ARF32
User Guide

DECLARATION OF CONFORMITY

according to ISO/IEC Guide 22 and EN45014

Manufacturer's name: **ADEUNIS R.F**.

Manufacturer's address: Parc technologique PRE ROUX IV
283 rue Paul Louis NEEL
38920 CROLLES - FRANCE

declares that the product

Product Name: ARF32
Product Number(s): ARF7044A
Product options:

conforms to the RTTE Directive 99/5/EC:
EMC: conformity is proven by compliance to the standard EN 301489 according to the requirements of EMC Directive 89/336/EEC.

Safety: conformity to the standard EN 60950 according to the requirements of Low Voltage Directive 73/23/EEC.

Radio: conformity is proven by compliance to harmonised standard EN 300220 covering essential radio requirements of the RTTE directive.

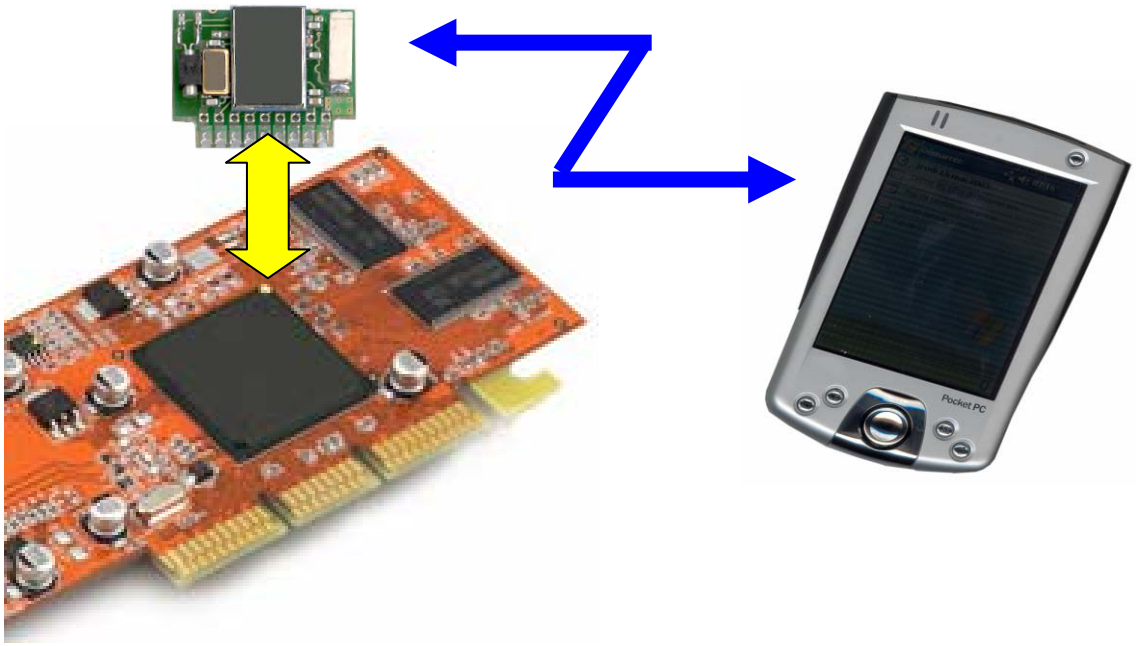
Notes:
- Conformity has been evaluated according to the procedure described in Annex III of the RTTE directive.
- The use of the spectrum is harmonised by the fact that the product never falls in one of the restrictions listed in appendix 3 (Annex 1, band E) of the CEPT recommendation 70-03.
- Receiver class (if applicable): 2.

Crolles, April 4th, 2001

VINCENT Hervé / Quality manager

OVERVIEW

The ARF32 module enables Bluetooth® compliant duplex communications over a 20-meter range in the worldwide 2.45 GHz frequency band.



