



Cmsemicon

CMS16P52/53/55

8-Bit OTP MCU

Data Sheet

CMS16P52/53/55**The Specification Revision History**

Doc. Version	Revision Description	Date
1.0	Initial version	18/11/2007
1.1	Modify spelling err	18/03/2008
1.2		

1. CMS16 Product Family

CMS's CMS16 family of 8-bit OTP-based microcontrollers. It uses a fully static CMOS design technology combines higher speeds with the low power and high noise immunity. On chip memory system includes 1.0K bytes of OTP ROM, and 48bytes of static RAM

2. Description

- ☐ On chip ROM size : 1K x14bits for CMS16P52/53/55
- ☐ Internal RAM size : 48 x 8 bits for CMS16P52/53/55
- ☐ 46 single word instructions
- ☐ 2-level stacks
- ☐ Stop Mode Wakeup when a high to low change in any pin of P0
- ☐ P0/P1 ports Pull-up Resistor can chosed by register
- ☐ 1 or 2 Comparators with + input can connected to GND
- ☐ Operating voltage
 - LV XT MODE(455K): 2.1~3.6V
 - XT MODE(4M): 2.5 ~ 5.5V
 - RC MODE: 2.1 ~ 5.5 V
 - Internal RC: 2.5~5.5V
- ☐ Operating frequency
 - 5V : 0 ~ 10 MHz
 - 2.1V : 0 ~ 2 MHz
- ☐ The most fast execution time is 400ns under 10 MHz in all single cycle instructions except the branch instruction
- ☐ Low Votage detector Reset (LVR)
- ☐ Stop Mode for power saving(WDT always run and the power current less than 3uA@3V)
- ☐ 8-bit real time clock/counter(RTCC) with 8-bit programmable prescaler
- ☐ 4 types of oscillator can be selected by programming OTP ROM:
 - RC Low cost RC oscillator
 - INTRC Internal R and C oscillator
 - XT Standard crystal oscillator

LVXT Low voltage crystal oscillator

- ☐ 3 oscillator start-up time can be selected by programming OTP

ROM(@VCC = 5V) :

560 μ s, 2.2ms, 9 ms

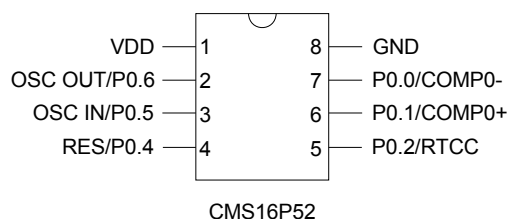
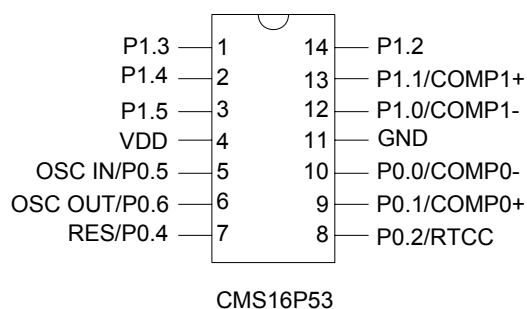
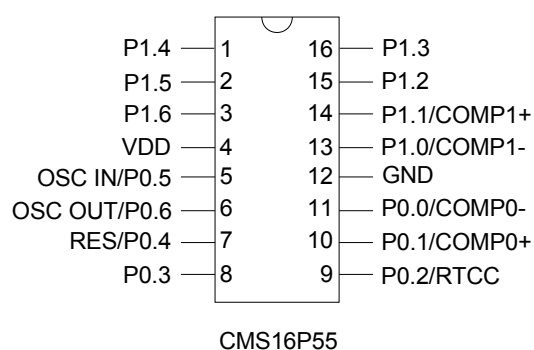
- ☐ On-chip RC oscillator based Watchdog Timer(WDT) always run
- ☐ All pins with their own independent direction control

