speaker output positive

Pin	Signal Name	Dir	Signal Type	Description
56	BEARN	O	Analogue	Speaker output negative
57	AFMS	O	Analogue	Audio output from module
58	SERVICE	I	2.7V	Flash programming voltage for the MS. Enable logger information if not flashing. Formerly VPPFLASH
59	ATMS	I	Analogue	Audio input to module
60	AGND	-	-	Analogue ground

2.2 General Electrical and Logical Characteristics

Many of the signals, as indicated in the table above, are high-speed CMOS logic inputs or outputs powered from a 2.75 V ± 5% internal voltage regulator, and are defined as Digital 2.75 V. Whenever a signal is defined as Digital 2.75 V, the following electrical characteristics apply.

Parameter	Min.	Max.	Units
High Level Output Voltage (V_{OH}), $I_o = -2mA$	2.2	2.75	V
Low Level Output Voltage (V_{OL}), $I_o = 2mA$	0	0.6	V
High Level Input Voltage (V_{IH})	1.93	2.75	V
Low Level Input voltage (V_{IL})	0	0.8	V

Note! Unused pins can be left floating.

2.2.1 General Protection Requirements

- All 2.75 V digital inputs will continuously withstand and suffer no damage in the power-on or power-off condition when subjected to any voltage from -0.5 V to 3.47 V (3.3 V + 5%).
- All 2.75 V digital outputs will continuously withstand a short circuit to any other voltage within the range 0 V to 3 V.
- All analogue outputs will continuously withstand a short circuit to any voltage within the range 0 V to 3 V.
- The SIM output signals and the SIMVCC supply will continuously withstand a short circuit to any voltage within the range 0 V to 5.8 V.

2.3 Grounds

Pin	Signal	Description
2, 4, 6, 8, 10, 12	DGND	Digital ground
60	AGND	Analogue ground

There are two ground connections in the GM47, AGND (analogue ground) and DGND (digital ground). Pin assignments are shown in the table above.

Note!   AGND and DGND are connected at a star point inside the module. They must *not* be joined together in your application.

2.3.1 Analogue Ground - AGND

AGND is the return signal, or analogue audio reference, for ATMS (Audio To Mobile Station) and AFMS (Audio From Mobile Station).

Parameter	Limit
I_{max}	$\cong 12.5mA$

2.3.2 Digital Ground - DGND

DGND is the reference or return signal for all system interface digital signals and is also the d.c. return for SERVICE and the power supply, VCC. Connect all DGND pins together in your application in order to carry the current drawn by the module.

2.4 VCC - Regulated Power Supply Input

Pins	Signal	Description
1, 3, 5, 7, 9, 11	VCC	regulated power supply input

Power is supplied to the module VCC pins, from an external source.

Connect all VCC pins together in your application in order to carry the current drawn by the module.

The electrical characteristics for VCC are shown in the table below.

Parameter	Mode	Limit
	Nominal	3.6V
	Tolerance including ripple [a]	3.4V - 4.0V
Vcc supply voltage	Over-voltage limit	5.5V
	Maximum ripple	TBD
Maximum allowable voltage drop	Burst transmission	200mV
Current drawn, at full TX power		<350mA (average)
		<2A (peak)

  a. Measured at system connector pins.

Note!   GM47 has no internal capacitance to supply the large current peaks during GSM burst transmission. We recommend you follow these general guidelines:

- Fit a low ESR electrolytic capacitor close to the module:
  $> 1,000\,\mu F$;
  $<100\,m\Omega$ ESR.
- Make sure power supply to module line resistance is $<200\,m\Omega$.

2.5 ON/OFF and External Power Signal

Pin	Signal	Dir	Description
14	ON/OFF	I	Pulse signal to turn the module on or off
34	VIO	O	2.75V supplied by the module

2.5.1 Switching the module ON and OFF

The module is turned on and off by momentarily grounding the ON/OFF pin. This input should be driven by an open collector, or other device which will not tie the input high, to allow the internal alarm clock function to operate. See the table below for exact characteristics. In the OFF state the current consumption of the module is less than $100\,\mu A$.

The ON/OFF signal is a digital input with the following characteristics:

Parameter	Min.	Typ.	Max.	Units
Voltage HIGH level (FALSE)			VCC	V
Voltage LOW level (TRUE)	0		0.3 x VCC	V
Pull-up resistance (internal)			39	kΩ

The following timing diagram illustrates both power-up and power-down processes.
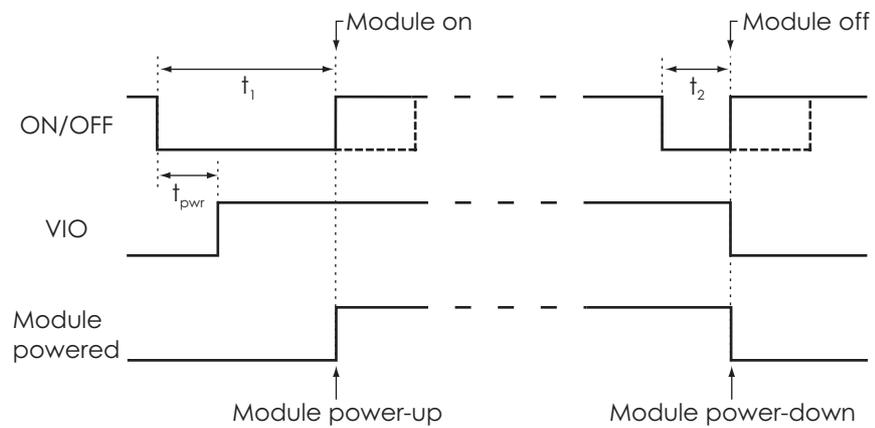
Figure 2.2 ON/OFF timing and VIO performance

Times are defined as follows:

Time	Description	Min.	Typ.	Max.	Units
t_1	Turn-on pulse time	≥2			s
t_2	Turn-off pulse time	≥1			s
	Hardware-reset pulse time[a]	>10			s
t_{pwr}	Time for VIO and internal voltages to be established	100		200	ms

    a. Active only when a full system reset is required.

2.5.2 VIO - 2.75V Supply

VIO provides an output voltage derived from an internal 2.75V regulator. Its electrical characteristics are shown below.

Parameter	Min.	Typ.	Max.	Units
Output Voltage (I_{load} = 50mA)	2.70	2.75	2.85	V
Load current			75	mA

You can use this output for the following:

• to indicate that the module is alive;

• to power interface circuits, external to the module.

2.6 Analogue Audio

Pin	Signal	Dir	Description
57	AFMS	O	Audio from mobile station
59	ATMS	I	Audio to mobile station
60	AGND	-	Ground (return) for analogue audio

ATMS is the audio input, and AFMS is the audio output, of the module. These signals can be used in Hands-free or Portable Hands-free mode.

Hands-free Mode

This mode is used for audio accessories, such as car kits and hands-free equipment.

Portable Hands-free Mode

This is the default mode. It activates a different amplification factor in the ME, and activates a 2V microphone bias level for ATMS. The bias level is adjustable using AT*E2EAMS.

2.6.1 Audio To Mobile Station - ATMS

ATMS is the analogue audio input to the module. Internally, the signal is sent to the CODEC (COder/DECoder), where it is converted to digital audio in PCM (Pulse Code Modulation) format. The encoded audio is sent to PCMOUT via the internal PCM bus.

ATMS provides a DC bias when it is used as the microphone input in Portable Hands-free applications. All other sources must be a.c.-coupled to avoid attenuation of low frequencies, and to prevent incorrect biasing or damage to the ATMS input. Use a capacitor greater than the value shown in the table below.

The ATMS input is a passive network followed by the transmit part of the CODEC.

Parameter	Limit
Application driving impedance (0.3 - 3.5kHz)	≤300Ω
AC coupling capacitance [a]	≥1µF
Module input impedance (0.3 - 3.5kHz)	>50kΩ
Low frequency cut-off (-3dB)	300Hz ± 50Hz

Parameter		Limit
High frequency cut-off (−3 dB)		> 3500 Hz ± 50 Hz
Output d.c. bias level	Hands-free mode	0 V
	Portable hands-free mode	2.0 V ± 0.1 V
Additional Gain in Portable hands-free mode		28.5 dB

    a. The a.c.-coupling capacitance must be supplied by your application, unless a d.c.-coupled microphone is used.

The following tables show the nominal PGA (programming gain settings). For more information see the relevant AT commands.

Maximum input voltage limit: $245\,mV_{rms}$

Input	Input (mV_{rms})	TXAGC (dB)	AUX AMP gain	PCMOUT (dBm0)
ATMS	245	0	13	3

Maximum input level at MICI, $61.4\,mV_{rms}$ output at PCMOUT = 3 dBm0

Input	Differential input (mV_{rms})	TXAGC (dB)	AUX AMP gain	PCMOUT (dBm0)
MICN MICP	61.4	0	25	3

Output at AFMS for 3 dBm0 at PCMIN

Input	dBm0	RXPGA	Volume control (dB)	AFMS (mV_{rms})
PCMIN	3	0	0	436

Output at BEARN/BEARP for 3 dBm0 at PCMIN

Input	dBm0	RXPGA	Volume control (dB)	BEAR (mV_{rms})
PCMIN	3	0	0	388

2.6.2 Audio From Mobile Station - AFMS

AFMS is the analogue audio output from the module and may be used to drive a speaker or the ear-piece in a portable hands-free accessory.

PCM digital audio signals, entering the module through the PCMIN pin, are translated to analogue signals by the CODEC. See "2.7 PCM Digital Audio", page 52 for further information.

The table below shows the audio signal levels for AFMS.

Parameter		Limit
Speaker impedance		64Ω to $1\,k\Omega$
Output Capacitance		$2.2\mu F \pm 10\%$
Levels (THD <5%)	Drive capability into $5\,k\Omega$ (0.3 - 3.5kHz)	$>2.4V_{p-p}$
	Drive capability into $1.5\,k\Omega$ (0.3 - 3.5kHz)	$>2.2V_{p-p}$
	Drive capability into $150\,\Omega$ (at 1kHz)	$>1.3V_{p-p}$

2.6.3 Microphone Signals

Pin	Speaker signals	Dir	Function
53	MICP	I	Microphone positive input
54	MICN	I	Microphone negative input

MICP and MICN are balanced differential microphone input pins. These inputs are compatible with an electret microphone. The microphone contains an FET buffer with an open drain output, which is supplied with at least +2V relative to ground by the module as shown below.
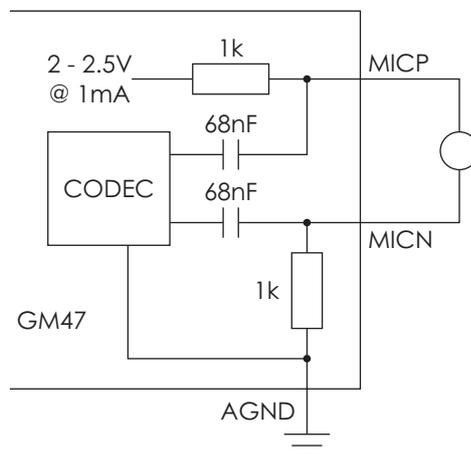
Figure 2.3 Microphone connections to the module

2.6.4 Speaker Signals

Pin	Speaker signals	Dir	Function
55	BEARP	O	Speaker positive output
56	BEARN	O	Speaker negative output

BEARP and BEARN are the speaker output pins. These are differential-mode outputs. The electrical characteristics are given in the table below.

Parameter	Limit
Output level (differential)	$\geq 4.0V_{pp}$
Output level (dynamic load = 32Ω)	$\geq 2.8V_{pp}$
Gain PCMIN[a] to BEARP/BEARN (differential)	$-9dB \pm 1$
Distortion at 1kHz and maximum output level	$\leq 5\%$
Offset, BEARP to BEARN	$\pm 30mV$
Ear-piece mute-switch attenuation	$\geq 40dB$

a. See PCMIN signal in "2.7 PCM Digital Audio", page 52

The following table shows the ear piece impedances that can be connected to BEARP and BEARN.

Ear piece model	Impedance	Tolerance
Dynamic ear piece	[32Ω + 800µH] // 100pF	±20%
Dynamic ear piece	[150Ω + 800µH] // 100pF	±20%
Piezo ear piece	1kΩ + 60nF	±20%

2.7 PCM Digital Audio

Pin	Signal	Dir	Function
52	PCMCLK	O	PCM clock
51	PCMSYNC	O	PCM frame sync
47	PCMULD	I	PCM audio input to DSP
48	PCMDLD	O	PCM audio output from DSP
50	PCMIN	I	PCM audio input to Codec
49	PCMOUT	O	PCM audio output to Codec

Figure 2.4 shows the PCM (Pulse Code Modulation) digital audio connection for external devices. These connections can be used to process PCM digital audio signals, bypassing the module's internal analogue audio CODEC.
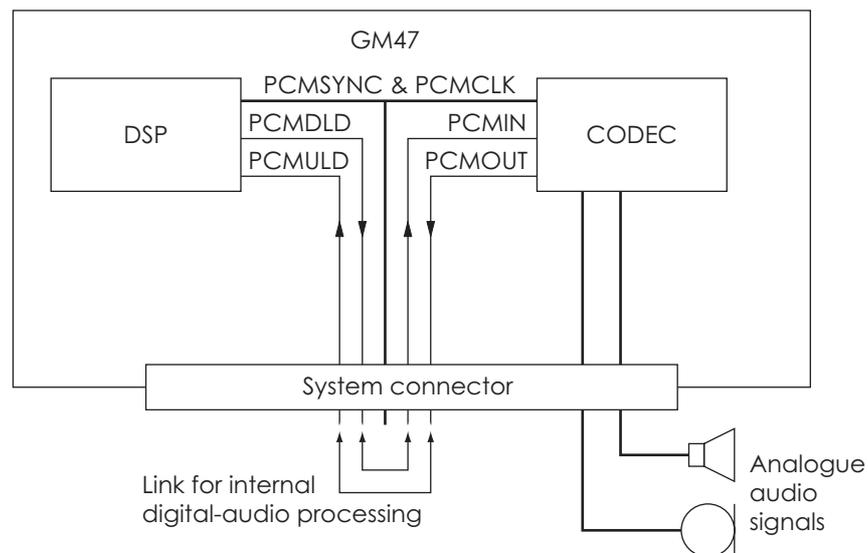
Figure 2.4 Pin connections to digital audio

Note!   When no external audio processing is performed, the following pins must be connected together:

- PCMDLD to PCMIN
- PCMULD to PCMOUT

Electrical characteristics

Digital 2.75 V CMOS input/output electrical characteristics apply.

2.7.1 PCM Data Format

All of the module's PCM signals, including signals between its CODEC and DSP conform to the PCM data I/O format of the industry standard DSP from Texas Instruments.

PCMCLK (bit clock) and PCMSYNC (frame syncronisation) are both generated by the DSP within the module.

The DSP within the module is the master therefore all external PCM clocks and data from external devices must be synchronized to it

13-Bit PCM Mode

Bit	Contents
D15 to D14	Equal to D13
D13 to D1	Two's complement of the 13-bit PCM
D0	LSB, not used

The module implements 13-bit PCM with the 13-bit data embedded in a 16-bit word within a 24-bit frame (see Figure 2.6). Each PCM word contains 16-bits: D0 to D15. D13 to D1 is the two's complement value of the 13-bit PCM, with D13 as the sign bit. D14 and D15 are always set to be equivalent with D13. D0, the LSB, is not used as shown in Figure 2.5 below.
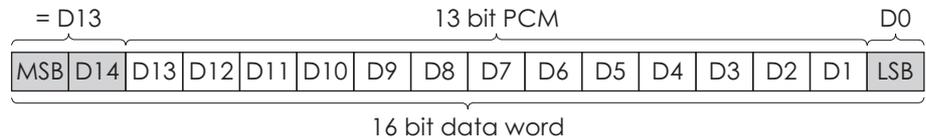
Figure 2.5 16-bit data word format

16-Bit PCM Mode

Bit	Contents
D15 - D0	Two's complement

The frame format is equal to the one shown in Figure 2.5, but with D15, D14 and D0 filled with significant bits. D0 is the two's compliment value of the 16-bit PCM with bit 15 as the sign bit.

PCM Timing Diagrams

The PCM timing is shown in Figure 2.6 below and it is seen that the CPU has 45 µs to serve an interrupt and setup data channels. Data is sent on the falling edge of the sync pulse. The data bits in PCMULD and PCMDLD are aligned so that the MSB in each word occurs on the same clock edge as shown in Figure 2.7.
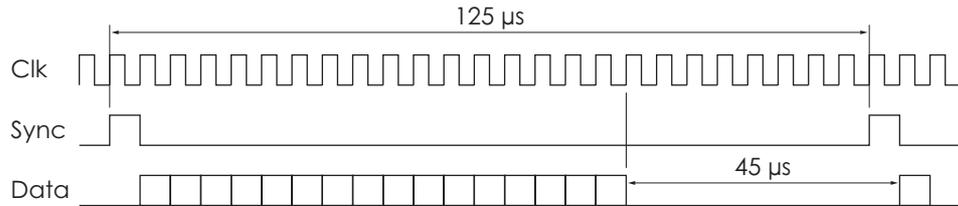
Figure 2.6 16-bit word within 24-bit frame

PCM signal timing is shown in Figure 2.7. The signals characteristics are described in the tables following Figure 2.7.
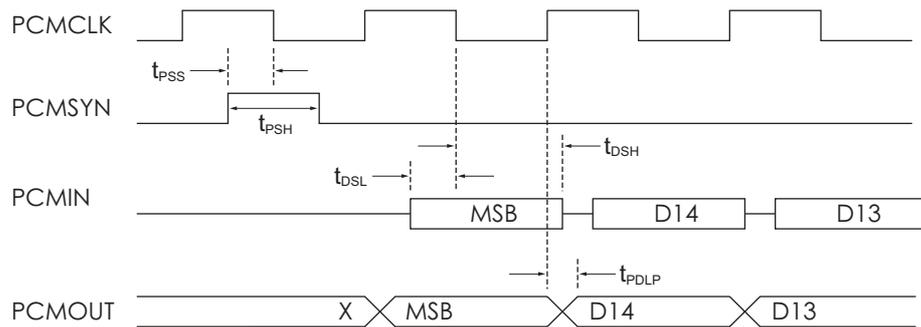
Figure 2.7 PCM Timing Diagram

Name	Description	Typ.	Unit
t_{PSS}	PCMSYN (setup) to PCMCLK (fall)	2.5	µs
t_{PSH}	PCMSYN pulse length	5	µs
t_{DSL}	PCMI (setup) to PCMCLK (fall)	2.5	µs
t_{DSH}	PCMI (hold) from PCMCLK (fall)	2.5	µs
t_{PDLP}	PCMO valid from PCMCLK (rise)	2.5	µs

Name	Description	Typ.	Unit
F_{PCMCLK}	PCM clock frequency	200	kHz
T_{PCMCLK}	PCM clock period with 50/50 mark space ratio	5	µs
F_{PCMSYN}	PCM sync frequency	8	kHz

Typical Rise/Fall times	Rise Time	Fall Time	Unit
PCMCLK	19	18	ns
PCMSYN	19	15	ns
PCMOUT	900	900	ns
PCMDLD	20	19	ns

2.8 Serial Data Interfaces

Pin	Signal	Dir	Description	RS232 CCITT N°
41	TD	I	Serial data to module (UART1)	103
42	RD	O	Serial data from module (UART1)	104
39	RTS	I	Request To Send (UART1)	105
40	CTS	O	Clear To Send (UART1)	106
37	DTR	I	Data Terminal Ready (UART1)	108.2
38	DCD	O	Data Carrier Detect (UART1)	109
36	RI	O	Ring Indicator (UART1)	125
45	TD2	I	UART2 Data Transmission	
46	RD2	O	UART2 Data Reception	
43	TD3	I	UART3 Data Transmission	
44	RD3	O	UART3 Data Reception	

The serial channels, consisting of three UARTs, are asynchronous communication links to the application or accessory units. UART1 has RS-232 functionality. UART2 and UART3 behave as general-purpose serial data links. In addition they are used for accessories and GPS respectively.

Digital 2.75 V CMOS input/output electrical characteristics apply.

The standard character format consists of 1 start bit, 8 bit data, no parity and 1 stop bit. In all, there are 10 bits per character.

2.8.1 UART1 (RS232) - RD, TD, RTS, CTS, DTR, DCD and RI

UART1 signals conform to a 9-pin RS232 (V.24) serial port, except for the DSR (CCITT N° 107) signal. The DSR signal has been removed as it is usually connected to DTR in most systems.

Note! UART1 signal levels do not match standard RS232 (V.28) levels. The relationship between the levels is shown in the table below.

RS232 level	RD, TD	RTS, CTS, DTR, DCD, RI	CMOS level
<−3V	1	OFF	>1.93V
>+3V	0	ON	<0.80V

Conversion between the module CMOS levels and RS232 levels can be achieved using a standard interface IC, such as the Maxim Integrated Products MAX3237.

2.8.2 Serial Data Signals - RD, TD

The default baud rate is 9.6kbits/s, however higher bit rates of up to 460 kbits/s are supported, set by an AT command. UART1 starts at a rate of 9.6kbits/s in standard AT command mode. The module also supports GSM 07.10 multiplexing protocol and starts when the appropriate command is sent.

Serial Data From Module (RD)

RD is an output signal that the module uses to send data via UART1 to the application.

Parameter	Limit
Application load resistance	≥100kΩ
Application load capacitance	<100pF

Serial Data To Module (TD)

TD is an input signal, used by the application to send data via UART1 to the module.

Parameter	Limit
Application driving impedance	<100Ω
Input capacitance	<100pF
Input resistance	<100Ω in series, with 100kΩ to DGND

2.8.3 Control Signals - RTS, CTS, DTR, DCD, RI

UART1 control signals are active low and need a standard interface IC, such as the MAX3237, to generate standard RS232 levels.

UART1 converted signals, together with DGND, RD and TD form a 9-pin RS232 data port.

RTS and CTS are capable of transmitting at 1/10th of the data transmission speed for data rates up to 460 kbit/s (byte-oriented flow control mechanism).

Note! When hardware flow control is not used in communications between the application and the module, RTS and CTS must to be connected to each other at the module.

Switching times for RTS and CTS

The table below shows the switching times.

Parameter	Limit
Time from Low to High level	<2μs
Time from High to Low level	<2μs

Request to Send (RTS)

Used to condition the DCE for data transmission. The default level is high by internal pull up.

The application must pull RTS low to enable data transmission from the module. Similarly, the module asserts CTS low, indicating it is ready to receive data transmission from the host.

Parameter	Limit
Application driving impedance	<100Ω
Input capacitance	<2nF
Input resistance (pull-up)	100kΩ to VCC

Clear To Send (CTS)

CTS is asserted by the DCE to indicate that the host (DTE) may transmit data. When CTS is high, the host (DTE) is not permitted to transmit data.

The table below shows the load characteristics for this signal.

Parameter	Limit
Application load capacitance	<500pF
Application load resistance	≥1MΩ

Data Terminal Ready (DTR)

> DTR indicates that the DTE is ready to receive data. It also acts as a hardware 'hang-up', terminating calls when switched high. The signal is active low. You can define the exact behaviour of DTR with an AT command.

Data Carrier Detect (DCD)

> DCD indicates that the DCE is receiving a valid carrier (data signal) when low.

Ring Indicator (RI)

> RI indicates that a ringing signal is being received by the DCE when low. You can define the exact behaviour of RI with an AT command.

Data Set Ready (DSR)

> No DSR signal is provided. Use any DGND connection for this functionality.

2.8.4 UART2 - TD2, RD2

> UART 2 consists of a full duplex serial communication port with transmission and reception lines.

> This communication port works in a mode called Operation and Maintenance.

> Operation and Maintenance mode works in combination with the SERVICE signal. Two events are possible if the SERVICE signal is active when the module is turned on. These are:
> - the module is reprogrammed if UART2 is connected to a computer running Sony Ericsson update software;
> - the module enters logging mode and sends data to UART2 if no reprogramming information is received.

> Timing and electrical signals characteristics are the same as for UART1, TD and RD.

Transmitted Data 2 (TD2)

> TD2 is used by the application to send data to the module via UART2. It has the same electrical characteristics as TD.

Received Data 2 (RD2)

> RD2 is used to send data to the application via UART2. It has the same electrical characteristics as RD.

2.8.5 UART3 - TD3, RD3 (designated for future use)

UART3 is a full duplex serial communication port with transmission and reception lines. It has the same timing and electrical signal characteristics as UART1, TD and RD.

Transmitted Data 3 (TD3)

TD3 is used by your application to send data to the module via UART3.

Received Data 3 (RD3)

RD is used to send data to your application via UART3.

2.9 SIM Card Related Signals

Pin	Signal	Dir	Description
15	SIMVCC	-	SIM card power supply
16	SIMPRESENCE	I	SIM card presence
17	SIMRST	O	SIM card reset
19	SIMCLK	O	SIM card clock
18	SIMDATA	I/O	SIM card data

These connections allow you to communicate with the SIM card holder in you application.

Note!   The distance between the SIM card holder and the module can be up to 25 cm.

This SIM interface allows the use of 3 V and 5 V SIM cards. By default it works on 3 V levels but will automatically switch to 5 V, if a 5 V SIM card is fitted.

SIM voltage levels, as shown in the following table, are dependent on the type of SIM card detected by the module.

Signal	Parameter	Mode	Min.	Typ.	Max.	Unit
SIMVCC	SIM supply voltage	3V	2.7	3.0	3.3	V
		5V	4.5	5.0	5.5	V
SIMDAT	High Level Input voltage (V_{IH})	3V	2.1		3.0	V
		5V	3.5		5.0	V
SIMDAT	Low Level Input voltage (V_{IL})	3V	0		0.9	V
		5V	0		1.5	V
SIMDAT	High Level Output voltage (V_{OH})	3V	2.7		3.0	V
		5V	4.7		5.0	V
SIMDAT	Low Level Output voltage (V_{OL})	3V	0		0.2	V
		5V	0		0.2	V
SIMCLK SIMRST	High Level Output voltage (V_{OH})	3V	2.4		3.0	V
		5V	4.4		5.0	V
SIMCLK SIMRST	Low Level Output voltage (V_{OL})	3V	0		0.35	V
		5V	0		0.3	V

2.9.1 SIM Detection - SIMPRESENCE

SIMPRESENCE is used to determine whether a SIM card has been inserted into or removed from the SIM card holder. You should normally wire it to the "card inserted switch" of the SIM card holder, but different implementations are possible.

When left open, an internal pull-up resistor maintains the signal high and means "SIM card missing" to the module. When pulled low the module assumes a SIM card is inserted.

SIMPRESENCE is a Digital 2.75 CMOS input with the following electrical characteristics.

Parameter	Min.	Typ.	Max.	Units
Pull-up resistance (at 2.75 V)	100			kΩ
Low Level Input voltage (SIM inserted)			0.80	V
High Level Input voltage (SIM missing)	>1.93		2.75	V

Note! To meet regulatory approvals SIMPRESENCE must be implemented.

2.10 Service/Programming

Pin	Signal	Dir	Description
58	SERVICE	I	Flash programming voltage

When the SERVICE input signal is active the module will:

- be reprogrammed if data is received through UART2 from a computer running Sony Ericsson reprogramming software;

- or it will output logging data on UART2.

The electrical characteristics are given below. The signal reference is DGND.

Mode	SERVICE Voltage (V)			Drive Capacity
	Min.	Typ.	Max.	
Normal Operation			0.8	-
Service/enable programming	1.9	2.75	13.6	>1mA

2.11 Buzzer

Pin	Signal	Dir	Description
31	BUZZER	O	Buzzer output from module

Connecting the BUZZER signal to an inverting transistor-buffer followed by a piezoelectric transducer enables the module to play pre-programmed melodies or sounds.

2.12 LED

Pin	Signal	Dir	Description
33	LED	O	LED Output from module

The LED states shown below, are hard coded.

LED indication	Operational status
No indication	No power or in the OFF state
Green, steady	Power on, not connected to a network
Green, blinking	Power on, connected to a network

The following circuit should be used to connect an LED.
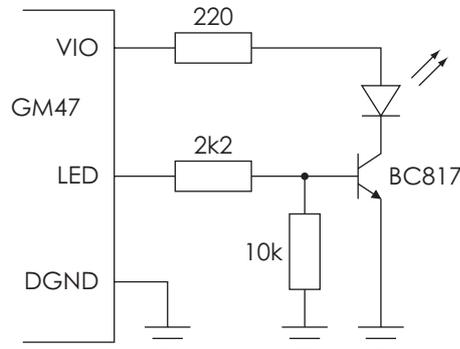
Figure 2.8 Electrical connections for the LED

2.13 General Purpose Digital I/O Ports

Pin	I/O port signal	Default signal	Description
21	IO1	-	Programmable Input/Output 1
22	IO2	-	Programmable Input/Output 2
23	IO3	-	Programmable Input/Output 3
24	IO4	-	Programmable Input/Output 4
37	IN5	DTR	Programmable input 5/Data Terminal Ready
32	OUT5	-	Programmable output 5
36	OUT6	RI	Programmable Output 6/Data Carrier Detect
38	OUT7	DCD	Programmable Output 7/Ring indicator

Signals which have an entry in the Default Signal column in the above table are multiplexed. Their operation depends on AT commands.

The following table gives you the input impedance. These values only apply when the signals are configured as input signals.

Parameter	Min.	Typ.	Max.	Units
Input impedance (IO1 - IO4) (pull-up)	20	39	100	kΩ
Input impedance (IN5)	100			kΩ

2.14 General Purpose Analogue I/O Ports

Pin	Signal	Dir	Description
20	DAC	O	Digital to analogue conversion output
26	ADC1	I	Analogue to digital conversion input 1
27	ADC2	I	Analogue to digital conversion input 2
28	ADC3	I	Analogue to digital conversion input 3

The module is able to convert digital to analogue signals and vice versa.

2.14.1 Digital to Analogue Converter - DAC

The DAC is an 8-bit converter. Conversion takes place when an AT command is sent to the module. The module sends the resulting analogue value to the DAC pin.

DAC output electrical characteristics are given in the following table.

Parameter	Limit	Units
Resolution	8	Bits
Output voltage for code = 0	$(2.75^a \times 0.05) \pm 0.05$	V
Output voltage for code = 255	$(2.75^a \times 0.95) \pm 0.05$	V
Nominal step size	$(2.75^a \times 0.9)/256$	mV
Absolute error[b]	$\leq \pm 0.5$	mV
Output wide-band noise and clock feed-through 0-1.1 MHz	≤ 0.5	mV_{rms}
Power-supply rejection ratio 50 Hz - 10 kHz	≥ 40	dB
Conversion rate ± 0.5LSB	≤ 2 (Load A)[c]	ms
	≤ 50 (Load B)[c]	ms
Output buffer impedance when disabled	≥ 50	kΩ
Output current source or sink	≥ 1	mA
Current consumption (active)	≤ 1.0	mA

a. Tolerance on this internal voltage is ±5%
b. Referred to the ideal conversion characteristic.
c. See Figure 2.9, page 64
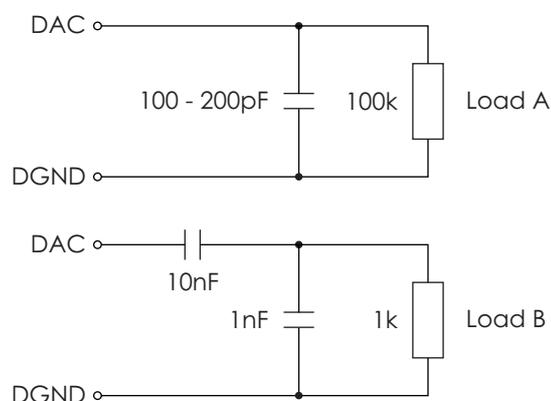
Figure 2.9 DAC loads

2.14.2 Analogue to Digital Converters 1, 2 and 3 - ADCx

The ADC is an 8-bit converter. An analogue value applied to any of the ADC pins is converted and stored in a register inside the module. When the appropriate AT command is received by the module, the digital value stored in the register is read.

ADC electrical characteristics are shown in the table below.

Parameter	Min.	Max.	Units
Resolution	8	8	Bits
Input voltage for 0000 0000 word	0	0.01×2.75^a	V
Input voltage for 1111 1111 word	0.99×2.75^a	2.75^a	V
Differential Non-Linearity (DNL)		±0.75	LSB
Overall Non-Linearity (INL)		±0.60	LSB
Absolute accuracy		±1.5	LSB
Input impedance	1		MΩ
Average supply current (continuous conversion)		1	mA
External source impedance		50	kΩ

a. Tolerance on this internal voltage is ±5%

2.15 External I^{2}C Serial Control Bus

Note!   The I^{2}C bus is currently not supported by the software

Pin	Signal	Dir	Description
29	SDA	I/O	I^{2}C serial data
30	SCL	O	I^{2}C serial clock

The external I^{2}C bus consists of two signals, SDA and SCL. This bus is isolated from the module's internal I^{2}C bus to ensure proper operation of the module, even if the external I^{2}C bus is damaged.

The electrical characteristics are shown below.

	Parameter	Min.	Typ.	Max.	Units
Transmit operation	Frequency I^{2}C CLK	81.25		400	kHz
	High or low I^{2}C CLK	1.2			µs
	Delay time after falling edge of I^{2}C CLK	308	308-1230		ns
	Hold time after falling edge of I^{2}C CLK	0			ns
Receive operation	Frequency I^{2}C CLK			400	kHz
	High or low I^{2}C CLK	1.2			µs
	Delay time after falling edge of I^{2}C CLK	100			ns
	Hold time after falling edge of I^{2}C CLK	0			ns

2.16 TX_ON - Burst Transmission

Pin	Signal	Dir	Description
35	TX_ON	O	GSM module to transmit

Burst transmission is the time when a GSM transceiver unit is transmitting RF signals. TX_ON indicates the module is going into transmission mode.

2.17 Real Time Clock

Pin	Signal	Dir	Description
25	VRTC	-	Voltage for the Real Time Clock

The Real Time Clock (RTC) provides the main microprocessor with a time-of-day calendar and alarm, and a one-hundred-year calendar. It's accuracy is shown in the table below

Parameter	Min.	Typ.	Max.	Units
RTC accuracy		20 (52)	40 (104)	ppm (s/month)

The Real Time Clock operates in two modes when connected to a separate power supply:

- RTC normal mode: the module is in ON or OFF mode and it is supplied with power (VCC is applied).
- RTC back-up mode: VCC is disconnected and the RTC is maintained by a separate backup power supply connected to the VRTC input (see Figure 2.10 below).

Backup power is provided by a capacitor, golden-capacitor or battery in your application and must be connected to the VRTC pin. During RTC normal operation, the back up source will be charged.

In back-up mode, the back-up source must provide enough power for RTC operation. Refer to the table for the amount of current required.

The following table shows voltage characteristics for both modes.

Parameter	Min.	Typ.	Max.	Units
Supply Voltage RTC (normal mode - charging the capacitor)	1.6	1.8	2.0	V
Supply Voltage RTC (back-up mode - Capacitor provides the current)	1.0	1.8	2.0	V
Current drawn		5.0	10.0	µA

If the voltage drops below 1.0 V in back-up mode, the RTC will stop working. The following diagram shows the RTC connections.
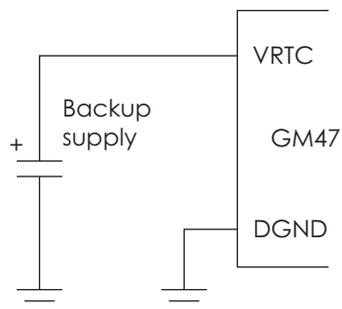
Figure 2.10 RTC connections

3. Antenna Connector

The module's antenna connector allows transmission of the radio frequency (RF) signals from the module to an external customer-supplied antenna. The connector is a micro-miniature coaxial MMCX surface mounted component. A number of suitable MMCX type, mating plugs are available from the following manufacturers;

• Amphenol;

• Suhner;

• IMS Connector Systems.

The electrical characteristics of the antenna interface are shown below.

Parameter	Limit	Description
Nominal impedance	50Ω	
Output Power	2 Watt peak (Class 4)	Extended GSM900
	1 Watt peak (Class 1)	GSM1800
Static Sensitivity	Better than −102dBm	Extended GSM900
	Better than −102dBm	GSM1800

4. Hints for Integrating the Module

This chapter gives you advice and helpful hints on how to integrate the GM47 into your application from a hardware perspective.

Please read and consider the information under the following headings before starting your integration work:

- Safety advice and precautions.
- Installation of the module.
- Antenna.

4.1 Safety Advice and Precautions

4.1.1 General

- Always ensure that use of the module is permitted. The module may present a hazard if used in proximity to personal medical electronic devices. As a rule, the module must not be used in hospitals, airports or planes.
- You are responsible for observing your country's safety standards, and where applicable the relevant wiring rules.
- Never use the module at a gas station, refuelling point, blasting area or in any other environment where explosives may be present.
- Operating the module close to other electronic devices, such as antennas, television sets, and radios may cause electromagnetic interference.
- Never try to dismantle the module yourself. There are no components inside the module that can be serviced by the user. If you attempt to dismantle the module, you may invalidate the warranty.
- To protect the power supply cables and meet the fire safety requirements, it is recommended that the electrical circuits are supplied with a power regulator. The power regulator should be placed as close to the terminals of the power supply as possible.
- Do not connect any incompatible component or product to the GM47. Note, Sony Ericsson does not warrant against defects, non-conformities or deviations caused thereby.

4.1.2 SIM Card

- Before handling the SIM card in your application, ensure that you are not charged with static electricity. Use proper precautions to avoid electrostatic discharges. The module must be switched off before the SIM card is installed in your application.

- When the SIM card hatch is opened, the SIM card connectors lie exposed under the SIM card holder. CAUTION: Do not touch these connectors! If you do, you may release an electrical discharge that could damage the module or the SIM card.
- When designing your application, the SIM card's accessibility should be taken into account. We always recommend that you have the SIM card protected by a PIN code. This will ensure that the SIM card cannot be used by an unauthorized person.

4.1.3 Antenna

- If the antenna is to be mounted outside, consider the risk of lightning. Follow the instructions provided by the antenna manufacturer.
- Never connect more than one module to a single antenna. The module can be damaged by radio frequency energy from the transmitter of another module.
- Like any mobile station, the antenna of the module emits radio frequency energy. To avoid EMI (electromagnetic interference), you must determine whether the application itself, or equipment in the application's proximity, needs further protection against radio emission and the disturbances it might cause. Protection is secured either by shielding the surrounding electronics or by moving the antenna away from the electronics and the external signals cable.
- The module and antenna may be damaged if either come into contact with ground potentials other than the one in your application. Beware, ground potential are not always what they appear to be.
- In the final application, the antenna must be positioned more than 20 cm away from human bodies. When this rule cannot be applied, the application designer is responsible for providing the SAR measurement test report and declaration.

4.2 Installation of the Module

4.2.1 Where to Install the Module

There are several conditions which need to be taken into consideration when designing your application as they might affect the module and its function. They are:

Environmental Conditions

The module must be installed so that the environmental conditions stated in the Technical Data chapter, such as temperature, humidity and vibration are satisfied. Additionally, the electrical specifications in the Technical Data section must not be exceeded.

Signal Strength

The module has to be placed in a way that ensures sufficient signal strength. To improve signal strength, the antenna can be moved to another position. Signal strength may depend on how close the module is to a radio base station. You must ensure that the location at which you intend to use the module, is within the network coverage area.

Degradation in signal strength can be the result of a disturbance from another source, for example an electronic device in the immediate vicinity. More information about possible communication disturbances can be found in section 4.3.5, page 74.

When an application is completed, you can verify signal strength by issuing the AT command AT+CSQ. See "AT+CSQ Signal Strength", page 126.

Tip! Before installing the module, use an ordinary mobile telephone to check a possible location for it. In determining the location for the module and antenna, you should consider signal strength as well as cable length

Connection of Components to GM47

The integrator is responsible for the final integrated system. Incorrectly designed or installed, external components may cause radiation limits to be exceeded. For instance, improperly made connections or improperly installed antennas can disturb the network and lead to malfunctions in the module or equipment.

Network and Subscription

- Before your application is used, you must ensure that your chosen network provides the necessary telecommunication services. Contact your service provider to obtain the necessary information.
- If you intend to use SMS in the application, ensure this is included in your (voice) subscription.
- Consider the choice of the supplementary services described in section "2.3.2 Short Message Service", page 18.

4.2.2 How to Install the Module

Power Supply

- Use a high-quality power supply cable with low resistance. This ensures that the voltages at the connector pins are within the allowed range, even during the maximum peak current. An electrolytic capacitor should be placed close to the power supply pins of the module to supply the peak currents during burst transmission. See "VCC - Regulated Power Supply Input", page 45.
- See section "2.2.1 General Protection Requirements", page 44.

Grounds

A ground connection is provided at the mounting hole next to the RF connector on the module (see Figure 2.1, page 41). Connect this ground point to the DGND pins of the module by the shortest, low-impedance path possible. The purpose of this connection is to allow any ESD picked up by the antenna to bypass the module's internal ground path.

Note!   It is recommended that you use a cable with a maximum resistance of 5 mΩ for the ground connection.

Note!   AGND and DGND are connected at a star point inside the module. They must *not* be joined together in your application.

Audio

Use a coupling capacitor in ATMS line if the application does not use the module's bias voltage. See also "Figure 2.3 Microphone connections to the module", page 50.

Software Upgrade

To upgrade the software, the system connector must be accessible in your application. The pins SERVICE, TD, RD and the power signals are used for this purpose. Please contact customer support for more details.

4.3 Antenna

4.3.1 General

The antenna is the component in your system that maintains the radio link between the network and the module. Since the antenna transmits and receives electromagnetic energy, its efficient function will depend on:

- the type of antenna (for example, circular or directional);
- the placement of the antenna;
- communication disturbances in the vicinity in which the antenna operates.