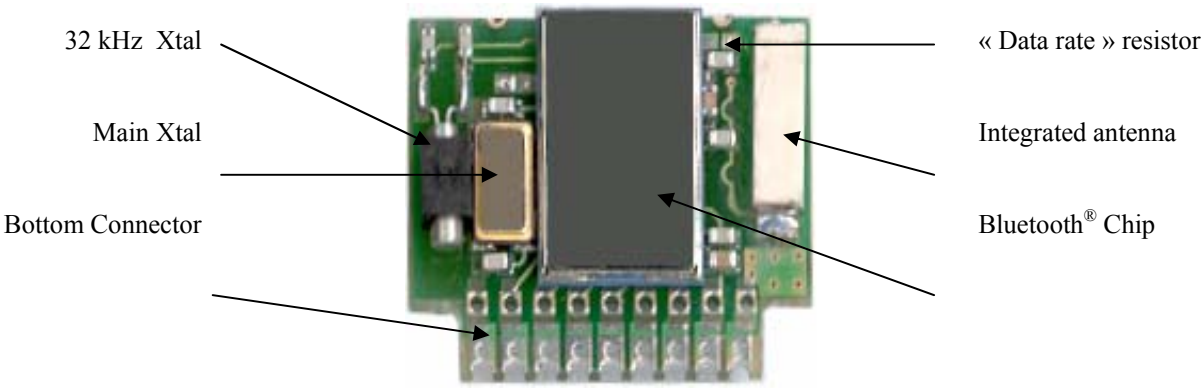
The ARF32 module fully complies with the V1.1 Bluetooth® standard and data rate goes up to 723 kbps. Data exchange and set-up are only done through an UART data port, under SPP profile. A miniature antenna is integrated.

ARF32 can be used in two modes:

Classical Bluetooth® mode: Master starts with GAP identification, then, SDAP profile review, SPP connection and transparent communication.

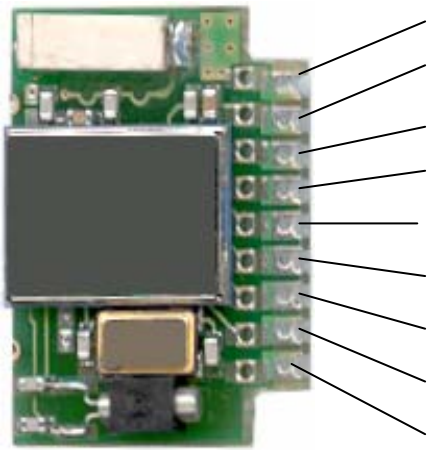
Automatic Bluetooth® mode: Identification, profile review and connection to 1 to 3 known slaves are recorded by the master. After booting, Bluetooth® link is directly open in transparent mode.

ARF32 modules are available as standalone ARF7044 module or in the ARF7069 demo kit. This demo kit can be fully set-up and used with the National Semiconductors® "Simply Blue Commander" Software.



- **Pin-out**

All connections are located on the ARF32 bottom connector:



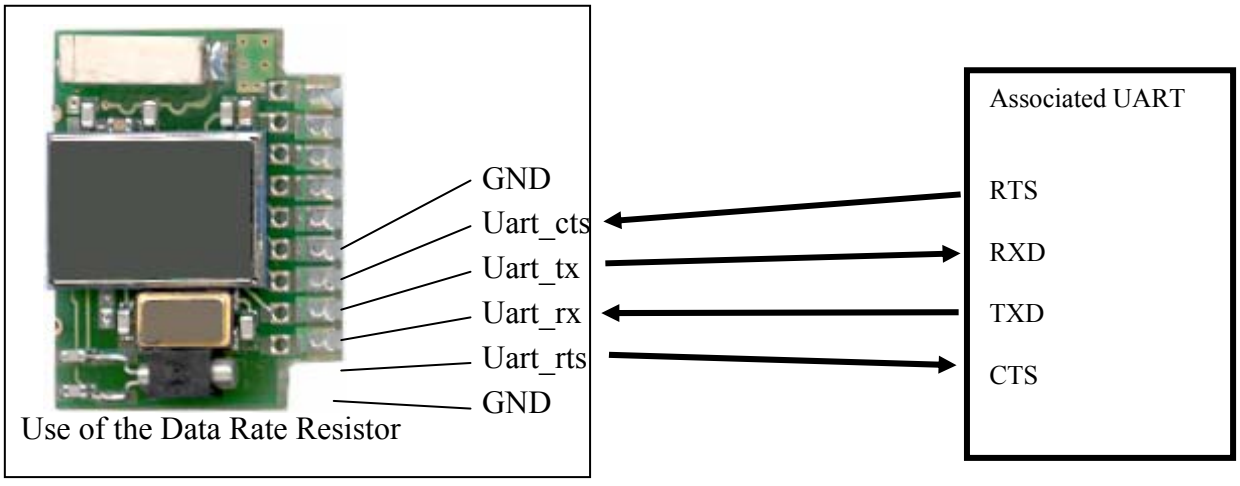
VCC	= Power Supply
VDD_DIG_PWR_D#	= UNUSED
Reset	= Full Hardware Reset (active low)
GND	= Ground
Uart_cts	= « Clear to send » Control Signal In
Uart_tx	= « Data to transmit » Data Out
Uart_rx	= « Received data » Data In
Uart_rts	= « Request to send » Control Signal Out
GND	= Ground