5I/O + 1 Input for CMS16P52

11I/O + 1 Input for CMS16P53

13I/O + 1 Input for CMS16P55

3. Pin Assignment



The PIN Description

Pin Name	Description
P0.0/COMP0-	Input/Ouput and Comparator0 - Input
P0.1/COMP0+	Input/Ouput and Comparator0 + Input
P0.2/RTCC	Input/Ouput
P0.3	Input/Ouput
P0.4/RES	RESET or Input
P0.5/OSCIN	Input/Ouput
P0.6/OSCOU	Input/Ouput
P1.0/COMP1-	Input/Ouput and Comparator1 - Input
P1.1/COMP1+	Input/Ouput and Comparator1 + Input
P1.2	Input/Ouput
P1.3	Input/Ouput
P1.4	Input/Ouput
P1.5	Input/Ouput
P1.6	Input/Ouput
VDD	Power supply
GND	Ground

4. Data Memory Map

Address	Name	Description	Value on Power-on Reset
00h	IAR	Uses contents of FSR to address data memory (not a physical register)	xxxx xxxx
01h	TMR	Timer0 Module Register	xxxx xxxx
02h	PCL	Low 8 bits of PC	1111 1111
03h	FLAGS	Flags	0001 1xxx
04h	FSR	Indirect data memory address pointer	1xxx xxxx
05h	P0	P0 data register	xxxx xxxx
06h	P1	P1 data register	xxxx xxxx
07h	COMPCON	Comparator and Pullup Resistor Control Resgister	0000 0000
08h	-----	Prohibited Access	xxxx xxxx
09h	-----	Prohibited Access	xxxx xxxx
0Ah	-----	Prohibited Access	xxxx xxxx
0Bh	-----	Prohibited Access	xxxx xxxx
0Ch	-----	Prohibited Access	xxxx xxxx
0Dh	-----	Prohibited Access	xxxx xxxx
0Eh	-----	Prohibited Access	xxxx xxxx
0Fh	-----	Prohibited Access	xxxx xxxx
10~1Fh		General purpose registers	xxxx xxxx
20~2Fh	-----	Prohibited Access	xxxx xxxx
30~3Fh		General purpose registers	xxxx xxxx
40~4Fh	-----	Prohibited Access	xxxx xxxx
50~5Fh		General purpose registers	xxxx xxxx
60~6Fh	-----	Prohibited Access	xxxx xxxx
70~7Fh	-----	Prohibited Access	xxxx xxxx

Legend: x = unknown, u = unchanged, – = unimplemented, read as '0' (if applicable).

Data memory is composed of registers, or bytes of RAM. Therefore, data memory for a device is specified by its register file. The register file is divided into two functional groups: Special Function Registers and General Purpose Registers.

The Special Function Registers include the TMR0 register, the Program Counter (PC), the FLAGS Register, the I/O registers (ports) and the File Select

Register (FSR). In addition, Special Purpose Registers are used to control the I/O port configuration and prescaler PRESCALES.

The General Purpose Registers are used for data and control information under command of the instructions.

FLAGS Register

This register contains the arithmetic FLAGS of the ALU, the RESET FLAG.

The FLAGS Register can be the destination for any instruction, as with any other register. If the FLAGS Register is the destination for an instruction that affects the Z, DC or C bits, then the write to these three bits is disabled. These bits are set or cleared according to the device logic. Furthermore, the TO and PD bits are not writable. Therefore, the result of an instruction with the FLAGS Register as destination may be different than intended.

For example, `CLR FLAGS` will clear the upper three bits and set the Z bit. This leaves the FLAGS Register as `000u u1uu` (where `u` = unchanged).

It is recommended, therefore, that only `SETB`, `CLRB` and `LD` instructions be used to alter the FLAGS Register because these instructions do not affect the Z, DC or C bits from the FLAGS Register. For other instructions which do affect FLAGS Bits, see the Instruction Set Summary.

FLAGS REGISTER (ADDRESS: 03h)							
Bit7	Bit6	BIT5	BIT4	BIT3	BIT2	BIT1	Bit0
unused	unused	unused	TO	PD	Z	DC	C
-	-	-	R	R	R/W	R/W	R/W

bit 7-5: These bits unused.