In the sections below, issues concerning antenna type, antenna placement, antenna cable, and possible communication disturbances are addressed.

In any event, you should contact your local antenna manufacturer for additional information concerning antenna type, cables, connectors, antenna placement, and the surrounding area. You should also

determine whether the antenna needs to be grounded or not. Your local antenna manufacturer might be able to design a special antenna suitable for your the application.

4.3.2 Antenna Type

Make sure that you choose the right type of antenna for the module. Consider the following requirements:

- the antenna must be designed for the dual frequency bands in use: EGSM/GSM 900/1800 for the GM47 and GSM 850/1900 for the GM48;
- the impedance of the antenna and antenna cable must be 50 Ω;
- the antenna output-power handling must be a minimum of 2 W;
- the VSWR value should be less than 3:1 to avoid damage to the module.

4.3.3 Antenna Placement

The antenna should be placed away from electronic devices or other antennas. The recommended minimum distance between adjacent antennas, operating in a similar radio frequency band, is at least 50 cm.

If signal strength is weak, it is useful to face a directional antenna at the closest radio base station. This can increase the strength of the signal received by the module.

The module's peak output power can reach 2 W. RF field strength varies with antenna type and distance. At 10 cm from the antenna the field strength may be up to 70 V/m and at 1m it will have reduced to 7 V/m.

In general, CE-marked products for residential and commercial areas, and light industry can withstand a minimum of 3 V/m.

4.3.4 The Antenna Cable

Use 50 Ω impedance low-loss cable and high-quality 50 Ω impedance connectors (frequency range up to 2 GHz) to avoid RF losses. Ensure that the antenna cable is as short as possible.

The Voltage Standing-Wave Ratio (VSWR) may depend on the effectiveness of the antenna, cable and connectors. In addition, if you use an adapter between the antenna cable and the antenna connector, it is crucial that the antenna cable is a high-quality, low-loss cable.

Minimize the use of extension cables, connectors and adapters. Each additional cable, connector or adapter causes a loss of signal power.

4.3.5 Possible Communication Disturbances

Possible communication disturbances include the following:

- **Noise** can be caused by electronic devices and radio transmitters.

- **Path-loss** occurs as the strength of the received signal steadily decreases in proportion to the distance from the transmitter.

- **Shadowing** is a form of environmental attenuation of radio signals caused by hills, buildings, trees or even vehicles. This can be a particular problem inside buildings, especially if the walls are thick and reinforced.

- **Multi-path fading** is a sudden decrease or increase in the signal strength. This is the result of interference caused when direct and reflected signals reach the antenna simultaneously. Surfaces such as buildings, streets, vehicles, etc., can reflect signals.

- **Hand-over** occurs as you move from one cell to another in the GSM network. Your mobile application call is transferred from one cell to the next. Hand-over can briefly interfere with communication and may cause a delay, or at worst, a disruption.

5. Technical Data

Mechanical Specifications

Maximum length	50 mm	
Maximum width	33 mm	
Maximum thickness	7.15 mm	(excluding connector pins and top of antenna connector)
Weight	18.5 g	

Power supply voltage, normal operation

Voltage	3.6 V nominal (3.4 V - 4.0 V)
Ripple	<100 mV @ 200 kHz; <20 mV @ >200 kHz
Voltage must always stay within a normal operating range, ripple included	
Power consumption	Voice/CSD: <250 mA (<2 A peak)
	Data (GPRS 4+1); <350 mA (<2 A peak)
	Idle mode: <5 mA
	Switched off: <100 µA

Radio specifications

Frequency range	GM47: EGSM 900 MHz and 1800 MHz (dual band)
	GM48: GSM 850 MHz and 1900 MHz (dual band)
Maximum RF output power	GM47: 900 MHz, Class 4, 2 W; 1800 MHz Class 1, 1 W
	GM48: 850 MHz, Class 5, 0.8 W; 1900 MHz Class 1, 1 W
Antenna impedance	50 Ω

SIM card

3 V or 5 V	Support of external SIM card

Environmental specifications

Operating temperature range (full specification)	-25°C to +55°C
Operating temperature range (working)	-30°C to +85°C
Storage temperature range	-40°C to +85°C
Maximum relative humidity	95% at +40°C
Stationary vibration, sinusoidal	Displacement: 7.5mm Acceleration amplitude: 20m/s² and 40m/s² Frequency range: 2-8Hz, 8-200Hz, 200-500Hz
Stationary vibration, random	Acceleration spectral density (m²/s²): 0.96, 2.88, 0.96 Frequency range: 5-10Hz, 10-200Hz, 200-500Hz, 60min/axis
Non-stationary vibration, including shock	Shock response spectrum I, peak acceleration: 3 shocks in each axis and direction; 300m/s², 11ms Shock response spectrum II, peak acceleration: 3 shocks in each axis and direction; 1000m/s², 6ms
Bump	Acceleration: 250m/s²
Free fall transportation	1.2m
Rolling pitching transportation	Angle: ±35degrees; period: 8s
Static load	10kPa
Low air pressure/high air pressure	70kPa/106kPa

Data Storage

SMS storage capacity	40 in ME In addition, the unit can handle as many SMS as the SIM can store
Phone book capacity	100

6. Declaration of Conformity

Declaration of Conformity

We, Sony Ericsson Mobile Communications AB of
Nya Vattentornet
S- 221 88 Lund, Sweden

declare under our sole responsibility that our product

Sony Ericsson type 6100501- BV

and in combination with our accessories, to which this declaration relates is in conformity with the appropriate standards 3GPP TS 51.010-1, EN 301489-7 and EN 60950, following the provisions of, Radio Equipment and Telecommunication Terminal Equipment directive 99/5/EC with requirements covering EMC directive 89/336/EEC, and Low Voltage directive 73/23/EEC.

C E 0682

Basingstoke, June 2002
Place & date of issue
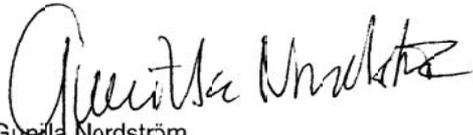
Gunilla Nordström
Corporate Vice President M2M Com

We fulfil the requirements of the R& TTE Directive (99/5/EC).

7. FCC Certificate

FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554

COPY   COPY

GRANT OF EQUIPMENT AUTHORIZATION
Certification

Sony Ericsson Mobile Communications AB
Nya Vattentornet

Date of Grant: 06/26/2002

Application Dated: 04/10/2002

Lund, Sweden 22188

Attention: Mats Hansson, Senior Staff Engineer

NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for the equipment identified hereon for use under the Commission's Rules and Regulations listed below.

FCC IDENTIFIER PY76220501-BV
Name of Grantee Sony Ericsson Mobile Communications AB

Equipment Class: Licensed Non-Broadcast Station Transmitter

Notes: Transmitter module for mobile applications

Grant Notes	FCC Rule Parts	Frequency Range (MHZ)	Output Watts	Frequency Tolerance	Emission Designator
	24E	1850.2 - 1908.75	1.4	1 PM	300KGXW
	22.901(d)	824.2 - 848.8	1.11	1 PM	300KGXW

Power is conducted.

This device is to be used ONLY for mobile and fixed applications.

Antenna gain is not to exceed -1.5 dBi.

The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. Users and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.

This device is GSM (PCS) and GSM 850 both of which can operate within the US.

This application was originally granted on 06/25/2002.

Mail To:
Karin Silberhorn,
CETECOM GmbH
Im Teelbruch 122
Essen, 45219
Germany

Part 4: Using AT Commands

1. Introduction to AT Commands

1.1 Overview

AT commands, issued from a computer in your application are used to control and implement the functions of the module.

Using AT commands, the following actions are possible:

- Control of DCE
- GPRS
- Call control
- Supplementary Service
- SIM application tool kit

The GM47 contains a large number of Ericsson-specific commands in addition to those implemented in accordance with the GSM and ITU-T recommendations. These commands are provided to enhance the functions of the module. The Ericsson-specific commands are identified by the asterisk that precedes the command (see the syntax description provided below).

Note!   Only commands that are listed in the Integrator's Manual are supported unless otherwise stated. Other commands may be listed by the module but these are only included for historical or legacy reasons.

1.2 Syntax Description

This section provides a brief description of the syntax used for the GM47, AT command set. See the ITU-T recommendation V.25ter for additional information.

1.2.1 Conventions

In this manual, the following conventions are used to explain the AT commands.

\<command\>	The name of the command that is to be entered.
\<parameter\>	The parameter values that are defined for a certain command.
\<CR\>	The command line is terminated by the Carriage Return (or Enter key) or ATS3 command.
\<LF\>	Line feed character or ATS4 command.

< >   The term enclosed in angle brackets is a syntactical element. The brackets do not appear in the command line.

[ ]   Square brackets are used to indicate that a certain item is optional. For example, sub-parameters of a command or an optional part of a response. The brackets do not appear in the command line.

Value   The default values of the supported parameters are indicated by using bold text when presenting the value.

- Other characters, including '?', '=', parenthesis, etc., appear in commands and responses as written.
- The final result codes OK, ERROR, +CME ERROR: <err> and CMS ERROR:<err> (see sections 1.2.3, AT Response Syntax and 1.3, Error Codes) are not listed under "Possible Responses" for each AT command.
- OK and ERROR are listed if these are the only possible responses.

1.2.2 AT Command Syntax

The AT standard is a line-oriented command language. Each command is made up of the following three elements:

- the prefix;
- the body;
- the termination character.

The prefix consists of the letters "AT", which are derived from the first two letters of the word attention. The body is made up of the **command,** the **parameter,** and if applicable the associated **values**.

Commands may be combined in the same command line. Spaces between the individual bodies are ignored.

Basic Syntax Command

The format of basic syntax commands is as follows:

AT<command>[=][<parameter>]<CR>

Example!   ATL=0<CR> *(sets the volume of the speaker)*

Additional commands may follow a command on the same command line without any character being required for separation. For the command D parameters, see the description for the command in question.

A version of the basic syntax is:

AT<command><parameter>

Extended Syntax Command

- **AT+<command>= [<parameter>]**
- **AT*<command>=[<parameter>]**

Example! AT+CFUN=0<CR> *(powers down the module)*

If several values are included in the command, they are separated by commas. It is also possible to enter commands with no values.

Additional commands may follow an extended syntax command on the same command line if a semicolon (**;** IRA 3B) is inserted after the preceeding extended command as a separator.

Read Command Syntax

The read command is used to check the current values of parameters. Type '?', after the command line:

- **AT+<command>?**
- **AT*<command>?**
- **AT<command>?**

Example! AT+CSCS?<CR> *(show current character set)*

<CR>"IRA"<CR>*(information text* response)

<CR>OK<CR>*(final result code response)*

Test Command Syntax

The test command is used to test whether the command has been implemented or to give information about the type of subparameters it contains. Type '?', after the command line:

- **AT+<command>=?**
- **AT*<command>=?**

Example! AT+CPAS=?<CR> *(shows supported values for the response parameters)*

<CR>CPAS: (0, 3, 4, 129, 130, 131)<CR> *(supported values)*

<CR>OK<CR> *(final result code)*

If the indicated <parameter> is not recognized, the result code ERROR is issued.

Note! Possible responses are indicated both as <command>:(list of supported<parameter>) and (in most cases) the actual range of the parameter values.

1.2.3 AT Response Syntax

The default mode response shown below, is in text mode. See the command V for further details.

Possible formats for the result codes are:

- Basic format result code, such as OK. The Basic result code also has a numerical equivalent.

- Extended format result code, prefixed with a plus sign (+) or an asterisk (*):

  – **AT+<command>: <parameter >**

  – **AT*<command>: <parameter>**

where the <parameter> is the result code value, note that a single space character separates the colon character from the <parameter>. If several values are included in the result code, they are separated by commas. It is also possible that a result code has no value. The extended syntax result codes have no numerical equivalent. They are always issued in alphabetical form.

- Information text response may contain multiple lines separated by <CR>. The TE detects the end of informational text responses by looking for a final result code response, such as OK.

There are two types of result code responses as outlined below:

Final Result Code

A final result code indicates to the TE that execution of the command is completed and another command may be issued.

- If you type an implemented AT command, you should get the result code OK.

- If you type an AT command that is not implemented, or which had the wrong parameter or syntax, you will get an error result code. It is ERROR or, for example, +**<command>** ERROR followed by an error code.

Final result codes are:

Value	General meaning
OK	Command executed, no errors
ERROR	Invalid command or command line too long
NO DIALTONE	No dialling possible, wrong mode
BUSY	Remote station busy
NO ANSWER	Connection completion time-out
NO CARRIER	Link not established or disconnected

Unsolicited Result Code

Unsolicited result codes indicate the occurrence of an event not directly associated with a command being issued from the TE.

1.3 Error Codes

1.3.1 +CME ERROR (Mobile Equipment Error Code)

This final result code is similar to the regular ERROR result code. If +CME ERROR: <err> is the result code for any of the commands in a command line, none of the commands in the same command line will be executed (neither ERROR nor OK result code shall be returned as a result of a completed command line execution). The format of <err> can be either numerical or alphabetical, and is set with the +CMEE command.

The table below provides the numerical values for the parameter <err>.

<err>	Description Syntax
0	Phone failure
1	No connection to phone
2	Phone -adaptor link reserved
3	Operation not allowed
4	Operation not supported
5	PH-SIM PIN required
10	SIM not inserted
11	SIM PIN required
12	SIM PUK required
13	SIM failure
14	SIM busy
15	SIM wrong
16	Incorrect password
17	SIM PIN2 required
18	SIM PUK2 required
20	Memory full
21	Invalid index
22	Not found
23	Memory failure
24	Text string too long
25	Invalid characters in text string

<err>	Description Syntax
26	Dial string too long
27	Invalid characters in dial string
30	No network service
31	Network time-out
32	Network not allowed - emergency calls only
100	Unknown
101- 255	Reserved by ETS

1.3.2 +CMS ERROR (Message Service Failure Result Code)

This final result code indicates an error related to mobile equipment or to the network. The operation is similar to the ERROR result code. None of the following commands in the same command line will be executed. Neither ERROR nor OK result code will be returned. ERROR is returned normally when an error is related to syntax or invalid parameters. Nevertheless, it always appears when a command fails.

The syntax is as follows:

+CMS ERROR: <err>

Values for the <err> parameter are described in the following table.

<err>	Description
0 - 127	GSM 04.11 Annex E-2 values
128 - 255	GSM 03.40 subclause 9.2.3.22 values
300	ME failure
301	SMS service of ME reserved
302	Operation not allowed
303	Operation not supported
304	Invalid PDU mode parameter
305	Invalid text mode parameter
310	SIM not inserted
311	SIM PIN required
312	PH-SIM PIN required
313	SIM failure
314	SIM busy
315	SIM wrong
316	SIM PUK required

<err>	Description
317	SIM PIN2 required
318	SIM PUK2 required
320	Memory failure
321	Invalid memory index
322	Memory full
330	SMSC address unknown
331	No network service
332	Network time-out
340	No +CNMA acknowledgment expected
500	Unknown error
- 511	Other values in range 256 - 511 are reserved
512-	Manufacturer specific

1.4 Examples on How to Use the AT Commands

For many of the more complicated commands, examples are provided after the command's description. Always refer to the detailed description of the command in question to check valid parameter values, AT command syntax and Response syntax.

1.5 SMS Text Mode

SMS text mode allows users to send SMSs without having to understand how PDUs are constructed. This section describes how to carry out basic operations in text mode and explains the steps that need to be taken.

Basic transmission of SMS

A script which sets the module up is shown below:

AT+CSDH=1   Enable the use of text mode parameters
OK
AT+CSMP=17,167   Set text mode parameter
OK
AT+CMGF=1   Switch the module to text mode
OK
AT+CMGS="07787154042"   Sending an SMS
> Test SMS➜   The text must be ended, as in PDU mode, with
                     a control-Z character

+CMGS: 204   Confirmation that the SMS has been sent successfully

OK

Note the following points:

1. Once the CSDH, CSMP and CMGF commands have been carried out they will not need to be initialized for this session.

2. These parameters are saved in NVRAM using the &W command.

Notification of SMS

New message indications are similar to the PDU mode as shown below:

AT+CNMI=3,1
OK

+CMTI: "SM",2

AT+CNMI=3,2
OK

+CMT: "+447747008670","Matt
L","02/11/19,09:58:42+00",145,36,0,0,"+447785016005"
,145,8
Test sms

Please note that currently the CMT indication does not have a CR/LF appended to the end of the SMS data. If the SMS contains one it will be displayed. Otherwise the application will need to recognize the CMT line and the length character, in this case 8 and count the characters into its input buffer.

Reading messages

Reading messages is performed as in PDU mode.

AT+CMGR=2
+CMGR: "REC UNREAD","+447747008670","Matt L","02/11/
19,09:57:28+00",145,36,0,0,"
+447785016005",145,8
Test sms

OK

Listing messages

In PDU mode numbers are used as parameters. In text mode letters are used instead and these must be upper case as the module does not accept lower case commands. See the example below:

AT+CMGL="ALL"
+CMGL: 1,"REC READ","+447747008670","Matt L","02/10/
21,10:07:23+04",145,4
Test
+CMGL: 2,"REC READ","+447747008670","Matt L","02/11/
19,09:57:28+00",145,8
Test sms
+CMGL: 3,"REC UNREAD","+447747008670","Matt L","02/11/
19,09:58:06+00",145,8
Test sms

OK

1.6 GPRS Communication

To initiate a session with the network you need to setup a 'data account' on the module, using the AT+CGDCONT command. You need to specify the correct Access Point Name (APN), which you get from your service provider. The command below sets up the data account to access Vodafone's internet server.

AT+CGDCONT=1,"IP","internet"

After this you need to use the ATD command to make a GPRS call. The example below dials into the network using account number 1 (the GM47 supports up to 10):

ATD*99***1#

If the module is able to connect to the APN it will return a CONNECT. At this point PPP/IP packets should be sent by the application, to negotiate an IP address. The easiest way of doing this whole thing is to create a windows dial up networking session with the dial string *99***1# after creating the data account on the module.

It is not possible to call a mobile station using GPRS at present. The reason for this is that unless a PDP context has been setup it has not been assigned an IP address by the GGSN/DHCP server and as a result it cannot be addressed other than through its phone number (defeating the object of using IP). This is specified in GSM 7.60 or 3GPP 27.060.

2. Call Control

2.1 AT+CPIN   PIN Control

See 3.26, AT+CPIN PIN Control

2.2 ATA   Answer Incoming Call

Description	Command	Possible Responses
Answer an incoming call	ATA	• CONNECT • CONNECT <text> • NO CARRIER • ERROR • OK

Answer and initiate connection to an incoming call.

<text>	Description
19200	Connected with data bit rate of 19200 bits/s (HSCSD)
9600	Connected with data bit rate of 9600 bits/s
4800	Connected with data bit rate of 4800 bits/s
2400	Connected with data bit rate of 2400 bits/s

2.3 ATD   Dial

Description	Command	Possible Responses
• Originate a call and dial the phone number specified in the command as <dial_string> or • Do a network detect	ATD<dial_string>[;]	• CONNECT • CONNECT <text> • NO CARRIER • ERROR • NO DIAL TONE • BUSY • OK
Dial the phone number stored in the mobile phone which is located by the index <l>	ATD>ME<l>[;]	• CONNECT • CONNECT <text> • NO CARRIER • ERROR • NO DIAL TONE • BUSY • OK
Dial the phone number stored in the SIM card which is located by the index <l>	ATD>SM<l>[;]	• CONNECT • CONNECT <text> • NO CARRIER • ERROR • NO DIAL TONE • BUSY • OK
Dial the phone number stored in the *Last dialled number* list on the SIM card, which is located by the index <l> The most recently dialled number is assumed to have <l>="1"	ATD>LD<l>[;]	• CONNECT • CONNECT <text> • NO CARRIER • ERROR • NO DIAL TONE • BUSY • OK
Redial the last phone number dialled. **Ericsson specific**	ATDL[;]	...

Used to initiate a phone connection, which may be data or voice (phone number terminated by semicolon). The phone number used to establish the connection will consist of digits and modifiers, or a stored number specification.

If the dial string is followed by a semicolon this informs the phone that the number is a voice rather than a data number.

If the dial string is omitted, and the semicolon included, the command instructs the ME to do a network detect. If the network is available OK is returned.

Abortability:

Aborting an ATD command is accomplished by the transmission from the DTE to the DCE of any character. A single character shall be sufficient to abort the command in progress; however, characters

transmitted during the first 125 milliseconds after transmission of the termination character are ignored. This is to allow the DTE to append additional control characters such as line feed after the command line termination character.

<dial_string>	Description
"0 1 2 3 4 5 6 7 8 9 * # +"	Valid characters for origination
W	The W modifier is ignored but is included only for compatibility purposes
,	The comma modifier is ignored but is included only for compatibility purposes
T	The T modifier is ignored but is included only for compatibility purposes
P	The P modifier is ignored but is included only for compatibility purposes

<Final Result Code>	Description
CONNECT	If connection is successfully established, only valid for data connections
CONNECT <text>	If connection is successfully established, only valid for data connections
NO CARRIER	Unable to establish a connection or the connection attempt was aborted by the user
ERROR	An unexpected error occurred while trying to establish the connection
NO DIALTONE	The mobile phone is being used for a voice call or is not within coverage of the network
BUSY	The phone number called is engaged, valid for data and voice connections
OK	Only valid for voice connections

<text>	Description
19200	Connected with data bit rate of 19200 bits/s (HSCSD)
9600	Connected with data bit rate of 9600 bits/s
4800	Connected with data bit rate of 4800 bits/s
2400	Connected with data bit rate of 2400 bits/s

Example

ATD07747008670;
OK
AT+VTS="4"
OK

2.4 ATH   *Hang up*

Description	Command	Possible Responses
Terminate the call	ATH	• ERROR • OK

Signals the MS to terminate an active call.

2.5 ATL   *Monitor Speaker Loudness*

Description	Command	Possible Responses
Request monitor speaker loudness	ATL[<value>]	• OK • ERROR
Show the current setting	ATL?	L: <value>
Show if the command is supported	ATL=?	L: (list of supported <values>s)

Included for compatibity. No functionality

<value>	Description
0	-14dB (minimum speaker volume)
1	-10.5dB
2	-7dB
3	-3.5dB
4	0dB (nominal speaker volume)
5	3.5dB
6	7dB
7	10.5dB
8	14dB (maximum speaker volume)

2.6 ATO   *Return to Online Data Mode*

Description	Command	Possible Responses
Return to on-line data mode	ATO[<value>]	• CONNECT • CONNECT <text> • NO CARRIER • ERROR

Switch to the on-line data mode from the on-line command mode during an active call. Returns ERROR when not in on-line command mode.

<value>	Description
0	Return to on-line data state from on-line command

2.7 ATP   *Select Pulse Dialling*

Description	Command	Possible Responses
Select pulse dialling	ATP	OK
Show if the command is supported	ATP=?	OK

Command is ignored, and is implemented for compatibility only. It would normally cause the next D command to use pulses when dialling the number.

2.8 ATT   *Select Tone Dialling*

Description	Command	Possible Responses
Select tone dialling	ATT	OK
Show if the command is supported	ATT=?	OK

Command is ignored, and is implemented for compatibility only. It would normally cause the next D command to use tones when dialling the number.

2.9 ATX   Call Progress Monitoring Control

Description	Command	Possible Responses
Set call progress monitoring control	ATX=[<n>] or ATX[<n>]	• OK • ERROR
Show the current setting	ATX?	X: <n>
Show if the command is supported	ATX=?	X: (list of supported <n>s)

Defines if the dial-tone detection and busy-tone detection are to be used during a call set-up.

<n>	Description
0	Body and dial tone detection off. No line speed reported on connection
1	Body and dial tone detection off. Report line speed on connection
2	Busy detection on and dial tone detection off. Report line speed on connection
3	Busy detect off and dial tone on. Report line speed on connection
4	Busy detect and dial tone detection on. Report line speed on connection. **Default value**

Note!   If there is no network available the <n> parameter will decide if "NO DIALTONE" or "NO CARRIER" will be returned. If the call recipient is busy, the <n> parameter will decide if "BUSY" or "NO CARRIER" will be returned.

2.10 AT+CHUP   Hang up Call

Description	Command	Possible Responses
Request hang-up	AT+CHUP	• OK • ERROR
Show if the commands is supported	AT+CHUP=?	• OK • ERROR

Causes the TA to hang-up the current call of the ME.

If no call is present, but an incoming call is notified, then the incoming call shall be rejected.

2.11 AT+CMOD   Call Mode

Description	Command	Possible Responses
Request Call Mode	AT+CMOD=[<mode>]	• OK • ERROR
Show the current setting	AT+CMOD?	• +CMOD: <mode> • OK • ERROR
Show if the command is supported	AT+CMOD=?	• +CMOD: (list of supported <mode>s) • OK • ERROR

Selects the call mode of further dialing commands (D) or for next answering command (A). Mode can be either single or alternating. In this ETS, terms "alternating mode" and "alternating call" refer to all GSM bearer and teleservices that incorporate more than one basic service (voice, data, fax) within one call.

When single mode is selected the call originating and hang-up procedures are similar to procedures specified in ITU-T Recommendations V.25ter, T.31 and T.32. In GSM there can be voice followed by data (refer to GSM 02.02), alternating voice/data (refer to GSM 02.02) and alternating voice/fax calls (refer to GSM 02.03).

Test command returns values supported by the TA as a compound value.

Note!   +CMOD is set to zero after a successfully completed alternating mode call. It is set to zero also after a failed answering. The power-up, factory (&F) and user resets (Z), also set the value to zero. This reduces the possibility that alternating mode calls are originated or answered accidentally.

<mode>	Description
0	Single mode. **Default value**. In order to avoid accidental originating or answering of alternating calls is <mode> set to single mode in following cases: - after a successfully completed alternating mode call; - after a unsuccessful answering; - after successfully execution of the commands &F and Z

2.12 AT+CVHU   Voice Hang-Up

Description	Command	Possible Responses
Set Command	+CVHU=[<mode>]	• +CME ERROR: <err> • OK
Show the current setting	+CVHU?	• +CVHU: <mode> • +CME ERROR: <err>
Show if the command is supported	+CVHU=?	+CVHU: (list of supported <mode>s)

Selects whether ATH or "drop DTR" causes a voice connection to be disconnected or not. Voice connection also includes alternating mode calls that are currently in voice mode.

Note! When <mode>=2, this command must be viewed in conjunction with the V.25ter command &D, or &D will be ignored.

<mode>	Description
0	"Drop DTR" ignored but OK response given. ATH disconnects
1	"Drop DTR" and ATH ignored but OK response given
2	"Drop DTR" behavior according to &D setting. ATH disconnects. **Default value**

2.13 AT+VTS   DTMF and Tone Generation

Description	Command	Possible Responses
Request transmission of DTMF tone(s)	AT+VTS=<DTMF>	OK ERROR
Show if the command is supported	AT+VTS=?	OK ERROR

This command allows the transmission of DTMF tones. These tones may be used, for example, when announcing the start of a recording period. The command is write only. In this profile of commands, the command does not operate in data or fax modes of operation (+FCLASS=0,1,2-7).

Note! The ATD-command is used only for dialing. It is not possible to generate arbitrary DTMF tones using the ATD command.

Note!   The AT+VTS command is used only during a voice call.

<DTMF>	Description
ASCII character string	An ASCII character string with entries in the set 0-9, #, *, A-D separated by commas. Each entry is interpreted as a single ASCII character. Example: The string "8,9" sends two DTMF tones, "8" followed by "9"

3. Control and Status

3.1 ATQ   *Result Code Suppression*

Description	Command	Possible Responses
Set Result Code Suppression	ATQ[=]<value>	• OK • ERROR
Show the current setting	ATQ?	Q: <value>
Show if the command is supported	ATQ=?	Q: (list of supported <value>s)

Determines whether or not the DCE transmits result codes to the DTE. When result codes are being suppressed, no portion of any intermediate, final, or unsolicited result code - header, result text, line terminator, or trailer - is transmitted.

<value>	Description
0	DCE transmits result codes. **Default value**
1	Result codes are suppressed and not transmitted

3.2 ATS0   *Automatic Answer Control*

Description	Command	Possible Responses
Automatic answer control	ATS0=[<rcnt>]	• OK • ERROR
Show the current setting	ATS0?	<rcnt>
Show if the command is supported	ATS0=?	S0: (list of supported <rcnt>s)

Defines the automatic answering feature of the modem. A non-zero value specifies the number of rings before the call is answered.

Note!   Call is always answered in the current fax class, regardless of whether the incoming call is voice, data, or fax.

<rcnt>	Description
0	Disable automatic answer. **Default value**
1-7	Answer after the specified number of rings

3.3 ATS2 *Escape Sequence Character*

Description	Command	Possible Responses
Set escape sequence character	ATS2=[<esc>]	• OK • ERROR
Show the current setting	ATS2?	<esc>
Show if the command is supported	ATS2=?	S2: (list of supported <esc>s)

Defines the character to be used as the escape sequence character when switching from on-line data mode to on-line command mode. The response to the command is modified to reflect the change.

<esc>	Description
43	Escape sequence character. **Default value**
0 to 255	Escape sequence character

Note! If the <esc> parameter is set to a value in the range of 128-255, the escape sequence detection is disabled.

3.4 ATS3 *Command Line Termination Character*

Description	Command	Possible Responses
Set Command Line Termination Character	ATS3=<value>	• OK • ERROR
Show the current setting	ATS3?	<value>
Show if the command is supported	ATS3=?	S3: (list of supported <value>s)

This S-parameter represents the decimal IA5 value of the character recognised by the DCE from the DTE to terminate an incoming command line. It is also generated by the DCE as part of the header, trailer, and terminator for result codes and information text, along with the S4 parameter.

The previous value of S3 is used to determine the command line termination character for entry of the command line containing the S3 setting command. However, the result code issued uses the value of S3 as set during the processing of the command line. For example, if S3 was previously set to 13 and the command line "ATS3=30" is issued,

the command line is terminated with a <CR> character (IA5 0/13), but the result code issued uses the character with the ordinal value 30 (IA5 2/14) in place of the <CR>.

<value>	Description
13	Command line termination character, **Default value**
0 to 127	Command line termination character

3.5 ATS4 *Response Formatting Character*

Description	Command	Possible Responses
Set Response Formatting Character	ATS4=<value>	• OK • ERROR
Show the current setting	ATS4?	<value>
Show if the command is supported	ATS4=?	S4: (list of supported <value>s)

This S-parameter represents the decimal IA5 value of the character generated by the DCE as part of the header, trailer, and terminator for result codes and information text, along with the S3 parameter (see the description of the V parameter for usage).

If the value of S4 is changed in a command line, the result code issued in response to that command line will use the new value of S4.

<value>	Description
10	Formatting character. **Default value** Note: ASCII character 10 is equivalent to <LF>
0 to 127	Formatting character

3.6 ATS5 *Command Line Editing Character (BACKSPACE)*

Description	Command	Possible Responses
Request Command Line Editing Character	ATS5=<value>	• OK • ERROR
Show the current setting	ATS5?	<value>
Show if the command is supported	ATS5=?	S5: (list of supported <value>s)

This S-parameter represents the decimal IA5 value of the character recognised by the DCE as a request to delete from the command line the immediately preceding character.

<value>	Description
8	Line editing character. **Default value**
0 to 127	Line editing character

3.7 ATS6 *Blind Dial Delay Control*

Description	Command	Possible Responses
Blind dial delay control	ATS6=[<dly>]	OK
Show the current setting	ATS6?	<dly>
Show if the command is supported	ATS6=?	S6: (list of supported <dly>s)

Included for compatibility. No functionality

<dly>	Description
2	Wait two seconds before blind dialling. **Default value**
2-255	Number of seconds to wait before blind dialling

3.8 ATS7 *Connection Completion Timeout*

Description	Command	Possible Responses
Set connection completion timeout	ATS7=[<tmo>]	• OK • ERROR
Show the current setting	ATS7?	<tmo>
Show if the command is supported	ATS7=?	S7: (list of supported <tmo>s)

Defines the maximum time allowed between completion of dialling and the connection being established. If this time is exceeded then the connection is aborted.

<tmo>	Description
50	Timeout value in seconds. **Default value**
1-255	Timeout value in seconds

3.9 ATS8 *Comma Dial Modifier Delay Control*

Description	Command	Possible Responses
Set Comma Dial Modifier Delay Control	ATS8=[<dly>]	• OK • ERROR
Show the current setting	ATS8?	<dly>
Show if the command is supported	ATS8=?	S8: (list of supported <dly>s)

Included for compatibility. No functionality

<dly>	Description
2	The value of the dial modifier delay in seconds. **Default value**
1-255	The value of the dial modifier delay in seconds

3.10 ATS10   Automatic Disconnect Delay Control

Description	Command	Possible Responses
Set Automatic Disconnect Delay Control	ATS10=[<val>]	• OK • ERROR
Show the current setting	ATS10?	<val>
Show if the command is supported	ATS10=?	S10: (list of supported <val>s)

Included for compatibility. No functionality

<val>	Description
2	Remains connected for two tenths of a second. **Default value**
1-254	Number of tenths of a second of delay

3.11 AT*ECAM   Ericsson Call Monitoring

Description	Command	Possible Responses
Set Call Monitoring on or off	AT*ECAM=<onoff>	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT*ECAM?	• *ECAM: <onoff> • +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT*ECAM=?	• *ECAM: list of supported <onoff>s • +CME ERROR: <err> • OK • ERROR

This command activates or deactivates the call monitoring function in the ME. When this log function is activated in the ME, the ME informs about call events, such as incoming call, connected, hang up etc.

It is preferable that the current status shall always be sent with result code *ECAV when activating the log function. The purpose of this is two fold:

• to gather relevant information for the call log in a TE;

- to make it possible for the TE to display call state information for an ongoing call.

<onoff>	Description
0	The call log function is disabled (off). **Default value**
1	The call log function is enabled (on)

Unsolicited result codes:
*ECAV: <ccid>,<ccstatus>,<calltype>,[<processid>],[<exitcause>], [<number>,<type>]

<ccid>	Description
1 to 7	Integer type. A number which uniquely defines a call in the phone (= number of call control process). There can not be two call id's with the same number simultaneously. The maximum number of call control processes are 7, which are 5 multiparty members, one call on hold, and one waiting call

<ccstatus>	Description
0	Idle
1	Calling (MO)
2	Connecting (MO)
3	Active (connection between A and B)
4	Hold
5	Waiting (MT)
6	Alerting (MT)
7	Busy

<calltype>	Description
1	Voice
2	Data
128	Voice2

<processid>	Description
Integer	Reported when returning to the Idle state (<ccstatus>=0)
	8 = H'08 = CC (Call Control)
	68 = H'44 = MM (Mobile Management)
	69 = H'45 = MS (Mobile Station)
	122 = H'7A = RR (Radio Resources)

<exitcause>	Description
Integer	Exit cause according to GSM 04.08 reported when returning to Idle state (<ccstatus> = 0)

<number>	Description
String	String type phone number of format specified by <type>. Only valid for <ccstatus> = 1 (Calling)

<type>	Description
	Type of address octet in integer format (refer to GSM 04.08, subclause 10.5.4.7)
129	ISDN/Telephony numbering plan, national/international unknown. **Default if no "+" in sca**
145	ISDN/Telephony numbering plan, international number. **Default if "+" in sca.**
161	ISDN/Telephony numbering plan, national number
128 to 255	Other values refer to GSM 04.08 section 10.5.4.7. Only valid for <ccstatus> = 1 (Calling)

Examples

AT*ECAM?
*ECAM: 0

AT*ECAM=1
OK

3.12 AT*EDST *Ericsson Daylight Saving Time*

Description	Command	Possible Responses
Set Daylight Saving Time	AT*EDST=<dst>	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT*EDST?	• *EDST: <dst> • +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT*EDST=?	• *EDST: (list of supported <dst>s) • +CME ERROR: <err> • OK • ERROR

This command sets the daylight saving time hours.

Note!   This command affects the MS clock set with the AT+CCLK command. To avoid confusion it is recommended the daylight saving time (DST) is set with this command before setting the actual local time with AT+CCLK.

<dst>	*Description*
0	Standard time
1	Daylight saving time, +1 hour
2	Daylight saving time, +2 hours

3.13 AT*EMAR   *Ericsson Master Reset*

Description	*Command*	*Possible Responses*
Perform a master reset in the MS	AT*EMAR=<phone lock code>	• +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT*EMAR=?	• +CME ERROR: <err> • OK • ERROR

This command requests the MS to reset user data. The user data in the MS will be reset to the default values. This command also unlocks the MS.

<phone lock code>	*Description*
String	Security code (phone lock code) must be verified before performing the master reset, see also AT+CLCK

3.14 AT*EPEE   Ericsson Pin Event

Description	Command	Possible Responses
Requests the MS to inform when the PIN code has been inserted	AT*EPEE=<onoff>	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT*EPEE?	• *EPEE: <onoff> • +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT*EPEE=?	• *EPEE: (list of supported <onoff>s) • +CME ERROR: <err> • OK • ERROR

The command requests the MS to report when the PIN code has been inserted and accepted.

<onoff>	Description
0	Request for report on inserted PIN code is not activated (off). **Default value**
1	Request for report on inserted PIN code is activated (on)

3.15 AT*ESMM   Ericsson Settings Minute Minder

Description	Command	Possible Responses
Sets the Minute Minder to on or off	AT*ESMM=<mode>	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT*ESMM?	• *ESMM: <mode> • +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT*ESMM=?	• *ESMM: list of supported <mode>s • +CME ERROR: <err> • OK • ERROR

This command sets the minute minder setting to "on" or "off" in the MS. Test command returns the <mode> value. When set to "on", a beep is sent to the audio output every minute.

<mode>	Description
0	OFF, minute minder off. **Default value**
1	ON, minute minder on

3.16 AT+CALA   *Set Alarm*

Description	Command	Possible Responses
Set an alarm time in the ME	AT+CALA=<time>[, <n>[,<type>[,<text> [,<recurr>[,<silent>]]]]]	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT+CALA?	• +CALA: <time1>,<n1>,<type1>,[<t ext1>],[<recurr1>],<silent1 >[<CR><LF>+CALA: <time2>,<n2>,<type2>,[<t ext2>],[<recurr2>],<silent2 >[...]]+CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CALA=?	• +CALA: (list of supported <n>s),(list of supported type>s),<tlength>,<rlengt h>,(list of supported <silent>s) • +CME ERROR: <err> • OK • ERROR

The command sets an alarm time in the ME. An array of different alarms can be set and each may be recurrent. If alarm setting fails, ERROR: <err> is returned.

When the alarm is timed out and executed, the unsolicited result code +CALV: <n> is always returned, even if the alarm is setup to be silent.

The alarm time is set in hours and minutes. Date, seconds and time zone cannot be set.

The alarm function uses the ring type defined with the AT*ERIN command.

The read command returns the list of current active alarm settings in the ME.

Show returns the supported array index values, alarm types and maximum length of the text strings.

<time>	Description
string type value	Refer to the AT+CCLK command. Note! Only hours and minutes are used i.e. date, time zone and seconds are not used

<n>	Description
Integer type	Index identifying an active alarm

Note!   The number of active alarms is manufacturer and product specific.

<tlength>	Description
Integer type	Maximum length of <text> parameter

Note!   The maximum length of the <text> parameter is manufacturer and product specific.

<recurr>	Description
Format: "<1..7>[,<1..7>[…]]"	For setting an alarm for one or more days in the week. The digits 1 to 7 correspond to the days in the week, Monday (1), …, Sunday (7). Example: The string "1,2,3,4,5" may be used for setting an alarm for all weekdays
Format:"0"	For setting an alarm for all days in the week

<rlength>	Description
Integer type	Maximum length of the <recurr> parameter

Unsolicited result codes:

+CALV: <n>

3.17 AT+CALD   Alarm Delete

Description	Command	Possible Responses
Delete an alarm	AT+CALD=<n>	• +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CALD=?	• +CALD: (list of supported <n>s) • +CME ERROR: <err> • OK • ERROR

This command removes an active alarm.

<n>	Description
Integer type	Index identifying an active alarm

3.18 AT+CCLK   *Set Clock and Date*

Description	Command	Possible Responses
Set the real time clock of the ME	AT+CCLK=<time>	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT+CCLK?	• +CCLK: <time> • +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CCLK=?	• OK • ERROR

Sets the real time clock of the ME. If setting fails in an ME, error +CME ERROR: <err> is returned. Read command returns the current setting of the clock.

<time>	Description
string type value	Format is "yy/mm/dd,hh:mm:ss±zz", where characters indicate year (two last digits), month, day, hour, minutes, seconds and time zone (indicates the difference, expressed in quarters of an hour, between the local time and GMT; range -47...+48), e.g. 6th of May 1994, 22:10:00 GMT+2 hours reads "94/05/06,22:10:00+08" NOTE: If the ME does not support time zone information then the three last characters of <time> are not returned by +CCLK?

Example

AT+CCLK?
+CCLK: "00/01/01,22:54:48+00"

OK

AT+CCLK="19/11/02,09:30:00+00"
OK

3.19 AT+CEER Extended Error Report

Description	Command	Possible Responses
Request an Extended Error Report	AT+CEER	• +CEER: <report> • OK • ERROR
Show if the command is supported	AT+CEER=?	• OK • ERROR

Causes the TA to return one or more lines of information text <report>. Typically, the text will consist of a single line containing the failure information given by the GSM network in text format.

<report>	Description
characters	The total number of characters, including line terminators, in the information text shall not exceed 2041 characters. Text shall not contain the sequence 0<CR> or OK<CR>

3.20 AT+CFUN Set Phone Functionality

Description	Command	Possible Responses
Set MS functionality	AT+CFUN=<fun>	• +CME ERROR: <err> • OK
Show the current setting	AT+CFUN?	• +CFUN: <fun> • +CME ERROR: <err>
Show if the command is supported	AT+CFUN=?	• +CFUN: (list of supported <fun>s) • +CME ERROR: <err>

Selects the level of functionality <fun> in the MS. Level "full functionality" results in the highest level of power drawn. "Minimum functionality" results in the minimum power drawn. Manufacturers may also specify levels of functionality between these two end levels.