- **Interface**

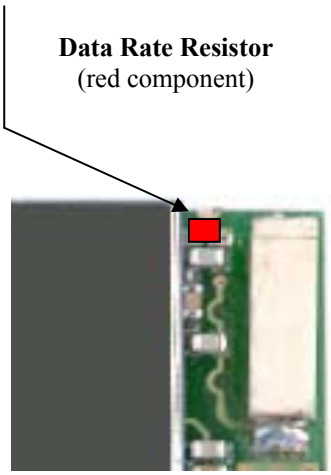
Pin description

SIGNAL	I/O	DESIGNATION	Comment
VCC	I	Main power supply	2.85 < VCC < 3.6 V and I < 65 mA
VDD-DIG_PWR_D#	I	Digital Supply Power Up	NOT TO BE USED
Reset	I	Hardware reset	ARF32 reset when Low
Uart_cts	I	Clear to send Signal	Serial port Flow control Input (**MUST BE USED**)
Uart_tx	O	Data to transmit	Serial port Data Output (0/Vcc level)
Uart_rx	I	Received data	Serial port Data Input (0/Vcc level)
Uart_rts	O	Request to send Signal	Serial port Flow control Output (**MUST BE USED**)
GND	-	Common Ground	Connected to motherboard ground plane

NB: For all I/Os: 0.7 x VCC < Logical 1 < VCC + 0.5 V
- 0.5 V < Logical 0 < 0.3 x VC



Use of the Data Rate Resistor



The purpose of this resistor is to access the ARF32 module by forcing the UART data rate in case of bad "Non Volatile Settings" programming during test and evaluation.

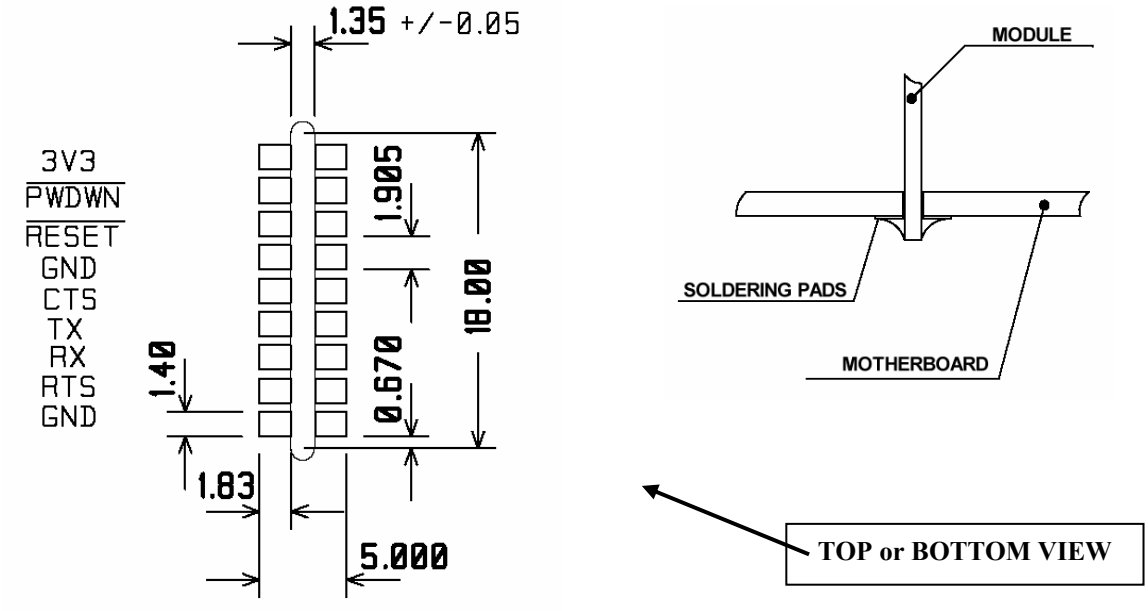
In case of setup error while evaluating, communication with ARF32 module can be lost (bad UART parameters setup).

By removing the "Data Rate Resistor", UART settings are forced to :

- Data rate = 9600 bps
- Parity = None
- Stop bit = 1
- Flow Control = RTS / CTS

It becomes possible to re-program the "Non volatile Settings" to access again the ARF32 Module. When done, resistor can be re-mounted.