TO : Time-out bit

1 = After power-up, `CLRWDT` instruction, or `STOP` instruction

0 = A WDT time-out occurred

PD: Power-down bit

1 = After power-up or by the `CLRWDT` instruction

0 = By execution of the `STOP` instruction

Z: Zero bit

1 = The result of an arithmetic or logic operation is zero

0 = The result of an arithmetic or logic operation is not zero

DC: Digit carry/borrow bit (for ADDA, ADDR, SUBA and SUBR instructions)

ADDA, ADDR

1 = A carry from the 4th low order bit of the result occurred

0 = A carry from the 4th low order bit of the result did not occur

SUBA, SUBR

1 = A borrow from the 4th low order bit of the result did not occur

0 = A borrow from the 4th low order bit of the result occurred

C: Carry/borrow bit (for ADDA, ADDR, SUBA, SUBR, and RRCA, RRCR, RLCA, RLCR instructions)

PRESCALE Register

The PRESCALE Register is a 6-bit wide, write-only register which contains various control bits to configure the Timer0/WDT prescaler and Timer0

By executing the PRESCALE instruction, the contents of the W Register will be transferred to the PRESCALE Register. A RESET sets the PRESCALE<5:0> bits.

PRESCALE REGISTER							
Bit7	Bit6	BIT5	BIT4	BIT3	BIT2	BIT1	Bit0
unused	unused	T0CKI	T0SE	PSA	PS2	PS1	PS0

bit 7-6: **Unimplemented:** Read as '0'

bit 5: **T0CKI**

1 = External P0.2/RTCC pin

0 = Internal instruction cycle clock (CLKOUT)

bit 4: **T0SE:** Timer0 source edge select bit

1 = Increment on high-to-low transition on T0CKI pin

0 = Increment on low-to-high transition on T0CKI pin

bit 3: **PSA:** Prescaler assignment bit

1 = Prescaler assigned to the WDT

0 = Prescaler assigned to the Timer0

bit 2-0: **PS<2:0>:** Prescaler rate select bits

Bit	Value	Timer0 Rate	WDT Rate
000		1:2	1:1

001	1:4	1:2
010	1:8	1:4
011	1:16	1:8
100	1:32	1:16
101	1;64	1:32
110	1:128	1;64
111	1:256	1:128

Program Counter(PCL)

As a program instruction is executed, the Program Counter (PC) will contain the address of the next program instruction to be executed. The PC value is increased by one, every instruction cycle, unless an instruction changes the PC.

Instructions where the PCL is the destination, or modify PCL instructions, include LD PCL,A ADDR PCL,A and SETB PCL,5. Those Instructions can't change the Upper bits of PC.

FSR Register

The FSR is a 7-bit (CMS16P52/53/55) wide register. It is used in conjunction with the IAR Register to indirectly address the data memory area.

The FSR<6:0> bits are used to select data memory add resses 00h to 7Fh.

IAR Register

The IAR Register is not a physical register. Addressing IAR actually addresses the register whose address is contained in the FSR Register (FSR is a *pointer*). This is indirect addressing.

EXAMPLE: INDIRECT ADDRESSING

Register file 08 contains the value 10h

Register file 09 contains the value 0Ah

Load the value 08 into the FSR Register

A read of the IAR Register will return the value of 10h

Increment the value of the FSR Register by one (FSR = 09h)

A read of the IAR register now will return the value of 0Ah.

Reading IAR itself indirectly (FSR = 0) will produce 00h. Writing to the IAR



Register indirectly results in a no-operation (although FLAGS bits may be affected).

A simple program to clear RAM locations 10h-1Fh using indirect addressing is shown in Example 6-2.

EXAMPLE HOW TO CLEAR RAM USING INDIRECT ADDRESSING

```

        LDIA      H'0F'          ;initialize pointer
        LD        FSR,A          ;to RAM
LOOP:
        INCR      FSR
        SETB      FSR, 4         ;When Bit4=0 (FSR>0Fh) The Register is not definite
        CLR       IAR           ;clear IAR Register
        SZINCA    FSR
        JP        LOOP          ;NO, clear next CONTINUE
EXIT:
        . . . .