Test command returns values supported by the ME as a compound.

Note! "AT+CFUN=" is interpreted as "AT+CFUN=0".

<fun>	Description
0	Minimum functionality. **Default value** Note: The ME is turned off
1	Full functionality. Note: If previously turned off, the phone is turned on

3.21 AT+CIND   *Indicator Control*

Description	Command	Possible Responses
Set Indicator Control	AT+CIND=[<ind> [,<ind>[,…]]]	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT+CIND?	• +CIND: <ind>,<ind>,… • +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CIND=?	• +CIND: (<descr>,(list of supported <ind>s)), (<descr>,(list of supported <ind>s)),… • +CME ERROR: <err> • OK • ERROR

Used to set the values of ME indicators. <ind> value 0 means that the indicator is off (or in state which can be identified as "off" state), 1 means that indicator is on (or in a state which is more substantial than "off" state), 2 is more substantial than 1, and so on. If the indicator is a simple on/off style element, it has values 0 and 1. The number of elements is ME specific. If the ME does not allow setting of indicators or it is not currently reachable, +CME ERROR: <err> is returned. If a certain indicator is not writable, it cannot be set. If the parameter is an empty field, the indicator will keep the previous value.

Test command returns pairs, where string value <descr> is a maximum 16 character description of the indicator and compound value is the allowed values for the indicator. If ME is not currently reachable, +CME ERROR: <err> is returned (refer to GSM 07.07).

<ind>	Description
Integer type	Value shall be in range of corresponding <descr>

<descr>	Description
"signal"	Signal quality (0-5)
"service"	Service availability (0-1)
"sounder"	Sounder activity (0-1)
"message"	Message received (0-1)
"call"	Call in progress (0-1)
"roam"	Roaming indicator (0-1)
"sms full"	A short message memory storage in the MT has become full (1), or memory locations are available (0); i.e. the range is (0-1)

3.22 AT+CLAC   *List all available AT Commands*

Command	Possible Responses
+CLAC	<AT Command1> [<CR> <LF> <AT Command2>[...]] +CME ERROR: <err>
+CLAC=?	+CME ERROR: <err>

Causes the ME to return one or more lines of AT commands. This command has the same functionality as AT*.

Note!   This command only returns the AT commands that are available to the user.

3.23 AT+CMEE   *Mobile Equipment Error*

Description	Command	Possible Responses
Request GSM Mobile Equipment Error Control	AT+CMEE=[<n>]	• OK • ERROR
Show the current setting	AT+CMEE?	• +CMEE: <n> • OK • ERROR
Show if the command is supported	AT+CMEE=?	• +CMEE: (list of supported <n>s) • OK • ERROR

Disables or enables the use of result code +CME ERROR: <err> as an indication of an error relating to the functionality of the ME. When enabled, ME related errors cause +CME ERROR: <err> final result code instead of the regular ERROR final result code. ERROR is returned normally when error is related to syntax, invalid parameters, or TA functionality. For more information, refer to "+CME ERROR (Mobile Equipment Error Code)", page 85.

<n>	Description
0	Disable +CME ERROR: <err> result code and use ERROR instead. **Default value**
1	Enable +CME ERROR: <err> result code and use numeric <err> values (see page 85)
2	Enable +CME ERROR: <err> result code and use verbose <err> values (see page 85)

3.24 AT+CMER   Mobile Equipment Event Reporting

Description	Command	Possible Responses
Set Phone Activity Status	AT+CMER=[<mode>[,<keyp>[,<disp>[,<ind>[,<bfr>]]]]]	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT+CMER?	• +CMER: <mode>,<keyp>,<disp>, <ind>,<bfr> • OK • ERROR
Show if the command is supported	AT+CMER=?	• +CMER: (list of supported s), (list of supported <keyp>s),(list of supported <disp>s),(list of supported <ind>s),(list of supported <bfr>s) • OK • ERROR

The command enables or disables the sending of unsolicited result codes from the ME to the TE in the case of key pressings, display changes, and indicator state changes. <mode> controls the processing of unsolicited result codes specified within this command. <bfr> controls the effect on buffered codes when <mode> 1, 2 or 3 is entered. If the ME does not support setting, +CME ERROR: <err> is returned.

Test command returns the modes supported by the TA as compound values.

<mode>	Description
0	Buffer unsolicited result codes in the TA; if TA result code buffer is full, codes can be buffered in some other place or the oldest ones can be discarded
3	Forward unsolicited result codes directly to the TE; TA-TE link specific inband technique used to embed result codes and data when TA is in on-line data mode

<keyp>	Description
0	No keypad event reporting
2	Keypad event reporting using result code +CKEV: <key>,<press>. Enables keypad event reporting of all key pressings Note: When this mode is enabled, corresponding result codes of all keys currently pressed will be flushed to the TA regardless of <bfr> setting

<disp>	Description
0	No display event reporting

<ind>	Description
0	No indicator event reporting
1	Indicator event reporting using result code +CIEV: <ind>,<value>. <ind> indicates the indicator order number (as specified for +CIND) and <value> is the new value of indicator. Only those indicator events, which are not caused by +CIND shall be indicated by the TA to the TE

<bfr>	Description
0	TA buffer of unsolicited result codes defined within this command is cleared when <mode> 1...3 is entered

Unsolicited Result Codes:

+CKEV: <key>,<press>

+CIEV: <ind>,<value>

3.25 AT+CPAS   Phone Activity Status

Description	Command	Possible Responses
Execute Phone Activity Status	AT+CPAS[=<mode>]	• +CPAS: <pas> • +CME ERROR <err> • OK • ERROR
Show if the command is supported	AT+CPAS=?	• +CPAS: (list of supported <pas>s) • +CME ERROR <err> • OK • ERROR

Returns the activity status <pas> of the ME. It can be used to interrogate the ME before requesting action from the phone.

When the command is executed without the <mode> argument, the command returns <pas> values from 0 to 128 (for supported values see table below). When, on the other hand, the command is executed with the <mode> argument set to 1, the command may return Ericsson specific <pas> values from 129 to 255 (for supported values see the table below).

Test command returns values supported by the ME as a compound value: refer to GSM 07.07.

<pas>	Description
0	Ready (ME allows commands from TA/TE)
3	Ringing (ME is ready for commands from TA/TE, but the ringer is active)
4	Call in progress (ME is ready for commands from TA/TE, but a call is in progress)
129	Not in call
130	Mobile oriented call in progress. This is a sub-state to 'call in progress'
131	Mobile terminated call in progress. This is a sub-state to 'call in progress'

<mode>	Description
1	Allows the CPAS to return Ericsson specific <pas> values, such as 129, 130 and 131

Example

AT+CPAS=?
+CPAS: (0,3,4,129,130,131)

OK

AT+CPAS
+CPAS: 0

OK

3.26 AT+CPIN   PIN Control

Description	Command	Possible Responses
Request PIN Control	AT+CPIN=<pin>[,<new pin>]	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT+CPIN?	• +CPIN: <code> • +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CPIN=?	• +CME ERROR: <err> • +CPIN: (supported <code>s) • OK • ERROR

Sends the password to the ME, which is necessary to make the ME operational (SIM PIN, SIM PUK or PH-SIM). If the PIN is to be entered twice, the TA autonomously repeats the PIN. If no PIN request is pending, no action is taken towards the ME and an error message (+CME ERROR <err>) is returned to the TE.

If the PIN required is PUK, the second pin is required. This second PIN, <newpin>, is used to replace the old PIN in the SIM.

Note! Commands which interact with the ME that are accepted when the ME has a pending request for SIM PIN, SIM PUK or PH-SIM are: +CGMI, +CGMM, +CGMR, +CGSN, +CFUN, +CMEE +CPIN, L and M.

<pin>,<newpin>	Description
string	The range for the SIM PIN and the PH- SIM PIN is 4 - 8 digits. The SIM PUK consists of 8 digits

<code>	Description
READY	ME is not pending for any password
SIM PIN	ME is waiting SIM PIN to be given
SIM PUK	ME is waiting SIM PUK to be given

<code>	Description
PH-SIM PIN	ME is waiting PHone-to-SIM card password to be given
SIM PIN2	ME is waiting SIM PIN2 to be given. This <code> is recommended to be returned only when the last executed command resulted in PIN2 authentication failure (i.e. +CME ERROR: 17); if PIN2 is not entered correctly after the failure, it is recommended that ME does not block its operation
SIM PUK2	ME is waiting SIM PUK2 to be given. This <code> is recommended to be returned only when the last executed command resulted in PUK2 authentication failure (i.e. +CME ERROR:18); if PUK2 and new PIN2 are not entered correctly after the failure, it is recommended that ME does not block its operation.
BLOCKED	The SIM cards is blocked for the user

<err>	Description
0	Phone failure
5	PH-SIM PIN required
10	SIM not inserted
11	SIM PIN required
12	SIM PUK required
13	SIM failure
14	SIM busy
15	SIM wrong
16	Incorrect password
24	Text string too long
25	Invalid characters in text string
100	Unknown

Example

AT+CPIN="0000"
OK

3.27 AT+CPWD   Change Password

Description	Command	Possible Responses
Request facility lock	AT+CPWD=<fac>, <oldpwd>, <newpwd>	• +CME ERROR <err> • OK • ERROR
Show if the command is supported	AT+CPWD=?	• +CPWD: (<fac1>,<pwdlength1>), (<fac2>,<pwdlength2>), … • +CME ERROR <err> • OK • ERROR

Sets a new password for the facility lock function defined by command Facility Lock +CLCK.

Test command returns a list of pairs which present the available facilities and the maximum length of their password.

<fac>	Description
"PS"	PH-SIM (lock PHone to SIM card) (ME asks password when other than current SIM card inserted)
"SC"	SIM (lock SIM card) (SIM asks password in ME power-up and when this lock command issued)
"P2"	SIM PIN2
"AO"	BAOC (Barr All Outgoing Calls) (refer GSM 02.88 clause 1)
"OI"	BOIC (Barr Outgoing International Calls) (refer GSM 02.88 clause 1)
"AI"	BAIC (Barr All Incoming Calls) (refer GSM 02.88 clause 2)
"IR"	BIC-Roam (Bar Incoming Calls when Roaming outside the home country) (refer GSM 02.88 clause 2)
"OX"	BOIC-exHC (Barr Outgoing International Calls except to Home Country) (refer GSM 02.88 clause 1)
"AB"	All Barring services (refer GSM 02.30)
"AG"	All outGoing barring services (refer GSM 02.30)
"AC"	All inComing barring services (refer GSM 02.30)

<oldpwd>	Description
string type	<oldpwd> shall be the same as password specified for the facility from the ME user interface or with the change password command, +CPWD

<newpwd>	Description
string type	<newpwd> is the new password, maximum length of password can be determined with <pwdlength>

<pwdlength>	Description
Integer type	Maximum length of the password for the facility

<err>	Description
0	Phone failure
3	Operation not allowed
5	PH-SIM PIN required
10	SIM not inserted
11	SIM PIN required
12	SIM PUK required
13	SIM failure
14	SIM busy
15	SIM wrong
16	Incorrect password
17	SIM PIN2 required
18	SIM PUK2 required
23	Text string too long
24	Invalid characters in text string
100	Unknown
101..255	Reserved by ETS

Example

AT+CPWD="SC","0000","0001"
OK

3.28 AT+CR   *Service Reporting Control*

Description	Command	Possible Responses
Set Service Reporting Control	AT+CR=<mode>	• OK • ERROR
Show the current setting	AT+CR?	• +CR: <mode> • OK • ERROR
Show if the command is supported	AT+CR=?	• +CR: (list of supported <mode>s) • OK • ERROR

Enables or disables display of intermediate bearer capability reports during the handshake phase.

<mode>	Description
0	Disable reporting. **Default value**
1	Enable reporting

Intermediate Result Codes:

+CR: <serv>

3.29 AT+CRC   *Cellular Result Code*

Description	Command	Possible Responses
Set Cellular Result Code option	AT+CRC=[<mode>]	• OK • ERROR
Show the current setting	AT+CRC?	• +CRC: <mode> • OK • ERROR
Show if the command is supported	AT+CRC=?	• +CRC: (list of supported <mode>s) • OK • ERROR

Command controls whether or not;

- the extended format of incoming call indication;
- or GPRS network request for PDP context activation;
- or notification for VBS/VGCS calls is used.

When enabled, an incoming call is indicated to the TE with unsolicited result code +CRING: <type> instead of the normal RING.

Test command returns values supported by the TA as a compound value.

<mode>	Description
0	Disables extended format
1	Enables extended format

Unsolicited Result Codes:

+CRING: <type>

3.30 AT+CSAS   Save Settings

Description	Command	Possible Responses
Save Settings	AT+CSAS[=<profile>]	• +CMS ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CSAS=?	• +CSAS: (list of supported <profile>s) • +CMS ERROR: <err> • OK • ERROR

Saves active message service settings to a non-volatile memory. A TA can contain several settings profiles. Settings specified in commands Service Centre Address +CSCA, Set Message Parameters +CSMP and Select Cell Broadcast Message Types +CSCB (if implemented) are saved. Certain settings may not be supported by the storage (e.g. SIM SMS parameters) and therefore can not be saved.

Test command shall display the supported profile numbers for reading and writing of settings.

<profile>	Description
0..255	Manufacturer specific profile number where settings are to be stored. **Default value is 0**

3.31 AT+CSQ   Signal Strength

Description	Command	Possible Responses
Show the Signal Strength	AT+CSQ	• +CSQ: <rssi>,<ber> • +CME ERROR <err> • OK • ERROR
Show if the command is supported	AT+CSQ=?	• +CSQ: (list of supported <rssi>s),(list of supported <ber>s) • +CME ERROR <err> • OK • ERROR

Returns the received signal strength indication <rssi> and channel bit error rate <ber> from the ME. Test command returns values supported by the TA as compound values.

<rssi>	Description
0	–113dBm or less
1	–111dBm
2..30	–109… –53dBm
31	–51dBm or greater
99	Not known or not detectable

<ber>	Description
0..7	As RXQUAL values in the table in GSM 05.08 subclause 8.2.4
99	Not known or not detectable

Example

AT+CSQ
+CSQ: 13,99

OK

3.32 AT+CTZU   Automatic Time Zone Update

Description	Command	Possible Responses
Enable and disable automatic time zone update via NITZ	AT+CTZU=<onoff>	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT+CTZU?	• +CTZU: <onoff> • +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CTZU=?	• +CTZU: (list of supported <onoff>s) • +CME ERROR: <err> • OK • ERROR

Enables and disables the automatic time zone update via NITZ. If setting fails in an ME error, +CME ERROR <err> is returned.

<onoff>	Description
0	The automatic time zone update is disabled (off). **Default value**
1	The automatic time zone update is enabled (on)

4. Audio

Note! *E2EAMS and *E2APR are new commands that replace the
funtionality offered by the *EALR, *EAMS, *EARS and *ELAM
commands. Use the new commands in new applications. The old
commands are included for compatibility.

*4.1 AT*E2EAMS* *Ericsson M2M Audio Profile Modification*

Description	Command	Possible Responses
Request operation with audio profile	AT*E2EAMS= <op>[,<TxPGA>, <RxPGA>,<SideToneGain>, <AuxInGain>,<MicInGain>, <TxAGC>,<Volume>, <MaxVolume>,<MicPath>, <SpkPath>,<TxPCM>, <RxPCM>,<HFAlgorithm>, <LocalAudio>,<TxGainLow>, <MicVolt2V>,<SideTone>, <NoiseRed>,<EchoCancel>, <AnalogRing>,][,<val>]]	• ERROR • OK
Show the current setting	AT*E2EAMS?	• *E2EAMS: <TxPGA>, <RxPGA>, <SideToneGain>, <AuxInGain>, <MicInGain>, <TxAGC>,<Volume>, <MaxVolume>, <MicPath>,<SpkPath>, <TxPCM>,<RxPCM>, <HFAlgorithm>, <LocalAudio>, <TxGainLow>, <MicVolt2V>, <SideTone>,<NoiseRed>, <EchoCancel>, <AnalogRing> OK • ERROR
Show if the command is supported	AT*E2EAMS=?	• *E2EAMS: (list of supported <op>s) • ERROR

This command allows the modification and configuration of the current
audio profile. An audio profile is a set of data which uniquely defines
the way in which the audio paths, gains, DSP algorithms and switch
setting are configured. There are several audio profiles available in
non-volatile storage, and the current profile can be modified by use of
the AT*E2APR command.

The AT*E2EAMS command allows the user to:

- configure the whole profile, specifying each audio parameter in a comma separated list;
- set a single parameter, given by its parameter number;
- save the current profile to non-volatile memory under the current profile number (see AT*E2APR).

The current audio settings can also be displayed by running the read command AT*E2EAMS?

Default audio settings are given in AT*E2APR.

Abortability:

This command may not be aborted.

Refer to the diagram below to understand which parts of the audio circuit are affected by the various parameters.
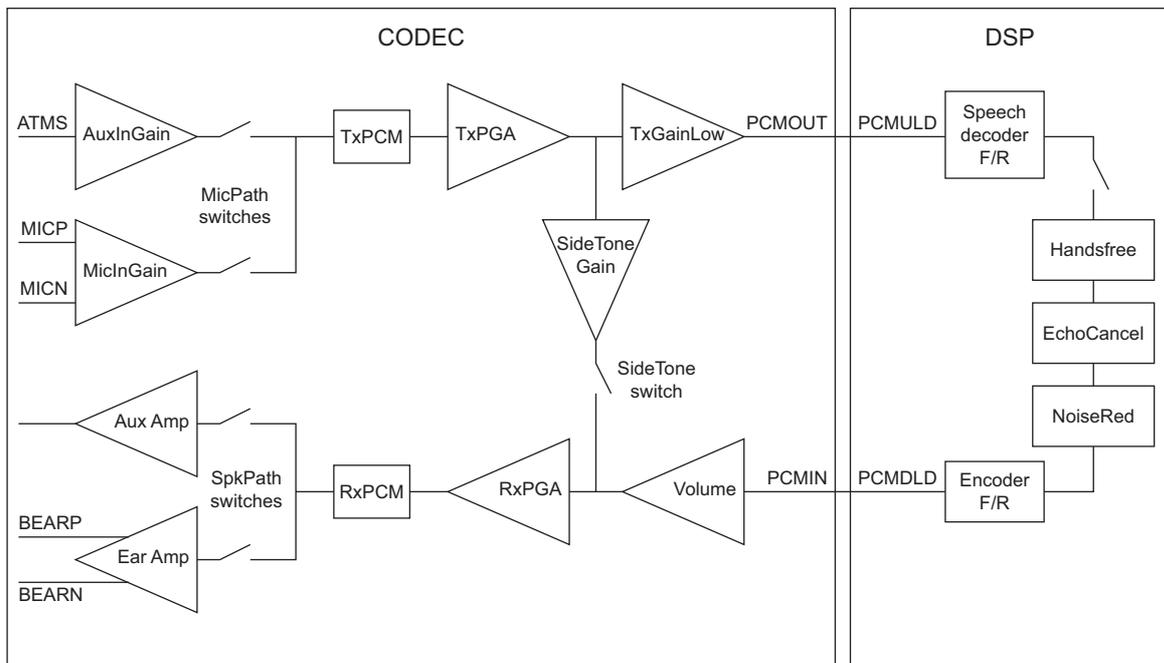
Figure 4.1 Audio diagram of the CODEC

<op>	Description
0	Configure current profile (<pr1> to <pr21>)
1	Set <TxPGA>
2	Set <RxPGA>
3	Set <SideToneGain>
4	Set <AuxInGain>
5	Set <MicInGain>
6	Set <TxAGC>
7	Set <Volume>
8	Set <MaxVolume>
9	Set <MicPath>
10	Set <SpkPath>
11	Set <TxPCM>
12	Set <RxPCM>
13	Set <HFAlgorithm>
14	Set <LocalAudio>
15	Set <TxGainLow>
16	Set <MicVolt2V>
17	Set <SideTone>
18	Set <NoiseRed>
19	Set <EchoCancel>
20	Set <AnalogRing>
255	Save current profile to non-volatile storage at current profile number

<TxPGA>, <RxPGA>	Description
0	-5dB PGA gain
1	-2.5dB PGA gain
2	0dB PGA gain
3	2.5dB PGA gain

<TxPGA>, <RxPGA>	Description
4	5dB PGA gain
5	7.5dB PGA gain
6	−7.5dB PGA gain
7	−10dB PGA gain

<SideToneGain>	Description
0	10dB
1	13dB
2	16dB
3	19dB
4	22dB
5	25dB

<AuxInputGain>	Description
0	MUTE
1	13dB
2	34dB
3	46dB

<MicInputGain>	Description
0	MUTE
1	13dB
2	25dB
3	34dB
4	46dB

<TxAGCGain>	Description
0	0dB
1	3dB
2	6dB

<Volume>, <MaxVolume>	Description
0	MUTE
1-9	Volume levels 1-9

<MicPath>, <SpkPath>	Description
0	OFF
1	MUTE
2	Internal (using microphone/speaker)
3	External (using ATMS/AFMS)

<TxPCM>, <RxPCM>	Description
0	13bit PCM
1	16bit PCM

<HFAlgorithm>	Description
0	No handsfree
1	Advanced handsfree
2	Switching handsfree
3	No handsfree handheld
4	No handsfree external

<LocalAudio>	Description
0	Local audio mode off
1	Local audio microphone/no speaker
2	Local audio no microphone/speaker
3	Local audio microphone/speaker

<TxGainLow>	Description
0	Tx gain normal
1	Tx gain –7 dB

<MicVolt2V>	Description
0	Microphone voltage at 2.5V
1	Microphone voltage at 2V

<SideTone>, <NoiseRed>, <EchoCancel>, <AnalogRing>	Description
0	OFF
1	ON

Examples

AT*E2EAMS=?
*E2EAMS=(0-21,255)
OK

Current default profile is 0:

AT*E2EAMS?
*E2EAMS: 2,2,3,2,3,2,5,9,3,3,0,1,0,0,0,1,1,1,1,1,1
OK

Sets current profile with these settings:

AT*E2EAMS=0,2,1,2,0,0,2,5,9,2,2,0,1,0,0,0,1,1,0,0,1,1
OK

Sets TxPGA gain to 0dB:

AT*E2EAMS=1,2
OK

Turns analog ringing off:

AT*E2EAMS=20,0
OK

Save current profile to currently loaded profile in non-volatile memory:

AT*E2EAMS=255
OK

4.2 AT*E2APR   M2M Audio Profile Manipulation

Description	Command	Possible Responses
Request operation with audio profile	AT*E2APR= <op>[,<prnum1> [,<prnum2>]]	• ERROR • OK • *E2APR: <TxPGA>,<RxPGA>, <SideToneGain>,<AuxInGain>, <MicInGain>,<TxAGC>, <Volume>,<MaxVolume>, <MicPath>,<SpkPath>, <TxPCM>,<RxPCM>, <HFAlgorithm>,<LocalAudio>, <TxGainLow>,<MicVolt2V>, <SideTone>,<NoiseRed>, <EchoCancel>,<AnalogRing> • OK
Show the current setting	AT*E2APR?	• *E2APR: current <prnum> • ERROR
Show if the command is supported	AT*E2APR=?	• *E2APR: (list of supported <op>s), (list of supported <prnum1>s), (list of supported <prnum2>s) • ERROR

This command allows the maniuplation and storage of the audio "profiles" stored in the MS. The requirement for the 2nd and 3rd parameters depend on the operation being carried out.

Using the command you can:

• Set one of the three audio profiles 0, 1 or 2 as the current profile. This will load the profile's settings from NVM and implement them.

• Read one of the audio profiles. The current settings for the profile number defined will be displayed.

• Copy all parameters from one profile into another.

• Reset any of the profiles. This will reinstate the factory defaults for the profile:
  - 0 is the handset profile,
  - 1 is the portable handsfree profile,
  - 2 is the car kit profile.

• Set a profile as the default profile on next power up.

<op>	Description
0	Set profile <prnum1> to set as current
1	Copy profile <prnum1> to <prnum2>
2	Read profile <prnum1> settings
3	Reset profile <prnum1> to factory default
4	Set default profile as <prnum1>. Will store this as defautl profile in NVM, and use it as default from next power on

<prnum1>, <prnum2>	Description
0	Profile 0 (Factory profile set for handset). **Default value**
1	Profile 1 (Factory profile set for portable handsfree)
2	Profile 2 (Factory profile set for car kit)

Examples

AT*E2APR=?
*E2APR= (0-4),(0-2),(0-2)
OK

Current default profile is profile 0:

AT*E2APR?
*E2APR: 0
OK

Set audio profile now used to profile 1:

AT*E2APR=0,1
OK

Audio profile 1 settings:

AT*E2APR=1,1
*E2APR: 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
OK

Copy audio profile 1 to audio profile 2:

AT*E2APR=2,1,2
OK

Reset audio profile 1 with factory default - this also resets the current audio paths to the new profile as 1 is currently used:

AT*E2APR=3,1
OK

Sets profile number 1 as the default when module is powered on:

AT*E2APR=4,1
OK

4.3 AT*EALR   Ericsson Audio Line Request

Description	Command	Possible Responses
Request the audio lines (ATMS,AFMS)	AT*EALR=<mode> [,<activation> [,<aud_status>]]	• *EALR: <mode>, <activation>,<resp> • OK • ERROR
Show the current setting	AT*EALR?	*EALR: <mode>,<activation>, <resp>
Show if the command is supported	AT*EALR=?	*EALR:(list of supported <mode>s, <activation>s and <aud_status>s parameters)

Included for compatibility. No functionality.

<mode>	Description
0	No request for ATMS or AFMS
1	Request ATMS and not AFMS
2	Request AFMS and not ATMS
3	Request ATMS and AFMS

<activation>	Description
0	Not direct activated audio accessory (e.g. cordless portable hands free)
1	Direct activated audio accessory (e.g. vehicle hands free)

<aud_status>	Description
0	No change of the audio status
1	Audio hand over. Accessory hands over control of both the audio lines and the call to the phone
2	Audio demand. Accessory demands control of both the audio lines and the call

<resp>	Description
0	Disable ATMS and AFMS
1	Enable ATMS and disable AFMS
2	Disable ATMS and enable AFMS
3	Enable ATMS and AFMS

4.4 AT*EAMS   *Ericsson Audio Mode Selection*

Description	Command	Possible Responses
Sets the audio mode for the application	AT*EAMS=<internal_voice_alg>[,<noise_reduction> [,<side tone> [,<short_echo_canceling> [,<ATMS_gain> [,<class> [,<ATMS_sensitivity_deviation _from_class> [,<AFMS_sensitivity_deviation _from_class>]]]]]]]	• OK • ERROR
Show the current setting	AT*EAMS?	*EAMS:<internal_voice_alg >, <noise_reduction>, <side_tone>, <short_echo_canceling>, <AFMS_gain>,<class>,<ATMS_sensitivity_deviation_from_class>,<AFMS_sensitivity_deviation_from_class>
Show if the command is supported	AT*EAMS=?	*EAMS: (list of supported <internal_voice_alg >s, <noise_reduction>s, <side_tone>s, <short_echo_canceling>s, <AFMS_gain>s, <class>s, <ATMS_sensitivity_deviation_from_class>s, <AFMS_sensitivity_deviation_from_class>s)

Included for compatibility. No functionality.

<internal_voice_alg>	Description
0	None
1	Semi Duplex
2	Full Duplex (Note! the internal hands free algorithm in the MS contains echo cancelling)

<noise_reduction>	Description
0	Off
1	On

<side_tone>	Description
0	Off
1	On

<short_echo_canceling>	Description
0	Off
1	On

<ATMS_gain>	Description
0	Normal (0 dB) (internal voice processing)

<Class>	Description
0	None
1	Low end, class reference Hector
2	Mid End, class reference Scott
3	High End, class reference Hasse

<ATMS_sensitivity_deviation_from_class>, <AFMS_sensitivity_deviation_from_class>	Description
0	0 dB
1	2,5 dB
2	−2,5 dB
3	5,0 dB
4	−5,0 dB

4.5 AT*EARS   Ericsson Audio Ring Signal

Description	Command	Possible Responses
Request analogue ring signal in the loudspeaker	AT*EARS=<mode>	• OK • ERROR
Show the current setting	AT*EARS?	*EARS: <mode>
Show if the command is supported	AT*EARS=?	*EARS: (list of supported <mode>s)

Included for compatibility. No functionality.

<mode>	Description
0	Disable analogue ring signal
1	Enable analogue ring signal

4.6 AT*E2PHFB   Portable Handsfree Button Sense Enable

Description	Command	Possible Responses
Set PHF functionality	AT*E2PHFB=<op>	• ERROR • OK
Show the current setting	AT*E2PHFB?	*E2PHFB: <op>
Show if the command is supported	AT*E2PHFB=?	• *E2PHFB: (list of supported <op>s • ERROR

This command allows the user to set the functionality for a PHF (portable handsfree) button, as used on simple handsfree equipment. When set to ON, the MS will detect the shortcircuit of the ATMS and AFMS lines, and interpret this as a PHF button press. This has the effect of answering/hanging up a call without recourse to AT commands.

<op>	Description
0	Disable PHF button. **Default value**
1	Enable PHF button

4.7 AT*ELAM   Ericsson Local Audio Mode

Description	Command	Possible Responses
Set local audio mode	AT*ELAM=<mic> [,<loudspeaker>]	• *ELAM: <mic>, <loudspeaker> • OK • ERROR
Show the current setting	AT*ELAM?	*ELAM: <mic>,<loudspeaker>
Show if the command is supported	AT*ELAM=?	*ELAM: (list of supported <mic>s and <loudspeaker>s parameters)

Included for compatibility. No functionality.

<mic>	Description
0	Off
1	Microphone analogue

<loudspeaker>	Description
0	Off
1	Loudspeaker analogue

4.8 AT*EMIC   Ericsson Microphone Mode

Description	Command	Possible Responses
Enables/disables the phone microphone	AT*EMIC=<mode>	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT*EMIC?	• *EMIC: <mode> • +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT*EMIC=?	• *EMIC: (list of supported <mode>s) • +CME ERROR: <err> • OK • ERROR

Included for compatibility. No functionality.

<mode>	Description
0	Microphone is disabled (off)
1	Microphone is enabled (on)

4.9 AT*EMIR   Ericsson Music Mute Indication Request

Description	Command	Possible Responses
Request for mute indications	AT*EMIR=<mode>	• OK • ERROR
Show the current setting	AT*EMIR?	*EMIR: <mode>,<resp>
Show if the command is supported	AT*EMIR=?	*EMIR: (list of supported <mode>s)

Included for compatibility. No functionality.

<mode>	Description
0	Off, music mute indication result codes will not be sent to the accessory
1	On, music mute indication result codes will be sent to the accessory

<resp>	Description
0	Music mute inactive
1	Music mute active

4.10 AT*EPRR   Ericsson Personal Ring Type Read

Description	Command	Possible Responses
Read phone number and ring type	AT*EPRR=<indexr>	• *EPRR: <indexr>,<number>, <type>,<sound type> • +CME ERROR <err> • OK • ERROR
Show if the command is supported	AT*EPRR=?	• *EPRR: (list of supported <indexr>s) • +CME ERROR <err> • OK • ERROR

Returns phone number, phone number type and sound type in location number <indexr>. If listing fails an error, +CME ERROR: <err>, is returned.

<indexr>	Description
1-50	Value of location number

<number>	Description
string type	Phone number of format <type>

<type>	Description
integer format	Type of address octet (refer GSM 04.08 [4] section 10.5.4.7)
128	Unknown numbering plan, national / international number unknown
129	ISDN / telephony numbering plan, national / international unknown
145	ISDN / telephony numbering plan, international number
161	ISDN / telephony numbering plan, national number
128 - 255	Other values refer GSM 04.08 [4] section 10.5.4.7

<sound type>	Description
0	Off. **Not supported**
1	Low ring signal
2	Medium ring signal
3	High ring signal
4	Mixed ring signal

<sound type>	Description
5	Beep. **Not supported**
6	Alarm. **Not supported**
7	Calendar Tone. **Not supported**
8	Calendar Click. **Not supported**
9-10	Reserved. **Not supported**
11	Melody 1
12-20	Melody 2. Melody 10 reserved for pre-set melodies
21-30	Reserved for melody 11-20. **Not supported**
31-38	Own melody 1-8
39-50	Reserved for own melodies. **Not supported**

4.11 AT*EPRW   Ericsson Personal Ringtype Write

Description	Command	Possible Responses
Request Personal Ringtype Write command	AT*EPRW=<indexr>, <number>,[<type>], <soundtype>	• +CME ERROR <err> • OK • ERROR
Show if the command is supported	AT*EPRW=?	• *EPRW: (list of supported <indexr>s),<nlength>,(list of supported <type>s),(list of supported <sound type>s) • +CME ERROR <err> • OK • ERROR

Writes phone number, phone number type and sound type in location number <indexr>. It is possible to use wild cards for phone number by substituting the digits with question marks. If writing fails an error, +CME ERROR: <err>, is returned.

If all parameters but <indexr> are omitted, the personal ring type at position <indexr> will be deleted.

<indexr>	Description
1-50	Value of location number. The location number must be free. If the given location number is not free, ERROR is returned

<number>	Description
string type	phone number of format <type>

<type>	Description
Integer format	Type of address octet (refer to GSM 04.08 [4] section 10.5.4.7)
128	Unknown numbering plan, national/international number unknown
129	ISDN/telephony numbering plan, national/international number unknown
145	ISDN/telephony numbering plan, international number
161	ISDN/telephony numbering plan, national number
128 - 255	Other values refer to GSM 04.08 [4] section 10.5.4.7

<nlength>	Description
integer type	Value indicating the maximum length of field <number>

<sound type>	Description
0	Off. **Not supported**
1	Low ring signal
2	Medium ring signal
3	High ring signal
4	Mixed ring signal
5	Beep. **Not supported**
6	Alarm. **Not supported**
7	Calendar Tone. **Not supported**
8	Calendar Click. **Not supported**
9-10	Reserved. **Not supported**
11	Melody 1
12-30	Melody 2. Melody 20 reserved for pre-set melodies
31-38	Own melody 1-8
39-50	Reserved for own melodies. **Not supported**

4.12 AT*ERIL   Ericsson Ring Level Set

Description	Command	Possible Responses
Sets ring volume for the ring signals used for incoming voice (L1 and L2), fax and data calls	AT*ERIL=<volume>[,<call type> [,<place>]]	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT*ERIL?	• *ERIL: <volume1>[,<call type1> [,<place1> [<CR><LF>…*ERIL: <volume n>[, <call type n> [,<place n>]]]]] • +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT*ERIL=?	• *ERIL: (list of supported <volume>s)[,(list of supported <call type>s) [,(list of supported <place>s)]] • +CME ERROR: <err> • OK • ERROR

Used to set the volume for the ring signals used for incoming voice, Line 1, Line 2, fax and data calls. The parameter <place> controls the ring level set for different types of modes. The signal volume is specified as "step", with an increasing volume for each signal, or as a selected level.

Line 1 is the default for <call type> if the parameter is not given.

<volume>	Description
0	Off
1-6	Volume setting, not increasing ring
129-134	Volume setting, increasing ring

<calltype>	Description
1	Line 1
2	Line 2
3	Fax
4	Data
5	Alarm. **Not supported**

<place>	Description
0	Hand held
1	Car mounted

4.13 AT*ERIN   Ericsson Ring Set

Description	Command	Possible Responses
Sets ring type for incoming voice (L1 and L2), fax and data calls and alarm	AT*ERIN= <sound type>, [<call type>]	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT*ERIN?	• *ERIN: <sound type1>,<call type1> [<CR><LF>…*ERIN: <sound type n>,<call type n>] • +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT*ERIN=?	• *ERIN: list of supported <sound type>s, list of supported <call type>s • +CME ERROR: <err> • OK • ERROR

Used to set sound for incoming voice, line L1 and L2, fax, data calls and alarm. For each of the incoming call types and alarm: voice on line 1, voice on line 2, fax calls and data calls and alarm a sound type is selected.

The type of sound is either a ring signal, selected from a predefined set, a melody, selected from a predefined set, or an own melody, selected from a set specified by the user.

Line 1 is the default for <call type> if the parameter is not given.

<call type>	Description
1	Line 1
2	Line 2
3	Fax
4	Data
5	Alarm

<sound type>	Description
0	Off. **Not supported**
1	Low ring signal
2	Medium ring signal
3	High ring signal
4	Mixed ring signal
5	Beep. **Not supported**
6	Alarm. **Not supported**
7	Calendar Tone. **Not supported**
8	Calendar Click. **Not supported**
9-10	Reserved. **Not supported**
11-20	Melody 1. Melody 10 reserved for preset melodies
21-30	Reserved. **Not supported**
31-38	Own melodies 1-8
39-5	Reserved for own melodies. **Not supported**

4.14 AT*ERIP   Ericsson Ring Signal Playback Command

Description	Command	Possible Responses
Plays the selected sound type at specified volume level	AT*ERIP = <volume>,<sound type>	• +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT*ERIP=?	• *ERIP: (list of supported <volume>s),(list of supported <sound type>s) • OK • ERROR

Used to play one of the sound types which are available as ring signals/
message signals on the module. The signal volume may not be chosen
as "step"; with an increasing volume for each signal. If value 1 is chosen
for parameter <volume>, nothing should happen. Signal volume may be
chosen as a selected level.

<volume>	Description
0	Off
1	Step. **Not Supported**
2-n	Volume setting

Refer to the AT*ERIN command for the <sound type> parameter.

4.15 AT*ESMA   Ericsson Set Message Alert Sound

Description	Command	Possible Responses
Sets the answer mode settings in the MS	AT*ESMA=<mode>	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT*ESMA?	• *ESMA: <mode> • +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT*ESMA=?	• *ESMA: list of supported <mode>s • +CME ERROR: <err> • OK • ERROR

<mode >	Description
0	Answer mode is not set to "Any key", or "Auto" (off)
1	Any Key mode on
2	Auto mode on

4.16 AT*ESOM   Ericsson Settings Own Melody

Description	Command	Possible Responses
Sets the own melodies in the MS	AT*ESOM= [<melody index>], <melody string>	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT*ESOM?	• *ESOM: <melody index> ,<melody string 1>, <CR><LF> ......*ESOM: <melody index>, <melody string n> • +CME ERROR: <err> • OK • ERROR
Shows if the command is supported	AT*ESOM=?	• *ESOM: (list of supported <melody index>),(list of supported <pause>s),(list of supported <prefix>s),(list of supported <tone>s), <mlength>,<mtones> • +CME ERROR: <err> • OK • ERROR

Sets the user defined own melodies in the MS. The <prefix> and <tone> indicates together the tone frequency and duration. The <pause> sets a pause between tones.

Test command returns the possible values of <melody index>, <pause>, <prefix>, <tone>, <mlength> and <mtones>.

<melody index>	*Description*
1-4	Melody 1 – 4. **Default setting: 1**

<melody string>	*Description*
string	A sequence of <tones> and <pause> entries. The <tones> may be preceded by one or two <prefix>(s)

<pause>	*Description*
p	Pause

<prefix>	*Description*
#	Half tone higher
(b)	Half tone lower
+	One octave higher

<tones>	*Description*
c,d,e,f,g,a,b	Short tones
C,D,E,F,G,A,B	Long tones

<mtones>	*Description*
integer	Indicating the maximum number of tones in a melody

<mlength>	*Description*
integer	Indicating the maximum length of <melody string>

4.17 AT*EXVC   Ericsson Set External Volume Control

Description	Command	Possible Responses
Sets the maximum volume level on the audio lines	AT*EXVC=<external volume>	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT*EXVC?	• *EXVC: <external volume> • +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT*EXVC=?	• *EXVC: (list of supported <external volume>s) • +CME ERROR: <err> • OK • ERROR

Used to set or query whether an external accessory such as the vehicle handsfree controls the audio volume.

By default, the <external volume> is turned off, i.e. the volume over AFMS is controlled by the phone MMI.

The set command is effective only as long as the phone senses that it is connected to an external accessory that has issued the command. Once the phone and the accessory are disconnected the <external volume> setting returns to default.

<external volume>	Description
0	The phone MMI controls audio volume over AFMS
1	Audio volume over AFMS is output at maximum level that is no clipping occurs. An external accessory such as a vehicle kit controls the actual volume level heard by the user

4.18 ATM   *Monitor Speaker Control*

Description	Command	Possible Responses
Set monitor speaker control	ATM[=][<speaker>]	• OK • ERROR
Show the current setting	ATM?	M: <speaker>
Show if the command is supported	ATM=?	M: (list of supported <speaker>s)

Define the activity of the speaker. This command is ignored by the modem and is only included for compatibility.

<speaker>	Description
0	Off during the entire call. **Default value**
1-3	Different "on" modes

5. Data - CSD/HSCSD

Note!   Since the module does not support V42bis compression the following commands have not been implemented:

- AT+DS
- AT+DR

5.1 AT+CBST   *Select Bearer Service Type*

Description	Command	Possible Responses
Select bearer service type	AT+CBST=[<speed>, [<name>,[<ce>]]]	• OK • ERROR
Show the current setting	AT+CBST?	• +CBST: <speed>,<name>, <ce> • OK • ERROR
Show if the command is supported	AT+CBST=?	• +CBST: (list of supported <speed>s,list of supported <name>s, list of supported <ce>s) • OK • ERROR

Selects the bearer service <name> with data rate <speed>, and the connection element <ce> to be used when data calls are originated. Values may also be used during mobile terminated data call setup, especially in the case of single numbering scheme calls.

Test command returns values supported by the TA as compound values.