- **Footprint**

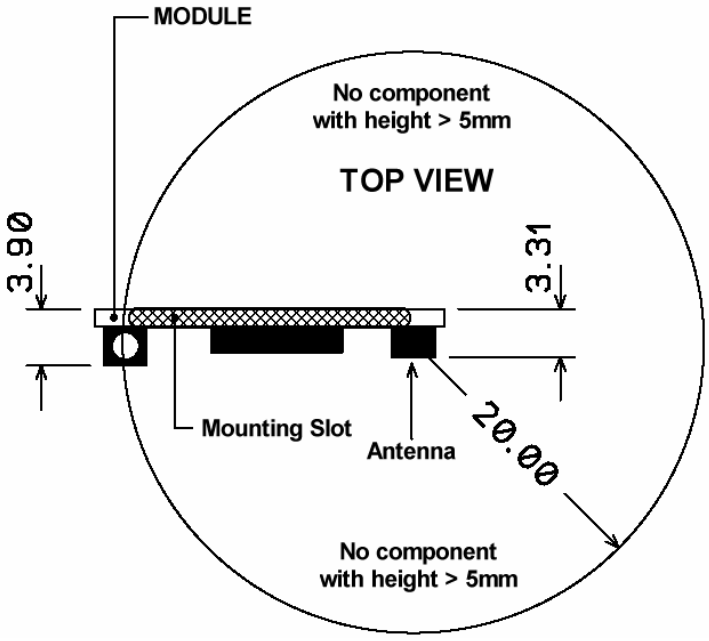


NB : When delivered with ARF7069 demokits, ARF7044 sample modules use a 2-mm pitch connector.
Usable references for mass production are:

- SAMTEC TMM-109-01-LL-S-RA
- RADIOSPARE 132-1083

Standalone ARF7044 module doesn't include this connector because of the suggested plugged mounting.

- **Recommended exclusion zone around antenna**



SOFTWARE MANAGEMENT

- **Non Volatile Default Settings**

Parameter	Default Value	Description
BDADDR	**HARD CODED**	Bluetooth Device Address
Local Name	Serial port device	
PIN Code	0000	Bluetooth PIN Code
Mode	Automatic	Command or Automatic mode
Default connections	0	Up to three default devices to connect on default
SDP database	1 SPP entry : Name : COM1 Authentif. & Encrypt. enabled	Service discovery database, control for supported profiles
UART speed	9600	Speed of the physical UART interface
UART settings	1 Stop bit, parity none	Settings of the physical UART interface
Ports to open	0000 0001	Defines the RF Comm port to open
Link keys	No link keys	Link keys for paired devices
Security mode	2	Security mode

- **Operating modes**

There are two main operating modes in the module: command mode and transparent mode.
The command mode is used to set up the bluetooth link between two pieces of bluetooth equipment.
The transparent mode is used to transfer data between two pieces of bluetooth equipment.

Command mode

A specific protocol is used to send commands to the bluetooth module.
The frame format is the following:
All the values are in hexadecimal format.

Start delimiter	**Packet type**	**Operation code**	**Data length**	**Checksum**	**Data**	**End delimiter**
1 byte	1 byte	1 byte	2 bytes	1 byte	<data length> bytes	1 byte

Start delimiter: 02 (<STX>)
Packet type: 52 ('R' for request), 69 ('i' for indication), 43 ('C' for confirm)
Operation code: command dependent
Data length: size of data. First byte is the Least Significant Byte and second byte is the Most Significant Byte
Checksum: Sum of all bytes from the packet type field to the data length field
Data: command data
End delimiter: 03 (<ETX>)

Example of the inquiry command

Start delimiter	Packet type	Operation code	Data length	Checksum	Data	End delimiter
02	52	00	03 00	55	0A 00 00	03

Frame: 02 52 00 03 00 55 0A 00 00 03

Transparent mode

In this mode all the data received on the UART RX pin are sent by radio to the target bluetooth module and will be available on the target bluetooth module UART TX pin.

Mode selection

A specific command (transparent mode) is used in order to switch from command mode to transparent mode.
A specific pattern: "UART break" is used to switch from transparent mode to command mode.

- **Setting up a link using the command interface**

Power up the two bluetooth modules. Connect one module with the RS232 link to a PC or Notebook or PDA. Use a terminal software configured at the current baudrate (9600 by default), 8 bits, 1 stop, no parity, flow control material.