```

P0,P1

As with any other register, the I/O Registers can be written and read under program control. On RESET, all I/O ports are defined as input (inputs are at hi-impedance) since the I/O control registers (WRSR P0, WRSR P1, WRSR P2) are all set.

P0 is an 8-bit I/O Register (P0<7:0>).

B7	B6	B5	B4	B3	B2	B1	B0
Always 0	OSCOUT/P0.6	OSCIN/P0.5	RES/P0.4	P0.3	P0.2	P0.1	P0.0

P0.4

When LVR Enable (OTP Program). This pin can be used as input port P3.2
Otherwise this pin is a reset pin.

P0.6 and P0.5

When Oscillator selected as INTRC(OTP Program), These two pins can be used as input or output, the direction can be operated by instruction WRSR P0

Example:

```

LDIA      00100000b
WRSR      P0      ;then P0.5 is input and P0.6 is output

```

P1 is an 8-bit I/O Register (P1<7:0>).

B7	B6	B5	B4	B3	B2	B1	B0
Always 0	P1.6	P1.5	P1.4	P1.3	P1.2	P1.1	P1.0

COMPCON Register

B[7]	B[6]	B[5]	B[4]	B[3]	B[2]	B[1]	B[0]
------	------	------	------	------	------	------	------

B[7] ----- no used

B[6] ----- + Input Control bit of Comparator1

0 – the + input of comparator1 connect to GND, P1.1 can be used as normal I/O

1 – the + input of comparator1 connect to P1.1

B[5] ----- Comparator1 enable control bit

0 –Comparator1 disable, P1.0 and P1.1 can be used as normal I/O

1 –Comparator1 enable, P1.0 used as analog – input

B[4] ----- + Input Control bit of Comparator0

0 – the + input of comparator0 connect to GND, P0.1 can be used as normal I/O

1 – the + input of comparator0 connect to P0.1

B[3] ----- Comparator0 enable control bit

0 –Comparator0 disable, P0.0 and P0.1 can be used as normal I/O

1 –Comparator0 enable, P0.0 used as analog – input

B[2] ----- Pullup Resistor of P2 Control bit

0 –Pullup Resistor of P2 Disable

1 –Pullup Resistor of P2 Enable

B[1] ----- Pullup Resistor of P1 Control bit

0 –Pullup Resistor of P1 Disable

1 –Pullup Resistor of P1 Enable

B[0] ----- Pullup Resistor of P0 Control bit

0 –Pullup Resistor of P0 Disable

1 –Pullup Resistor of P0 Enable

When any port was used as output or analog input, the Pullup Resistor will be disable.

EXAMPLE:(How to use Comparator 0)

```

SETB    COMPCON, 3 ;
SETB    COMPCON, 4 ;Set P0.1 as + input of comparator 0
NOP                                           ;Delay
NOP
NOP
SZB     P0, 0 ;Get the result of comparator 0
JP      P_LT_N

```

N_LT_P:

```

...
JP      EXIT
P_LT_N:
...
EXIT:
        CLRB      COMPCON, 3 ; disable comparator 0
        CLRB      COMPCON, 4

```

WRSR Registers

There have 3 WRSR Registers, Their address are the same with 2H,P0,P1. Those registers can only accessed by instruction WRSR.

The Output Driver Control Registers are loaded with the contents of the Acc by executing the WRSR R instruction. A '1' from a WRSR Register bit puts the corresponding output driver in a hi-impedance (input) mode. A '0' puts the contents of the output data latch on the selected pins, enabling the output buffer

Example:

```

LDIA      0FH
WRSR      P0      ;P0.0~P0.3 input and P0.4~P0.7 output

```

5. ROM MAP

CMS16P52/53/55 memory is organized into program memory and data memory. Total OTP memory of CMS16P52/53/55 is 1K bytes.

The RESET vector for the CMS16P52/53/55 is at 3FFh. A NOP at the RESET vector location will cause a restart at location 000h.