<speed>	Description
0	Auto selection of baud rate
4	2400bps V.22bis
6	4800bps V.32
7	9600bps V.32
12	9600bps V.34
15	19200bps V.34
68	2400bps V.110 (ISDN)
70	4800bps V.110 (ISDN)

<speed>	Description
71	9600 bps V.110 (ISDN)
75	14400 bps V.110 (ISDN)
79	19200 bps V.110 (ISDN)
80	28800 bps V.110 (ISDN)
81	38400 bps V.110 (ISDN)
82	48000 bps V.110 (ISDN)
83	56000 bps V.110 (ISDN)

<name>	Description
0	Asynchronous connection (UDI or 3.1 kHz modem)

<ce>	Description
1	Non transparent

5.2 AT+CRLP *Radio Link Protocol*

Description	Command	Possible Responses
Set radio link protocol	AT+CRLP=[<iws> [,<mws>[,<T1> [,<N2>[,<ver> [, <T4>]]]]]]	• OK • ERROR
Show the current setting	AT+CRLP?	• +CRLP: <iws>,<mws>,<T1>,<N2>[,<ver1> [,<T4>]][<CR><LF> • +CRLP: <iws>,<mws>,<T1>,<N2>[,<ver2> [,<T4>]][...]] • OK • ERROR
Show if the command is supported	AT+CRLP=?	• +CRLP: (list of supported <iws>s), (list of supported <mws>s), (list of supported <T1>s), (list of supported<N2>s)[,<ver1> [,(list of supported <T4>s)]] [<CR><LF>+CRLP: (list of supported <iws>s), (list of supported <mws>s), (list of supported <T1>s), (list of supported <N2>s)[,<ver2>[,(list of supported <T4>s)]][...]] • OK • ERROR

Radio link protocol (RLP) parameters used when non-transparent data calls are originated may be altered with this command. Available command subparameters depend on the RLP versions implemented by the device (e.g. <ver> may not be available if device supports only versions 0 and 1).

Read command returns current settings for each supported RLP version <verx>. Only RLP parameters applicable to the corresponding <verx> are returned.

Test command returns values supported by the TA as a compound value. If ME/TA supports several RLP versions <verx>, the RLP parameter value ranges for each <verx> are returned in a separate line.

<iws>	Description
120 0 - 496	IWF to MS window size

<mws>	Description
120 0 - 496	MS to IWF window size

<T1>	*Description*
48 38 - 100	Acknowledgment timer T1 (*10ms)

<N2>	*Description*
6 0 - 255	Re-transmission attempts N2

<T4>	*Description*
5 3 - 255	Re-sequencing period T4 (*10ms)

<ver>	*Description*
Integer	RLP version. When version indication is not present, <ver>=0 is assumed

Example

AT+CRLP?
+CRLP: 61,61,48,6,0
+CRLP: 120,120,48,6,2,3

OK

6. Data - GPRS

6.1 AT+CGACT   PDP Context Activate or Deactivate

Description	Command	Possible Responses
Activate or deactivate the specified PDP context(s)	+CGACT=[<state> [,<cid>[,<cid>[,...]]]]	• +CME ERROR: <err> • OK • ERROR
Show the current setting	+CGACT?	• +CGACT: <cid>, <state>[<CR><LF> +CGACT: <cid>, <state>[...]] • OK • ERROR
Show if the command is supported	+CGACT=?	• +CGACT: (list of supported <state>s) • OK • ERROR

Used to activate or deactivate the specified PDP context(s).

After the command has completed, the MS remains in V.250 command state. If the MS is already in the requested state, the command is ignored and OK is returned. If the requested state cannot be achieved, ERROR or +CME: ERROR is returned. If the MS is not attached to the GPRS service when the activation form of the command is executed, the MS first performs a GPRS attach and then attempts to activate the specific contexts.

If no <cid>s are specified the activation form of the command activates all defined contexts.

If no <cid>s are specified the deactivation form of the command deactivates all active contexts.

<state>	Description
0	PDP context activation deactivated
1	PDP context activation activated

<cid>	Description
Integer type	A numeric parameter which specifies a specific PDP context definition

6.2 AT+CGATT   GPRS Attach or Detach

Description	Command	Possible Responses
Attach or detach MS to the GPRS/packet domain/packet domain service	+CGATT=[<state>]	• +CME ERROR: <err> • OK • ERROR
Show the current setting	+CGATT?	• +CGATT: <state> • OK • ERROR
Show if the command is supported	+CGATT=?	• +CGATT: (list of supported <state>s) • OK • ERROR

Used to attach the MS to, or detach the MS from, the GPRS/packet domain service. After the command has completed, the MS remains in V.250 command state. If the MS is already in the requested state, the command is ignored and the OK response is returned. If the requested state cannot be achieved, an ERROR or +CME ERROR response is returned. Extended error responses (enabled by the +CMEE command) are listed under "+CME ERROR (Mobile Equipment Error Code)", page 85.

Any active PDP contexts will be automatically deactivated when the attachment state changes to detached.

Note!   This command has the characteristics of both the V.250 action and parameter commands. Hence it has the read form in addition to the execution/set and test forms.

<state>	Description
0	Detached
1	Attached

6.3 AT+CGDATA Enter Data State

Description	Command	Possible Responses
Establish GPRS/packet domain connection	+CGDATA=[<L2p>,[cid [,cid>[,...]]]]	• CONNECT • ERROR • OK • ERROR
Show if the command is supported	+CGDATA=?	• +CGDATA: (list of supported <L2P>s) • OK • ERROR

Causes the MS to perform whatever actions are necessary to establish communication between the TE and the network using one or more GPRS/packet domain PDP types. This may include performing a GPRS/packet domain attach and one or more PDP context activations.

<L2P>	Description
PPP	Point-to-point protocol for a PDP such as IP

6.4 AT+CGDCONT Define PDP Context

Description	Command	Possible Responses
Select PDP context parameters	+CGDCONT=[<cid> [,<PDP_type> [,<APN> [,<PDP_addr> [,<d_comp> [,<h_comp> [,<pd1> [,...[,pdN]]]]]]]]	• +CME ERROR: <err> • OK • ERROR
Show the current setting	+CGDCONT?	• +CGDCONT: <cid>, <PDP_type>,<APN>, <PDP_addr>,<d_comp>, <h_comp>[,<pd1>[,...[,pdN]]] [<CR><LF>+CGDCONT: <cid>, <PDP_type>,<APN>, <PDP_addr>,<d_comp>, <h_comp>[,<pd1>[,...[,pdN]]] [...]] • OK • ERROR
Show if the command is supported	+CGDCONT=?	• +CGDCONT: (range of supported <cid>s), <PDP_type>,,,(list of supported <d_comp>s), (list of supported <h_comp>s) [,(list of supported <pd1>s) [,...[,(list of supported <pdN>s)]]] [<CR><LF>+CGDCONT: (range of supported <cid>s), <PDP_type>,,,(list of supported <d_comp>s), (list of supported <h_comp>s) [,(list of supported <pd1>s)[,...[,(list of supported <pdN>s)]]] [...]] • OK • ERROR

Specifies PDP context parameter values for a PDP context identified by the (local) context identification parameter, <cid>.

<cid>	Description
Integer type	(PDP Context Identifier) a numeric parameter which specifies a particular PDP context definition. The parameter is local to the TE-MS interface and is used in other PDP context-related commands. The range of permitted values (minimum value = 1) is returned by the test form of the command
1-10	Supported values. **Ericsson specific**

<PDP_type>	Description
IP	Internet Protocol (IETF STD 5)

<APN>	Description
String type	(Access Point Name) a string parameter which is a logical name that is used to select the GGSN or the external packet data network. If the value is null or omitted, then the subscription value will be requested

<PDP_address>	Description
String type	A string parameter that identifies the MS in the address space applicable to the PDP. If the value is null or omitted, then a value may be provided by the TE during the PDP startup procedure or, failing that, a dynamic address will be requested

<d_comp>	Description
0	PDP data compression OFF
1	PDP data compression ON
2..255	Reserved

<h_comp>	Description
0	PDP header compression OFF
1	PDP header compression ON
2..255	Reserved

<pdN>	Description
String type	Zero to N string parameters whose meanings are specific to the <PDP_type>

6.5 AT+CGEREP   GPRS Event Reporting

Description	Command	Possible Responses
Set command	+CGEREP=[<mode>[,<bfr>]]	• +CME ERROR: <err> • OK • ERROR
Show the current setting	+CGEREP?	• +CGEREP: <mode>,<bfr> • OK • ERROR
Show if the command is supported	+CGEREP=?	• +CGEREP: (list of supported <mode>s),(list of supported <bfr>s) • OK • ERROR

Enables or disables the sending of unsolicited result codes, +CGEV: XXX from MS to TE in the case of certain events occurring in the GPRS/packet domain MS or the network.

<mode>	Description
0	Buffer unsolicited result codes in the MS. No codes are forwarded to the TE
1	Discard unsolicited result codes when MS-TE link is reserved; otherwise forward them directly to the TE

<bfr>	Description
0	MS buffer of unsolicited result codes defined within this command is cleared when <mode> 1 or 2 is entered

6.6 AT+CGPADDR Show PDP Address

Description	Command	Possible Responses
Show PDP addresses for specified CIDs	+CGPADDR=[<cid> [,<cid> [,...]]]	• +CGPADDR: <cid>,<PDP_addr> [<CR><LF>+CGPADDR: <cid>,<PDP_addr> [...]] • OK • ERROR
Show if the command is supported	+CGPADDR=?	• +CGPADDR: (list of defined <cid>s) • OK • ERROR

Returns a list of PDP addresses for the specified context identifiers. The test command returns a list of defined <cid>s.

<cid>	Description
Integer type	Parameter which specifies a particular PDP context definition (see +CGDCONT command). If no <cid> is specified, the addresses for all defined contexts are returned

<PDP_address>	Description
String type	A string that identifies the MS in the address space applicable to the PDP. The address may be static or dynamic. For a static address, it will be the one set by the +CGDCONT command when the context was defined. For a dynamic address it will be the one assigned during the last PDP context activation that used the context definition referred to by <cid>. <PDP_address> is omitted if none is available

6.7 AT+CGQMIN Quality of Service Profile (Minimum Acceptable)

Description	Command	Possible Responses
Set minimum acceptable profile	+CGQMIN=[<cid> [,<precedence> [,<delay> [,<reliability> [,<peak> [,<mean>]]]]]]	• +CME ERROR: <err> • OK • ERROR
Show the current setting	+CGQMIN?	• +CGQMIN: <cid>, <precedence>, <delay>, <reliability>, <peak>, <mean>[<CR><LF>+CGQMIN: <cid>, <precedence>, <delay>, <reliability>, <peak>, <mean>[…]] • OK • ERROR
Show if the command is supported	+CGQMIN=?	• +CGQMIN: <PDP_type>, (list of supported <precedence>s), (list of supported <delay>s), (list of supported <reliability>s) , (list of supported <peak>s), (list of supported <mean>s)[<CR><LF>+CGQMIN: <PDP_type>, (list of supported <precedence>s), (list of supported <delay>s), (list of supported <reliability>s) , (list of supported <peak>s), (list of supported <mean>s)[…]] • OK • ERROR

Allows the TE to specify a minimum acceptable profile which is checked by the MS against the negotiated profile returned in the Activate PDP Context Accept message.

The set command specifies a profile for the context identified by the (local) context identification parameter, <cid>. Since this is the same parameter that is used in the +CGDCONT command, the +CGQMIN command is effectively an extension to the +CGDCONT command. The QoS profile consists of a number of parameters, each of which may be set to a separate value.

A special form of the set command, +CGQMIN=<cid> causes the minimum acceptable profile for context number <cid> to become undefined. In this case no check is made against the negotiated profile.

<cid>	Description
Integer type	Parameter which specifies a particular PDP context definition

<precedence>	Description
0	Subscribed (from network) value used
1	High priority
2	Normal priority
3	Low priority

<delay>	Description
0	Subscribed (from network) value used
1-4	Delay class

<reliability>	Description
0	Subscribed (from network) value used
1-5	Reliability class

<peak>	Description
0	Subscribed (from network) value used
1	Up to 1000 (8kbits/s)
2	Up to 2000 (16kbits/s)
3	Up to 4000 (32kbits/s)
4	Up to 8000 (64kbits/s)
5	Up to 16000 (128kbits/s)
6	Up to 32000 (256kbits/s)
7	Up to 64000 (512kbits/s)
8	Up to 128000 (1024kbits/s)
9	Up to 256000 (2048kbits/s)

<mean>	Description
0	Subscribed (from network) value used
1	Best effort
2	100 (~0.22bits/s)
3	200 (~0.44bits/s)
4	500 (~1.11bits/s)
5	1000 (~2.2bits/s)
6	2000 (~4.4bits/s)
7	5000 (~11.1bits/s)

<mean>	Description
8	10000 (~22 bits/s)
9	20000 (~44 bits/s)
10	50000 (~111 bits/s)
11	100000 (~0.22 kbits/s)
12	200000 (~0.44 kbits/s)
13	500000 (~1.11 kbits/s)
14	1000000 (~2.2 kbits/s)
15	2000000 (~4.4 kbits/s)
16	5000000 (~11.1 kbits/s)
17	10000000 (~22 kbits/s)
18	20000000 (~44 kbits/s)
31	50000000 (~111 kbits/s)

6.8 AT+CGQREQ Quality of Service Profile (Requested)

Description	Command	Possible Responses
Set quality of service profile	+CGQREQ=[<cid> [,<precedence> [,<delay> [,<reliability> [,<peak> [,<mean>]]]]]]	• +CME ERROR: <err> • OK • ERROR
Show the current setting	+CGQREQ?	• +CGQREQ: <cid>, <precedence>, <delay>, <reliability>, <peak>, <mean>[<CR><LF>+CGQREQ: <cid>, <precedence>, <delay>, <reliability>, <peak>, <mean>[...]] • OK • ERROR
Show if the command is supported	+CGQREQ=?	• +CGQREQ: <PDP_type>, (list of supported <precedence>s), (list of supported <delay>s), (list of supported <reliability>s), (list of supported <peak>s), (list of supported <mean>s) [<CR><LF>+CGQREQ: <PDP_type>, (list of supported <precedence>s), (list of supported <delay>s), (list of supported <reliability>s), (list of supported <peak>s), (list of supported <mean>s)[...]] • OK • ERROR

Allows the TE to specify a quality of service profile that is used when the MS sends an activate PDP context request message to the network.

The set command specifies a profile for the context identified by the (local) context identification parameter, <cid>. Since this is the same parameter that is used in the +CGDCONT command, the +CGQREQ command is effectively an extension to the +CGDCONT command. The QoS profile consists of a number of parameters, each of which may be set to a separate value.

A special form of the set command, +CGQREQ= <cid> causes the requested profile for context number <cid> to become undefined.

<cid>	Description
Integer type	Parameter which specifies a particular PDP context definition

<precedence>	Description
0	Subscribed (from network) value used
1	High priority
2	Normal priority
3	Low priority

<delay>	Description
0	Subscribed (from network) value used
1-4	Delay class

<reliability>	Description
0	Subscribed (from network) value used
1-5	Reliability class

<peak>	Description
0	Subscribed (from network) value used
1	Up to 1000 (8kbits/s)
2	Up to 2000 (16kbits/s)
3	Up to 4000 (32kbits/s)
4	Up to 8000 (64kbits/s)
5	Up to 16000 (128kbits/s)
6	Up to 32000 (256kbits/s)
7	Up to 64000 (512kbits/s)
8	Up to 128000 (1024kbits/s)
9	Up to 256000 (2048kbits/s)

<mean>	Description
0	Subscribed (from network) value used
1	Best effort
2	100 (~0.22 bits/s)
3	200 (~0.44 bits/s)
4	500 (~1.11 bits/s)
5	1000 (~2.2 bits/s)
6	2000 (~4.4 bits/s)
7	5000 (~11.1 bits/s)
8	10000 (~22 bits/s)
9	20000 (~44 bits/s)
10	50000 (~111 bits/s)
11	100000 (~0.22 kbits/s)
12	200000 (~0.44 kbits/s)
13	500000 (~1.11 kbits/s)
14	1000000 (~2.2 kbits/s)
15	2000000 (~4.4 kbits/s)
16	5000000 (~11.1 kbits/s)
17	10000000 (~22 kbits/s)
18	20000000 (~44 kbits/s)
31	50000000 (~111 kbits/s)

6.9 AT+CGREG   GPRS Network Registration Status

Description	Command	Possible Responses
Set command	AT+CGREG=[<n>]	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT+CGREG?	• +CGREG: <n>,<stat>[,<lac>, <ci>] • +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CGREG=?	• +CGREG: (list of supported <n>s) • OK • ERROR

Controls the presentation of an unsolicited result code +CGREG: <stat> when <n>=1 and there is a change in the GPRS/packet domain network registration status of the MS, or code +CGREG: <stat>[,<lac>,<ci>] when <n>=2 and there is a change of the network cell.

Note!   If the GPRS/Packet Domain MS also supports circuit mode services, the +CGREG command and +CGREG: result code apply to the registration status and location information for those services.

<n>	Description
0	Disable network registration unsolicited result code
1	Enable network registration unsolicited result code
2	Enable network registration and location information unsolicited result code

<stat>	Description
0	Not registered, MS is not searching for a new operator to register with
1	Registered, home network
2	Not registered, but MS is searching for a new operator to register with
3	Registration denied
4	Unknown
5	Registered, roaming

<lac>	Description
String type	Two byte location area code in hexadecimal format

<ci>	Description
String type	Two byte cell ID in hexadecimal format

Example

AT+CGREG?
+CGREG: 0,3

OK

6.10 AT+CGSMS Select Service for MO SMS Messages

Description	Command	Possible Responses
Set service or service preference	+CGSMS=[<service>]	• OK • ERROR
Show the current setting	+CGSMS?	• +CGSMS: <service> • OK • ERROR
Show if the command is supported	+CGSMS=?	• +CGSMS: (list of available <service>s) • OK • ERROR

Used to specify the service or service preference that the MS will use to send MO SMS messages. The read command returns the currently selected service or service preference.

<services>	Description
2	GPRS/packet domain preferred (use circuit switched if GPRS/packet domain not available)
3	Circuit switched preferred (use GPRS/packet domain if circuit switched not available)

7. Data - HSCSD

7.1 AT+CHSC   HSCSD Current Call Parameters

Description	Command	Possible Responses
Show the current setting	AT+CHSC	• +CHSC:<rx>,<tx>,<aiur>,<coding> • +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CHSC=?	• +CME ERROR: <err> • OK • ERROR

Returns information about the current HSCSD call parameters, i.e. the current number of receive and transmit timeslots, air interface user rate and channel coding.

<rx>	Description
0	No HSCSD call is active. See also note below
1	The number of receive timeslots currently in use is 1
2	The number of receive timeslots currently in use is 2

<tx>	Description
0	No HSCSD call is active. See also note below
1	The number of transmit timeslots currently in use is 1

<aiur>	Description
0	No HSCSD call is active. See also note below.
1	Current air interface user rate is 9.6kbits/s
3	Current air interface user rate is 19.2kbits/s

<coding>	Description
0	No HSCSD call is active. See also note
4	Current channel coding is 9.6kbits/s (TCH/F9.6)
8	Current channel coding is 14.4kbits/s (TCH/F14.4)

7.2 AT+CHSD   HSCSD Device Parameters

Description	Command	Possible Responses
Show the current setting	AT+CHSD	• +CHSD: <mclass>,<maxRx>, <maxTx>,<sum>,<codings> • +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CHSD=?	• +CME ERROR: <err> • OK • ERROR

Shows information about HSCSD features supported by the ME/TA.

<mclass>	Description
2	Multislot class is 2

<maxRx>	Description
2	Maximum number of receive timeslots that ME can use is 2

<maxTx>	Description
1	Maximum number of transmit timeslots that ME can use is 1

<sum>	Description
3	Total number of receive and transmit timeslots that ME can use at the same time is 3 (i.e. 2+1). The following applies in a HSCSD call: 2 (receive slots) + (transmit slots) <sum>

<codings>	Description
4	Indicates that the accepted channel coding for the next established non-transparent HSCSD call is 9.6kbits/s only

7.3 AT+CHSN   HSCSD Non Transparent Call Configuration

Description	Command	Possible Responses
Set HSCSD configuration. This command is also used during a call if new <wAiur> and/or <wRx> are/is desired	AT+CHSN=[<wAiur> [,<wRx>[,<topRx> [,<codings>]]]]	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT+CHSN?	• +CHSN: <wAiur>, <wRx>, <topRx>, <codings> • +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CHSN=?	• +CHSN: (list of supported <wAiur>s), (list of supported <wRx>s), (list of supported <topRx>s), (list of supported <codings>s) • +CME ERROR: <err> • OK • ERROR

Controls parameters for non-transparent HSCSD calls. Changing <topRx> or <codings> during a call does not affect the current call. Changing <wAiur> or <wRx> affects the current call only if <topRx> was non-zero when the call was established. When using the command in this way it comes in the "action" command category. This is what is referred to as user initiated up- and down-grading in GSM 02.34 and GSM 03.34.

Note! Recommended value for parameter <speed> in AT+CBST is 0.

<wAiur>	Description
0	TA/ME shall calculate a proper number of receive timeslots from currently selected fixed network user rate (<speed> parameter from +CBST command, and <codings>, and <wRx> (or <maxRx> from +CHSD command if <wRx>=0)
1	Wanted air interface user rate is 9.6kbit/s
2	Wanted air interface user rate is 14.4kbit/s
3	Wanted air interface user rate is 19.2kbit/s
4	Wanted air interface user rate is 28.8kbit/s

<wRx>	Description
0	TA/ME shall calculate a proper number of receive timeslots from currently selected <wAiur> and <codings> See note below
1	Wanted number of receive timeslots is 1
2	Wanted number of receive timeslots is 2

<topRx>	Description
0	Indicates that the user is not going to change <wAiur> and /or <wRx> during the next call
1	Top value for <wRx> that user is going to request during the next established non-transparent HSCSD call is 1
2	Top value for <wRx> that user is going to request during the next established non-transparent HSCSD call is 2

<codings>	Description
4	Indicates that the accepted channel coding for the next established non-transparent HSCSD call is 9.6kbit/s only

7.4 AT+CHSR   HSCSD Parameters Report

Description	Command	Possible Responses
Set HSCSD parameters reporting on or off	AT+CHSR=[<mode>]	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT+CHSR?	• +CHSR: <mode> • +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CHSR=?	• +CHSR: (list of supported <modes>s) • +CME ERROR: <err> • OK • ERROR

With this command enabled, the intermediate result code +CHSR:
<rx>,<tx>,<aiur>,<coding> is returned (from TA to TE) when an
HSCSD call is being set up. The result code represents the current
(negotiated or renegotiated) HSCSD parameters. If enabled, the
intermediate result code is transmitted at the point of the call setup
negotiation, where the ME/TA has determined what type of HSCSD
connection will be used. Result code transmission is done after possible
service (CR), error control (+ER), and/or compression (+DR) reporting,

but before possible TE-TA rate (+ILRR) reporting and before the intermediate result code CONNECT is transmitted. The format of the intermediate result code is:

+CHSR: <rx>,<tx>,<aiur>,<coding>

For the value definitions, refer to "AT+CHSC HSCSD Current Call Parameters", page 171. For instance, for a non-transparent HSCSD call, result code 'CHSR: 2, 1, 4, 8' means that the call has two timeslots downlink, one timeslot uplink, the air interface user rate is 28.8 kbits/s and the used channel coding is TCH/F14.4.

<mode>	Description
0	Disable reporting
1	Enable reporting

Itermediate Result Codes:

+CHSR: <rx>,<tx>,<aiur>,<coding>

7.5 AT+CHSU   HSCSD Automatic User Initiated Upgrading

Description	Command	Possible Responses
Set HSCSD automatic user initiated upgrading on or off	AT+CHSU=[<mode>]	• OK • ERROR
Show the current setting	AT+CHSU?	• +CHSU=<mode> • OK • ERROR
Show if the command is supported	AT+CHSU=?	• +CHSU: (list of supported <modes>s) • OK • ERROR

Enables or disables the HSCSD automatic user-initiated upgrade.

<mode>	Description
0	Disable use of UP bit for upgrading. **Default value**
1	Enable use of UP bit for upgrading

8. GPS Interoperability

8.1 AT*EENMEA   NMEA (GPS) Mode on UART2

Description	Command	Possible Responses
Enable NMEA commands on the UART	AT*EENMEA=<mode>	• OK • ERROR • +CME ERROR: < err>
Show the current setting	AT*EENMEA?	• *EENMEA:<mode> • +CME ERROR: <err>
Shows if the command is supported	AT*EENMEA=?	• *EENMEA: (list of supported <mode>s) • +CME ERROR: < err>

This command enables transmission of NMEA commands from UART1 to UART2 and vice versa. The module acts as a transparent link between the GPS device connected to UART2 and the application communicating with it on UART1.

When the application sends the command AT*EENMEA=2 the module is able to handle both AT and NMEA commands simultaneously. If the OK response is received the application can start handling both NMEA and AT commands. Otherwise the response ERROR is returned.

In the mode with simultaneous AT and NMEA commands, <CR> is required after each NMEA command and after the last AT command before the new NMEA. NMEA commands must start with a $. All NMEA commands are forwarded to UART2. All NMEA responses from UART2 are displayed as responses to UART1 along with AT responses.

By sending AT*EENMEA=0, the application ends AT and NMEA commands, simultaneous handling mode. It sends OK, and then returns to AT mode.

The port rate of UART1 for NMEA commands can be controlled using the AT*NMPR command.

Responses	Description
OK	The requested action has been performed
ERROR	Following causes of error are considered: - incorrect syntax - NMEA commands have already been enabled in other 07.10 channels

<mode>	Description
0	Disable NMEA communication. **Default value**
2	Enable NMEA communication simultaneously with AT commands

8.2 AT*E2NMPR Ericsson M2M Set NMEA (GPS) Port Rate

Description	Command	Possible Responses
Request operation to set data rate for GPS/ NMEA Port	AT*E2NMPR=<pr>	• ERROR • OK
Show the current setting	AT*E2NMPR?	*E2NMPR: <pr>
Show if the command is supported	AT*E2NMPR=?	• *E2NMPR: (list of supported <pr>s) • ERROR

This command allows the user to set the physical Data rate for the GPS/ NMEA port. The port rate will be set for the GPS/NMEA port only when NMEA is active - see AT*EENMEA.

<op>	Description
o	600 Baud rate
1	1200 Baud rate
2	2400 Baud rate
3	4800 Baud rate
4	9600 Baud rate. **Default value**
5	19200 Baud rate
6	38400 Baud rate
7	57600 Baud rate
8	115200 Baud rate
9	230400 Baud rate
10	460800 Baud rate

Examples

AT*E2NMPR=?
*E2NMPR=(0-10)
OK

Port rate currently set:

AT*E2NMPR?
*E2NMPR: 4
OK

Set GPS/NMEA port rate to 4800 baud:

AT*E2NMPR=2
OK

9. Fax

9.1 AT*E2FAX Ericsson M2M Fax Comm. Baud Rate Modification

Description	Command	Possible Responses
Request change of fax comm. baud rate	AT*E2FAX= <RcV>	• ERROR • OK
Show the current setting	AT*E2FAX?	• *E2FAX: <RcV> • ERROR
Shows if the command is supported	AT*E2FAX=?	• *E2FAX: (list of supported <RcV>s) • ERROR

This command allows the modification of the factory default RS232 comm. setting between standard 9600 baud and 19200 baud. This is needed as the addition of fax capabilities, within the module, require communication between fax applications and the module to run at a higher baud rate than the fax transmission baud rate (In this case the fastest transmission rate is 9600 baud). Once this command has been performed, the user must then execute the AT&F command to reset the module with the new RS232 comm's baud rate.

The AT*E2FAX command allows the user to:

• "Configure" the RS232 Comm. speed default factory profile, specifying whether the speed should be 9600 baud (standard) or 19200 baud for FAX application comm. This value will then be used once the AT&F command is next used.

• "Read" what value this default factory profile has been set to.

<RcV>	Description
0	Configure RS232 default setting to 9600 baud
1	Configure RS232 default setting to 19200 baud

Examples

AT*E2FAX=?

*E2FAX= (0-1)
OK

AT*E2FAX?

*E2FAX: 0   (Current default setting is 19200 baud)
OK

AT*E2FAX=0

OK   (Sets default RS232 setting to 9600 baud)

9.2 Low Level Fax Commands

The following table of low level fax commands are supported and used by the GM47 for fax operation.

AT+FAA	AT+FBADLIN	AT+FBADMUL
AT+FBOR	AT+FBUG	AT+FCIG
AT+FCLASS	AT+FCQ	AT+FCR
AT+FDCC	AT+FDFFC	AT+FDIS
AT+FDR	AT+FDT	AT+FECM
AT+FET	AT+FK	AT+FLID
AT+FLNFC	AT+FLPL	AT+FMDL?
AT+FMFR?	AT+FMI?	AT+FMINSP
AT+FMM?	AT+FMR?	AT+FPHCTO
AT+FPTS	AT+FRBC	AT+FREL
AT+FREV?	AT+FRH	AT+FRM
AT+FRS	AT+FSPL	AT+FTBC
AT+FTH	AT+FTM	AT+FTS
AT+FVRFC	AT+FWDFC	

10. Identification

10.1 AT   *Attention Command*

Description	Command	Possible Responses
Checks the communication between the MS and application	AT	• OK • +CME ERROR <err>

This command is used to determine the presence of an MS. If the MS supports AT commands, it returns an OK final result code.

10.2 AT&F   *Set to Factory Defined Configuration*

Description	Command	Possible Responses
Execute	AT&F	• OK • ERROR
Show if the command is supported	AT&F=?	&F: (list of supported <profile>s)

This command instructs the DCE to set all parameters to default values specified by the manufacturer, which may take in consideration hardware configuration and other manufacturer defined criteria.

10.3 AT&W   *Store User Profile*

Description	Command	Possible Responses
Stores the current user profile to non volatile memory	AT&W=[<pr>] or AT&W[<pr>]	• OK • ERROR
Show if the command is supported	AT&W=?	&W: (list of supported <pr>s)

This command stores the current user profile in non-volatile memory.

< pr>	Description
0	Stores current settings in User Profile 0

10.4 AT* List all Supported AT Commands

Description	Command	Possible Responses
List all implemented AT commands	AT*	<AT Command1> [<CR> <LF> <AT Command2>[...]] / <AT Command1> [<CR> <LF> <AT Command2>[...]]

Lists all the commands supported by the MS.

10.5 AT+CGMI Read MS Manufacturer Identification

Description	Command	Possible Responses
Request manufacturer identification	AT+CGMI	• <manufacturer> • +CME ERROR: <err>
Show if the command is supported	AT+CGMI=?	• OK • ERROR

Causes the MS to return one or more lines of information text.

<manufacturer>	Description
Sony Ericsson	This company's name is displayed

Example

AT+CGMI
Sony Ericsson

OK

10.6 AT+CGMM Read MS Model Identification

Description	Command	Possible Responses
Request the model identification	AT+CGMM	• <model type> <model name> • +CME ERROR: <err>
Show if the command is supported	AT+CGMM=?	• OK • ERROR

Causes the MS to return one or more lines of information text <model>, determined by the MS manufacturer. It is intended to permit the user of the ITAE/ETAE to identify the specific model of the MS to which it is

connected. Typically the text will consist of a single line containing the name of the product, but manufacturers may choose to provide more information if desired.

<model type>	Description
String type	A unique ASCII character/digit string, always 10 characters long. Spaces are used when the number of characters/digits is less than 10

<model name>	Description
String type	Model name for the transceiver unit, for example, GM47

Example

AT+CGMM
6100501-BVGM47

OK

10.7 AT+CGMR   Read MS Revision Identification

Description	Command	Possible Responses
Request MS revision identification string	AT+CGMR	• <revision> • +CME ERROR: <err>
Show if the command is supported	AT+CGMR=?	• OK • ERROR

This command causes the MS to return a string containing information about the software version.

<revision>	Description
String type	An ASCII string containing date (year, month, day, hour, minute) plus KRC number. Example: 9710051610 CXC125112

10.8 AT+CGSN   Read MS Product Serial Number Identification

Description	Command	Possible Responses
Request product serial number	AT+CGSN	• <sn> • +CME ERROR: <err>
Show if the command is supported	AT+CGSN=?	• OK • ERROR

This command causes the MS to return the IMEI (International Mobile station Equipment Identity), which identifies the individual ME.

<sn>	Description
String	The IMEISV, which is the IMEI (International Mobile station Equipment Identity; refer GSM 03.03) number of the ME and the software version number. Text shall not contain the sequence 0<CR> or OK<CR>

10.9 AT+GMI   Read Manufacturer Identification

Description	Command	Possible Responses
Request manufacturer identification	AT+GMI	<manufacturer>
Show if the command is supported	AT+GMI=?	• OK • ERROR

This command causes the DCE to transmit one or more lines of information text. Typically, the text will consist of a single line containing the name of the manufacturer, but may provide more information such as address and telephone number for customer service.

<manufacture>	Description
string type	The total number of characters, including line terminators, in the information text returned in response to this command shall not exceed 2048 characters. Note that the information text shall not contain the sequence "0" or "OK", so that DTE can avoid false detection of the end of this information text

10.10 AT+GMM   Read Model Identification

Description	Command	Possible Responses
Request revision identification	AT+GMM	<model>
Show if the command is supported	AT+GMM=?	• OK • ERROR

This command causes the DCE to transmit one or more lines of information text, determined by the manufacturer, which is intended to permit the user of the DCE to identify the specific model of device. Typically, the text will consist of a single line containing the name of the product, but manufacturers may choose to provide any information desired.

<model>	Description
string type	The total number of characters, including line terminators, in the information text returned in response to this command shall not exceed 2048 characters. Note that the information text shall not contain the sequence "0 " or "OK", so that DTE can avoid false detection of the end of this information text

10.11 AT+GMR   Read Revision Identification

Description	Command	Possible Responses
Request revision identification	AT+GMR	<revision>
Show if the command is supported	AT+GMR=?	• OK • ERROR

This command returns a manufacturer specified software revision name in a text string.

<revision>	Description
string type	The total number of characters, including line terminators, in the information text returned in response to this command shall not exceed 2048 characters. Note that the information text shall not contain the sequence "0" or "OK", so that DTE can avoid false detection of the end of this information text.

Example

AT+GMR
R2A009prgCXC1122112

10.12 ATI   Identification Information

Description	Command	Possible Responses
Execute	ATI[<value>]	<information>

This command causes the DCE to transmit one or more lines of text, followed by a final result code. As an option, <value> can be used to select from among multiple types of identifying information as shown in the table below.

This command provides compatibility with Microsoft Windows 95.

<value>	Description
0	Same information as +GMM command (model identification)
1	Same information as +GMR command (revision identification)
3	Modem model description
5	Active settings
7	Modem configuration profile (brief listing of the modem functionality: fax classes, Bluetooth, IrDA, modem type, etc.)
8	DCE hardware type version
9	PnP (plug and play) information

Examples

ATI=1
CXC1122112

ATI=5
Configuration Settings on Channel 0
&C: 1
&D: 0
*EENMEA: 0
+CGACT: 1,0
+CGATT: 0
+CGDCONT: 1,"IP","internet","",0,0
+CGEREP: 0,0
+CGREG: 0,3
+CHSR: 0
+CHSU: 0
+CMEE: 1
+CMUX: 0,0,1,31,10,3,30,10,2
+CR: 0

+CRC: 0
+CRLP: 61,61,48,6,0
+CRLP: 120,120,48,6,2,3
+CVHU: 2
+ICF: 3,3
+IFC: 2,2
+ILRR: 0
+IPR: 115200
E: 1
M: 0
Q: 0
S0: 000
S10: 002
S2: 043
S3: 013
S4: 010
S5: 008
S6: 002
S7: 050
S8: 002
V: 1
X: 4

OK

190

11. Input/Output

11.1 AT*E2IO   Ericsson M2M Input/Output Read/Write

Description	Command	Possible Responses
Request operation with the I/O signals	AT*E2IO=<op>,<io> [,<val>][,<adc_val>]	• ERROR • OK • *E2IO: <op>,<io>[,[<val>] [,<adc_val>]] OK
Show if the command is supported	AT*E2IO=?	• *E2IO: (list of supported <op>s), <io>s,(list of supported <val>s),(list of supported <adc_val>s) • ERROR

Description:

The module has 8 digital I/Os; 4 configurable GPIOs, 1 input-only, and 3 output-only.

The module also has 3 ADCs, and 1 DAC. All of these signals are controlled by the AT*E2IO command.

Note!   IO1 to IO4 are set to INPUT as a factory default. Their status (Input/Output) is stored in non-volatile memory.

Set command controls the operations with the I/O signals for the M2M devices. It is possible to perform up to 5 operations. These operations have the following meaning:

• **Read** ($<op>$ = 0): It reads the state of the specified signal. It returns the binary state of digital signals or value (0-255) of an ADC input or the DAC output. In case of a digital I/O the command has the following syntax:

> AT*E2IO=0,"IO1"
> *E2IO: 0,"IO1",0
>
> OK

If reading from the ADC/DACs:

> AT*E2IO=0,"AD1"
> *E2IO: 0,"AD1",,62
>
> OK

- **Write** (<op> = 1): Sets an output to a specific value. For digital sources <val>='0' or '1' and for the analog ones, 0-255. If the signal is bi-directional (IO1 to IO4) it must be configured as an output before writing is allowed. If the output can be written to, the signal is set to <val> and OK is returned, otherwise ERROR is returned.

    AT*E2IO=1,"IO1",1

    OK

    or

    AT*E2IO=1,"DA1",,100

    OK

- **Configure** (<op> = 2): The configuration operation is used for the bi-directional signals (IO1 to IO4). They can be configured as input, <val>= '0' or output, <val>='1'. If the signal is not configurable, ERROR is returned in place of OK. Once set, the signal remains configured even after a power cycle. Example shown below:

    AT*E2IO=2,"IO1",1   (Set IO1 as an output)

    OK

- **Configure Check** (<op> = 3): This operation reads the current configuration of the signal. Returned <val> is current signal state. If the signal is configurable, the current state and OK are returned, if not ERROR is returned.

    AT*E2IO=3,"IO1"
    *E2IO: 3,"IO1",1   (IO1 is currently set as an output)

    OK

- **Trigger** (<op> = 4): Input signals can be set to send an unsolicited result code whenever a change in one of the inputs has been produced. Setting a trigger (<val> = '1') will cause the unsolicited result to be sent when a change from the current signal state occurs (signal must be unchanging when command is executed). Clearing a trigger (<val> = '0') will clear a currently set trigger. Configurable signals (IO1 to IO4) must be set as inputs before they can be triggered. Triggers are only applicable while the module is ON. Power-cycling will clear all current triggers. If a signal is triggerable OK is returned and the trigger is set/cleared, otherwise ERROR is returned.

    AT*E2IO=4,"I5",1   (Set trigger on I5)

    OK

    (I5 changes state, sometime later)

 *E2IO: 3,"I5",1   (I5 triggered, current state '1')

- **Trigger Check** (<op> = 5): Checks if a signal input is configured as a trigger. Returned <val> shows the current trigger state; '1' for triggered or '0' for not triggered. If the signal is triggerable, the current trigger status and OK are return, otherwise ERROR is returned.

 AT*E2IO=5,"I5"
 *E2IO: 5,"I5",1   (I5 is currently set to trigger)

 OK

The test command returns the supported I/Os and allowed value ranges.

Abortability:

This command may not be aborted.

<op>	Description
0	Read
1	Write
2	Configure
3	Configure Check
4	Trigger
5	Trigger Check

<io>	Description
"IO1"	Digital Input 1. Supported Operations: 0,1,2,3,4,5
"IO2"	Digital Input 2. Supported Operations: 0,1,2,3,4,5
"IO3"	Digital Input 3. Supported Operations: 0,1,2,3,4,5
"IO4"	Digital Input 4. Supported Operations: 0,1,2,3,4,5
"I5"	Digital Input 5. Supported Operations: 0,4,5
"O5"	Digital Output 5. Supported Operations: 0,1
"O6"	Digital Output 6. Supported Operations: 0,1
"O7"	Digital Output 7. Supported Operations: 0,1
"DA1"	Digital/Analogue Input: Supported Operations: 0,1
"AD1"	Analogue/Digital Output 1: Supported Operations: 0
"AD2"	Analogue/Digital Output 2: Supported Operations: 0
"AD3"	Analogue/Digital Output 3: Supported Operations: 0

<val>		Description	
	Read/Write	**Configure**	**Trigger**
0	The logic value is FALSE	I/O signal is INPUT	I/O signal is NOT set to trigger
1	Logic value is TRUE	I/O signal is OUTPUT	I/O signal is set to trigger

<adc_val>	Description
0-255	The decimal value shall represent the analogue voltage it is hold on the I/O. Applicable only to A/D or D/A signals.