Please find below a typical request / response sequence in order to establish a typical link. All request must be send by the PC / NB / PDA (i.e. the master). All indication and confirm responses are sent by the Bluetooth slave module:

> GIAC Inquiry request: 02 52 00 03 00 55 0A 00 00 03
< Inquiry module indication: 02 69 01 09 00 73 **34 BE 1F 17 00 08** 00 00 00 03

In bold: address of the target bluetooth module. This address will be used within the command SDAP Connect and the command SPP Connect

< Inquiry module confirm: 02 43 00 01 00 44 00 03
> SDAP connect request: 02 52 32 06 00 8A **34 BE 1F 17 00 08** 03
< SDAP connect module confirm: 02 43 32 01 00 76 00 03
> SDAP service browse SPP request: 02 52 35 02 00 89 01 11 03
< SDAP service browse SPP module confirm: 02 43 35 0D 00 85 00 01 02 10 01 11 01 05 43 4F 4D 31 00 03
> SDAP disconnect request: 02 52 33 00 00 85 03
< SDAP disconnect module confirm: 02 43 33 01 00 77 00 03
> SPP connect request: 02 52 0A 08 00 64 01 **34 BE 1F 17 00 08** 01 03
< SPP connect module confirm: 02 43 0A 02 00 4F 00 01 03
< SPP connect module indication: 02 69 3E 04 00 AB 01 0C 00 00 03
> Enter transparent mode: 02 52 11 01 00 64 01 03
< Enter transparent mode module confirm: 02 43 11 02 00 56 00 01 03

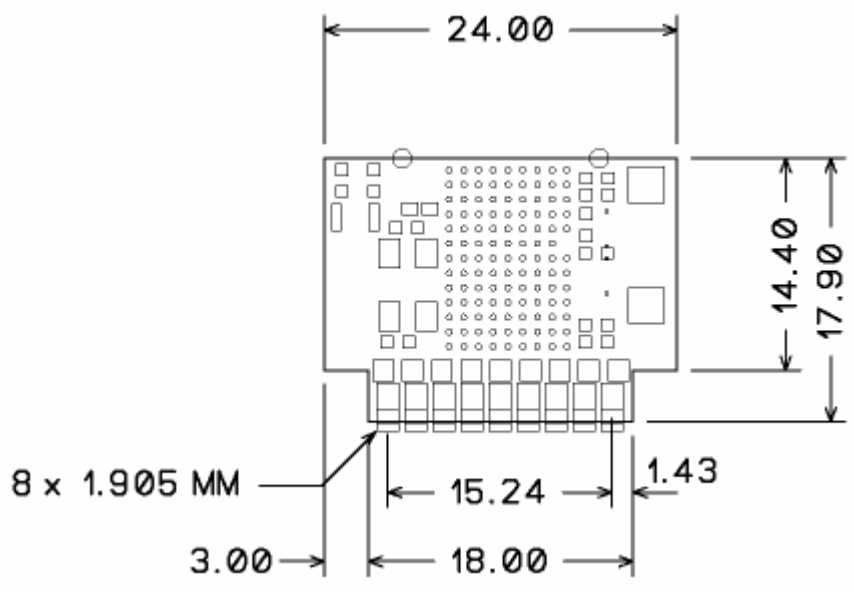
Now you can exchange data in transparent mode between the two bluetooth modules.
To come back to the command mode you have to send an UART break.