6. OSCILLATOR CONFIGURATIONS

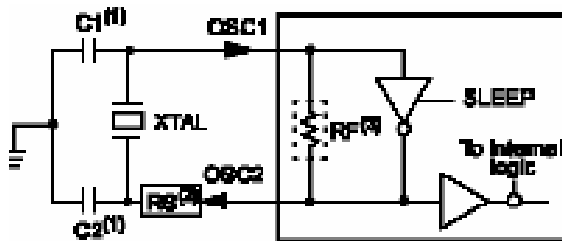
CMS16P52/53/55 can be operated in four different oscillator modes. The user can program OTP ROM to select one of these four modes:

1. EXT RC: External C and R
2. INTRC: Internal C and Internal Resistor
3. XT: High Speed Crystal/Resonator
4. LVXT: Low Speed Crystal/Resonator

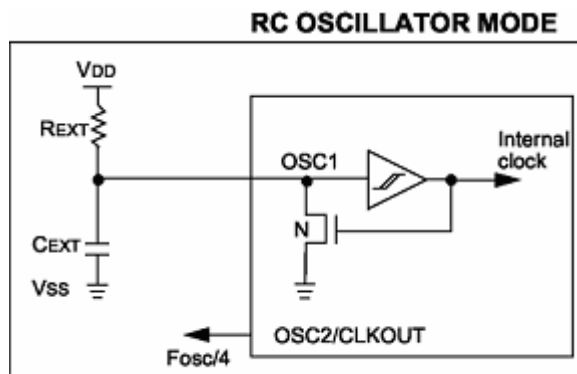
Crystal Oscillator/Ceramic Resonators

In XT, LVXT modes, a crystal or ceramic resonator is connected to the OSCIN/P3.1 and OSCOUT/P3.0 pins to establish oscillation. The CMS16P52/53/55 oscillator design requires the use of a parallel cut crystal. Use of a series cut crystal may give a frequency out of the crystal manufacturers specifications. When in XT, LVXT modes, the device can have an external clock source drive the OSCIN/P3.1 pin.

XT and HF XT Mode



External RC Mode



The oscillator frequency, when in EXT RC, divided by 4, is available on the OSCOUT/P0.6 pin, and can be used for test purposes

7. RESET

CMS16P52/53/55 devices may be RESET in one of the following ways:

Power-On Reset (POR)

Low Voltage Reset (LVR)

MCLR Reset

P0 Wake-up Reset (from STOP)

WDT Reset

The bellow Table shows these RESET conditions for the PCL and FLAGS registers

Table7.1 FLAGS BITS AND THEIR SIGNIFICANCE

Condition	TO	PD
Power-On Reset	1	1
MCLR Reset (normal operation)	u	u
MCLR Wake-up (from STOP)	1	0
WDT Reset (normal operation)	0	1
WDT Wake-up (from STOP)	0	0

Legend: u = unchanged, x = unknown, — = unimplemented read as '0'

Some registers are not affected in any RESET condition. Their FLAGS is unknown on POR and unchanged in any other RESET. Most other registers are reset to a “RESET state” on Power-On Reset (POR), MCLR or WDT Reset. A MCLR or WDT wake-up from STOP also results in a device RESET, and not a continuation of operation before STOP

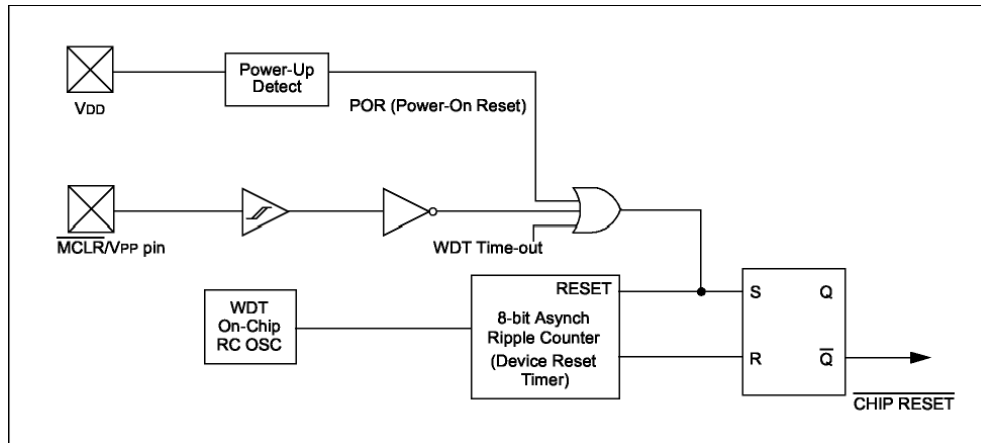
Table7.2 SUMMARY OF REGISTERS ASSOCIATED WITH RESET