Unsolicited Result Codes:

*E2IO: <source>, <io>, <val>

Scenario Cases

Reading an I/O:

AT Command	Response	Comment
AT*E2IO=0,"I1"		The TE is requesting for the logic value of I1 (Digital Input 1)
	*E2IO:0,"I1",1 OK	The MS responds I1 has a TRUE logic value
AT*E2IO=0,"AD1"		The TE is requesting for the reading of AD1 value (Analogue Input 1)
	*E2IO:0,"AD1", ,87 OK	The MS responds AD1 has a decimal value of 87. In volts: ((2.75*0.9)/256)*87 = 0.841 V

Writing in an Output:

AT Command	Response	Comment
AT*E2IO=1,"O1",1		The TE is requesting to write a TRUE logic to O1 (Digital Output 1)
	OK	The MS responds OK because the operation has been performed
AT*E2IO=1,"I3",0		The TE is requesting to write a FALSE logic value to I3 (Digital Input 3)
	ERROR	The MS responds ERROR because the operation is not possible

AT Command	Response	Comment
AT*E2IO=1,"DA1",95		The TE is writing 95 decimal value to hold a voltage of: ((2.75*0.9)/256)*95 = 0.918V
	OK	The MS responds OK because the operation has been performed

Configuring an I/O:

AT Command	Response	Comment
AT*E2IO=2,"I1",0 or AT*E2IO=2,"O1",0		The TE is requesting to configure IO1 as an input
	OK	The MS responds OK because the operation has been performed
AT*E2IO=2,"I4",1 or AT*E2IO=2,"O4",1		The TE is requesting to configure IO4 as an output
	OK	The MS responds OK because the operation has been performed

Checking an I/O status:

AT Command	Response	Comment
AT*E2IO=3,"I1" or AT*E2IO=3,"O1"		The TE is requesting to check the configuration of the IO1 signal
	*E2IO:3,"I1",0 OK or *E2IO:3,"O1",0 OK	The MS responds IO1 is configured as an input
AT*E2IO=3,"I4" or AT*E2IO=3,"O4"		The TE is requesting to check the configuration of the IO4 signal
	*E2IO:3,"I4",1 OK or *E2IO:3,"O4",1 OK	The MS responds IO4 is configured as an output

Triggering an Input:

AT Command	Response	Comment
AT*E2IO=4,"I1",1		The TE is requesting to trigger Input 1
	OK	The MS responds OK because the operation has been performed
AT*E2IO=4,"I4",0		The TE is requesting to not trigger Input 4
	OK	The MS responds OK because the operation has been performed
	*E2IO:4,"I1",1 OK	An event has occurred. The input 1 has triggered on changing the input to logic value 1

Checking an Input Trigger:

AT Command	Response	Comment
AT*E2IO=5,"I1"		The TE is requesting the trigger state of the Input 1
	*E2IO=5,"I1",1 OK	The MS responds that I1 has its trigger active

12. Interface

12.1 AT+CPIN   *PIN Control*

See 3.26, AT+CPIN PIN Control

12.2 AT&C   *Circuit 109 (DCD) Control*

Description	Command	Possible Responses
Set behavior of carrier detect	AT&C[<value>]	OK ERROR

Determines the behaviour of the carrier detect.

<value>	Description
0	DCD always on
1	DCD follows the connection. **Default value**

12.3 AT&D   *Circuit 108 (DTR) Response*

Description	Command	Possible Responses
Control actions from DTE	AT&D[<value>]	OK ERROR

Controls all actions initiated by data terminal ready from DTE.

<value>	Description
0	Ignore. **Default value**
1	When in on-line data mode, switch to on-line command mode. For all other states, see <value>=2
2	Disconnect and switch to off-line command mode

12.4 AT&S   *Circuit 107 (DSR) Response*

This command is not availalbe in software releases up to and including R2A.

Description	Command	Possible Responses
Set behaviour of data set ready	AT&S[<value>]	• OK • ERROR

197

Determines the behaviour of the data set ready signal.

<value>	Description
0	DSR always on
1	DSR on in data mode. DSR off in command mode. **Default value**

12.5 AT+WS46   *Mode Selection*

Description	Command	Possible Responses
Sets the cellular protocol mode	AT+WS46=n	• OK • ERROR
Show the current setting	AT+WS46?	• <n> OK • ERROR
Show if the command is supported	AT+WS46=?	• (list of supported <n>s) OK • ERROR

Allows an accessory to query and control the cellular protocol mode of the phone.

<n> parameter	Description
12	This value is used for GSM at 900 Mhz., DCS-1800, and PCS-1900 phones

12.6 ATE   *Command Echo*

Description	Command	Possible Responses
Request Command Echo	ATE[<value>] ATE=[<value>]	• OK • ERROR
Show the current setting	ATE?	<value>
Show if the command is supported	ATE=?	E: (list of supported <value>s)

The setting of this parameter determines whether or not the DCE echoes characters received from the DTE during command state and online command state.

<value>	Description
0	DCE does not echo characters during command state and online command state
1	DCE echoes characters during command state and online command state. **Default value**

12.7 ATV   DCE Response Format

Description	Command	Possible Responses
Set DCE response format	ATV[=]<value>	• OK • ERROR
Show the current setting	ATV?	V: <value>
Show if the command is supported	ATV=?	V: (list of supported <value>s)

Select either descriptive or numeric response codes. The ATV command sets the verbose numeric response codes and strips off the <S3><S4> additions to the command response.

<value>	Description
0	Display numeric result codes
1	Display verbose result codes. **Default value**

List of result codes

ATV1/ATV=1	ATV0/ATV=0	Description
OK	0	Acknowledges execution of a command
CONNECT	1	A connection has been established; the DCE is moving from command state to online data state
RING	2	The DCE has detected an incoming call signal from the network
NO CARRIER	3	The connection has been terminated or the attempt to establish a connection failed
ERROR	4	Command not recognized, command line maximum length exceeded, parameter value invalid, or other problem with processing the command line
NO DIALTONE	6	No dial tone detected
BUSY	7	Engaged (busy) signal detected
NO ANSWER	8	"@" (Wait for Quiet Answer) dial modifier was used, but remote ringing followed by five seconds of silence was not detected before expiration of the connection timer
CONNECT <TEXT>	Manufacturer-specific	Same as CONNECT, but includes manufacturer-specific text that may specify DTE speed, line speed, error control, data compression, or other status

12.8 ATZ   Reset to Default Configuration

Description	Command	Possible Responses
Execute	ATZ	• OK • ERROR
Execute	ATZ=<profile>	• OK • ERROR
Show if supported and list available parameter range	ATZ=?	Z: (list of supported <profile>s)

This command instructs the DCE to set all parameters to their default values as specified by the user. Consider hardware configuration switches or non-volatile parameter storage (if implemented) when using this command.

Commands included on the same command line as the Z command will be ignored.

<profile >	Description
0	Select the user profile to restore

12.9 AT+CMUX   Switch to 07.10 Multiplex Protocol

Description	Command	Possible Responses
Switch to 07.10	AT+CMUX=<transparency>[,<subset>[,<port_speed>[,<N1>[,<T1>[,<N2>[,<T2>[,<T3>[,<k>]]]]]]]]	+CME ERROR: <err>
Show the current setting	AT+CMUX?	• +CMUX:<transparency>,<subset>,<port_speed>,<N1>,<T1>,<N2>,<T2>,<T3>[,<k>] • +CME ERROR: <err>
Show if the command is supported	AT+CMUX=?	• +CMUX: (list of supported <transparency>s), (list of supported <subset>s), (list of supported <port_speed>s), (list of supported <N1>s), (list of supported <T1>s), (list of supported <N2>s), (list of supported <T2>s), (list of supported <T3>s), (list of supported <k>) • +CME ERROR: <err>

The command is used to turn on the multiplexer. Only "no transparency is supported". The parameter <k> is not used.

The default values for the parameters below are for "no transparency" and "only UIH frames used".

<transparency>	Description
0	No transparency

<subset>	Description
0	Only UIH frames used

<port_speed>	Description
1	9 600 bits/s
2	19 200 bits/s
3	38 400 bits/s
4	57 600 bits/s
5	115 200 bits/s
6	230 400 bits/s
7	460 800 bits/s

<N1>	Description
31	Default maximum frame size

<T1>	Description
10	100ms default timer

<N2>	Description
3	Default maximum number of re-transmissions

<T2>	Description
30	300ms default timer

<T3>	Description
10	10s default timer

<k>	Description
1..7	Window size

12.10 AT+CRES   Restore SMS Settings

Description	Command	Possible Responses
Restore settings	AT+CRES[=<profile>]	• +CMS ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CRES=?	• +CRES: (list of supported <profile>s) • +CMS ERROR: <err> • OK • ERROR

Restores message service settings from non-volatile memory to active memory. A TA can contain several profiles of settings. Settings specified in commands Service Centre Address +CSCA, Set Message Parameters +CSMP and Select Cell Broadcast Message Types +CSCB (if implemented) are restored. Certain settings, such as SIM SMS parameters, cannot be restored.

<profile>	Description
0..2	Profile number where settings are to be stored. **Default value is 0**

12.11 AT+ICF   Cable Interface Character Format

Description	Command	Possible Responses
Defines DTE-DCE character framing	AT+ICF=[format[,parity]]	• OK • ERROR
Show the current setting	AT+ICF?	• +ICF: <format>,<parity> • OK • ERROR
Show if the command is supported	AT+ICF=?	• +ICF: (list of supported <format>s), (list of supported <parity>s) • OK • ERROR

This extended-format compound parameter is used to determine the local serial port start-stop (asynchronous) character framing used by the DCE to accept DTE commands, and while transmitting information text and result code, if this is not automatically determined; **(Not supported)** +IPR=0 forces +ICF=0 (see +IPR).

<format>	Description
3	8 Data 1 Stop. **Default value**

<parity>	Description
3	Space. **Default value**

Example

AT+ICF?
+ICF: 3,3

OK

12.12 AT+IFC   DTE-DCE Local Flow Control

Description	Command	Possible Responses
Defines DTE-DCE local flow control	AT+IFC=[<by_te>, [<by_ta>]]	• OK • ERROR
Show the current setting	AT+IFC?	+IFC: <by_te>,<by_ta>
Show if the command is supported	AT+IFC=?	+IFC: (list of supported <by_te>s,<by_ta>s)

Defines the flow control between the modem and the computer when in on-line data mode.

No flow control is enabled in any of the command modes.

<by_te>	Description
0	No flow control on DTE
1	Xon/Xoff flow control on DCE. Control characters are removed by the DCE interface
2	RTS flow control on DCE. **Default value**
3	Xon/Xoff flow control on DCE. Control characters are passed to the remote DCE/DTE

<by_ta>	Description
0	No flow control on DCE
1	Xon/Xoff flow control on DTE
2	CTS flow control on DCE. **Default value**

12.13 AT+ILRR   Cable Interface Local Rate Reporting

Description	Command	Possible Responses
Defines DTE-DCE character framing	AT+ILRR=<value>	• OK • ERROR
Show the current setting	AT+ILRR?	+ILRR:<value>
Show if the command is supported	AT+ILRR=?	+ILRR:(list of supported <values>s)

Specifies whether or not the extended-format "+ILRR:<rate>" information text is transmitted from the DCE to the DTE. The <rate> reported shall represent the current (negotiated or renegotiated) DTE-DCE rate. If enabled, the intermediate result code is transmitted after any modulation, error control or data compression reports are transmitted, and before any final result code (e.g. CONNECT) is transmitted. The <rate> is applied after the final result code is transmitted.

<value>	Description
0	Disables reporting of local port rate (+ILRR: is not transmitted). **Default value**
1	Enables reporting of local port rate (+ILRR: is transmitted)

12.14 AT+IPR   Cable Interface Port Command

Description	Command	Possible Responses
Defines fixed DTE rate	AT+IPR=[rate]	• OK • ERROR
Show the current setting	AT+IPR?	• +IPR:<rate> • OK • ERROR
Show if the command is supported	AT+IPR=?	• +IPR: (), (list of fixed-only <rate>s)] • OK • ERROR

Specifies the data rate at which the DCE will accept commands, in addition to 1200 bits/s or 9600 bits/s (as required in v25ter, subclause 4.3). It may be used to select operation at rates used by the DTE, which the DCE is not capable of automatically detecting.

The specified rate takes effect following the issuance of any result code(s) associated with the current command line.

<rate>	Description
Discrete integer value	The <rate> value specified shall be the rate in bits per second at which the DTE-DCE interface should operate, e.g. "19200" or "115200". The rates supported by a particular DCE are manufacturer specific.
	The following rates, are supported; 1200 2400 4800 9600 19200 38400 57600 115200 230400 460800

12.15 AT*E2SPI   Serial Peripheral Interface

Description	Command	Possible Responses
Set Serial Peripheral interface	AT*E2SPI=<op> [,<byteformat> [,<InitSync>]] [,<byte1>,<byte2>,..., <byte n>]	• ERROR • OK • *E2SPI: <byte1rx>,<byte2rx>,..., <bytenrx> OK
Show the current setting	AT*E2SPI?	• *E2SPI: <active>, <byteformat> OK
Shows if the command is supported	AT*E2SPI=?	• *E2SPI: (list of supported <op>s,list of supported <byteformat>s, list of supported <InitSync>s) • ERROR

This command allows the user to send data via an SPI bus. The SPI bus is made up from the IO pins (IO1 = Clock, IO2 = Data In, IO3 = Data Out, and O6/ RI = Sync (optional)).

The bus works with the GM47 being the SPI master. The clock is generated by the GM47, and on each clock cycle, data is both transmitted on the Data Out pin, and received on the Data in pin. The Sync pin (optional) can be used as a chipselect pin for latching the data after a number of bytes have been sent. The initial state of the Sync pin can be set, so it is toggled from that state.

Once the SPI bus is enabled, the IOs that are used can not be used for any other purpose until the SPI is disabled. This means the AT*E2IO command cannot modify these pins, and if the Sync pin is activated, RI will not be output.

Three operations can be made on the SPI bus:

SPI Enable (<op> = 255)

This command is entered to set up the SPI bus, and to enable the relevant signals. The byte format is defined here (the number of bytes output between toggling the Sync pin high and low). The Initial state of the Sync pin is also defined. If the byte format is set to zero (0), then the Sync pin is not used, and is not controlled by the SPI.

Example:

AT*E2SPI=255,2,1<CR>

OK

This command sets the SPI bus active, and the Sync pin is made toggle every 2 bytes of output data. The initial state of the Sync pin is HIGH.

SPI Send/Receive (<op> = 1-32)

This command sends from 1 - 32 bytes of data across the enabled SPI bus. Data is sent MSB first, from the first byte to the last byte.

Example:

AT*E2SPI=8,170,170,85,85,170,170,85,85<CR>

OK

This command sends 8 bytes (170,170,85,85,170,170,85,85) across the SPI bus. Bytes are in decimal format.

SPI Disable (<op>= 0)

This command is sent to disable the SPI functionality, and restore use of IO pins to other applications. The SPI bus must be disabled before being enabled with a new set of parameters.

AT*E2SPI=0

OK

<op>	Description
0	Disable SPI bus
1-32	Send/ receive 1-32 bytes
255	Enable SPI bus

<byteformat>	Description
0	No Sync Pin function
1-32	Sync is toggled every 1-32 bytes sent/received

<InitSync>	Description
0	Sync Pin initial state LOW
1	Sync Pin initial state HIGH

<byte x>, <byte x rx>	Description
0-255	decimal value denoting the byte value to be sent

<active>	Description
0	SPI bus is active (pins are controlled by SPI)
1	SPI bus is not active (pins are not controlled by SPI)

12.16 AT*E2ESC M2M Escape Sequence Guard Time

Description	Command	Possible responses
Set GPRS online command guard time	AT*E2ESC=[<gt>]	• OK • ERROR
Show the current setting	AT*E2ESC?	*E2ESC: <gt>
Show if the command is supported	AT*E2ESC=?	• OK • ERROR

Defines a guard time for the escape sequence in GPRS to return to on-line command mode i.e. if +++AT<CR> is received either as part of the data stream or a terminating string from the application and no further data is received for the duration of the guard time the module will go into on line command mode. This guards against the module accidentally going into on line command mode. The verbose format of +++AT<CR> is <S2><S2><S2>AT<S3>.

<gt>	Description
0	No guard time. **Default value**
1-10	Guard time in seconds

13. Network

13.1 AT*E2CD   Ericsson M2M Cell Description

Description	Command	Possible Responses
Request network cell description	AT*E2CD=<n>	• ERROR • OK
Show the current setting	AT*E2CD?	• *E2CD: <n>,<lac>,<ci>,<ta> • ERROR
Show if the command is supported	AT*E2CD=?	• *E2CD: (list of supported <n>s) • ERROR

Controls the presentation of an unsolicited result code E2CD: when <n>=1, or when there is a change in one of the network cell parameters, E2CD: <lac>,<ci>,<ta>.

Read command returns the status of result code presentation and several values, which show the network cell parameters.

Location information <lac>, <ci> and <ta> are returned only when <n>=1 and the ME is registered in the network. To know if the ME is registered use the AT+CREG command. If the ME is not registered in the cellular network an ERROR message is returned.

<n>	Description
0	Disable network location information unsolicited result code. **Default value**
1	Enable network location information unsolicited result code *E2CD: <lac>,<ci>,<ta>

<lac>	Description
String type	Two byte location area code in hexadecimal format

<ci>	Description
string type	Two byte cell ID in hexadecimal format

<ta>	Description
0-63	According to GSM 04.18 V8.6.0, the coding of the timing advance value is the binary representation of the timing advance in bit periods; 1 bit period = 48/13 ìs. <ta> is the integer representation of the timing advance in binary format
64-255	Reserved

13.2 AT*E2EMM   Ericsson M2M Engineering Monitoring Mode

Description	Command	Possible Responses
Set the response presentation mode	AT*E2EMM= <n>[,<m>]	• ERROR • OK
Display mode neighbour cells are taken from the toplist		*E2EMM: Serving Cell MCC,MNC,LAC,CellID,BSIC,Ch[,RxL,C1,C2][,RxLFull,RxLSub,RxQFull,RxQSub,TA,TN], <mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>[,<rxl>,<c1>,<c2>][,<rxlFull>,<rxlSub>,<rxqfull>,<rxqsub>,<ta>,<tn>], NeighBours Cells MCC,MNC,LAC,CellID,BSIC,Ch,RxL[,C1,C2], <mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>,<rxl>[,<c1>,<c2>] <mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>,<rxl>[,<c1>,<c2>] … <mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>,<rxl>[,<c1>,<c2>] OK
Compact mode. The first cell is the serving cell, the rest are neighbour cells taken from the toplist		*E2EMM: <mcc>,<mnc>,<ci>,<bsic>,<ch>[,<rxl>][,<rxlSub>,<rxqsub>,<ta>],<mcc>,<mnc>,<ci>,<bsic>,<ch>,<rxl>, <mcc>,<mnc>,<ci>,<bsic>,<ch>,<rxl>, … <mcc>,<mnc>,<ci>,<bsic>,<ch>,<rxl> OK
Verbose mode. The first cell is the serving cell and the rest are neighbour cells as provided by the network in the system info. messages (2 and 5) and via the AT*E2NBTS command		*E2EMM: <mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>[,<rxl>,<c1>,<c2>][,<rxlFull>,<rxlSub>,<rxqfull>,<rxqsub>,<ta>,<tn>], <mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>,<rxl>[,<c1>,<c2>] <mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>,<rxl>[,<c1>,<c2>] … <mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>,<rxl>[,<c1>,<c2>] OK
Reduced display mode - info. as display mode but without text headings or <CR><LF> separators, neighbour cells from top list		*E2EMM: <mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>[,<rxl>,<c1>,<c2>][,<rxlFull>,<rxlSub>,<rxqfull>,<rxqsub>,<ta>,<tn>], <mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>,<rxl>[,<c1>,<c2>] <mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>,<rxl>[,<c1>,<c2>] … <mcc>,<mnc>,<lac>,<ci>,<bsic>,<ch>,<rxl>[,<c1>,<c2>] OK
Show the current setting	AT*E2EMM?	• *E2EMM: <n> • ERROR
Show if the command is supported	AT*E2EMM= ?	• *E2EMM: (list of supported <n>s),(list of supported <m>s) • ERROR

There are four presentation format modes (Display, Compact, Verbose, and Reduced Display) and two response types (one shot response or continuous unsolicited responses).

The purpose of the presentation format mode Display is to display the data in a readable form, including headers and line breaks (<CR><LF>). This format is, however, not well suited for machine decoding. The formats Verbose, Compact and Reduced Display do not have headers or line breaks. Verbose mode displays more parameters than the compact mode.

The response types give the user the choice of one a shot information or an unsolicited response with <m> seconds between each response.

Examples

AT*E2EMM=1
*E2EMM:
Serving Cell
MCC,MNC,LAC,CellId,BSIC,Ch,RxL,C1,C2
234,15,0016,0D91,2E,0081,-085,00019,00019
Neighbour Cells
MCC,MNC,LAC,CellId,BSIC,Ch,RxL,C1,C2
000,00,0016,4047,3A,0083,-103,00001,00001
000,00,0016,423C,3A,0065,-104,00000,00000
000,00,0016,2F21,21,0067,-104,00000,00000
000,00,0016,8E3D,34,0077,-104,00000,00000
000,00,0016,348A,10,0091,-104,00000,00000

OK

AT*E2EMM=3
*E2EMM: <servcell mcc>,<servcell mnc>,<servcell ci>,
<servcell bsic>,<servcell ch>[,<servcell rxl>][,<servcell rxlSub>,
<servcell rxqsub>,<servcell ta>],<neighborcell1 mcc>,
<neighborcell1 mnc>,<neighborcell1 ci>,<neighborcell1 bsic>,
<neighborcell1 ch>,<neighborcell1 rxl>,<neighborcell2 mcc>,
<neighborcell2 mnc>,<neighborcell2 ci>,<neighborcell2 bsic>,
<neighborcell2 ch>,<neighborcell2 rxl>,
…
<neighborcelln mcc>,<neighborcellnmnc>,<neighborcellnci>,
<neighborcelln bsic>,<neighborcelln ch>,<neighborcelln rxl>
<CR><LF>
OK

AT*E2EMM=5
*E2EMM: <servcell mcc>,<servcell mnc>,<servcell lac>,
<servcell ci>,<servcell bsic>,<servcell ch>[,<servcell rxl>,
<servcell C1>,<servcell C2>][,<servcell rxlFull>,<servcell rxlSub>,
<servcell rxqfull>,<servcell rxqsub>,<servcell tn>,<servcell ta>],

<neighborcell1 mcc>,<neighborcell1 mnc>,<neighborcell1 lac>,
<neighborcell1 ci>,<neighborcell1 bsic>,<neighborcell1 ch>,
<neighborcell1 rxl>[,<neighborcell1 C1>,<neighborcell1 C2>],
<neighborcell2 mcc>,<neighborcell2 mnc>,<neighborcell2 lac>,
<neighborcell2 ci>,<neighborcell2 bsic>,<neighborcell2 ch>,
<neighborcell2 rxl>[,<neighborcell2 C1>,<neighborcell2 C2>],
…
<neighborcelln mcc>,<neighborcellnmnc>,<neighborcelln lac>,
<neighborcelln ci>,<neighborcelln bsic>,<neighborcelln ch>,
<neighborcelln rxl>[,<neighborcelln C1>,<neighborcelln C2>]
<CR><LF>
OK

AT*E2EMM=7
*E2EMM:<servcell mcc>,<servcell mnc>,<servcell lac>,
<servcell ci>,<servcell bsic>,<servcell ch>[,<servcell rxl>,
<servcell c1>,<servcell c2>][,<servcell rxlFull>,<servcell rxlSub>,
<servcell rxqfull>,<servcell rxqsub>,<servcell ta>,<servcell tn>],
<neighborcell1 mcc>,< neighborcell1 mnc>,<neighborcell1 lac>,
<neighborcell1 ci>,<neighborcell1 bsic>,<neighborcell1 ch>,
<neighborcell1 rxl>[,< neighborcell1 c1>,<neighborcell1 c2>],
<neighborcell2 mcc>,<neighborcell2 mnc>,<neighborcell2 lac>,
<neighborcell2 ci>,<neighborcell2 bsic>,<neighborcell2 ch>,
<neighborcell2 rxl>[,<neighborcell2 c1>,<neighborcell2c2>]

…

<neighborcelln mcc>,<neighborcelln mnc>,<neighborcelln lac>,
<neighborcelln ci>,<neighborcelln bsic>,<neighborcelln ch>,
<neighborcelln rxl>[,<neighborcelln c1>,<neighborcelln c2>]
OK

The mode setting <n> in the set command has the combination listed in the table below.

When <n>=5, the shot information is the same as in <n>=1, but neighbouring cells, which have to be up to 16. This is the information that comes from the Serving Cell through the BCCH, reporting the BTS that are on the Serving Cell's surroundings.

<n>	Description
0	Disable network monitoring unsolicited result code. **Default value**
1	One shot presentation of the network location information. Display mode with headers and <CR><LF> line separators
2	Enable network location information unsolicited result code in Display mode (like n=1). There will be continuous unsolicited information responses <m> seconds apart
3	One shot presentation of the compact network location information

<n>	Description
4	Enable compact network location information unsolicited result code. There will be continuous unsolicited information responses <m> seconds apart
5	One shot presentation of the network location information (verbose format), including 16 BTSs, coming from the Serving Cell signalling information
6	As n=5 format but there will be continuous unsolicited information responses <m> seconds apart
7	One shot presentation of the network information (same information as in n=1) but no headers or <CR><LF> line separators. Neighbor cells from the Toplist
8	As n=7 format but there will be continuous unsolicited information responses <m> seconds apart

<m>	Description
1-255	Integer type giving time (in seconds) between unsolicited responses. **Default value is 5**

<mcc>	Description
Integer type	Three digits in decimal format. The Mobile Country Code identifies the PLMN serving cell country according to ITU

<mnc>	Description
Integer type	Two digits in decimal format. The Mobile Network Code identifies the PLMN operator in the serving cell

<lac>	Description
Integer type	Two byte location area code in hexadecimal format

<ci>	Description
Integer type	Two byte cell ID in hexadecimal format

<bsic>	Description
Integer type	One byte Base Stations Identification code in hexadecimal format

<ch>	Description
(0-1023)	It represents the ARFCN that shows the Absolute RF Channel, which identifies the BCCH carrier

LZT 123 7263 R1C

<rxl>	*Description*
Integer type	Received Signal Strength level in dBm measured on idle mode

<rxlfull>	*Description*
Integer type	Received Signal Strength level in dBm. The Rx Level is taken in the Downlink and statistically is applied to 100 TDMA frames of the TCH or during a SACCH multiframe

<rxlsub>	*Description*
Integer type	Received Signal Strength level in dBm. The Rx Level is taken from the DownLink signal and the average is applied to subset of SACCH frames

<rxqfull>	*Description*
0	BER < 0.1%
1	0.26% < BER < 0.30%
2	0.51% < BER < 0.64%
3	1.0% < BER < 1.3%
4	1.9% < BER < 2.7%
5	3.8% < BER < 5.4%
6	7.6% < BER < 11.0%
7	BER > 15.0%

<mcc>	*Description*
Integer type	Three digits in decimal format. The Mobile Country Code identifies the PLMN serving cell country according to ITU

<rxqsub> is the parameter that indicates the quality in the received signal on dedicated mode. The measurement average is applied to a subset of a SACCH multiframe.

<rxqsub>	*Description*
0	BER < 0.1%
1	0.26% < BER < 0.30%
2	0.51% < BER < 0.64%
3	1.0% < BER < 1.3%

<rxqsub>	Description
4	1.9% < BER < 2.7%
5	3.8% < BER < 5.4%
6	7.6% < BER < 11.0%
7	BER > 15.0%

<c1>	Description
Integer	Path Loss criterion parameter for neighbour cells. The MS calculates this parameter, in idle mode, to decide if the cell is suitable to camp on. After the calculation the criterion is C1 > 0. See GSM 05.08

<c2>	Description
Integer	Cell reselection parameter for neighbour cells. This parameter shall optimise the selected cell reselection

<ta>	Description
0-63	According to GSM 04.18 V8.6.0, the coding of the timing advance value is the binary representation of the timing advance in bit periods; 1 bit period = 48/13 ìs. <ta> is the integer representation of the timing advance in binary format
64-255	Reserved

<tn>	Description
0-7	Its value indicates the time slot number in a traffic channel

13.3 AT*E2SPN   M2M Service Provider Indication

Description	Command	Possible Responses
Request service provider indication	AT*E2SPN	• *E2SPN: <spi> • +CME ERROR: <err>
Show if the command is supported	AT*E2SPN=?	• OK • ERROR

Causes the MS to return the service provider name stored in the SIM card (<spi> parameter). The text will consist of a maximum of 16 bytes containing the service provider name stored in the EF_{SPN} file in the SIM card (see GSM 11.11). ERROR is returned if the field is not present on the SIM.

<spi>	Description
String	String type field of maximum length 16 bytes; character set as specified by command Select TE character set +CSCS

13.4 AT*EALS   Ericsson Request ALS Status

Description	Command	Possible Responses
Requests current status for ALS	AT*EALS	• *EALS: <status> • +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT*EALS=?	• +CME ERROR: <err> • OK • ERROR

Used to request the MS to give ALS (Alternate Line Services) status. The information is available on the SIM card. If ALS is active, the user has two lines for voice calls. The line number or name tag for the line is then indicated on the display.

<status>	Description
0	ALS function is not active (off)
1	ALS function is active (on)

13.5 AT*ECSP   Ericsson Customer Service Profile

Description	Command	Possible Responses
Read the customer service profile from the SIM	AT*ECSP=\<service group>	• *ECSP: \<service group>,\<services> • +CME ERROR: \<err> • OK • ERROR
Show if the command is supported	AT*ECSP=?	• +CME ERROR: \<err> • OK • ERROR

This command is used to read the customer service profile (CSP) from the SIM. CSP is a list on the SIM, which indicates the services that are user accessible. Each of the services has a related bit within the CSP. The services are grouped into service groups, with a maximum of 8 services in a group. For each service group, a bit mask tells which services are available (bit=1). Unused bits are set to 0.

\<service group>	Description
Byte	Each service group has a corresponding number, service group code

\<services>	Description
byte	Bit mask (8 bits), indicating the services within the service group Bit=0: unused or unavailable service Bit=1: available service

13.6 AT*EPNR   Ericsson Read SIM Preferred Network

Description	Command	Possible Responses
Read entries in SIM preferred list	AT*EPNR=<format> [,<index1> [,<index2]]	• *EPNR: <index1>,<oper1>[...] *EPNR: <index2>, <oper2> • +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT*EPNR=?	• *EPNR: (list of supported <index>s), (list of supported <format>s) • +CME ERROR: <err> • OK • ERROR

This command is used to read the SIM preferred list of networks ($EF_{PLMNSEL}$).

<index1>	Description
integer	Start index (>0)

<index2>	Description
integer	Stop index (>0)

<format>	Description
2	Numeric <oper>

<oper>	Description
string	String indicates the code for the operator. E.g. GSM - Sweden - Europolitan: "24008" (3 + 2). PCS: 3 digits for country and 3 digits for network

Example

AT*EPNR=2,1,10
*EPNR: 1,"24008"
*EPNR: 2,"20404"
*EPNR: 3,"20810"
*EPNR: 4,"20205"
*EPNR: 5,"65501"
*EPNR: 6,"26203"
*EPNR: 7,"50503"
*EPNR: 8,"27201"
*EPNR: 9,"64101"

*EPNR: 10,"27801"

OK

13.7 AT*EPNW Ericsson Write SIM Preferred Network

Description	Command	Possible Responses
Write/delete entries in SIM preferred list	AT*EPNW=[<index>] [,<format>,<oper>]	• +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT*EPNW=?	• *EPNW: (list of supported <index>s), (list of supported <format>)s • +CME ERROR: <err> • OK • ERROR

This command is used to edit the SIM preferred list of networks (EF$_{PLMNSEL}$). The entry field <oper> contains mobile country code (MCC) and mobile network code (MNC).

<index>	Description
Integer	Index to entry in SIM preferred list. The SIM preferred list contains at least 8 positions according to GSM 11.11

<format>	Description
2	Numeric <oper>

<oper>	Description
String	String indicates the code for the operator. E.g. GSM – Sweden - Europolitan: "24008" (3 + 2). PCS: 3 digits for country and 3 digits for network

13.8 AT*E2SSN   Ericsson M2M SIM Serial Number

Description	Command	Possible Responses
Request SIM Serial number	AT*E2SSN?	<SSN>
Shows if the command is supported	AT*E2SSN=?	• OK • ERROR

This command requests the SIM serial number held in the ICCid field (address 2FE2) on the SIM and returns all valid characters to the TE. This field is detailed in GSM 11.11 section 10.1.1.

<SSN>	Description
String without double quotes	SIM serial number

EXAMPLES

AT*E2SSN?
8944110063503224707
OK

where the raw data contained in the ICCid field on the SIM is 984411003605234207F7.

Test command:

AT*E2SSN=?
OK

13.9 AT*ESLN   *Ericsson Set Line Name*

Description	Command	Possible Responses
Sets the line name tag in the MS	AT*ESLN=<line> [,<name>]	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT*ESLN?	• *ESLN: <line1>,<name1><CR><LF> *ESLN: <line2>,<name2> • +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT*ESLN=?	• *ESLN: (list of supported <line>s),<lname> • +CME ERROR: <err> • OK • ERROR

Sets the name tag for a selected line.

<line>	Description
0	This means that the two lines will use the default name tags, i.e. "L1" and "L2". **Default value**
1	Line 1
2	Line 2

<name>	Description
String	Characters for name tag This parameter is optional when <line> is set to 0

<lname>	Description
Integer	Maximum number of characters to use in <name> string (20)

13.10 AT+CIMI   Subscriber Identification

Description	Command	Possible Responses
Read IMSI	AT+CIMI	• <IMSI> • +CME ERROR <err> • OK • ERROR
Show if the command is supported	AT+CIMI=?	• OK • ERROR

Causes the TA to return <IMSI>, identifying the individual SIM attached to the ME.

<IMSI>	Description
string without double quotes	International Mobile Subscriber Identity

Example

AT+CIMI
234157411545420

OK

13.11 AT+CLCK   Facility Lock

Description	Command	Possible Responses
Request facility lock	AT+CLCK=<fac>, <mode>[,<passwd> [,<class>]]	• when <mode>=2 and command successful: +CLCK: <status>[,<class1> [<CR><LF>+CLCK: <status>,<class2>[...]] • +CME ERROR <err> • OK • ERROR
Show if the command is supported	AT+CLCK=?	• +CLCK: (list of supported <fac>s) • +CME ERROR <err> • OK

The command is used to lock, unlock or interrogate an ME or a network facility <fac>. A password is normally needed to carry out such actions.

Call barring facilities are based on GSM supplementary services (refer to GSM 02.88). The interaction of these, with other commands based on other GSM supplementary services, is described in the GSM standard.

<fac>	Description
"PS"	PH-SIM (lock PHone to SIM card) (ME asks password when other than current SIM card inserted)
"SC"	SIM (lock SIM card) (SIM asks password in ME power-up and when this lock command issued)
"FD"	SIM fixed dialling feature. PIN2 is required as a password
"P2"	SIM PIN2
"AO"	BAOC (bar all outgoing calls)
"OI"	BOIC (bar outgoing international calls)
"AI"	BAIC (bar all incoming calls)
"IR"	BIC-Roam (bar incoming calls when roaming outside the home country)
"OX"	BOIC-exHC (bar outgoing international calls except to home country)
"AB"	All barring services
"AG"	All out going barring services
"AC"	All in coming barring services
"PN"	Network personalization
"PU"	Network subset personalization
"PP"	Service provider personalization
"PC"	Corporate personalization

<mode>	Description
0	Unlock
1	Lock
2	Query status
10	Full lock (only valid for <fac>="PS", after power on always ask for password)

<status>	Description
0	Not active
1	Active

<passw>	Description
string type	Is the same as password specified for the facility from the ME user interface or with change password command, +CPWD

<classx>	Description
1	Voice L1
2	Data
4	Fax
8	Short message service
16	Data circuit sync
32	Data circuit async
64	Dedicated packet access
128	Voice L2
1..30	When "no reply" is enabled or queried, this gives the time in seconds to wait before the call is forwarded. **Default value is 20**

13.12 AT+CNUM Subscriber Number

Description	Command	Possible Responses
Request subscriber number	AT+CNUM	• +CNUM: [<alpha1>],<number1>,<type1> [,<speed>,<service>[,<itc>]][<CR> <LF>+CNUM: [<alpha2>],<number2>,<type2> [,<speed>,<service> [,<itc>]][...]] • +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CNUM=?	• +CME ERROR: <err> • OK • ERROR

This command returns the MSISDNs related to the subscriber (this information can be stored in the SIM or in the ME). If subscriber has different MSISDN for different services, each MSISDN is returned in a separate line.

<alphax>	Description
Alphanumeric string	Associated with <numberx>; used character set should be the one selected with the Select TE character set command, +CSCS

<numberx>	*Description*
String type	Phone number of format specified by <typex>

<typex>	*Description*
Integer format	Type of address, (refer to GSM 04.08 subclause 10.5.4.7)

<speed>	*Description*
data rate	As defined in subclause 6.7 GSM 07.07

<service>	*Description*
0	Asynchronous modem
4	Voice
5	Fax

<itc>	*Description*
0	3.1 kHz
1	UDI

13.13 AT+COLP   Connected Line Identification Presentation

Description	*Command*	*Possible Responses*
Request connected line identification presentation	AT+COLP=[<n>]	• OK • ERROR
Show the current setting	AT+COLP?	• +COLP: <n>,<m> • OK • ERROR
Show if the command is supported	AT+COLP=?	• +COLP: (list of supported <n>s) • OK • ERROR

This command refers to the GSM/UMTS supplementary service COLP (Connected Line Identification Presentation) that enables a calling subscriber to get the connected line identity (COL) of the called party after setting up a mobile originated call. The command enables or disables the presentation of the COL at the TE. It has no effect on the execution of the supplementary service COLR in the network.

When enabled (and allowed by the called subscriber), +COLP: <number>,<type>[,<subaddr>,<satype> [,<alpha>]] intermediate result code is returned from the TA to the TE before any +CR or V.25ter responses. It is manufacturer specific if this response is used when normal voice call is established.

Read command gives the status of <n>, and also triggers an interrogation of the provision status of the COLP service according 3GPP TS 22.081 (given in <m>).

Test command returns values supported by the TA as a compound value.

<n>	Description
0	Disable
1	Enable

<m>	Description
0	COLP not provisioned
1	COLP provisioned
2	unknown (e.g. no network, etc.)

Intermediate Result codes:

+COLP: <number>,<type>[,<subaddr>,<satype> [,<alpha>]]

13.14 AT+COPS Operator Selection

Description	Command	Possible Responses
Request operator selection	AT+COPS=[<mode> [,<format> [,<oper>]]]	• +CME ERROR <err> • OK • ERROR
Show the current setting	AT+COPS?	• +COPS: <mode>[,<format>, <oper>] • +CME ERROR <err> • OK • ERROR
Show if the command is supported	AT+COPS=?	• +COPS: list of supported (<stat>,long alphanumeric <oper>, short alphanumeric <oper>,numeric <oper>)s • +CME ERROR <err> • OK • ERROR

Forces an attempt to select and register the GSM network operator.

<mode>	Description
0	Automatic (<oper> field is ignored)
1	Manual (<oper> field present)
3	Set only <format> (for read command +COPS?), do not attempt registration/de-registration (<oper> field is ignored); this value is not applicable in read command response
4	Manual/automatic (<oper> field present); if manual selection fails, automatic mode (<mode>=0) is entered

<format>	Description
0	Automatic (<oper> field is ignored)
2	Numeric <oper>

<oper>	Description
string type	Format determined by the <format> setting

<stat>	Description
0	Unknown
1	Available
2	Current
3	Forbidden

Example

AT+COPS=?
+COPS: (2,"UK VODAFONE","UK Vodafone","23415")
+COPS: (3,"UK Orange PCS Ltd","Orange","23433")
+COPS: (3,"T-Mobile UK","T-Mobile UK","23430")
+COPS: (3,"O2 - UK","O2 - UK","23410")

OK

13.15 AT+CREG Network Registration

Description	Command	Possible Responses
Request network registration	AT+CREG=[<n>]	• +CME ERROR <err> • OK • ERROR
Show the current setting	AT+CREG?	• +CREG: <n>,<stat> • +CME ERROR <err> • OK • ERROR
Show if the command is supported	AT+CREG=?	• +CREG: (list of supported <n>s) • +CME ERROR <err> • OK • ERROR

Set command controls the presentation of an unsolicited result code +CREG: <stat> when <n>=1 and there is a change in the ME network registration status.

Read command returns the status of result code presentation and an integer <stat>, which shows whether the network has currently indicated the registration of the ME.

Controls the presentation of the unsolicited result code +CREG.

<n>	Description
0	Disable network registration unsolicited result code. **Default value**
1	Enable network registration unsolicited result code

<stat>	Description
0	Not registered, ME is not currently searching for a new operator to register with
1	Registered, home network
2	Not registered, but ME is currently searching for a new operator to register with
3	Registration denied
4	Not detailed
5	Registered, roaming

Example

AT+CREG?
+CREG: 0,1

OK

13.16 AT*ECPI   *Ciphering Indicator*

Description	Command	Possible Responses
Request activation of the ciphering indication	AT*ECPI=<switch>	• OK • +CME: <error> • ERROR
Shows the current setting	AT*ECPI?	• *ECPI: <switch> • OK • ERROR
Show if the command is supported	AT*ECPI=?	• *ECPI: (list of supported <switch>es values) • OK • ERROR

This command allows the external application to activate/deactivate the ciphering indication. The ciphering indication allows the external application to detect when the mobile connection becomes deciphered and thus unsecured.

Test command gives the current value of the <switch> parameter, informing if the indicator is enabled or disabled.

The ciphering indicator feature may be disabled by the home network operator setting data in the "administrative data" field (EFAD) in the SIM as defined in GSM 11.11.

If this feature is not disabled by the SIM, then whenever a connection is in place, which is or becomes deciphered, an indication is given via the unsolicited result code *ECPV:<ciphering>.

<switch>	Description
1	Ciphering indication is on. The unsolicited result code *ECPV is sent anytime the communication is unsecured and when it becomes secure again
0	Ciphering indication is off. Disable the ciphering indication, *ECPV is not sent

Unsolicited Result Codes:

*ECPV: <ciphering>. Sent only when <switch> is set to 0.