- **Advanced commands**

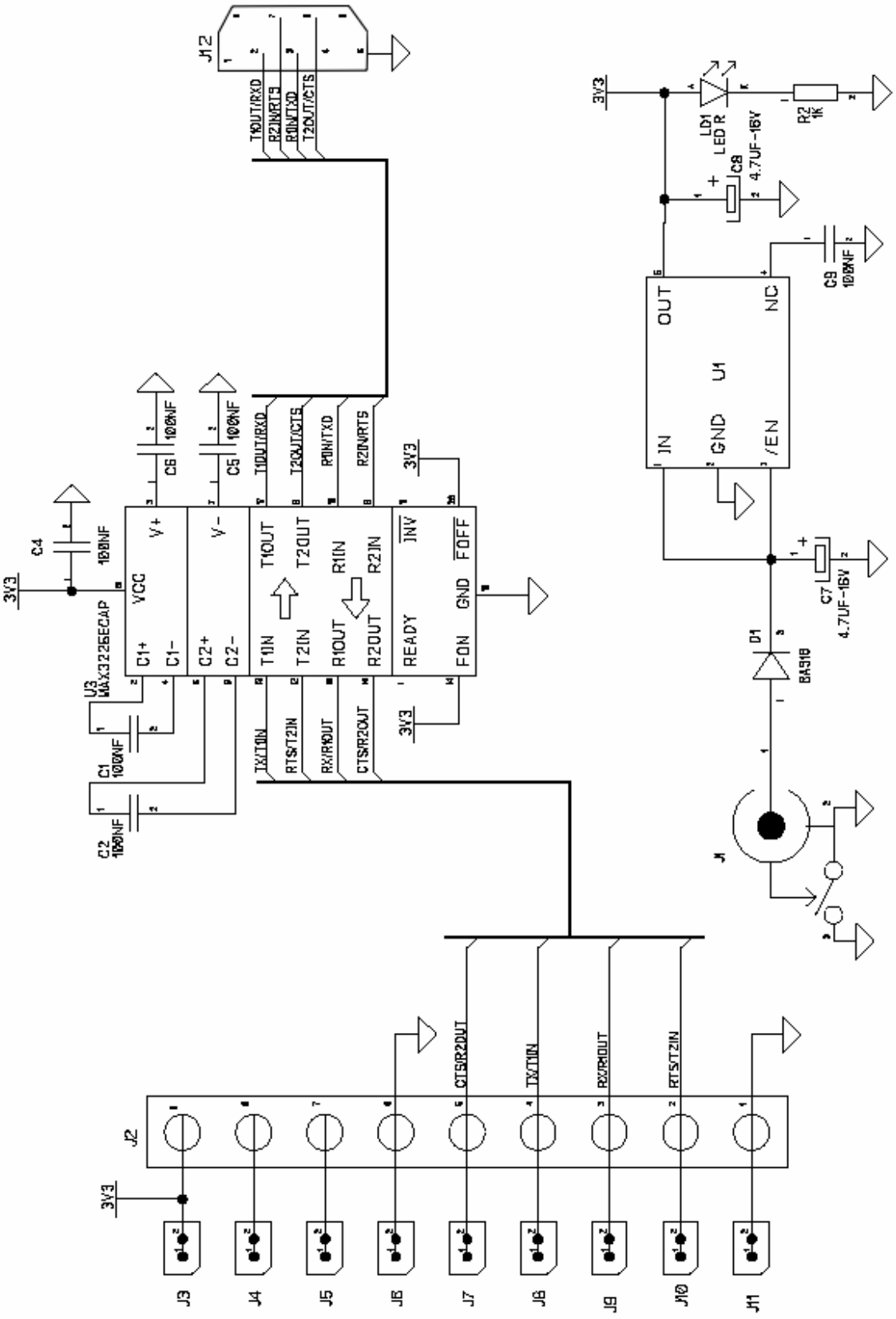
Other commands are available in command mode. Please refer to the National Semiconductors “Simply Blue Commander Software and “Software User Guide”

SPECIFICATIONS

Rough data rate	723 Kbps
UART programmable data rates	Standards from 9.6 to 921.6 kbps
UART ports	TXD - RXD - RTS - CTS
Frequency	FHSS / 2.402 to 2.480 GHz
Radiated RF power	2 mW (3 dBm)
Sensitivity	-85 dBm for BER 10^{-3}
Operating range	>20 m when plugged (with exclusion zone)
Operating voltage	3.3V nominal (2.85 to 3.6 V)
TX / RX consumption	40 mA
PowerDown current	250µA (When software powered down)
Power supply rise time	50 ms
Operating temperature	-35°C / +80°C
Dimensions	20 x 24 x 4 mm



References
ARF7044A: Plugged Bluetooth® Class 2 Complete Module
ARF7069B: RS232 Demo Kit


J12
T1OUT/RXD
R2IN/RTS
R1IN/TXD
T2OUT/CTS
3V3
LD1
LED R
R2
1K
C8
4.7UF-16V
C9
100NF
U1
OUT
NC
IN
GND
/EN
C7
4.7UF-16V
D1
BAS16
J1
C4
100NF
C6
100NF
C5
100NF
U3
MAX3225ECAP
V+
VCC
V-
C1+
C1-
C2+
C2-
T1IN
T2IN
R1OUT
R2OUT
T1OUT
T2OUT
R1IN
R2IN
INV
READY
FON
FOFF
GND
C1
100NF
C2
100NF
TX/T1IN
RTS/T2IN
RX/R1OUT
CTS/R2OUT
J2
J3
J4
J5
J6
J7
J8
J9
J10
J11