Address	Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Value on POR	Value on MCLR and WDT Reset
03h	FLAGS	--	--	--	TO	PD	Z	DC	C	00011xxx	000q quuu

Legend: u = unchanged, x = unknown, q = see Table 7.1 for possible values.

The TO and PD bits (FLAGS <4:3>) are set or cleared depending on the different RESET conditions (Table7.1). These bits may be used to determine the nature of the RESET

The bellow table lists a full description of RESET states of all registers. The following figure shows a simplified block diagram of the On-chip Reset circuit.
Figure Reset Pin



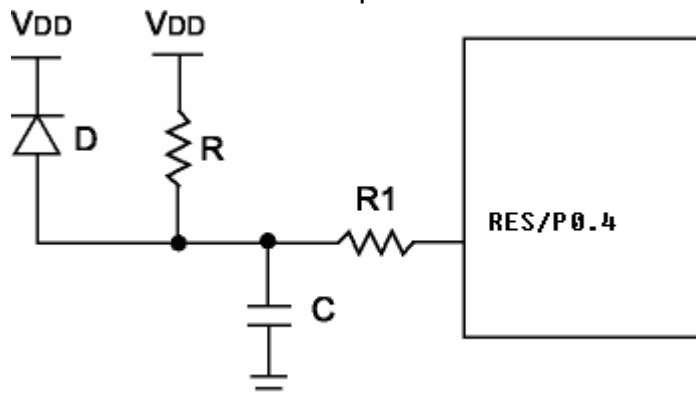
Power-On Reset (POR)

The CMS16P52/53/55 family incorporates on-chip Power-On Reset (POR) circuitry which provides an internal chip RESET for most power-up situations. To use this feature, the user merely ties the RES/P0.4 pin to VDD. A simplified block diagram of the on-chip Power-On Reset circuit is shown in Figure Reset Pin.

The Power-On Reset circuit and the Device Reset Timer circuit are closely related. On power-up, the RESET latch is set and the DRT is RESET. The DRT timer begins counting once it detects RES to be high. After the time-out period, which is $t_{yCMSally} 560\mu s$ to $18ms@5V$, it will RESET the reset latch and thus end the on-chip RESET signal

Note: When the device starts normal operation (exits the RESET condition), device operating parameters (voltage, frequency, temperature, etc.) must be met to ensure operation. If these conditions are not met, the device must be held in RESET until the operating conditions are met.

The POR circuit does not produce an internal RESET when VDD declines

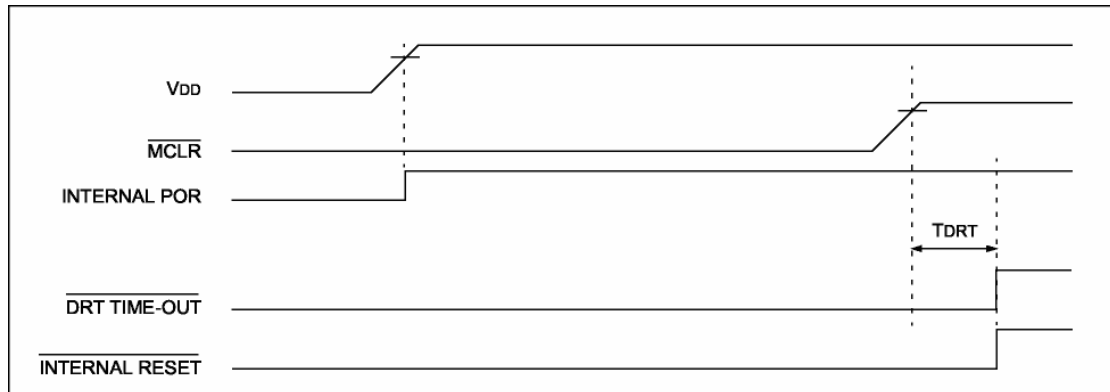


External Power-On Reset circuit is required only if VDD power-up is too slow. The diode D helps discharge the capacitor quickly when VDD powers down.