Unsolicited Result Codes

*ECPV - Ciphering Indicator

SYNTAX - Unsolicited Result code

Description	Response	When
Set command informs the TE when a communication is unsecured due to the fact that the network is not enciphering the communication	*ECPV: <ciphering>	When AT*ECPI enables it, the *ECPV:<ciphering> is sent during a connection whenever the communication is not enciphered. If a connection becomes secure after that, the *ECPV:<ciphering> is sent again to indicate that now the communication is enciphered

<ciphering>	Description
0	The connection is secured. The network enciphers the communication
1	The connection is unsecured. The network does not encipher the communication

13.17 AT*E2NBTS Ericsson M2M Neighbour BTS

Description	Command	Possible Responses
Set Neighbour Cells to monitor	AT*E2NBTS=<ch1>,<bsic1>[,<ch2>,<bsic2>[,<ch3>,<bsic3>[,<ch4>,<bsic4>[,<ch5>,<bsic5>[,<ch6>,<bsic6>[,<ch7>,<bsic7>[,<ch8>,<bsic8>[,<ch9>,<bsic9>[,<ch10>,<bsic10>[,<ch11>,<bsic11>[,<ch12>,<bsic12>[,<ch13>,<bsic13>[,<ch14>,<bsic14>[,<ch15>,<bsic15>[,<ch16>,<bsic16>]]]]]]]]]]]]]]]	• ERROR • OK
Show the current setting	AT*E2NBTS?	• *E2NBTS: <mcc>,<mnc>, <ci>,<bsic>,<ch>, <rxl><CR><LF> <mcc>,<mnc>, <ci>,<bsic>,<ch>, <rxl><CR><LF> … <mcc>,<mnc>, <ci>,<bsic>,<ch>, <rxl><CR><LF> <CR><LF> • OK • ERROR
Show if the command is supported	AT*E2NBTS=?	• *E2NBTS: (list of supported <ch>s) • ERROR

The set command shall provide with the ARFCNs (<ch>) and the BSIC (the BSIC is a cell colour code) to the MS in order to monitor those channels, belonging to the neighbour cells, instead of the ones that come through the air interface, in the serving cell information broadcast channel.

It is possible to update that information with up to 16 neighbour cells. If less than 16 <ch>s are provided, then the assigned channels shall substitute the last previous channel (given either by the BCCH or by another AT*E2NBTS command), if it is not in the list yet. Therefore, <ch1>,<bsic1> will substitute BTS 16 in the MS, <ch2>,<bsic2> to the BTS 15 and so on. If any of the <ch>s is already in the top-list, then it is skipped.

The read command displays the data of every neighbour cell, including the following parameters: MCC, MNC, Cell ID, BSIC, Channel and Rx Level.

<ch>	Description
(0-1023)	It represents the ARFCN that shows the Absolute RF Channel, which identifies a BCCH carrier

<mcc>	Description
String Type	Three digits in decimal format. The Mobile Country Code identifies the PLMN serving cell country according to ITU

<mnc>	Description
String Type	Two digits in decimal format. The Mobile Network Code identifies the PLMN operator in the serving cell

<ci>	Description
String type	Two byte cell ID in hexadecimal format

<bsic>	Description
String Type	One byte Base Stations Identification code in hexadecimal format

<rxl>	Description
String Type	Received Signal Strength level in dBm, measured in idle mode

14. Phonebook

14.1 AT*E2PBCS   Ericsson M2M Phonebook Check Sum

Description	Command	Possible Responses
Request phone book checksum	AT*E2PBCS	• *E2PBCS: <cks> • +CME ERROR: <err>
Show if the command is supported	AT*E2PBCS=?	• OK • ERROR

Command causes the ME to return the phone book checksum <cks> stored internally . Phone book checksum is recalculated whenever there is a change in the phone book. By requesting the checksum, the external application can detect if the phone book in the ME has changed, without downloading the whole phone book.

During the SIM initialisation process, it takes some time to download the phone book from the SIM card to the ME, depending on the number of entries. In case the command is invoked before the checksum has been calculated, the ME gives an ERROR message.

<cks>	Description
Hex type	1 byte in hexadecimal (between ""), containing the checksum

14.2 AT*ESAG   Ericsson Add to Group

Description	Command	Possible Responses
Adds a new item to the group with <gindex>	AT*ESAG=<gindex>, <type>, <itemindex>	• +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT*ESAG=?	• *ESAG: (list of supported <gindex>s, list of supported <type>s • OK • ERROR

This command adds a contact or a phone number to the current group.

<gindex>	Description
1-10	The group index within the hierarchical phone book

<type>	Description
1	Contact
2	Phone number

<itemindex>	Description
Integer	The index of the contact/group/phone number to add. The <itemindex> parameter has the following meaning: if the item to add is a contact, the <itemindex> is the index of the contact in the contacts book. If the item to add is a phone number the <itemindex> is the index in the phone book

14.3 AT*ESCG   Ericsson Create Group

Description	Command	Possible Responses
Adds a new group to the hierarchical phone book	AT*ESCG=<name>	• +CME ERROR: <err> • OK • ERROR
Shows if the command is supported	AT*ESCG=?	• *ESCG: <maxnamelength> • +CME ERROR: <err> • OK • ERROR

This command creates a new group in the hierarchical phone book. The group is stored at the first available position. There are 10 group positions in the hierarchical phone book.

<name>	Description
String	The group name. Character set as specified by command Select TE Character Set (AT+CSCS)

<maxnamelength>	Description
integer	The maximum length of the grouping (bytes)

14.4 AT*ESCN   Ericsson Set Credit Card Number

Description	Command	Possible Responses
Set up a credit card number	AT*ESCN=<mode> [,<passwd>][,<indexn>] [,<asn>,<type>,<name>, <vercode>[,<send order>]]	• +CME ERROR: <err> when mode=3:*ESCN: <indexn>,<asn>,<type>, <name>,<vercode>, <send order> When mode=4:*ESCN: <selindexn> • OK • ERROR
Show if the command is supported	AT*ESCN=?	• *ESCN: (list of supported <index>s),(list of supported <mode>s),(list of supported <send order>s) • +CME ERROR: <err> • OK • ERROR

Command is used to:

- set up a credit card number in the ME.

- disable credit card calls.

- enable one of the credit card call services.

- query the settings for one of the services.

- query the active credit call access server.

<mode>	Description
0	Settings for a credit card call (<passwd>, <indexn>, <asn>,<type>,<name>,<vercode> [,<send order>]). The four (4) parameters (<passwd>, <indexn>, <asn>, <vercode>) are mandatory when <mode>=0. If all those are not submitted ERROR will be returned
1	Disable credit card calling (<passwd>). If any other parameters are submitted, they are ignored
2	Enable one of the credit card call services (<passwd>, <indexn>). If any other parameters are submitted, they are ignored
3	Query (<passwd>, <indexn>). If any other parameters are submitted, they are ignored
4	Query for the selected credit call access server. If any parameters are submitted, they are ignored

<passwd>	Description
String	character string, phone lock code "PS", PH-SIM

<indexn>	*Description*
1	Index number to the first credit card call access server
2	Index number to the second credit card call access server

<selindexn>	*Description*
0	Credit card calling disabled
1	Index number to the first credit card call access server
2	Index number to the second credit card call access server

<asn>	*Description*
String	Character string <0..9,+>, max. 20 characters Phone number of format specified by <typex>

<type>	*Description*
Integer format	Type of address

<name>	*Description*
String	Character string of the name tag, for M&M. Maximum of 18 characters

<vercode>	*Description*
String	Character string <0..9,#,*>. Maximum of 20 characters

<send order>	*Description*
1	Verification code first. **Default value**
2	phone number to call first

14.5 AT*ESDG   Ericsson Delete Group

Description	Command	Possible Responses
Deletes a group defined in the hierarchical phone book	AT*ESDG=<gindex>	• +CME ERROR: <err> • OK
Show if the command is supported	AT*ESDG=?	• *ESDG: list of <gindex>s • OK

This command deletes the group at position <gindex> from the hierarchical phone book.

<gindex>	Description
1-10	The group index

14.6 AT*ESDI   Ericsson Delete Group Item

Description	Command	Possible Responses
Deletes the item in group <gindex> with position <index>	AT*ESDI=<gindex>,<index>	• +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT*ESDI=?	• +CME ERROR: <err> • OK • ERROR

The command deletes the item with <index> in the group with <gindex>.

<gindex>	Description
1-10	The groups index within the hierarchical phone book

<index>	Description
1-15	The items index within the group

14.7 AT*ESGR   Ericsson Group Read

Description	Command	Possible Responses
Lists the groups defined in the hierarchical phone book	AT*ESGR	• *ESGR: <gindex1>, <name1>[<CR><LF> <gindex2>, <name2>..] • OK • ERROR
Shows if the command is supported	AT*ESGR=?	OK

This command lists the groups in the hierarchical phone book.

<gindex>	Description
1-10	The group index

<name>	Description
String	The group name

14.8 AT*EGIR   Ericsson Group Item Read

Description	Command	Possible Responses
Lists the items in the <gindex> group	AT*EGIR=<gindex>	• *EGIR: <index1>, <type1>,<itemindex> [<CF><LF><index2>, <type2>, <itemindex> [...]] • OK • ERROR
Show if the command is supported	AT*EGIR=?	• OK • ERROR

This command lists the items stored in the group identified by <gindex>.

<gindex>	Description
1-10	The groups index within the hierarchical phonebook

<index>	Description
1-15	The items index within the group

<type>	Description
Integer	The kind of item. See AT*ESAG <item> table for definition

<itemindex>	Description
Integer	The item's index within the phonebook/contacts/group

14.9 AT*ESIL   Ericsson Silence Command

Description	Command	Possible Responses
Sets the MS to silent mode	AT*ESIL=[<mode>]	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT*ESIL?	• *ESIL: <mode> • +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT*ESIL=?	• *ESIL: (list of supported <mode>s) • +CME ERROR: <err> • OK • ERROR

This command orders the phone to be in silent mode. When the phone is in silent mode, all sounds from the MS are prevented.

<mode>	Description
0	Silent mode off. **Default value**
1	Silent mode on

14.10 AT*ESNU   Ericsson Settings Number

Description	Command	Possible Responses
Sets a number in the MS	AT*ESNU=<type>, <number>[,<number type>]	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT*ESNU?	• *ESNU: <type 1>, <number 1>, <number type 1> <CR><LF> ....*ESNU: <type n>, <number n>, <number type n> • +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT*ESNU=?	• *ESNU: (list of supported <type>s) • +CME ERROR: <err> • OK • ERROR

This command sets a <type> number, in the format <number type>, in the MS.

<type>	Description
0	Voice L1
1	Voice L2
2	Fax
3	Data

<number type>	Description
129	Default value when dialling string does not include the international access code character '+'
145	Default value when dialling string includes the international access code character '+'

<number>	Description
0-9, +	Number

14.11 AT+CPBF   Phonebook Find

Description	Command	Possible Responses
Show the current setting	+CPBF=\<findtext>	• +CPBF: \<index1>,\<number>,\<type>, \<text>[[...]\<CR>\<LF>+CBPF: \<index2>,\<number>,\<type>, \<text>] • +CME ERROR: \<err> • OK • ERROR
Show if the command is supported	+CPBF=?	• +CPBF: \<nlength>,\<tlength> • +CME ERROR: \<err> • OK • ERROR

Returns phone book entries whose alphanumeric field starts with \<findtext>. Only currently selected source will be searched for,

\<findtext>	Description
string type	Field of maximum length \<tlength>; character set as specified by the select TE character set command, +CSCS

14.12 AT+CPBR   Phonebook Read

Description	Command	Possible Responses
Read phone book entries	+CPBR=\<index1> [,\<index2>]	• +CPBR:\<index1>,\<number>, \<type>,\<text>[[,\<text_date>, \<text_time>]\<CR>\<LF>+CPBR: \<index2>,\<number>,\<type>, \<text>[,\<text_date>, \<text_time>]] • +CME ERROR \<err> • OK • ERROR
Show if the command is supported	+CPBR=?	• +CPBR: (list of supported \<index>s),\<nlength>,\<tlength> • +CME ERROR \<err> • OK • ERROR

Returns phone book entries in location number range \<index1>... \<index2> from the current phone book memory storage selected with +CPBS. If \<index2> is left out, only location \<index1> is returned. Entry fields returned are location number \<indexn>, phone number stored there \<number> (of format \<type>) and text \<text> associated with the number.

\<indexn>	Description
integer type	Values in the range of location numbers of phone book memory

<number>	Description
string type	Phone number of format <type>

<type>	Description
129	ISDN/telephony numbering plan, national/international unknown
145	ISDN/telephony numbering plan, international number
161	ISDN/telephony numbering plan, national number
128 - 255	Other values refer to GSM 04.08 section 10.5.4.7

<text>	Description
string type	Field of maximum length <tlength>; character set as specified by the select TE character set command, +CSCS.

<nlength>	Description
integer type	Value indicating the maximum length of field <number>

<tlength>	Description
integer type	Value indicating the maximum length of field <text>

Example

AT+CPBR=1,99
+CPBR: 1,"44123456789",145,"Test Number"
+CPBR: 2,"440987654321",145,"Test number 2"
+CPBR: 3,"449876543210",129,"Test Number 3"

OK

14.13 AT+CPBS   Phone Storage

Description	Command	Possible Responses
Set phone book storage	AT+CPBS=<storage> [,<password>]	• +CME ERROR <err> • OK • ERROR
Show the current setting	AT+CPBS?	• +CPBS: <storage> • +CME ERROR <err> • OK • ERROR
Show if the command is supported	AT+CPBS=?	• +CPBS: (list of supported <storage>s) • +CME ERROR <err> • OK • ERROR

Selects phone book memory storage <storage>, which is used by other phone book commands. Read command returns currently selected memory, and when supported by manufacturer, number of used locations and total number of locations in the memory.

<storage>	Description
"FD"	Fixed dialled numbers
"EN"	Emergency numbers
"ME"	ME phone book
"SM"	SIM phone book
"DC"	ME dialled calls list (30 entries)
"RC"	ME received calls list (30 entries)
"MC"	ME missed calls list (30 entries)

<passwd>	Description
String type	Represents the password required when selecting password protected <storage>s, for example PIN2 for storage "ME"

14.14 AT+CPBW   Phonebook Write

Description	Command	Possible Responses
Request phone book write	AT+CPBW=[<index>] [, <number>[,<type> [,<text>]]]	• +CME ERROR <err> • OK • ERROR
Show if the command is supported	AT+CPBW=?	• +CPBW: (list of supported <index>s),<nlength> ,(list of supported <type>s),<tlength> • +CME ERROR <err> • OK • ERROR

Writes phone book entry in location number <index> in the current phone book memory storage area, selected with AT+CPBS. If the <number> and <text> parameters are omitted, the entry is deleted. If <index> is omitted but <number> is included, the entry is written to the first free location in the phone book.

<index>	Description
integer type	Values in the range of location numbers of phone book memory

<number>	Description
string type	Phone number of format <type>

<type>	Description
integer format	Type of address octet, default 145 when dialing string includes international access code character "+", otherwise 129. (refer to GSM 04.08 subclause 10.5.4.7)
129	ISDN/telephony numbering plan, national/international unknown
145	ISDN/telephony numbering plan, international number
161	ISDN/telephony numbering plan, national number
128-255	Other values refer GSM 04.08 section 10.5.4.7

<text>	Description
string type	Field of maximum length <tlength>; character set as specified by the select TE character set command, +CSCS

<nlength>	Description
integer type	Value indicating the maximum length of field <number>

<tlength>	Description
integer type	Value indicating the maximum length of field <text>

Example

AT+CPBW=1,"44123456789",145,"Test Number"

OK

AT+CPBW=2,"440987654321",145,"Test number 2"

OK

AT+CPBW=3,"449876543210",129,"Test Number 3"

OK

14.15 AT*ECAW *Ericsson Callers Allowed Write*

Description	Command	Possible Responses
Write to or remove from CA list	AT*ECAW=[<CAindex>] ,[<groupname>][,[<storage>],[<PBindex>][,<CLUID>]]	• +CME ERROR <err> • OK • ERROR
Show if the command is supported	AT*ECAW=?	• *ECAW: (list of supported <CAindex>s),<gn_length>,(list of supported <storage>s) • +CME ERROR <err> • OK • ERROR

Command is used for writing entries to and removing entries from the Callers Allowed (CA) list.

If only <CAindex> is given, the entry at position <CAindex> will be deleted.

If only <groupname> is given, a reference (group name) to a group is added to the CA list.

If only <storage> and <PBindex> are given, a reference (PB index) to a phonebook entry is added to the Callers Allowed (CA) list.

If only <CLUID> is given, a reference (CLUID) to the unique identifier to a contact is added to the CA list.

Supplying <CAindex> and any of the following parameters will result in an ME error, +CME ERROR: <err>.

If writing fails in an ME, error +CME ERROR: <err> is returned.

Test command returns location range supported by the CA list and the supported storages.

<CAindex>	Description
Integer type	Values in the range of location numbers of CA list

<groupname>	Description
String format	Name of callers allowed group

<storage>	Description
ME	ME phonebook

<PBindex>	Description
Integer type	Values in the range of location numbers of phonebook memory

<CLUID>	Description
Integer format	LUID for contact

14.16 AT*ECAR Ericsson Callers Allowed Read

Description	Command	Possible Responses
List calls allowed	AT*ECAR= <Caindex1> [,<Caindex2>]	• *ECAR:<CAindex>,[<groupname>][, [<storage>],[<PBindex>][,CLUID]] • +CME ERROR <err> • OK • ERROR
Show if the command is supported	AT*ECAR=?	• *ECAR: (list of supported <CAindex>s),<gn_length>,(list of supported <storage>s) • +CME ERROR <err> • OK • ERROR

This command returns entries in the Callers Allowed list. The list consists of a mix of phonebook entries, contacts and groups. The response consists of list index <CAindex> and one of the following types: <groupname>, phonebook storage <storage> plus phonebook index <PBindex>, or unique identifier to a contact <CLUID>. If <CAindex2> is supplied, all list items from <CAindex1> to <CAindex2> will be returned.

If listing fails in a ME +CME ERROR: <err> is returned.

<CAindexn>	Description
Integer format	Start value of location number

<groupname>	Description
String format	Name of callers allowed group

<CLUID>	Description
Integer format	LUID for contact

Refer to the AT*ECAW command for the <storage> and <PBindex> parameters.

15. Short Message Services - Point to Point

15.1 AT+CPIN   PIN Control

See 3.26, AT+CPIN PIN Control

15.2 AT+CGSMS Select Service for MO SMS Messages

See 6.10, AT+CGSMS Select Service for MO SMS Messages

15.3 AT+CPMS   Preferred Message Storage

Common for both PDU (Protocol Data Unit) and Text Modes

Description	Command	Possible Responses
Set preferred message storage	AT+CPMS=<mem1> [,<mem2>] [,<mem3>]	• +CPMS: <used1>,<total1>,<used2>, <total2>,<used3>,<total3> • *+CMS ERROR: <err>* • OK • ERROR
Show the current setting	AT+CPMS?	• +CPMS: <mem1>,<used1>,<total1, <mem2>,<used2>,<total2, <mem3>,<used3>,<total3> • *+CMS ERROR: <err>* • OK • ERROR
Show if the command is supported	AT+CPMS=?	• +CPMS: (list of supported <mem1>s),(list of supported <mem2>s),(list of supported <mem3>s) • OK • ERROR

Selects memory storage <mem1>, <mem2> and <mem3> to be used for reading, writing, etc. If chosen storage is not appropriate for the ME (but is supported by the TA), final result code +CMS ERROR: <err> is returned.

Test command returns lists of memory storage supported by the TA.

<mem1>	Description
string type	Memory from which messages are read and deleted (commands List Messages +CMGL, Read Message +CMGR and Delete Message +CMGD)
"ME"	ME message storage
"SM"	SIM message storage. **Default value**

<mem2>	Description
string type	Memory to which writing and sending operations are made (commands Send Message from Storage +CMSS and Write Message to Memory +CMGW)
"ME"	ME message storage
"SM"	SIM message storage

<mem3>	Description
string type	Memory to which received SMs are preferred to be stored (unless forwarded directly to TE). Received CBMs are always stored in "BM" (or some manufacturer specific storage) unless directly forwarded to TE
"ME"	ME message storage
"SM"	SIM message storage

<used1>,<used2>,<used3>	Description
integer type	Total number of messages currently in <mem1>, <mem2> and <mem3> respectively

<total1>,<total2> ,<total3>	Description
integer type	Total number of message locations in <mem1>, <mem2> and <mem3> respectively

Examples

AT+CPMS=?
+CPMS: ("ME","SM"),("ME","SM"),("ME","SM")

OK

AT+CPMS?
+CPMS: "ME",0,40,"SM",1,15,"ME",0,40

OK

AT+CPMS="sm","sm","sm"
+CPMS: 1,15,1,15,1,15

OK

15.4 AT+CSCA   Service Centre Address

Common for both PDU and Text Modes

Description	Command	Possible Responses
Set service centre address	AT+CSCA=<sca> [,<tosca>]	• OK • ERROR
Show the current setting	AT+CSCA?	• +CSCA: <sca>,<tosca> • OK • ERROR
Show if the command is supported	AT+CSCA=?	• OK • ERROR

Updates the SMSC address, through which mobile originated SMs are transmitted. In text mode, the setting is used by send (+CMGS) and write (+CMGW) commands. In PDU mode, the setting is used by the same commands, but only when the length of the SMSC address coded into <pdu> parameter equals zero. Note that a "+" in front of the number in <sca> has precedence over the <tosca> parameter, so that a number starting with "+" will always be treated as an international number.

<sca>	Description
string type	GSM 04.11 (3G TS 24.011) RP SC address Address-Value field in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character set

<tosca>	Description
integer type	GSM 04.11 (3G TS 24.011) RP SC address type-of-address octet in integer format
129	ISDN/telephony numbering plan, national/international unknown
145	ISDN/telephony numbering plan, international number
161	ISDN/telephony numbering plan, national number
128-255	Other values refer GSM 04.08 section 10.5.4.7

Example

>AT+CSCA?
>+CSCA: "44385016005",145
>
>OK

15.5 AT+CMGF   Message Format

Common for both PDU and Text Modes

Description	Command	Possible Responses
Set message format	AT+CMGF=<mode>	• OK • ERROR
Show the current setting	AT+CMGF?	• +CMGF: <mode> • OK • ERROR
Show if the command is supported	AT+CMGF=?	• +CMGF: (list of supported <mode>s) • OK • ERROR

This command tells the TA, which input and output format to use for messages. The <mode> parameter indicates the format of messages used with send, list, read and write commands, and unsolicited result codes resulting from received messages. Mode can be either PDU mode (entire TP data units used) or text mode (headers and body of the messages given as separate parameters).

Test command returns supported modes as a compound value.

<mode>	Description
0	PDU mode
1	Text mode

15.6 AT+CMGW Write Message to Memory

PDU Mode

Description	Command	Possible Responses
Write message to memory	AT+CMGW=<length> [,<stat>]<CR> **PDU is given**<ctrl-Z/ESC>	• +CMGW: <index> • +CMS ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CMGW=?	• OK • ERROR

Stores a message to memory storage <mem2>. Memory location <index> of the stored message is returned. By default message status will be set to 'stored unsent', but parameter <stat> allows other status values to be given. ME/TA manufacturer may choose to use different default <stat> values for different message types. Entering PDU is the same as specified by the send message command, +CMGS. If writing fails, final result code +CMS ERROR: <err> is returned. See "AT+CPMS Preferred Message Storage", page 251.

<stat>	Description
2	Stored unsent message (only applicable to SMs)

<index>	Description
Integer type	Value in the range of location numbers supported by the associated memory

<length>	Description
Integer type	Value indicating in PDU mode (+CMGF=0), the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length)

<pdu>	Description
...	In the case of SMS: GSM 04.11 SC address followed by GSM 03.40 TPDU in hexadecimal format: ME/TA converts each octet of TP data unit into two IRA character long hexadecimal number (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)) In the case of CBS: GSM 03.41 TPDU in hexadecimal format

Text Mode

Description	Command	Possible Responses
Write message to memory	AT+CMGW [=<oa/da> [,<tooa/toda>[,<stat>]]] <CR> **Text is entered** <ctrl-Z/ ESC>	• +CMGW: <index> • +CMS ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CMGW=?	• OK • ERROR

Stores message (either SMS-DELIVER or SMS-SUBMIT) to memory storage <mem2>. Memory location <index> of the stored message is returned. By default message status will be set to 'stored unsent', but parameter <stat> allows also other status values to be given. The entering of text is done as specified in the send message command, +CMGS. If writing fails, final result code +CMS ERROR: <err> is returned.

Note! SMS-COMMANDs and SMS-STATUS-REPORTs cannot be stored in text mode.

<stat>	Description
2	Stored unsent message (only applicable to SMs)

<oa>	Description
String type	GSM 03.40 TP-Originating-Address Value in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character (refer command +CSCS). Type of address given by <tooa>

<da>	Description
String type	GSM 03.40 TP-Destination-Address Value in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character (refer command +CSCS). Type of address given by <toda>

<tooa>	Description
String type	GSM 04.11 TP-Originating-Address Type-of-Address octet in integer format (default refer <toda>)

<toda>	Description
String type	GSM 04.11 TP-Destination- Address Type-of-Address octet in integer format (when first character of <da> is +(IRA 43) default is 145, otherwise default is 129

<index>	*Description*
Integer type	Value in the range of location numbers supported by the associated memory

15.7 AT+CMGS   Send Message

PDU Mode

Description	*Command*	*Possible Responses*
Send message	AT+CMGS=<length><CR>**PDU is given**<ctrl-Z/ESC>	• +CMGS: <mr>[,<ackpdu>] • +CMS ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CMGS=?	• OK • ERROR

Sends a message from a TE to the network (SMS-SUBMIT). Message reference value <mr> is returned to the TE on successful message delivery. Optionally, when AT+CSMS <service> value is 1 and there is network support, <ackpdu> is returned. Values can be used to identify message upon unsolicited delivery status report result code. If sending fails in a network or an ME error, final result code +CMS ERROR: <err> is returned. This command is abortable.

- <length> must indicate the number of octets coded in the TP layer data unit to be given (i.e. SMSC address octets are excluded).

- The TA shall send a four character sequence <CR><LF><greater_than><space> (IRA 13, 10, 62, 32) after command line is terminated with <CR>; after that PDU can be given from TE to ME/TA.

- The DCD signal is in the ON state as PDU is given.

- The echoing of given characters back from the TA is controlled by V.25ter echo command E.

- The PDU shall be hexadecimal format (similarly as specified for <pdu>) and given in one line; ME/TA converts this coding into the actual octets of PDU.

- When the length octet of the SMSC address (given in the <pdu>) equals zero, the SMSC address set with command Service Centre Address +CSCA is used.

- Sending can be cancelled by giving <ESC> character (IRA 27).

- <ctrl-Z> (IRA 26) must be used to indicate the ending of PDU.

<mr>	*Description*
Integer type	GSM 03.40 TP-Message-Reference in integer format

<length>	Description
Integer type	Value indicating in PDU mode (+CMGF=0), the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length)

<ackpdu>	Description
...	GSM 03.40 RP-User-Data element of RP-ACK PDU; format is same as for <pdu> in case of SMS, but without GSM 04.11 SC address field and parameter shall be bounded by double quote characters like a normal string type parameter

Text Mode

Description	Command	Possible Responses
Send message	AT+CMGS=<da> [,<toda>] <CR> **Text is entered**<ctrl-Z/ ESC>	• +CMGS: <mr>[,<scts>] • +CMS ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CMGS=?	• OK • ERROR

Sends a message from a TE to the network (SMS-SUBMIT). Message reference value <mr> is returned to the TE on successful message delivery. Optionally, when AT+CSMS <service> value is 1 and there is network support, <scts> is returned. Values can be used to identify message upon unsolicited delivery status report result code. If sending fails in a network or an ME error, final result code +CMS ERROR: <err> is returned. This command is abortable.

• The entered text (GSM 03.40 TP-Data-Unit) is sent to address <da> and all current settings (refer Set Text Mode Parameters +CSMP and Service Centre Address +CSCA) are used to construct the actual PDU in the ME/TA.

• The TA shall send a four character sequence <CR><LF><greater_than><space> (IRA 13, 10, 62, 32) after the command line is terminated with <CR>; after that text can be entered from the TE to the ME/TA.

• The DCD signal is in the ON state as text is entered.

• The echoing of entered characters back from the TA is controlled by V.25ter echo command E.

• The entered text should be formatted as follows:

> if <dcs> (set with +CSMP) indicates that GSM 03.38 default alphabet is used and <fo> indicates that GSM 03.40 TP-User-Data-Header-Indication is not set:

if TE character set other than "HEX" (refer command Select TE Character Set +CSCS in TS 07.07): ME/TA converts the entered text into GSM alphabet according to rules of Annex A; backspace can be used to delete last character and carriage returns can be used (previously mentioned four character sequence shall be sent to the TE after every carriage return entered by the user);

if TE character set is "HEX": the entered text should consist of two IRA character long hexadecimal numbers which ME/TA converts to 7-bit characters of GSM alphabet (e.g. 17 (IRA 49 and 55) will be converted to character Π (GSM 23));

if <dcs> indicates that 8-bit or UCS2 data coding scheme is used or <fo> indicates that GSM 03.40 TP-User-Data-Header-Indication is set: the entered text should consist of two IRA character long hexadecimal numbers which ME/TA converts into 8-bit octet (e.g. two characters 2A (IRA 50 and 65) will be converted to an octet with integer value 42).

- Sending can be cancelled by giving <ESC> character (IRA 27).
- <ctrl-Z> (IRA 26) must be used to indicate the ending of the message body.

<da>	Description
String type	GSM 03.40 TP-Destination-Address Value in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character (refer command +CSCS). Type of address given by <toda>

<toda>	Description
String type	GSM 04.11 TP-Destination- Address Type-of-Address octet in integer format (when first character of <da> is +(IRA 43) default is 145, otherwise default is 129

<mr>	Description
String type	GSM 03.40 TP-Service-Centre-Time-Stamp in time-string format (refer <dt>)

<scts>	Description
Integer	GSM 03.40 TP-Message-Reference

Example

AT+CMGF=1
OK
AT+CSDH=1
OK
AT+CSMP=17,167,0,0
OK
AT+CMGS="+447747008670"
> Test SMS□
+CMGS: 15

OK

15.8 AT+CMSS   Send From Storage

PDU mode

Description	Command	Possible Responses
Send from storage	AT+CMSS=<index>	• +CMSS: <mr> • *+CMS ERROR: <err>* • OK • ERROR
Show if the command is supported	AT+CMSS=?	• OK • ERROR

Sends message with location value <index> from message storage <mem2> to the network (SMS-SUBMIT or SMS-COMMAND). Reference value <mr> is returned to the TE on successful message delivery. If sending fails in a network or an ME error, final result code +CMS ERROR: <err> is returned. This command is abortable. See "AT+CPMS Preferred Message Storage", page 251.

<index>	Description
Integer type	Value in the range of location numbers supported by the associated memory

<mr>	Description
Integer type	GSM 03.40 TP-Message-Reference in integer format

Text Mode

Description	Command	Possible Responses
Send from storage	AT+CMSS=<index> [,<da> [,<toda>]]	• +CMSS: <mr> [,<scts>] • +CMS ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CMSS=?	• OK • ERROR

Sends message with location value <index> from message storage <mem2> to the network (SMS-SUBMIT or SMS-COMMAND). Reference value <mr> is returned to the TE on successful message delivery. Optionally, when +CSMS <service> value is 1 and network supports, <scts> is returned. If sending fails in a network or an ME error, final result code +CMS ERROR: <err> is returned. This command is abortable.

<index>	Description
Integer type	Value in the range of location numbers supported by the associated memory

<da>	Description
String type	GSM 03.40 TP-Destination-Address Value in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character (refer command +CSCS). Type of address given by <toda>

<toda>	Description
String type	GSM 04.11 TP-Destination- Address Type-of-Address octet in integer format (when first character of <da> is +(IRA 43) default is 145, otherwise default is 129

<scts>	Description
String type	GSM 03.40 TP-Service-Centre-Time-Stamp in time-string format (refer <dt>)

<mr>	Description
Integer type	GSM 03.40 TP-Message-Reference in integer format

15.9 AT+CMGC   Send Command

PDU Mode

Description	Command	Possible Responses
Send command message	AT+CMGC=<length><CR> <pdu><ctrl-Z/ESC>	• if PDU mode (+CMGF=0) and sending successful: +CMGC: <mr>[,<ackpdu>] • if sending fails: +CMS ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CMGC=?	• OK • ERROR

Sends a command message from a TE to the network (SMS-COMMAND). The entering of PDU is as specified in the send message command, +CMGS. Message reference value <mr> is returned to the TE on successful message delivery. Optionally (when +CSMS <service> value is 1 and network supports) <ackpdu> is returned. Values can be used to identify message upon unsolicited delivery status report result code. If sending fails in a network or an ME error, final result code +CMS ERROR: <err> is returned. This command is abortable.

<length>	Description
Integer type	Value indicating in PDU mode (+CMGF=0), the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length)

<pdu>	Description
String	In the case of SMS: GSM 04.11 SC address followed by GSM 03.40 TPDU in hexadecimal format: ME/TA converts each octet of TP data unit into two IRA character long hexadecimal number (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)) In the case of CBS: GSM 03.41 TPDU in hexadecimal format

<mr>	Description
Integer type	GSM 03.40 TP-Message-Reference in integer format

<ackpdu>	Description
String	GSM 03.40 RP-User-Data element of RP-ACK PDU; format is same as for <pdu> in case of SMS, but without GSM 04.11 SC address field and parameter shall be bounded by double quote characters like a normal string type parameter

Text Mode

Description	Command	Possible Responses
Send command message	AT+CMGC=<fo>,<ct>[,<pid>[,<mn>[,<da>[,<toda>]]]]<CR>**Text is entered**<ctrl-Z/ESC>	• if PDU mode (+CMGF=1) and sending successful: +CMGC: <mr>[,<scts>] • if sending fails: +CMS ERROR: <err> • OK • ERROR
Show if the commands is supported	AT+CMGC=?	• OK • ERROR

Sends a command message from a TE to the network (SMS-COMMAND). The entering of text is as specified in the send message command, +CMGS, but the format is fixed to be a sequence of two IRA character long hexadecimal numbers, which the ME/TA converts into 8-bit octets (refer to +CMGS). Message reference value <mr> is returned to the TE on successful message delivery. Optionally, when +CSMS <service> value is 1 and there is network support, <scts> is returned. Values can be used to identify message upon unsolicited delivery status report result code. If sending fails in a network or an ME error, final result code +CMS ERROR: <err> is returned. This command is abortable.

<fo>	Description
0	First octet of SMS-DELIVER in integer format
1	First octet of SMS_SUBMIT in integer format
2	First octet of SMS-STATUS-REPORT in integer format
3	First octet of SMS-COMMAND in integer format

<ct>	Description
Integer	GSM 03.40 TP-Command-Type. **Default value is 0**

<pid>	Description
0-255	Protocol Identifier in integer format. **Default value is 0**, according to 07.05 section 9.2.3.9

<mn>	Description
Integer	GSM 03.40 TP-Message-Number

<da>	*Description*
String type	GSM 03.40 TP-Destination-Address Value in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character (refer command +CSCS). Type of address given by <toda>

<toda>	*Description*
String type	GSM 04.11 TP-Destination- Address Type-of-Address octet in integer format (when first character of <da> is +(IRA 43) default is 145, otherwise default is 129

<mr>	*Description*
Integer type	GSM 03.40 TP-Message-Reference in integer format

<scts>	*Description*
String type	GSM 03.40 TP-Service-Centre-Time-Stamp in time-string format (refer to <dt>)

15.10 AT+CNMI   New Message Indications to TE

PDU Mode

Description	*Command*	*Possible Responses*
Set new message indication to TE	AT+CNMI=[<mode> [,<mt>[,<bm>[,<ds>]]]]	• +CMS ERROR: <err> • OK • ERROR
Show the current setting	AT+CNMI?	• +CNMI: <mode>,<mt>,<bm>,<ds> • OK • ERROR
Show if the command is supported	AT+CNMI=?	• +CNMI: (list of supported <mode>s), (list of supported <mt>s), (list of supported <bm>s), (list of supported <ds>s) • OK • ERROR

Selects the procedure for the way in which new messages received from the network, are indicated to the TE when it is active, e.g. DTR signal is ON. If the TE is inactive (DTR signal is OFF), message receiving is carried out as specified in GSM 03.38 (3G TS 23.038).

If the command fails and the error is related to mobile equipment or network, the final result code CMS ERROR: <err> is returned.

<mode>	Description
3	Forward unsolicited result codes directly to the TE. TA-TE link specific inband technique used to embed result codes and data when TA is in on-line data mode

<mt>	Description
0	No SMS-DELIVER indications are routed to the TE. No class, Class 0, class 1 and class 3 use <mem3> as preferred storage. Class 2 messages shall be stored in the SIM. If it this is not possible then the MS shall send an error message accordingly to GSM 03.38
1	SMS-DELIVER is stored into ME/TA and the indication of the memory location is routed to the TE using unsolicited result code: +CMTI: <mem>,<index>
2	Class 0, class 1, and class 3 SMS-DELIVERs are routed directly to the TE using the unsolicited result code but not stored in ME/TA: +CMT:[<alpha >], <length><CR><LF><pdu> (PDU mode enabled) Class 2 data coding scheme result in indication as defined in <mt>=1
3	Class 3 SMS-DELIVERs are routed directly to TE using unsolicited result codes +CMT: <length><CR><LF><pdu>. Class 3 SMS-DELIVER is not stored in ME/TA. Messages of other data coding schemes result in indication as defined in <mt>=1

<bm>	Description
0	Store message to "BM" (or some manufacturer specific memory). No CBM indications are routed to the TE
2	New CBMs are routed directly to the TE using unsolicited result code: +CBM: <length><CR><LF><pdu> (PDU mode enabled). New CBMs are not stored in CBM memory

<ds>	Description
0	No SMS-STATUS-REPORTs are routed to the TE. SMS-STATUS-REPORT is stored in ME/TA
1	SMS-STATUS-REPORTs are routed to the TE using unsolicited result code: +CDS: < length>< CR>< LF>< pdu> (PDU mode enabled). SMS-STATUS-REPORT is not stored in ME/TA
2	SMS-STATUS-REPORTs are routed to the TE using unsolicited result code: +CDSI: < mem><index> (PDU mode enabled). SMS-STATUS-REPORT is stored in ME/TA

Unsolicited Result codes:

+CMT: <length><CR><LF><pdu>
+CMTI: <mem>,<index>
+CBM: <length><CR><LF><pdu>
+CDS: <length><CR><LF><pdu>
+CDSI: <mem><index>

Text Mode

Description	Command	Possible Responses
Set new message indication to TE	AT+CNMI=[<mode>[,<mt>[,<bm>[,<ds>]]]]	• +CMS ERROR: <err> • OK • ERROR
Show the current setting	AT+CNMI?	• +CNMI: <mode>,<mt>,<bm>,<ds> • OK • ERROR
Show if the command is supported	AT+CNMI=?	• +CNMI: (list of supported <mode>s), (list of supported <mt>s), (list of supported <bm>s), (list of supported <ds>s) • OK • ERROR

Selects the procedure for the way in which new messages received from the network, are indicated to the TE when it is active, e.g. DTR signal is ON. If TE is inactive (DTR signal is OFF), message receiving is carried out as specified in GSM 03.38 (3G TS 23.038).

If the command fails and the error is related to mobile equipment or network, the final result code CMS ERROR: <err> is returned.

<mode>	Description
3	Forward unsolicited result codes directly to the TE. TA-TE link specific inband technique used to embed result codes and data when TA is in on-line data mode

<mt>	*Description*
0	No SMS-DELIVER indications are routed to the TE. No class, Class 0, class 1 and class 3 use <mem3> as preferred storage. Class 2 messages shall be stored in the SIM. If it this is not possible then the MS shall send an error message accordingly to GSM 03.38
1	SMS-DELIVER is stored into ME/TA and the indication of the memory location is routed to the TE using unsolicited result code: +CMTI: <mem>,<index>
2	Class 0, class 1, and class 3 SMS-DELIVERs are routed directly to the TE using the unsolicited result code: +CMT:<oa>, [<alpha>, <scts> [,<tooa>,<fo>,<pid>,<dcs>, <sca>,<tosca>,<length>]<CR><LF><data> (text mode enabled). About parameters in italics, refer to the show text mode command, +CSDH
3	Class 3 SMS-DELIVERs are routed directly to TE using unsolicited result codes +CMT:<oa>, [<alpha>, <scts> [,<tooa>,<fo>,<pid>,<dcs>,<sca>,<tosca>,<length>]<CR> <LF><data> (Text Mode enabled). About parameters in italics, refer to the show text mode command, +CSDH. Messages of other data coding schemes result in indication as defined in <mt>=1

<bm>	*Description*
0	Store message to "BM" (or some manufacturer specific memory). No CBM indications are routed to the TE
2	New CBMs are routed directly to the TE using unsolicited result code: +CBM: <sn>,<mid>,<dcs>,<page>,<pages><CR><LF><data> (Text mode enabled)

<ds>	*Description*
0	No SMS-STATUS-REPORTs are routed to the TE
1	SMS-STATUS-REPORTs are routed to the TE using unsolicited result code: : +CDS: <fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st> (Text mode enabled). SMS-STATUS-REPORT is not stored in ME/TA
2	SMS-STATUS-REPORTs are routed to the TE using unsolicited result code: +CDSI: < mem><index> (Text mode enabled). SMS-STATUS-REPORT is stored in ME/TA

Unsolicited Result codes:

+CMT:<oa>, [<alpha>, <scts>
[,<tooa>,<fo>,<pid>,<dcs>,<sca>,<tosca>,<length>]<CR><LF>
<data> (Text Mode enabled). Refer to the show text mode command,
+CSDH for information on the parameters in italics.
+CMTI: <mem>,<index>
+CBM: <sn>,<mid>,<dcs>,<page>,<pages><CR><LF><data>
+CDS: <fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st>
+CDSI: <mem><index>

Example

Display cell broadcast messages:

AT+CNMI=3,0,2,0,0

15.11 AT+CMGR Read Message

PDU Mode

Description	Command	Possible Responses
Read message	AT+CMGR=<index>	• +CMGR: <stat>,[<alpha>],<length>]<CR><LF><pdu> • +CMS ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CMGR=?	• OK • ERROR

Returns message with location value <index> from preferred message storage <mem1> to the TE. Status of the message and entire message data unit <pdu> is returned. If status of the message is 'received unread', status in the storage changes to 'received read'. If reading fails, final result code +CMS ERROR: <err> is returned.