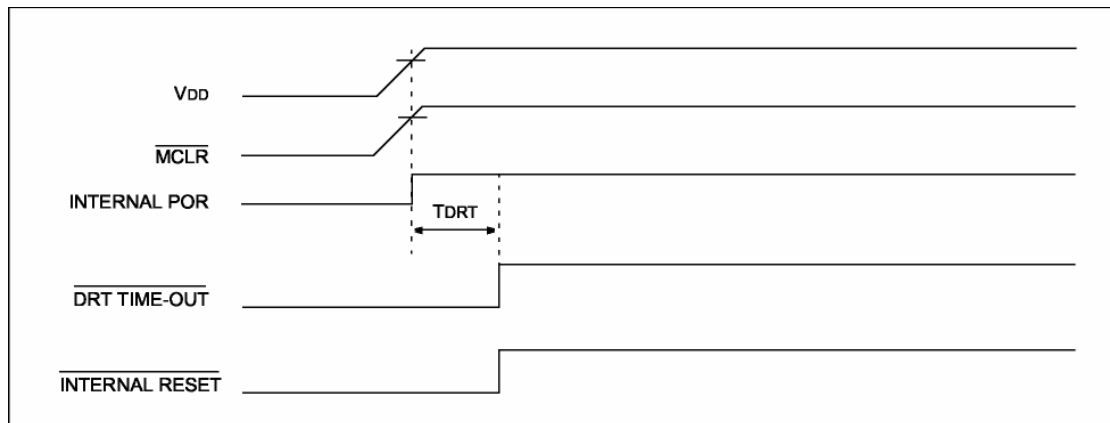
$R < 40\text{ k}$ is recommended to make sure that voltage drop across R does not violate the device electrical specification.

$R1 = 1\text{ k}$ to 1 k will limit any current flowing into RES from external capacitor C in the event of MCLR pin breakdown due to Electrostatic Discharge (ESD) or Electrical Over-stress (EOS).

TIME-OUT SEQUENCE ON POWER-UP (MCLR NOT TIED TO



TIME-OUT SEQUENCE ON POWER-UP (RES NOT TIED TO



Device Reset Timer (DRT)

The Device Reset Timer (DRT) provides an 560us to 18ms (5V) nominal time-out on RESET regardless of Oscillator mode used. Those timer can be selected by program OTP ROM. The DRT operates on an internal RC oscillator. The processor is kept in RESET as long as the DRT is active. The DRT delay allows VDD to rise above VDD min., and for the oscillator to stabilize

The Device Reset time delay will vary from chip to chip due to VDD, temperature, and process variation.

The DRT will also be triggered upon a Watchdog Timer time-out. This is particularly important for applications using the WDT to wake the CMS16P52/53/55 from Stop mode automatically.

P0 Wakeup Reset

When the MCU is in STOP mode after executed a STOP instruction, a high to low change in any pin of P0 will cause a reset of the MCU.

8. INSTRUCTION SET SUMMARY

TABLE 8-2: INSTRUCTION SET SUMMARY

Mnemonic	Description	Cycle	FLAGS Affected
SZB R,b	If R.b = 0 Then Skip	1 or 2	---
SNZB R,b	If R.b = 1 Then Skip	1 or 2	---
SZDECA R	1. [R]-1→Acc 2. If [R]-1= 0 Then Skip	1 or 2	---
SZDECR R	1. [R]-1→R 2. If [R]-1= 0 Then Skip	1 or 2	---
SZINCA R	1. [R]+1→Acc 2. If [R]+1= 0 Then Skip	1 or 2	---
SZINCR R	1. [R]+1→R 2. If [R]+1= 0 Then Skip	1 or 2	---
JP add	Jump	2	---
CALL add	Call	2	---
RET i	Return with i to Acc	2	---
LD A,R	[R] → Acc	1	Z
LD R,A	Acc → R	1	---
LDR R	[R] → R	1	Z
LDIA i	i → Acc	1	---
ADDA R	[R] + Acc → Acc	1	C,HC,Z
ADDR R	[R] + Acc → R	1	C,HC,Z
SUBA R	[R] – Acc → Acc	1	C,HC,Z
SUBR R	[R] – Acc → R	1	C,HC,Z
INCA R	[R] + 1 → Acc	1	Z