<stat>	Description
0	Received unread message (i.e. new message)
1	Received read message
2	Stored unsent message (only applicable to SMs)
3	Stored sent message (only applicable to SMs)

<index>	Description
Integer type	Value in the range of location numbers supported by the associated memory

<alpha>	Description
String type	Manufacturing specific. Should be left empty but not omitted

<length>	Description
Integer type	Value indicating in PDU mode (+CMGF=0), the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length)

<pdu>	*Description*
	In the case of SMS: GSM 04.11 SC address followed by GSM 03.40 TPDU in hexadecimal format: ME/TA converts each octet of TP data unit into two IRA character long hexadecimal number (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)) In the case of CBS: GSM 03.41 TPDU in hexadecimal format

Note! It is possible to send SMS in PDU mode, if help for this is required then please contact customer support.

Text Mode

Description	*Command*	*Possible Responses*
Read message	AT+CMGR= [<index>]	• **if text mode (+CMGF=1), command successful and SMS-DELIVER:** +CMGR: <stat>,<oa>,[<alpha>],<scts>,[<tooa>, <fo>,<pid>,<dcs>,<sca>,<tosca>, <length>]<CR><LF><data> • **if text mode (+CMGF=1), command successful and SMS-SUBMIT:** +CMGR: <stat>,<da>,[<alpha>],*[<toda>,<fo>, <pid>,<dcs>,[<vp>],<sca>,<tosca>, <length>]*<CR><LF><data> • **if text mode (+CMGF=1), command successful and SMS-STATUS-REPORT:** +CMGR: <stat>,<fo>,<mr>,[<ra>],[<tora>], <scts>,<dt>,<st> • **if text mode (+CMGF=1), command successful and SMS-COMMAND:** +CMGR: <stat>,<fo>,<ct>*[,<pid>,[<mn>],[<da>], [<toda>],<length><CR><LF><cdata>]* • **if text mode (+CMGF=1), command successful and CBM storage:** +CMGR: <stat>,<sn>,<mid>,<dcs>,<page>, <pages><CR><LF><data> • +CMS ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CMGR=?	• OK • ERROR

Returns messages with location index <index> from message storage <mem1> to the TE. About text mode parameters in Italics, refer command Show Text Mode Parameters (+CSDH), If the status of the message is 'received unread', status in the storage changes to 'received read'. If listing fails final result code +CMS ERROR: <err> is returned.

<index>	*Description*
Integer type	Value in the range of location numbers supported by <mem1>

<stat>	*Description*
0	Received unread message (new message)
1	Received read message
2	Stored unsent message (only applicable to SMs)
3	Stored sent message (only applicable to SMs)

<oa>	Description
String type	GSM 03.40 TP-Originating-Address Value in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character (refer command +CSCS). Type of address given by <tooa>

<da>	Description
String type	GSM 03.40 TP-Destination-Address Value in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character (refer command +CSCS). Type of address given by <toda>

<toda>	Description
String type	GSM 04.11 TP-Destination- Address Type-of-Address octet in integer format (when first character of <da> is +(IRA 43) default is 145, otherwise default is 129

<tooa>	Description
String type	GSM 04.11 TP-Originating-Address Type-of-Address octet in integer format (default refer <toda>)

<tora>	Description
String type	GSM 04.11 TP-Recipient-Address Type-of-Address octet in integer format (default refer <toda>)

<alpha>	Description
String type	Manufacturing specific. Should be left empty but not omitted, i.e. commas shall mark the place were it should be. Used character set should be the one selected with command Select TE Character Set +CSCS

<scts>	Description
String type	GSM 03.40 TP-Service-Centre-Time-Stamp in time-string format (refer <dt>)

<length>	Description
Integer type	Value indicating in PDU mode (+CMGF=0), the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length)

<data>

The entered text should be formatted as follows:

if <dcs> (set with +CSMP) indicates that GSM 03.38 default alphabet is used and <fo> indicates that GSM 03.40 TP-User-Data-Header-Indication is not set:

if TE character set other than "HEX" (refer command Select TE Character Set +CSCS in TS 07.07): ME/TA converts the entered text into GSM alphabet according to rules of Annex A; backspace can be used to delete last character and carriage returns can be used (previously mentioned four character sequence shall be sent to the TE after every carriage return entered by the user);

if TE character set is "HEX": the entered text should consist of two IRA character long hexadecimal numbers which ME/TA converts to 7-bit characters of GSM alphabet (e.g. 17 (IRA 49 and 55) will be converted to character Π (GSM 23));

if <dcs> indicates that 8-bit or UCS2 data coding scheme is used or <fo> indicates that GSM 03.40 TP-User-Data-Header-Indication is set: the entered text should consist of two IRA character long hexadecimal numbers which ME/TA converts into 8-bit octet (e.g. two characters 2A (IRA 50 and 65) will be converted to an octet with integer value 42);

sending can be cancelled by giving <ESC> character (IRA 27)
<ctrl-Z> (IRA 26) must be used to indicate the ending of the message body

<fo>	*Description*
0	First octet of SMS-DELIVER in integer format
1	First octet of SMS_SUBMIT in integer format
2	First octet of SMS-STATUS-REPORT in integer format
3	First octet of SMS-COMMAND in integer format

<mr>	*Description*
Integer	GSM 03.40 TP-Message_Reference

<ra>	*Description*
String type	GSM 03.40 TP-Recipient-Address-Value field. BCD (or GSM default alphabet) are converted to characters of the currently selected TE character set (refef command +CSCS. Type of address given by <tosca>

<dt>	*Description*
String type	GSM 03.40 TP-Discharge-Time in string format "yy/mm/dd,hh:mm:ss±zz where characters indicate year, month, day, hour,minutes, seconds and time zone

<st>	*Description*
Integer	GSM 03.40 TP-status

<ct>	*Description*
Integer	GSM 03.40 TP--command-type. **Default value is 0**

<sn>	*Description*
Integer	GSM 03.41 CBM serial number

<mid>	*Description*
String type	All different possible combinations of CBM message identifiers (refer <mid>) (default is empty string); e.g. "0,1,5-7" <mid> GSM 03.41 CBM message identifier in integer format

<page>	*Description*
Integer format	GSM 03.41 CBM page parameter bits 4-7 in integer format

<pages>	*Description*
Integer type	GSM 03.41 CBM page parameter bits 0-3 in integer format

<pid>	*Description*
0 - 255	Protocol Identifier in integer format. **Default value is 0**, according to 07.05 section 9.2.3.9

<dcs>	*Description*
0 - 255	Data coding scheme. See GSM 03.48. **UCS2 and compressed text not supported**

<sca>	*Description*
String type	GSM 04.11 RP SC address Address-Value field in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character set

<tosca>	*Description*
Integer type	GSM 04.11 RP SC address type-of-address octet in integer format
129	ISDN/telephony numbering plan, national/international unknown
145	ISDN/telephony numbering plan, international number
161	ISDN/telephony numbering plan, national number
128 - 255	Other values refer to GSM 04.08 section 10.5.4.7

<vp>	Description
0 - 143	(TP-VP+1) x 5 minutes (i.e. 5 minute intervals up to 12 hous)
144 - 167	12 hours + ((TP_VP-143) x 30 minutes)
168 - 196	(TP-VP-166) x 1 day
197 - 255	(TP-VP-192) x 1 week

<mn>	Description
Integer type	GSM 03.40 TP-message-number

Example

AT+CMGR
R1A100   CXC1122112

OK

15.12 AT+CMGL List Message

PDU Mode

Description	Command	Possible Responses
List message	AT+CMGL [=<stat>]	• +CMGL: <index>,<stat>,[<alpha>],<length> <CR><LF><pdu>[<CR><LF> +CMGL: <index>,<stat>,[<alpha>],<length> <CR><LF><pdu>[...]] • +CMS ERROR: <err>
Show if the command is supported	AT+CMGL=?	• +CMGL: (list of supported <stat>s)

Note!   Returns messages with status value <stat> from preferred message storage <mem1> to the TE. Entire data units <pdu> are returned. If status of the message is 'received unread', status in the storage changes to 'received read'. If listing fails, final result code +CMS ERROR: <err> is returned.

<stat>	Description
0	Received unread message (i.e. new message)

<stat>	Description
1	Received read message
2	Stored unsent message (only applicable to SMs)
3	Stored sent message (only applicable to SMs)
4	All messages (only applicable to +CMGL command)

<index>	Description
Integer type	Value in the range of location numbers supported by the associated memory

<alpha>	Description
String type	Manufacturing specific. Should be left empty but not omitted

<length>	Description
Integer type	Value indicating in PDU mode (+CMGF=0), the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length)

<pdu>	Description
	In the case of SMS: GSM 04.11 SC address followed by GSM 03.40 TPDU in hexadecimal format: ME/TA converts each octet of TP data unit into two IRA character long hexadecimal number (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)) In the case of CBS: GSM 03.41 TPDU in hexadecimal format

Text Mode

Description	*Command*	*Possible Responses*
List message	AT+CMGL =[<stat>]	• **If text mode (+CMGF=1), command successful and SMS-SUBMITs and SMS-DELIVERs:** +CMGL: <index1>,<stat>,<oa/da>,[<alpha>], [<scts>][,<tooa/toda>,<length>] <CR><LF><data>[<CR><LF> +CMGL: <index2>,<stat>,<oa/da>,[<alpha>], [<scts>][,<tooa/toda>,<length>] <CR><LF><data>[...]] • **If text mode (+CMGF=1), command successful and SMS-STATUS-REPORT:** +CMGL: <index1>,<stat>,<fo>,<mr>, [<ra>], [<tora>],<scts>,<dt>,<st> [<CR><LF> +CMGL: <index2>,<stat>,<fo>,<mr>,[<ra>], [<tora>],<scts>,<dt>,<st>[...]] • **If text mode (+CMGF=1), command successful and SMS-COMMANDs:** +CMGL: <index>,<stat>,<fo>,<ct> [<CR><LF> +CMGL: <index>,<stat>,<fo>,<ct>[...]] • **If text mode (+CMGF=1), command successful and CBM storage:** +CMGL: <index>,<stat>,<sn>,<mid>,<page>, <pages>,<CR><LF><data>[<CR><LF> +CMGL: <index>,<stat>,<sn>,<mid>,<page>, <pages><CR><LF> <data>[...]] • **Otherwise:** +CMS ERROR: <err>
Show the current setting	AT+CMGL?	• +CMGL:<stat> • +CMS ERROR: <err>
Show if the command is supported	AT+CMGL=?	• +CMGL: (list of supported <stat>s) • +CMS ERROR: <err>

Returns messages with status value <stat> from message storage <mem1> to the TE. About text mode parameters in Italics, refer command Show Text Mode Parameters (+CSDH). If the status, of the message is 'received unread', status in the storage changes to 'received read'. If listing fails final result code +CMS ERROR: <err> is returned.

<index>	*Description*
Integer type	Value in the range of location numbers supported by <mem1>

<stat>	*Description*
Integer	Indicates the status of messages in memory
0	Received unread message (new message)
1	Received read message
2	Stored unsent message (only applicable to SMs)
3	Stored sent message (only applicable to SMs)
4	All messages (only applicable to +CMGL command)

<oa>	*Description*
String type	GSM 03.40 TP-Originating-Address Value in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character (refer command +CSCS). Type of address given by <tooa>

<da>	*Description*
String type	GSM 03.40 TP-Destination-Address Value in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character (refer command +CSCS). Type of address given by <toda>

<toda>	*Description*
String type	GSM 04.11 TP-Destination- Address Type-of-Address octet in integer format (when first character of <da> is +(IRA 43) default is 145, otherwise default is 129

<tooa>	*Description*
String type	GSM 04.11 TP-Originating-Address Type-of-Address octet in integer format (default refer <toda>)

<tora>	*Description*
String type	GSM 04.11 TP-Recipient-Address Type-of-Address octet in integer format (default refer <toda>)

<alpha>	*Description*
String type	Manufacturing specific. Should be left empty but not omitted i.e.
commas shall mark the place were it should be. Used character set should be the one selected with command Select TE Character Set +CSCS

<scts>	*Description*
String type	GSM 03.40 TP-service-centre-time-stamp in time-string format (refer <dt>)

<length>	*Description*
Integer type	Value indicating in PDU mode (+CMGF=0), the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length)

<data>

The entered text should be formatted as follows:

    if <dcs> (set with +CSMP) indicates that GSM 03.38 default alphabet is used and <fo> indicates that GSM 03.40 TP-User-Data-Header-Indication is not set:

        if TE character set other than "HEX" (refer command Select TE Character Set +CSCS in TS 07.07): ME/TA converts the entered text into GSM alphabet according to rules of Annex A; backspace can be used to delete last character and carriage returns can be used (previously mentioned four character sequence shall be sent to the TE after every carriage return entered by the user);

        if TE character set is "HEX": the entered text should consist of two IRA character long hexadecimal numbers which ME/TA converts to 7-bit characters of GSM alphabet (e.g. 17 (IRA 49 and 55) will be converted to character Π (GSM 23));

    if <dcs> indicates that 8-bit or UCS2 data coding scheme is used or <fo> indicates that GSM 03.40 TP-User-Data-Header-Indication is set: the entered text should consist of two IRA character long hexadecimal numbers which ME/TA converts into 8-bit octet (e.g. two characters 2A (IRA 50 and 65) will be converted to an octet with integer value 42);

sending can be cancelled by giving <ESC> character (IRA 27)
<ctrl-Z> (IRA 26) must be used to indicate the ending of the message body

<fo>	*Description*
0	First octet of SMS-DELIVER in integer format
1	First octet of SMS_SUBMIT in integer format
2	First octet of SMS-STATUS-REPORT in integer format
3	First octet of SMS-COMMAND in integer format

<mr>	*Description*
Integer	GSM 03.40 TP-Message-Reference

<ra>	*Description*
String	GSM 03.40 TP-Recipient-Address-Value field. BCD (or GSM default alphabet) are converted to characters of the currently selected TE character set (refef command +CSCS. Type of address given by <tosca>

<dt>	Description
String	GSM 03.40 TP-Discharge-Time in string format "yy/MM/dd,hh:mm:ss+-zz where characters indicate year, month, day, hour,minutes, seconds and time zone

<st>	Description
Integer	GSM 03.40 TP-Status

<ct>	Description
Integer	GSM 03.40 TP-Command-Type (default 0)

<sn>	Description
Integer	GSM 03.41 CBM Serial Number

<mid>	Description
String type	All different possible combinations of CBM message identifiers (refer <mid>) (default is empty string); e.g. "0,1,5-7"
	<mid> GSM 03.41 CBM Message Identifier in integer format

<page>	Description
Integer format	GSM 03.41 CBM Page Parameter bits 4-7 in integer format

<pages>	Description
Integer format	GSM 03.41 CBM Page Parameter bits 0-3 in integer format

Example

AT+CMGF=1
OK

AT+CMGL=?
+CMGL: "REC UNREAD","REC READ","STO UNSENT","STO SENT","ALL"

OK

15.13 AT+CMGD Delete Message

Common for both PDU and Text modes

Description	Command	Possible Responses
Delete message	AT+CMGD=<index>	• +CMS ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CMGD=?	• OK • ERROR

Deletes message from preferred message storage <mem1> location <index>. If deleting fails, final result code +CMS ERROR: <err> is returned. Test command shows the valid memory locations.

<index>	Description
Integer type	Value in the range of location numbers supported by the associated memory

15.14 AT+CSDH   Show Text Mode Parameters

Only Applicable to Text Mode

Description	Command	Possible Responses
Set the show text mode	AT+CSDH=[<show>]	• +CME ERROR: <err> • OK
Show the current setting	AT+CSDH?	• +CSDH: <show> • +CME ERROR: <err>
Show if the command is supported	AT+CSDH=?	• +CSDH: (list of supported <show>s) • OK • +CME ERROR: <err>

Controls whether detailed header information is shown in text mode result codes.

<show>	Description
0	Do not show header values defined in commands AT+CSCA and AT+CSMP (<sca>, <tosca>, <fo>, <vp>, <pid> and <dcs>) nor <length>, <toda> or <tooa> in +CMT, +CMGL, +CMGR result codes for SMS-DELIVERs and SMS-SUBMITs in text mode; for SMS-COMMANDs in +CMGR result code, do not show <pid>, <mn>, <da>, <toda>, <length> or <cdata>
1	Show the values in result codes

15.15 AT+CSMP   Set Text Mode Parameters

Only Applicable to Text Mode

Description	Command	Possible Responses
Set the text mode parameters	AT+CSMP=[<fo> [,<vp>[,<pid> [,<dcs>]]]]	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT+CSMP?	• +CSMP: <fo>,<vp>,<pid>,<dcs> • +CME ERROR: <err>
Show if the command is supported	AT+CSMP=?	• +CSMP: (List of supported <fo>s), (list of supported <vp>s), (list of supported <pid>s), (list of supported <dcs>s) • +CME ERROR: <err> • OK • ERROR

Used to select values for additional parameters needed when SM is sent to the network or placed in a storage when text format message mode is selected. It is possible to set the validity period starting from when the SM is received by the SMSC (<vp> is in range 0… 255). The <pid> parameter identifies the higher protocol being used or indicates interworking with a certain type of telematic service and <dcs> determines the way the information is encoded as in GSM 03.38.

<fo>	Description
0-255	Depending on the command or result code: first octet of GSM 03.40 SMS-DELIVER, SMS-SUBMIT (default value 17),SMS-STATUS-REPORT, or SMS-COMMAND (default value 2) in integer format

<vp>	Description
0-143	(TP-VP+1) x 5 minutes (i.e 5 minutes intervals up to 12 hous)
144-167	12 hours + ((TP_VP-143) x 30 minutes)
168-196	(TP-VP-166) x 1 day
197-255	(TP-VP-192) x 1 week

<pid>	Description
0-255	Protocol Identifier in integer format. **Default value is 0**, according to 07.05 section 9.2.3.9

<dcs>	Description
0-255	Data coding scheme. See GSM 03.38. **UCS2 and compressed text not supported**

15.16 AT+CSCS   Select Character Set

Description	Command	Possible Responses
Set command informs TA which character set is used by the TE	AT+CSCS=<chset>	• OK • ERROR
Show the current setting	AT+CSCS?	• +CSCS: <chset> • OK • ERROR
Show if the command is supported	AT+CSCS=?	• +CSCS: (list of supported <chset>s) • OK • ERROR

This command informs the TA which character set <chset> is used by the TE. The TA is then able to convert character strings correctly between TE and ME character sets.

When TA-TE interface is set to 8-bit operation and the used TE alphabet is 7-bit, the highest bit shall be set to zero.

Note! How the internal alphabet of ME is converted to, or from, the TE alphabet is manufacturer specific.

Read command shows current setting and test command display conversion schemes implemented in the TA.

<chset>	Description
"GSM"	GSM default alphabet (GSM 03.38 subclause 6.2.1). **Default value**
"IRA"	International reference alphabet (ITU-T T.50). Note: recommended default value by GSM 07.07.
"8859-n"	ISO 8859 Latin *n* (1-6) character set
"UTF-8"	Universal text format, 8 bits
"ERICSSON"	Unicode, 16-bit universal multiple-octet coded character set (ISO/IEC10646)

Example

AT+CSCS?
+CSCS: "GSM"

OK

15.17 AT+CSMS   Select Message Service

Common for both PDU and Text Modes

Description	Command	Possible Responses
Select message service	AT+CSMS=<service>	• +CSMS: <mt>,<mo>,<bm> • +CMS ERROR: <err> • OK • ERROR
Show the current setting	AT+CSMS?	• +CSMS: <service>,<mt>,<mo>, <bm> • OK • ERROR
Show if the command is supported	AT+CSMS=?	• +CSMS: (list of supported <service>s) • OK • ERROR

Selects messaging service <service>. It returns the types of messages supported by the ME: <mt> for mobile terminated messages, <mo> for mobile originated messages and <bm> for broadcast type messages. If the chosen service is not supported by the ME (but is supported by the TA), final result code +CMS ERROR: <err> is returned.

<service>	Description
0	GSM 03.40 and 03.41. The syntax of SMS AT commands is compatible with GSM 07.05 Phase 2 version 4.7.0; Phase 2+ features which do not require new command syntax may be supported (e.g. correct routing of messages with new Phase 2+ data coding schemes)
2..127	Reserved

<mt>	Description
0	Mobile terminated messages not supported
1	Mobile terminated messages supported

<mo>	Description
0	Mobile originated messages not supported
1	Mobile originated messages supported

<bm>	Description
0	Broadcast messages not supported
1	Broadcast messages supported

<err>	Description
0...127	GSM 04.11 Annex E-2 values
128...255	GSM 03.40 subclause 9.2.3.22 values
300	ME failure
302	Operation not allowed
304	Invalid PDU mode parameter
310	SIM not inserted
311	SIM PIN required
312	PH-SIM PIN required
313	SIM failure
314	SIM busy
315	SIM wrong
316	SIM PUK required
317	SIM PIN2 required
318	SIM PUK2 required
500	Unknown error
...511	Other values in range 256...511 are reserved
512...	Manufacturer specific

15.18 AT*E2SMSRIRing indicator for SMS

Description	Command	Possible Responses
Enable RI for incoming SMS	AT*E2SMSRI=<n>	• OK • ERROR
Show the current setting	AT*E2SMSRI=?	• *E2SMSRI: <n> • OK • ERROR
Show if the command is supported	AT*E2SMSRI=?	• *E2SMSRI: (list of supported <n>s) • OK • ERROR

This command enables/disables the Ring Indicator pin response to an incoming SMS message. If enabled, a negative going pulse is generated on receipt of an incoming SMS message. The duration of this pulse is selectable in steps of 50 ms up to a maximum of 1,150 ms and is determined by the value of <n> that is used in the command. The command is disabled by setting <n> to 0.

Note!   The Ring Indicator will always be active for incoming calls independent of this setting.

<n>	*Description*
0	RI is disabled for incoming SMS messages. **Default value**
50-1150	RI is enabled for incoming SMS messages. Pulse duration selectable between 50 and 1,150ms inclusive

16. Short Message Services - Cell Broadcast

16.1 AT+CNMI   *New Message Indications to TE*

See 15.10, AT+CNMI New Message Indications to TE

16.2 AT+CSCB   *Select Cell Broadcast Message Type*

Common for both PDU and text modes

Description	Command	Possible Responses
Select cell broadcast message type	AT+CSCB=[<mode> [,<mids>]]	• +CMS ERROR: <err> • OK • ERROR
Show the current setting	AT+CSCB?	• +CSCB: <mode>,<mids> • OK • ERROR
Show if the command is supported	AT+CSCB=?	• +CSCB: (list of supported <mode>s) • OK • ERROR

Selects which types of CBMs are to be received by the ME.

<mode>	Description
0	Message types in <mids> and <dcss> are accepted

<mids>	Description
string type	All different possible combinations of CBM message identifiers (refer <mid>) (default is empty string); e.g. "0,1,5-7" <mid> GSM 03.41 CBM Message Identifier in integer format

Example

AT+CSCB?
+CSCB: 0,"50"

OK

17. SIM Application Toolkit

17.1 AT+CPIN   PIN Control

See 3.26, AT+CPIN PIN Control

17.2 AT*E2STKS   SIM Application Toolkit Settings

Description	Command	Possible responses
Set the presentation of the unsolicited result codes corresponding to STK	AT*E2STKS=<on_off>	• +CME ERROR <err> • OK • ERROR
Show the current setting	AT*E2STKS?	• *E2STKS: <on_off> • +CME ERROR <err> • OK • ERROR
Show if the command is supported	AT*E2STKS=?	• *E2STKD: list of supported <on_off> • +CME ERROR <err> • OK • ERROR

Allows the external application to disable or enable the presentation of the unsolicited result codes corresponding to the STK commands. Parameter <on_off> is used to disable or enable the presentation of an unsolicited result code *E2STK. Setting chosen is stored internally so that it is not necessary to change it each time the ME is switched on.

If the presentation of the unsolicited result codes is disabled, the messages below are not sent to the application.

The unsolicited result codes shall be disabled by default.

<on_off>	Description
0	Disable the presentation of the unsolicited result codes related to STK. **Default value**
1	Enable the presentation of the unsolicited result codes related to STK

Unsolicited Result Codes:

The unsolicited result codes defined in sections below can be received.

17.3 AT*E2STKD   M2M STK Display Text

Description	Command	Possible responses
Answer to the reception of DISPLAY TEXT	AT*E2STKD=<answer>	• +CME ERROR <err> • OK • ERROR
Show if the command is supported	AT*E2STKD=?	• *E2STKD: (list of supported <answer>) • +CME ERROR <err> • OK • ERROR

The ME passes the parameters within DISPLAY TEXT command to the external application by means of the unsolicited result code *E2STKD.

Command AT*E2STKD allows the external application to send the appropriate answer after receiving the unsolicited result code, and before the timeout expires.

If Answer command is sent once the timeout expires, an ERROR response is generated.

Test command returns the list of supported <answer>. Values follow GSM 11.14 standard

<answer>	Description
0	OK. Performed as required: the text was displayed and cleared as requested. It corresponds to '00' Command performed successfully, described in the GSM standard
1	Failed. User Terminated Session: the text was displayed as requested and the user wants to end the proactive session. It corresponds to '10' Proactive session terminated by the user, described in the GSM standard
2	Failed. User requests backwards move: the text was displayed as requested and the user wants to go backwards in the session. It corresponds to '11' Backward move in the proactive SIM session requested by the user
3	Failed. No response from user: the text was displayed, and although the clear condition was "Wait for user to clear", the user did not react. It corresponds to '12' no response from user
4	Failed. Screen is busy: the text could not be displayed

Unsolicited Result Codes:

*E2STKD: <priority>,<clear_condition>,<coding>,<text_length>, <text>

Values follow GSM 11.14 standard.

<priority>	Description
0	Display normal priority text
1	Display high priority text

<clear_condition>	Description
0	Clear message after a dalay
1	Wait for user to clear message

<coding>	Description
0	Text is coded in unpacked format, using the SMS default 7-bit coded alphabet, as defined in GSM 03.38 with bit 8 set to 0. It corresponds to data coding scheme of 8 bit
1	Text is coded in packed format, using the SMS default 7-bit coded alphabet, packed in 8-bit octets, as defined in GSM 03.38. It corresponds to data coding scheme of 7 bit GSM default alphabet

<text_length>	Description
Integter type	Value indicating the maximum length of field <text>

<text>	Description
string type	Field of maximum length <text_length>, in string type format between "". Coding is defined in <coding>

17.4 AT*E2STKG   M2M STK Get Inkey

Description	Command	Possible responses
Answer to the reception of GET INKEY	AT*E2STKG=<answer>, [<response_type>, <user_response>]	• +CME ERROR <err> • OK
Show if the command is supported	AT*E2STKG=?	• *E2STKG: (list of supported <answer>), (list of supported <response_type>), <user_response> • +CME ERROR <err> • OK • ERROR

The ME passes the parameters within GET INKEY command to the external application by means of the unsolicited result code E2STKG.

The external application then sends AT*E2STKG with the user response.

Answer command allows the external application to send the appropriate answer, after receiving the unsolicited result code, and before the timeout expires.

If Answer command is sent once the timeout expires, an ERROR response is generated.

If <answer> parameter is not 0, a failure has occurred and no more parameters are sent. If the extra parameters are sent, the ME indicates ERROR.

Test command returns the list of supported values, and the maximum value of <prompt_text_length>.

Values follow GSM 11.14 standard.

<answer>	Description
0	OK. Performed as required: the text was displayed. It corresponds to '00' Command performed successfully, described in the GSM standard
1	Failed. User Terminated Session: the text was displayed as requested and the user wants to end the proactive session. It corresponds to '10' Proactive session terminated by the user, described in the GSM standard
2	Failed. User requests backward move: the text was displayed as requested and the user wants to go backwards in the session. It corresponds to '11' Backward move in the proactive SIM session requested by the user
3	Failed. No response from user: the text was displayed, and the user did not react. It corresponds to '12' No response from user
4	Failed. Screen is busy: the text could not be displayed

<response_type>	Description
0	Response type shall be digits (0-9, *, # and +)
1	Response type shall be SMS default alphabet
3	Response type shall be "Yes/No" response

<user_response>	Description
String type	Field of 1 to 2 bytes length in string type format between "". Coding is defined in <response_type>. Length shall be 2 bytes when coding is UCS2 . Otherwise it shall be 1 byte

Unsolicited Result Codes:

*E2STKG: <coding>,<prompt_text_length>,<prompt_text>

Values follow GSM 11.14 standard.

<coding>	Description
0	Text is coded in unpacked format, using the SMS default 7-bit coded alphabet, as defined in GSM 03.38 with bit 8 set to 0. It corresponds to data coding scheme of 8 bit
1	Text is coded in packed format, using the SMS default 7-bit coded alphabet, packed in 8-bit octets, as defined in GSM 03.38. It corresponds to data coding scheme of 7 bit GSM default alphabet

<prompt_text_length>	Description
Integer type (0-235)	Value indicating the maximum length of field <prompt_text>

<prompt_text>	Description
String type	Field of maximum length <prompt_text_length>, in string type format between "". Coding is defined in <prompt_coding>.

17.5 AT*E2STKI   M2M STK Get Input

Description	Command	Possible responses
Answer to the reception of GET INPUT	AT*E2STKI=<answer>, [<response_type>, <response_length>, <user_response>]	• +CME ERROR <err> • OK • ERROR
Show if the command is supported	AT*E2STKI=?	• *E2STKI: (list of supported <answer>),(list of supported <response_type>), <response_length>, <user_response> • +CME ERROR <err> • OK • ERROR

The ME passes the parameters within GET INPUT command to the external application by means of the unsolicited result code E2STKI. The external application sends AT*E2STKI with the user response.

AT*E2STKI allows the external application to send the appropriate answer after receiving the unsolicited result code, and before the timeout expires.

If Answer command is sent once the timeout expires, an ERROR response is generated.

If <answer> parameter is not 0, a failure has occurred and no more parameters are sent. If the extra parameters are sent, the ME indicates ERROR.

Test command returns the list of suported values, and <prompt_text_length>.

Values follow GSM 11.14 standard.

<answer>	Description
0	OK. Performed as required: the text was displayed. It corresponds to '00' command performed succesfully, described in the GSM standard
1	Failed. User terminated session: the text was displayed as requested and the user wants to end the proactive session. It corresponds to '10' proactive session terminated by the user, described in the GSM standard
2	Failed. User requests backward move: the text was displayed as requested and the user wants to go backwards in the session. It corresponds to '11' backward move in the proactive SIM session requested by the user
3	Failed. No response from user: the text was displayed, and the user did not react. It corresponds to '12' No response from user
4	Failed. Screen is busy: the text could not be displayed

<response_type>	Description
0	Response type shall be digits (0-9, *, # and +)
1	Response type shall be SMS default alphabet
3	Response type shall be "Yes/No" response

<response_length>	Description
Integer type (0-160)	Value indicating the length of response field <user_response>. It shall be an integer within the range between <min_length_response> and <max_length_response>

<user_response>	Description
String type	Field of length between <min_length_response> and <max_length_response>, in string type format between "". Coding is defined in <response_type>.

Note! If <response_type>=3 (Yes/No), the length of <user_response> is 1 byte. Otherwise, the ME gives an ERROR message.

Unsolicited Result Codes:

*E2STKI: <min_length_response>,<max_length_response>, <echo_input>,<prompt_coding>,<prompt_text_length>, <prompt_text>

Values follow GSM 11.14 standard.

<min_length_response>	Description
Integer type (0-160)	Value indicating the minimum length of response field <user_response>

<max_length_response>	Description
Integer type (0-160)	Value indicating the maximum length of response field <user_response>

<echo_input>	Description
0	The user input shall be echoed
1	The user input shall be hidden

<prompt_coding>	Description
0	Text is coded in unpacked format, using the SMS default 7-bit coded alphabet, as defined in GSM 03.38 with bit 8 set to 0. It corresponds to data coding scheme of 8 bit
1	Text is coded in packed format, using the SMS default 7-bit coded alphabet, packed in 8-bit octets, as defined in GSM 03.38. It corresponds to data coding scheme of 7 bit GSM default alphabet
2	Text is coded in UCS2 alphabet, as defined in GSM 03.38. It corresponds to data coding scheme of 16 bit UCS2 alphabet

<prompt_text_length>	Description
Integer type	Value indicating the maximum length of field <prompt_text>

<prompt_text>	Description
String type	Field of maximum length <prompt_text_length>, in string type between "". Coding is defined in <prompt_coding>

17.6 AT*E2STKL   M2M STK Select Item

Description	Command	Possible responses
Answer to the reception of SELECT ITEM	AT*E2STKL=<answer>, [<user_response>]	• +CME ERROR <err> • OK • ERROR
Show if the command is supported	AT*E2STKL=?	• *E2STKL: (list of supported <answer>), (list of supported <user_response>) • +CME ERROR <err> • OK • ERROR

The ME passes the parameters within SELECT ITEM command to the external application by means of the unsolicited result code *E2STKL.

Command AT*E2STKL allows the external application to send the appropriate answer after receiving the unsolicited result code, and before the timeout expires.

If Answer command is sent once the timeout expires, an ERROR response is be generated.

If <answer> parameter is not 0, a failure has occurred and no more parameters are sent. If the extra parameters are sent, the ME indicates ERROR.

Values follow GSM 11.14 standard.

<answer>	Description
0	OK. Performed as required. It corresponds to '00' command performed succesfully, described in the GSM standard
1	Failed. User terminated session. It corresponds to '10' Proactive session terminated by the user, described in the GSM standard
2	Failed. User requests backwards move. It corresponds to '11' Backward move in the proactive SIM session requested by the user
3	Failed. No response from user. It corresponds to '12' no response from user
4	Failed. Screen is busy: the text could not be displayed

<user_response>	Description
integer type	The identifier is a single byte between 1 and 255. It identifies the selected <item_idn> within the items list

Unsolicited Result Codes:

E2STKL: <NbrOfItems>,<coding>,<text_length>,<alpha_id>
[,<default>]<CR><LF>E2STKL: <item_id1>,<coding>,
<text_length>,<item1><CR><LF>[…]E2STKL: <item_idn>,
<coding>,<text_length>,<itemn><CR><LF>]

Values follow GSM 11.14 standard.

<coding>	Description
0	Text is coded in unpacked format, using the SMS default 7-bit coded alphabet, as defined in GSM 03.38 with bit 8 set to 0. It corresponds to data coding scheme of 8 bit
1	Text is coded in packed format, using the SMS default 7-bit coded alphabet, packed in 8-bit octets, as defined in GSM 03.38. It corresponds to data coding scheme of 7 bit GSM default alphabet

<text_length>	Description
Integer type (0-240)	Value indicating the maximum length of field <alpha_id>, <itemn1>,.<Itemn>

<alpha_id>	Description
String type	Field of string type between "". Coding is according to EF_{AND} as defined in GSM 11.11

The maximum length is fixed

<default>	Description
Integer type	The <default> parameter is a single byte between 1 and 255. It shows the default/selected item within the list

<item_idn>	Description
Integer type	The identifier is a single byte between 1 and 255. Each item <itemn> in the list shall have a unique identifer <item_idn>

<itemn>	Description
String type	Field of string type between "". Coding is according to EF_{AND} as defined in GSM 11.11

<NbrOfItems>	Description
Integer type	Number of items to be presented in the following unsolicited results

The maximum length is fixed.

17.7 AT*E2STKM   M2M STK Set Up Menu

Description	Command	Possible responses
Answer to the reception of SET UP MENU	AT*E2STKM=<answer>, <on_off>	• +CME ERROR <err> • OK • ERROR
Show if the command is supported	AT*E2STKM=?	• *E2STKM: (list of supported <answer>),(list of supported <on_off>) • +CME ERROR <err> • OK • ERROR

The ME passes the parameters within SET UP MENU command to the external application, so that the STK menu can be built externally, by means of the unsolicited result code *E2STKM.

The current menu can be removed by sending only the parameter <on_off> = 0.

Answer command allows the external application to send the appropriate answer after receiving the unsolicited result code, and before the timeout expires.

If Answer command is sent once the timeout expires, an ERROR response is generated.

Values follow GSM 11.14 standard.

<answer>	Description
0	OK. Performed as required: it corresponds to '00' command performed successfully, described in the GSM standard
1	Failed. User Terminated Session: the command was executed as requested and the user wants to end the proactive session. It corresponds to '10' proactive session terminated by the user, described in the GSM standard
2	Failed. User requests backwards move: the command was executed as requested and the user wants to go backwards in the session. It corresponds to '11' backward move in the proactive SIM session requested by the user
3	Failed. No response from user: the command was executed, and the user did not react. It corresponds to '12' no response from user
4	Failed. Screen is busy
5	Failed. Command beyond MEs capability. It corresponds to '30'. It was not possible to successfully integrate or remove the list of menu items

<on_off>	Description
0	Remove the current menu
1	New menu to be displayed

Unsolicited Result Codes:

*E2STKM: <NbrOfItems>,<coding>,<text_length>, <alpha_id><CR><LF>E2STKM: <item_id1>,<coding>, <text_length>,<item1>[<CR><LF>[…]E2STKM: <item_idn>, <coding>,<text_length>,<itemn>]

Values follow GSM 11.14 standard.

<coding>	Description
0	Text is coded in unpacked format, using the SMS default 7-bit coded alphabet, as defined in GSM 03.38 with bit 8 set to 0. It corresponds to data coding scheme of 8 bit
1	Text is coded in packed format, using the SMS default 7-bit coded alphabet, packed in 8-bit octets, as defined in GSM 03.38. It corresponds to data coding scheme of 7 bit GSM default alphabet

<text_length>	Description
Integer type	Value indicating the maximum length of field <alpha_id>, <itemn1>, <Itemn>

<alpha_id>	Description
String type	Field of string type between "". Coding is according to EF_{AND} as defined in GSM 11.11

The maximum length is fixed.

<item_idn>	Description
Integer type	The identifier is a single byte between 1 and 255. Each item <itemn> in the list shall have a unique identifer <item_idn>

<itemn>	Description
String type	Field of string type format between "". Coding is according to EF_{AND} as defined in GSM 11.11

<NbrOfItems>	Description
Integer type	Number of Items to be presented in the following unsolicited results

The maximum length is fixed.

The parameters have no default values.

17.8 AT*E2STKN   M2M STK Envelope (Menu Selection)

Description	Command	Possible responses
Do the menu selection	AT*E2STKN=<sel_item>	• +CME ERROR <err> • OK • ERROR
Show if the command is supported	AT*E2STKN=?	• *E2STKN: (list of supported <sel_item>) • +CME ERROR <err> • OK • ERROR

The application informs the ME about the selected menu item by means of the AT*E2SKTN command. The ME answers with OK, or ERROR.

The Do command allows the external application to select the menu item in the item list that was created by means of the SET-UP MENU command.

<sel_item>	Description
Integer type	The identifier is a single byte between 1 and 255. It identifies the selected menu item corresponding to SET-UP MENU command. Values follow the definition described in GSM 11.14

17.9 AT*E2STKC   M2M STK Set Up Call

Description	Command	Possible responses
Answer to the reception of SET UP CALL	AT*E2STKC=<answer>	• +CME ERROR <err> • OK • ERROR
Show if the command is supported	AT*E2STKC=?	• *E2STKC: (list of supported <answer>) • +CME ERROR <err> • OK • ERROR

The ME passes the parameters within SET UP CALL command to the external application by means of the unsolicited result code *E2STKC, so that it takes up the decision on progressing or rejecting the call.

Answer command allows the external application to send the appropriate answer after receiving the unsolicited result code, and before the timeout expires.

If Answer command is sent once the timeout expires, an ERROR response is generated.

Values follow GSM 11.14 standard.

<answer>	Description
0	OK. Performed as required. It corresponds to '00' command performed succesfully, described in the GSM standard
1	Failed. User terminated session. It corresponds to '10' Proactive session terminated by the user, described in the GSM standard
2	Failed. User requests backwards move. It corresponds to '11' backward move in the proactive SIM session requested by the user
3	Failed. No response from user. It corresponds to '12' no response from user
4	Failed. Screen is busy: the text could not be displayed
6	Failed. User rejected call set-up request. It corresponds to '22'
7	Failed. User cleared down call before connection or network release. It corresponds to '23'

Unsolicited Result Codes:

*E2STKC: <ton>,<dial_string>,<SetUpRequirement>,<coding>, <text_length>,<alpha_id>

Values follow GSM 11.14 standard.

<ton>	Description
Integer type	Field of 1 byte indicating the Type of Number, coded as for EF_{AND}. See GSM 04-08, section 10.5.4.7 for the allowed values

<dial_string>	Description
String type	Phone number of format <ton>

<coding>	Description
0	Text is coded in unpacked format, using the SMS default 7-bit coded alphabet, as defined in GSM 03.38 with bit 8 set to 0. It corresponds to data coding scheme of 8 bit
1	Text is coded in packed format, using the SMS default 7-bit coded alphabet, packed in 8-bit octets, as defined in GSM 03.38. It corresponds to data coding scheme of 7 bit GSM default alphabet

<text_length>	*Description*
Integer type (0-240)	Value indicating the maximum length of field <alpha_id>

<alpha_id>	*Description*
String type	Field of string type between "". Coding is according to EF$_{AND}$ as defined in GSM 11.11

The maximum length is fixed

17.10 *E2STKE STK Send Short Message

Unsolicited Result Code:

*E2STKE: <coding>, < text_length >, <alpha_id>

The ME passes the <alpha_id> within SEND SHORT MESSAGE command to the external application, by means of the unsolicited result code *E2STKE. This informs the external application that the ME is sending an SMS.

<coding>	*Description*
0	Text is coded in unpacked format, using the SMS default 7-bit coded alphabet, as defined in GSM 03.38 with bit 8 set to 0. It corresponds to data coding scheme of 8 bit
1	Text is coded in packed format, using the SMS default 7-bit coded alphabet, packed in 8-bit octets, as defined in GSM 03.38. It corresponds to data coding scheme of 7 bit GSM default alphabet

<text_length>	*Description*
Integer type (0-240)	Value indicating the maximum length of field <alpha_id>

<alpha_id>	*Description*
String type	Field of string type format between "". Coding is according to EF$_{AND}$ as defined in GSM 11.11
'FF'	In case that the SIM does not provide the optional alpha identifier, or this is a null data object, the ME shall give 'FF' to indicate "Sending SMS", so that the external application is informed

The maximum length is fixed.

17.11 *E2STKP   STK Send SS

Unsolicited Result Code:

*E2STKP: <ton>, <SS_string>, <coding>, <text_length>, <alpha_id>, <SS_return>

The ME passes the parameters within SEND SS command to the external application, by means of the unsolicited result code *E2STKP. This informs the external application that the ME has sent an SS string to the network, and provides the current status after this operation.

<ton>	Description
integer type	Field of 1 byte indicating the Type of Number, coded as for EF_{AND}. See GSM 04-08, section 10.5.4.7 for the allowed values

<SS_string>	Description
String type	SS string of format <ton>

<coding>	Description
0	Text is coded in unpacked format, using the SMS default 7-bit coded alphabet, as defined in GSM 03.38 with bit 8 set to 0. It corresponds to data coding scheme of 8 bit
1	Text is coded in packed format, using the SMS default 7-bit coded alphabet, packed in 8-bit octets, as defined in GSM 03.38. It corresponds to data coding scheme of 7-bit GSM default alphabet

<text_length>	Description
Integer type (0-240)	Value indicating the maximum length of field <alpha_id>

<alpha_id>	Description
String type	Field of string type format between "". Coding is according to EF_{AND} as defined in GSM 11.11
'FF'	In case that the SIM does not provide the optional alpha identifier, or this is a null data object, the ME shall give 'FF' to indicate "SS string sent" so that the external application is informed

The maximum length is fixed.

<SS_return>	Description
Integer type	Field of 1 byte indicating the SS Return Result Operation code, as defined in GSM 04.80, so that the external application is informed about the result of the SS operation

17.12 *E2STKU   *STK Send USSD*

Unsolicited Result Code:

*E2STKU: <coding>, <text_length>, <alpha_id>

Description:

The ME shall passes the <alpha_id> parameter within SEND USSD command to the external application, by means of the unsolicited result code *E2STKU. This informs the external application that the ME is sending a USSD string to the network.

<coding>	Description
0	Text is coded in unpacked format, using the SMS default 7-bit coded alphabet, as defined in GSM 03.38 with bit 8 set to 0. It corresponds to data coding scheme of 8 bit
1	Text is coded in packed format, using the SMS default 7-bit coded alphabet, packed in 8-bit octets, as defined in GSM 03.38. It corresponds to data coding scheme of 7-bit GSM default alphabet

<text_length>	Description
Integer type (0-240)	Value indicating the maximum length of field <alpha_id>

<alpha_id>	Description
String type	Field of string type format between "". Coding is according to EF_{AND} as defined in GSM 11.11
'FF'	In case that the SIM does not provide the optional alpha identifier, or this is a null data object, the ME shall give 'FF' to indicate "SS string sent" so that the external application is informed

The maximum length is fixed.

17.13 *E2STKR   STK Refresh

Unsolicited Result Code:

*E2STKR: <indicator>

The ME informs the external application about the coming REFRESH command, by means of the unsolicited result code *E2STKR (eg Reset is coming).

<indicator>	Description
Integer type	Indicator describes the mode that the SIM has requested when sending a REFRESH command
0	SIM initialization and full file change notification
1	File change notification
2	SIM initialization and file change notification
3	SIM initialization
4	SIM reset

17.14 AT*E2STKTO   SIM Application Toolkit Settings

Parameter Command Syntax:

AT*E2STKTO = <Command>, <timer>

This command allows the external application to configure some general settings related to STK.

Defined values:

Parameter <Command> is used to define the command that the time parameter is going to be applied.

Parameter <timer> is used to fix the timeout period applicable to Proactive SIM mechanism.

<Command>	Description
Integer type (0-6)	It defines the command that the time parameter is going to be applied
0	All the commands with timeout associated are set to the value of <timer>
1	Set Up Menu command timeout is set to the value of <timer>

<Command>	Description
2	Set Up Call command timeout is set to the value of <timer>
3	Display Text command timeout is set to the value of <timer>
4	Get Input command timeout is set to the value of <timer>
5	Select Item command timeout is set to the value of <timer>

<timer>	Description
Integer type (0-99)	Specifies the value in seconds to be set in the timeout associated with the command specified in <command>
0	All the commands timeouts are set to its default value
(1-99)	The timeout of the command specified in <command> is set to this value

Unsolicited result code:

*E2STKTO: <command>

18. Supplementary Services

18.1 AT+CPIN   PIN Control

See 3.26, AT+CPIN PIN Control

18.2 AT+CACM   Accumulated Call Meter

Description	Command	Possible Responses
Reset the ACM (Accumulated Call Meter) value on the SIM	AT+CACM=[<passwd>]	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT+CACM?	• +CACM: <acm> +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CACM=?	• +CME ERROR: <err> • OK • ERROR

Resets the Advice of Charge related accumulated call meter value in SIM file EF_{ACM}. ACM contains the total number of home units for both the current and preceding calls. SIM PIN2 is usually required to reset the value. If setting fails in an ME error, +CME ERROR: <err> is returned. See "+CME ERROR (Mobile Equipment Error Code)", page 85.

Note!   This command must take into account what line is chosen with AT*ELIN.

Read command returns the current value of ACM.

<passwd>	Description
String type	SIM-PIN2

<acm>	Description
String type	Accumulated call meter value similarly coded as <ccm> under +CAOC

18.3 AT+CAMM   Accumulated Call Meter Maximum

Description	Command	Possible Responses
Set command sets the Advice of Charge related accumulated call meter maximum value in SIM file EF_{ACMmax}	AT+CAMM=[<acmmax> [,<passwd>]]	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT+CAMM?	• +CAMM: <acmmax> +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CAMM=?	• +CME ERROR: <err> • OK • ERROR

Sets the Advice of Charge related accumulated call meter maximum value in SIM file EF_{ACMmax}. ACMmax contains the maximum number of home units allowed to be consumed by the subscriber. When ACM (refer +CACM) reaches ACMmax calls are prohibited. SIM PIN2 is usually required to set the value. If setting fails in an ME error, +CME ERROR: <err> is returned.

Read command returns the current value of ACMmax.

<acmmax>	Description
String type	Accumulated call meter maximum value similarly coded as <ccm> under +CAOC; value zero disables ACMmax feature

<passwd>	Description
String type	SIM PIN2

18.4 AT+CAOC   Advice of Charge

Description	Command	Possible Responses
Execute command	AT+CAOC[=<mode>]	• [+CAOC: <ccm>] +CME ERROR: <err> • OK • ERROR
Show the current setting	AT+CAOC?	• +CAOC: <mode> • OK • ERROR
Show if the command is supported	AT+CAOC=?	• [+CAOC: (list of supported <mode>s] • OK • ERROR

Use of Advice of Charge supplementary service command enables the subscriber to get information about the cost of calls. With <mode>=0, the execute command returns the current call meter value from the ME. The command also includes the possibility to enable an unsolicited event reporting of the CCM information. The unsolicited result code +CCCM: <ccm> is sent when the CCM value changes, but no more than every 10 seconds. Deactivation of the unsolicited event reporting is made with the same command.

Read command indicates whether the unsolicited reporting is activated or not. Read command is available when the unsolicited result code is supported.

It is recommended (although optional) that the test command return the supported mode values.

<mode>	Description
0	Query CCM value
1	Deactivate the unsolicited reporting of CCM value
2	Activate the unsolicited reporting of CCM value

<ccm>	Description
String type	Three bytes of the current call meter value in hexadecimal format (e.g. "00001E" indicates decimal value 30); value is in home units and bytes are similarly coded as ACMmax value in the SIM

18.5 AT+CPUC   Price Per Unit and Currency Table

Description	Command	Possible Responses
Set command sets the parameters of Advice of Charge related price per unit and currency table in SIM file EF$_{PUCT}$	AT+CPUC=<currency>, <ppu>[,<passwd>]	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT+CPUC?	• +CPUC: <currency>,<ppu> +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT+CPUC=?	• OK • ERROR

Sets the parameters of Advice of Charge related price per unit and currency table in SIM file EF$_{PUCT}$. PUCT information can be used to convert the home units (as used in +CAOC, +CACM and +CAMM) into currency units. SIM PIN1 or SIM PIN2 (depending on which SIM card that is used) is required to set the parameters. If setting fails in an ME error, +CME ERROR: <err> is returned.

Read command returns the current parameters of PUCT.

For information on the character set see AT+CSCS in the Short Message Services section.

<currency>	Description
String	Alpha-identifier of the currency code (3 characters, e.g. SEK)

<ppu>	Description
String type	price per unit; dot is used as a decimal separator (e.g. "2.66")

<passwd>	Description
String type	SIM PIN1 or SIM PIN2

18.6 AT*EDIF   *Ericsson Divert Function*

Description	Command	Possible Responses
Enable and disable notification with the unsolicited result code *EDIF	AT*EDIF=<onoff>	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT*EDIF?	• *EDIF: <onoff> +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT*EDIF=?	• *EDIF: (list of supported <onoff>s) • +CME ERROR: <err> • OK • ERROR

This command enables and disables notification of divert status changes with the unsolicited result code *EDIF.

<onoff>	Description
0	Disable notification with the unsolicited result code *EDIF
1	Enable notification with the unsolicited result code *EDIF

Unsolicited Result Codes:

*EDIF: <reason>,<status>,<classx>[,<number>,<type>]

18.7 AT*EIPS   *Identity Presentation Set*

Description	Command	Possible Responses
Sets the alpha tag to be displayed in the ME	AT*EIPS=<ID>, <alphatag mode>	• +CME ERROR: <err> • OK • ERROR
Show the current setting	AT*EIPS?	• *EIPS: <ID1>,<alphatag mode1><CR><LF> *EIPS: <ID2>,<alphatag mode2><CR><LF> • +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT*EIPS=?	• *EIPS: (list of supported ID>s),(list of supported <alphatag mode>s) • +CME ERROR: <err> • OK • ERROR

This command enables or disables the presentation of the alpha tag of the Caller ID and Called ID to the TE if the ID is recognized. The alpha tag is the first name and the last name. The presentation is done by an unsolicited result code, *ELIP for Caller ID and *EOLP for Called ID.

<ID>	Description
1	Caller ID (*ELIP)
2	Called ID (*EOLP)

<alphatag mode>	Description
0	Off
1	First name and last name displayed

Unsolicited Result Codes:

*ELIP:<alpha tag>

*EOLP:<alpha tag>

18.8 AT*ELIN   Ericsson Line Set

Description	Command	Possible Responses
Set the current line to <line>	AT*ELIN=<line>	• *ELIN: <line> • +CME ERROR: <err> • OK • ERROR
Show the current setting	AT*ELIN?	• *ELIN: <line> • +CME ERROR: <err> • OK • ERROR
Show if the command is supported	AT*ELIN=?	• *ELIN: list of supported <line>s +CME ERROR: <err> • OK • ERROR

This command requests the ME to set the current line to <line>.

Note!   The following command reads its value from the current line and is thus affected by the use of *ELIN:

AT+CACM - Accumulated Call Meter

<line>	Description
1	L1
2	L2

18.9 AT*E2SSD   M2M Supplementary Service Dispatch

Description	Command	Possible Responses
Send Supplementary Service command	AT*E2SSD=<SS_String>	• OK • ERROR
Show if the command is supported	AT*E2SSD=?	• OK • ERROR

This command allows the user to send a Public MMI command string in order to activate, deactivate, interrogate or modify settings for Supplementary Services.

Once a string is sent, the command will return OK if parsed and sent successfully, otherwise ERROR is returned. The command does not verify that the operation executes successfully - use the AT*E2SSI command to gain feedback of the operation status.

313

Refer to GSM 02.30 for Public MMI services and codes.

<SS_String>	Description
String Type	String in double quotes, containing a Public MMI command to modify, activate, interrogate or deactivate a Supplementary Service. String can contain values '0-9', '*' and '#'

18.10 AT*E2SSI   M2M Supplementary Service Indications

Description	Command	Possible Responses
Set Supplementary Service indications	AT*E2SSI=<op>	• ERROR • OK
Show the current setting	AT*E2SSI?	*E2SSI: <op>
Show if the command is supported	AT*E2SSI=?	• *E2SSI: (list of supported <op>s) • ERROR

This command allows the user to display the unsolicited response code *E2SSI on network responses (either command confirmation or error responses) for Supplementary Services. This can be used in conjunction with the AT+CSSN command which gives responses on the network notification of SS status.

The default setting is OFF, where responses are disabled.

<op>	Description
0	Disable *E2SSI indications. **Default value**
1	Enable *E2SSI indications

Unsolicited Result codes:

*E2SSI: <errorcode>[,<Opcode>[,<SS_Code>,[<BasicServChoice>, <BasicServValue>],[<SS_Status>],[<ForwardedToNr>], [<NoReplyConditionTime>], [<CLI_RestrictionOption>]]]

or

*E2SSI: <errorcode>[,<Opcode>[,<SS_Code>,[<BasicServChoice>, <BasicServValue>],[<SS_Status>],[<SubscriptionOption>]]]

<errorcode>	Description
0	OK (no error)
1	SSI_PASSWORD_ERROR
2	SSI_TOO_MANY_PARTS
3	SSI_COMMAND_ERROR

<errorcode>	Description
4	SSI_SIM_ERROR
5	SSI_NUMBER_ERR
6	SSI_CALL_BARRED
7	SSI_NOT_AVAILABLE
8	SSI_UNSUCCESSFUL
9	SSI_NOT_ALLOWED
10	SSI_NETWORK_PROBLEM

<Opcode>	Description
10	REGISTER_SS
11	ERASE_SS
12	ACTIVATE_SS
13	DEACTIVATE_SS
14	INTERROGATE_SS

<SScode>	Description
0	ALL_SS
16	ALL_LINE_IDENTIFICATION_SERVICES
17	CALLING_LINE_IDENTIFICATION_PRESENTATION
18	CALLING_LINE_IDENTIFICATION_RESTRICTION
19	CONNECTED_LINE_IDENTIFICATION_PRESENTATION
20	CONNECTED_LINE_IDENTIFICATION_RESTRICTION
21	MALICIOUS_CALL_IDENTIFICATION
32	ALL_FORWARDING_SERVICES
33	CALL_FORWARDING_UNCONDITIONAL
40	ALL_CONDITIONAL_FORWARDING_SERVICES
41	CALL_FORWARDING_ON_MOBILE_SUBSCRIBER_BUSY
42	CALL_FORWARDING_ON_NO_REPLY
43	CALL_FORWARDING_ON_SUBSCRIBER_NOT_REACHABLE
49	EXPLICIT_CALL_TRANSFER
64	ALL_CALL_COMPLETION_SERVICES
65	CALL_WAITING
66	CALL_HOLD
67	COMPLETION_OF_CALL_TO_BUSY_SUBSCRIBER

<SScode>	Description
81	MULTI_PARTY
112	ALL_CHARGING_SS
113	ADVICE_OF_CHARGE_INFORMATION
114	ADVICE_OF_CHARGE_CHARGING
144	ALL_BARRING_SERVICES
145	BARRING_OF_OUTGOING_CALLS
146	BARRING_OF_ALL_OUTGOING_CALLS
147	BARRING_OF_ALL_OUTGOING_INTERNATIONAL_CALLS
148	BARRING_OF_ALL_OG_INTERNATIONAL_NON_HPLMN_DIRECTED_CALLS
153	BARRING_OF_INCOMING_CALLS
154	BARRING_OF_ALL_INCOMING_CALLS
155	BARRING_OF_ALL_IC_CALLS_WHEN_OUTSIDE_HPLMN

<BasicServChoice>	Description
2	BEARER_SERVICE
3	TELE_SERVICE

<BasicServValue>	Description	
	<TELE_SERVICE>	<BEARER_SERVICE>
0	TS_ALL_TELE_SERVICES	BS_ALL_BEARER_SERVICES
16	TS_SPEECH	BS_ALL_DATA_CDA_SERVICES
17	TS_TELEPHONY	BS_DATA_CDA_300BPS
18	TS_EMERGENCY_CALLS	BS_DATA_CDA_1200BPS
20		BS_DATA_CDA_2400BPS
21		BS_DATA_CDA_4800BPS
22		BS_DATA_CDA_9600BPS
24		BS_ALL_DATA_CDS_SERVICES
25		BS_DATA_CDS_300BPS
26		BS_DATA_CDS_1200BPS
28		BS_DATA_CDS_2400BPS
29		BS_DATA_CDS_4800BPS
30		BS_DATA_CDS_9600BPS
32	TS_ALL_SHORT_MESSAGE_SERVICES	BS_ALL_PAD_ACCESS_CA_SERVICES

<BasicServValue>	Description	
	<TELE_SERVICE>	<BEARER_SERVICE>
33	TS_SHORT_MESSAGE_MT_PP	BS_PAD_ACCESS_CA_300BPS
34	TS_SHORT_MESSAGE_MO_PP	BS_PAD_ACCESS_CA_1200BPS
35		BS_PAD_ACCESS_CA_1200_75BPS
36		BS_PAD_ACCESS_CA_2400BPS
37		BS_PAD_ACCESS_CA_4800BPS
38		BS_PAD_ACCESS_CA_9600BPS
40		BS_ALL_DATA_PDS_SERVICES
44		BS_DATA_PDS_2400BPS
45		BS_DATA_PDS_4800BPS
46		BS_DATA_PDS_9600BPS
48		BS_ALL_ALTERNATE_SPEECH_DATA_CDA
56		BS_ALL_ALTERNATE_SPEECH_DATA_CDS
64	TS_VIDEOTEX	BS_ALL_SPEECH_FOLLOWED_BY_DATA_CDA
72		BS_ALL_SPEECH_FOLLOWED_BY_DATA_CDS
80	TS_TELETEX	BS_ALL_DATA_CIRCUIT_ASYNCHRONOUS
88		BS_ALL_DATA_CIRCUIT_SYNCHRONOUS
96	TS_ALL_FAX_SERVICES	BS_ALL_ASYNCHRONOUS_SERVICES
97	TS_FAX_GROUP3_ALTER_SPEECH	
98	TS_AUTOMATIC_FAX_GROUP3	
99	TS_FAX_GROUP4	
104		BS_ALL_SYNCHRONOUS_SERVICES
112	TS_ALL_DATA_SERVICES	
120		BS_12_KBIT_UNRESTRICTED_DIGITAL
128	TS_ALL_TELESERVICES_EXCEPT_SMS	
208	TS_AUXILIARY_SPEECH	
209	TS_AUXILIARY_TELEPHONY	

<SS_Status>	Description
0	NO_FLAG_SET
1	SS_STATUS_ACTIVE
2	SS_STATUS_REGISTERED

<SS_Status>	Description
4	SS_STATUS_PROVISIONED
7	SS_STATUS_PRA

<ForwardedToNr>	Description
String	Phone number string in double quotes

<NoReplyConditionTime>	Description
0-65532	Integer value for time

<CLI_Restriction Option>	Description
0	PERMANENT
1	TEMPORARY_DEFAULT_RESTRICTED
2	TEMPORARY_DEFAULT_ALLOWED

<Subscription Option>	Description
1	OVERRIDE_CATEGORY
2	CLI_RESTRICTION_OPTION
5	RESTRICTION_PER_CALL

18.11 AT+CCFC   Call Forwarding number and Conditions

Description	Command	Possible Responses
Request Calling forwarding number and conditions	AT+CCFC=<reason>,<mode>[,<number>[,<type>[,<class>[,<satype>]]]]	• +CME ERROR <err> • when <mode>=2 and command successful: +CCFC: <status>,<class1>[,<number>,<type>[,<satype>]][<CR><LF> +CCFC: <status>,<class2>[,<number>,<type>[,<satype>]][...]] • OK • ERROR
Show if the command is supported	AT+CCFC=?	• + CCFC: (list of supported <reason>s) • +CME ERROR <err> • OK • ERROR

This command allows control of the call forwarding supplementary service. Registration, erasure, activation, deactivation, and status query are supported. When querying the status of a network service (<mode>=2) the response line for 'not active' case (<status>=0) should be returned only if service is not active for any <class>.

<reason>	Description
0	Unconditional
1	Mobile busy
2	No reply
3	Not reachable
4	All call forwarding
5	All conditional call forwarding

<mode>	Description
0	Disable
1	Enable
2	Query status
3	Registration
4	Erasure

<number>	Description
string type	String type phone number of forwarding address in format specified by <type>

<type>	Description
integer format	Type of address octet
129	ISDN/telephony numbering plan, national/international unknown. **Default value if '+' is not in <sca>**
145	ISDN/telephony numbering plan, international number. **Default value if '+' is in <sca>**
161	ISDN/telephony numbering plan, national number
128 - 255	Other values

<satype>	Description
integer format	Type of subaddress octet
128	NSAP (X.213/ISO 8348 AD2), even number of address signals
136	NSAP (X.213/ISO 8348 AD2), odd number of address signals
160	User defined, even number of address signals
168	User defined, odd number of address signals
128 - 255	Other values reserved

<classx>	Description
integer	Sum of integers each representing a class of information. **Default value is 7**
1	Voice L1
2	Data
4	Fax
8	Short message service
16	Data circuit sync
32	Data circuit async
64	Dedicated packet access
128	Dedicated PAD access

<status>	Description
0	Not active
1	Active

18.12 AT+CCWA Call Waiting

Description	Command	Possible Responses
Request call waiting	AT+CCWA=[<n> [,<mode> [,<class>]]]	• when<mode>=2 and command successful: +CCWA:<status>,<class1>[<CR> <LF> +CCWA: <status>,<class2>[...]] +CME ERROR <err> • OK • ERROR
Show the current setting	AT+CCWA?	• +CCWA: <n> +CME ERROR <err> • OK • ERROR
Show if the command is supported	AT+CCWA=?	• +CCWA: (list of supported <n>s) +CME ERROR <err> • OK • ERROR

This command allows control of the call waiting supplementary service according to 3GPP TS 22.083. Activation, deactivation and status query are supported. When querying the status of a network service (<mode>=2) the response line for 'not active' case (<status>=0) should be returned only if service is not active for any <class>. Parameter <n> is used to disable or enable the presentation of an unsolicited result code +CCWA: <number>,<type>,<class>,[<alpha>][,<CLI validity>] to the TE when call waiting service is enabled. The command is abortable when the network is interrogated.

The interaction of this command with other commands based on other GSM/UMTS supplementary services is described in the GSM/UMTS standards.

Test command returns values supported by the TA as a compound value.

<n>	Description
0	Disable
1	Enable

<mode>	Description
0	Disable
1	Enable
2	Query status

<classx>	Description
integer	Sum of integers each representing a class of information. **Default value is 7**
1	Voice L1
2	Data
4	Fax
8	Short message service
16	Data circuit sync
32	Data circuit async
64	Dedicated packet access
128	Dedicated PAD access

<status>	Description
0	Not active
1	Active

<number>	Description
String type	String type phone number of forwarding address in format specified by <type>

<type>	Description
Integer format	Type of address octet in integer format (GSM 04.08 10.5.4.7)

<err>	Description
0	Phone failure
3	Operation not allowed
4	Operation not supported
21	Invalid index
30	No network service
31	Network timeout
100	Unknown

Unsolicited Result Codes:

+CCWA: <number>, <type>, <class>

Example

```
AT+CCWA=?
+CCWA: (0-1)

OK

AT+CCWA?
+CCWA: 0

OK
```

18.13 AT+CHLD   Call Hold and Multiparty

Description	Command	Possible Responses
Request call related supplementary services	AT+CHLD=<n>	• +CME ERROR <err> • OK • ERROR
Show if the command is supported	AT+CHLD=?	• +CHLD: (list of supported <n>s) • +CME ERROR <err> • OK • ERROR

This command allows control of the following call related services:

- a call can be temporarily disconnected from the ME but the connection is retained by the network;
- multiparty conversation (conference calls);
- the served subscriber who has two calls (one held and the other either active or alerting) can connect the other parties and release the served subscriber's own connection.

Calls can be put on hold, recovered, released, added to conversation, and transferred similarly as defined in 3GPP TS 22.030.

This is based on the GSM/UMTS supplementary services HOLD (Call Hold; refer 3GPP TS 22.083 clause 2), MPTY (MultiParty; refer 3GPP TS 22.084) and ECT (Explicit Call Transfer; refer 3GPP TS 22.091). The interaction of this command with other commands based on other GSM/UMTS supplementary services is described in the GSM/UMTS standards.

Note!   Call Hold and MultiParty are only applicable to teleservice 11.

It is recommended (although optional) that test command returns a list of operations which are supported. The call number required by some operations is denoted by "x" (e.g. +CHLD: (0,0x,1,1x,2,2x,3)).

<n>	Description
...	Integer type; equals to numbers entered before SEND button in GSM 02.30 subclause 4.5.5.1
0	Releases all held calls or sets User Determined User Busy (UDUB) for a waiting call
0X	Releases a specific call X from a held multiparty call
1	Releases all active calls (if any exist) and accepts the other (held or waiting) call
1X	Releases a specific active call X
2	Places all active calls (if any exist) on hold and accepts the other (held or waiting) call
2X	Places all active calls on hold, except call X with which communication is supported
3	Adds a held call to the conversation
4	Connects the two calls and disconnects the subscriber from both calls (explicit call transfer)

"X" is the numbering (starting with 1) of the call given by the sequence of setting up or receiving the calls (active, held or waiting) as seen by the served subscriber. Calls hold their number until they are released. New calls take the lowest available number. Where both a held and a waiting call exists, the above procedures shall apply to the waiting call (i.e. not to the held call) in conflicting situation.

Note!   The "directory number" case shall be handled with dial command D, and the END case with hangup command H (or +CHUP).

18.14 AT+CLIP   Calling Line Identification

Description	Command	Possible Responses
Request calling line identification	AT+CLIP=<n>	• +CME ERROR <err> • OK • ERROR
Show the current setting	AT+CLIP?	• + CLIP : <n>,<m> • +CME ERROR <err> • OK • ERROR
Show if the command is supported	AT+CLIP=?	• + CLIP : (list of supported <n>s) • +CME ERROR <err> • OK • ERROR

This command refers to the GSM supplementary service CLIP (Calling Line Identification Presentation) that enables a called subscriber to get the calling line identity (CLI) of the calling party when receiving a mobile terminated call. Set command enables or disables the presentation of the CLI at the TE. It has no effect on the execution of the supplementary service CLIP in the network.

When the presentation of the CLI at the TE is enabled (and calling subscriber allows), +CLIP: <number>,<type> response is returned after every RING (or +CRING: <type>; refer to subclause "Cellular result codes +CRC" in GSM 07.07) result code sent from TA to TE. Whether this response is used when a normal voice call is answered, depends on the manufacturer.

Read command gives the status of <n> and also triggers an interrogation of the provision status of the CLIP service according to GSM 02.81 (given in <m>).

Test command returns values supported by the TA as a compound value.

<n>	Description
0	Disable
1	Enable

<m>	Description
0	CLIP not provisioned
1	CLIP provisioned
2	Unknown (e.g. no network)

Unsolicited Result codes:

+CLIP: <number>,<type>

<number>	Description
String type	String type phone number of format specified by <type>

<type>	Description
Integer format	Type of address octet in integer (refer to GSM 04.08 sub-clause 10.5.4.7)

Example

AT+CLIP=1
OK

RING

+CLIP: "07747008670",129,,,"Matt L",0

18.15 AT+CLIR   Calling Line Identification Restriction

Description	Command	Possible Responses
Request calling line identification restriction	AT+CLIR=[<n>]	• +CME ERROR <err> • OK • ERROR
Show the current setting	AT+CLIR?	• +CLIR: <n>,<m> • +CME ERROR <err> • OK • ERROR
Show if the command is supported	AT+CLIR=?	• +CLIR: (list of supported <n>s) • +CME ERROR <err> • OK • ERROR

This command refers to CLIR-service according to GSM 02.81 that allows a calling subscriber to enable or disable the presentation of the CLI to the called party when originating a call.

Set command overrides the CLIR subscription (default is restricted or allowed) when temporary mode is provisioned as a default adjustment for all following outgoing calls. Using the opposite command can revoke this adjustment. If this command is used by a subscriber without provision of CLIR in permanent mode the network will act according GSM 02.81.

The setting shall be per logical channel.

When the MS is turned off and then turned on again the parameter setting <n> shall turn back to default, i.e. the presentation of CLI shall be used according to the subscription of the CLIR service, <n> is 0.

Read command gives the default adjustment for all outgoing calls (given in <n>), and also triggers an interrogation of the provision status of the CLIR service (given in <m>).

Test command returns values supported by the TA as a compound value.

Note! On a per call base CLIR functionality is explained in subclause "ITU-T V.25ter dial command".

<n>	Description
0	Presentation indicator is used according to the subscription of the CLIR service
1	CLIR invocation
2	CLIR suppression

<m>	Description
0	CLIR not provisioned
1	CLIR provisioned in permanent mode
2	Unknown (e.g. no network)
3	CLIR temporary mode presentation restricted
4	CLIR temporary mode presentation allowed

18.16 AT+CSSN   Supplementary Service Notification

Description	Command	Possible Responses
Presentation of notification result codes from TA to TE	AT+CSSN=[<n>[,<m>]]	• +CME ERROR <err> • OK • ERROR
Show the current setting	AT+CSSN?	• +CSSN: <n>,<m> • +CME ERROR <err> • OK • ERROR
Show if the command is supported	AT+CSSN=?	• +CSSN: (list of supported <n>s),(list of supported <m>s) • +CME ERROR <err> • OK • ERROR

This command refers to supplementary service related network initiated notifications. The set command enables or disables the presentation of notification result codes from TA to TE.

When <n>=1 and a supplementary service notification is received after a mobile originated call setup, unsolicited result code +CSSI: <code1>[,<index>] is sent to TE before any other MO call setup result codes presented in this ETS or in V.25ter. When several different <code1>s are received from the network, each of them shall have its own +CSSI result code.

When <m>=1 and a supplementary service notification is received during a mobile terminated call setup or during a call, or when a forward check supplementary service notification is received, unsolicited result code +CSSU: <code2>[,<index>] is sent to TE. In case of MT call setup, result code is sent after every +CLIP result code (refer command "Calling line identification presentation +CLIP") and when several different <code2>s are received from the network, each of them shall have its own +CSSU result code.

Note!   The difference between <index> and <cindex> is that <index> is a position mark while <cindex> is a unique value for each CUG. <index> is not supported.

Test command returns values supported by the TA as a compound value.

<n>	Description
0	Disable the +CSSI result code presentation status in the TA
1	Enable the +CSSI result code presentation status in the TA

<m>	Description
0	Disable the +CSSU result code presentation status in the TA
1	Enable the +CSSU result code presentation status in the TA

<code1>	Description
0	Unconditional call forwarding is active
1	Some of the conditional call forwarding are active
2	Call has been forwarded
3	Call is waiting
4	This is a CUG call (also <index> present)
5	Outgoing calls are barred
6	Incoming calls are barred
7	CLIR suppression rejected

<index>	Description
0...9	CUG index
10	No index (preferred CUG taken from subscriber data)

<code2>	Description
0	This is a forwarded call (MT call setup)
1	This is a CUG call (also <index> present) (MT call setup)
2	Call has been put on hold (during a voice call)
3	Call has been retrieved (during a voice call)
4	Multiparty call entered (during a voice call)
5	Call on hold has been released (this is not a SS notification) (during a voice call)
6	Forward check SS message received (can be received whenever)
10	Incoming call has been forwarded

18.17 AT+CUSD   Unstructured Supplementary Service Data

Description	Command	Possible Responses
Request unstructured supplementary service data	AT+CUSD=[<n>[,<str>]]	• +CME ERROR: <err> • OK
Show the current setting	AT+CUSD?	• +CUSD: <n> • OK • ERROR
Show if the command is supported	AT+CUSD=?	• +CUSD: (list of supported <n>s) • OK • ERROR

This command allows control of the Unstructured Supplementary Service Data (USSD) according to GSM 02.90. Both network and mobile initiated operations are supported. Parameter <n> is used to disable/enable the presentation of an unsolicited result code (USSD response from the network, or network initiated operation) +CUSD: <m>[,<str>,<dcs>] to the TE. In addition, value <n>=2 is used to cancel an ongoing USSD session. If <n> is not given then the default value 0 is taken.

When <str> is given, a mobile initiated USSD string or a response USSD string to a network initiated operation is sent to the network. The response USSD string from the network is returned in a subsequent unsolicited +CUSD: result code.

The interaction of this command with other commands based on other GSM supplementary services is described in the GSM standard.

Test command returns values supported by the TA as a compound value.

Some different scenarios are shown below:

• An incoming network initiated USSD-Notify should be presented to the external application as an unsolicited result code +CUSD: if the external application has enabled result code presentation.

• An incoming USSD-request asking for a reply should sent to the external application as an unsolicited result code +CUSD: if the external application has enabled result code.

• If the external application answers to the request with the command AT+CUSD then the ME sends the answer to the network.

• A USSD-request sent with the command AT+CUSD from the external application.

The different alternatives are shown below.

	Network	Mobile Equipment	External application
1	Signal	Sends unsolicited result code +CUSD	Result code presentation enabled, presented
2	Signal asking for reply	Sends unsolicited result code +CUSD	Result code presentation enabled, presented
3			Answer AT+CUSD
3b			Sends AT+CUSD

<n>	Description
0	Disable result code presentation in the TA
1	Enable result code presentation in the TA
2	Terminate (abort) USSD dialogue. This value is not applicable to the read command response

<str>	Description
string	String type USSD (when <str> parameter is not given, network is not interrogated): -If <dcs> indicates that GSM 03.38 default alphabet is used: *if TE character set other than "HEX" (refer command Select TE Character Set +CSCS): ME/TA converts GSM alphabet into current TE character set according to rules of GSM 07.05 Annex A

Example 1

AT Command	Result Code	Description
AT+CUSD=1,"*34#"		Enable the Result Code presentation in the TAE and send a USSD-request
	+CUSD:1,"id code" OK	Further user action required, give id code
AT+CUSD=1,"7465338"		Id code given
	+CUSD:0 OK	No further user action required

Example 2

AT Command	Result Code	Description
	+CUSD:0,"Expensive incoming call"	Incoming USSD-notify telling the user that the incoming call is expensive

Example 3

AT Command	Result Code	Description
AT+CUSD=1,"*55*0700#"		Enable the Result Code presentation in the TAE and send a USSD-request asking for an alarm at the time 07:00
	+CUSD:0,"ALARM"	At 07:00 the network sends an alarm to the user

Example 4

AT+CUSD=1,"*#100#"
OK

+CUSD: 0,"07787154042"

OK

19. Alphabetical Listing of AT Commands

AT Command	Description	Page No.
AT*E2STKL	M2M STK Select Item	296
AT*E2STKM	M2M STK Set Up Menu	298
AT*E2STKN	M2M STK Envelope (Menu Selection)	300
AT*E2STKS	SIM Application Toolkit Settings	289
AT*E2STKTO	SIM Application Toolkit Settings	305
AT*EALR	Ericsson Audio Line Request	137
AT*EALS	Ericsson Request ALS Status	217
AT*EAMS	Ericsson Audio Mode Selection	138
AT*EARS	Ericsson Audio Ring Signal	139
AT*ECAM	Ericsson Call Monitoring	106
AT*ECAR	Ericsson Callers Allowed Read	248
AT*ECAW	Ericsson Callers Allowed Write	247
AT*ECPI	Ciphering Indicator	230
AT*ECSP	Ericsson Customer Service Profile	218
AT*EDIF	Ericsson Divert Function	311
AT*EDST	Ericsson Daylight Saving Time	108
AT*EENMEA	NMEA (GPS) Mode on UART2	177
AT*EGIR	Ericsson Group Item Read	240
AT*EIPS	Identity Presentation Set	312
AT*ELAM	Ericsson Local Audio Mode	140
AT*ELIN	Ericsson Line Set	313
AT*EMAR	Ericsson Master Reset	109
AT*EMIC	Ericsson Microphone Mode	141
AT*EMIR	Ericsson Music Mute Indication Request	141
AT*EPEE	Ericsson Pin Event	110
AT*EPNR	Ericsson Read SIM Preferred Network	219
AT*EPNW	Ericsson Write SIM Preferred Network	220
AT*EPRR	Ericsson Personal Ring Type Read	142
AT*EPRW	Ericsson Personal Ring Type Write	143
AT*ERIL	Ericsson Ring Level Set	145
AT*ERIN	Ericsson Ring Set	146
AT*ERIP	Ericsson Ring Signal Playback Command	147
AT*ESAG	Ericsson Add to Group	235

AT Command	Description	Page No.
AT*ESCG	Ericsson Create Group	236
AT*ESCN	Ericsson Set Credit Card Number	237
AT*ESDG	Ericsson Delete Group	239
AT*ESDI	Ericsson Delete Group Item	239
AT*ESGR	Ericsson Group Read	240
AT*ESIL	Ericsson Silence Command	241
AT*ESLN	Ericsson Set Line Name	222
AT*ESMA	Ericsson Set Message Alert Sound	148
AT*ESMM	Ericsson Settings Minute Minder	110
AT*ESNU	Ericsson Settings Number	242
AT*ESOM	Ericsson Settings Own Melody	148
AT*EXVC	Ericsson Set External Volume Control	150
AT+CACM	Accumulated Call Meter	307
AT+CALA	Set Alarm	111
AT+CALD	Alarm Delete	112
AT+CAMM	Accumulated Call Meter Maximum	308
AT+CAOC	Advice of Charge	309
AT+CBST	Select Bearer Service Type	153
AT+CCFC	Call Forwarding Number and Conditions	319
AT+CCLK	Set Clock and Date	113
AT+CCWA	Call Waiting	321
AT+CEER	Extended Error Report	114
AT+CFUN	Set Phone Functionality	114
AT+CGACT	PDP Context Activate or Deactivate	157
AT+CGATT	GPRS Attach or Detach	158
AT+CGDATA	Enter Data State	159
AT+CGDCONT	Define PDP Context	160
AT+CGEREP	GPRS Event Reporting	162
AT+CGMI	Read MS Manufacturer Identification	184
AT+CGMM	Read MS Model Identification	184
AT+CGMR	Read MS Revision Identification	185
AT+CGPADDR	Show PDP Address	163
AT+CGQMIN	Quality of Service Profile (Minimum Acceptable)	164

AT Command	Description	Page No.
AT+CGQREQ	Quality of Service Profile (Requested)	166
AT+CGREG	GPRS Network Registration Status	169
AT+CGSMS	Select Service for MO SMS Messages	170
AT+CGSN	Read MS Product Serial Number Identification	186
AT+CHLD	Call Hold and Multiparty	323
AT+CHSC	HSCSD Current Call Parameters	171
AT+CHSD	HSCSD Device Parameters	172
AT+CHSN	HSCSD Non Transparent Call Configuration	173
AT+CHSR	HSCSD Parameters Report	174
AT+CHSU	HSCSD Automatic User Initiated Upgrading	175
AT+CHUP	Hang Up Call	96
AT+CIMI	Subscriber Identification	223
AT+CIND	Indicator Control	115
AT+CLAC	List All Available AT Commands	116
AT+CLCK	Facility Lock	223
AT+CLIP	Calling Line Identification	325
AT+CLIR	Calling Line Identification Restriction	326
AT+CMEE	Mobile Equipment Error	116
AT+CMER	Mobile Equipment Event Reporting	117
AT+CMGC	Send Command	262
AT+CMGD	Delete Message	280
AT+CMGF	Message Format	254
AT+CMGL	List Message	274
AT+CMGR	Read Message	268
AT+CMGS	Send Message	257
AT+CMGW	Write Message to Memory	255
AT+CMOD	Call Mode	97
AT+CMSS	Send From Storage	260
AT+CMUX	Switch to 07.10 Multiplex Protocol	200
AT+CNMI	New Message Indications to TE	264
AT+CNUM	Subscriber Number	225
AT+COLP	Connected Line Identification on Presentation	226
AT+COPS	Operator Selection	228

AT Command	Description	Page No.
AT+IPR	Cable Interface Port Command	204
AT+VTS	DTMF and Tone Generation	98
AT+WS46	Mode Selection	198
ATA	Answer	91
ATD	Dial	92
ATE	Command Echo	198
ATH	Hang up	94
ATI	Identification Information	188
ATL	Monitor Speaker Loudness	94
ATM	Monitor Speaker Control	151
ATO	Return to Online Data Mode	95
ATP	Select Pulse Dialling	95
ATQ	Result Code Suppression	101
ATS0	Automatic Answer Control	101
ATS2	Escape Sequence Character	102
ATS3	Command Line Termination Character	102
ATS4	Response Formatting Character	103
ATS5	Command Line Editing Character (BACKSPACE)	104
ATS6	Blind Dial Delay Control	104
ATS7	Connection Completion Timeout	105
ATS8	Comma Dial Modifier Delay Control	105
ATS10	Automatic Disconnect Delay Control	106
ATT	Select Tone Dialling	95
ATV	DCE Response Format	199
ATX	Call Progress Monitoring Control	96
ATZ	Reset to Default Configuration	200

Unsolicited Result Code	Description	Page No.
*E2STKE	STK Send Short Message	302
*E2STKP	STK Send SS	303
*E2STKR	STK Refresh	305
*E2STKU	STK Send USSD	304