INCR	R	$[R] + 1 \rightarrow R$	1	Z
DECA	R	$[R] - 1 \rightarrow \text{Acc}$	1	Z
DECR	R	$[R] - 1 \rightarrow R$	1	Z
ANDA	R	$[R] \text{ and } \text{Acc} \rightarrow \text{Acc}$	1	Z
ANDR	R	$[R] \text{ and } \text{Acc} \rightarrow R$	1	Z
ORA	R	$[R] \text{ or } \text{Acc} \rightarrow \text{Acc}$	1	Z
ORR	R	$[R] \text{ or } \text{Acc} \rightarrow R$	1	Z
ORIA	i	$\text{Acc or } i \rightarrow \text{Acc}$	1	Z
XORA	R	$[R] \text{ XOR } \text{Acc} \rightarrow \text{Acc}$	1	Z
XORR	R	$[R] \text{ XOR } \text{Acc} \rightarrow R$	1	Z
XORIA	i	$i \text{ XOR } \text{Acc} \rightarrow \text{Acc}$	1	Z
COMA	R	$\text{NOT } [R] \rightarrow \text{Acc}$	1	Z
COMR	R	$\text{NOT } [R] \rightarrow R$	1	Z
RLCA	R	Rotate left with acc, the result to Acc But R no change	1	C
RLCR	R	Rotate left with acc, the result to R	1	C
RRCA	R	Rotate right with acc, the result to Acc But R no change	1	C
RRCR	R	Rotate right with acc, the result to R	1	C
SWAPA	R	Exchange R.0~R.3 and R.4~R.7 The Result to Acc (R no Change)	1	---
SWAPR	R	Exchange R.0~R.3 and R.4~R.7 The Result to R	1	---
CLRB	R,b	$0 \rightarrow R.b$	1	---
SETB	R,b	$1 \rightarrow R.b$	1	---
NOP			1	---
STOP			1	TF,PF
CLRWDT		Clear Watchdog Timer	1	TF,PF
PRESCALE		$\text{Acc} \rightarrow \text{Prescale Register}$	1	---

WRSR	R	Acc → Special register	1	---
CLRA		0 → Acc	1	Z
CLR	R	0 → R	1	Z

9. ELECTRICAL CHARACTERISTICS

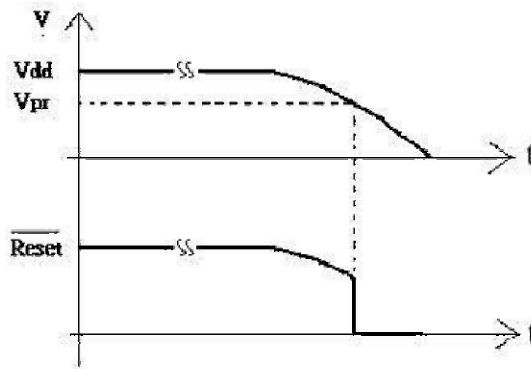
Absolute Maximum Ratings	
Ambient Temperature under bias	–55°C to +125°C
Storage Temperature	–65°C to +150°C
Voltage on V _{DD} with respect to Gnd	0V to +7.5V
Voltage on RES with respect to GND ⁽¹⁾	0V to +14V
Voltage on all other pins with respect to GND	–0.6V to (V _{DD} + 0.6V)
Total power dissipation ⁽²⁾	800 mW
Max. current out of GND pin	150 mA
Max. current into V _{DD} pin	100 mA
Max. current into an input pin (T0CKI only)	±500 uA
Input clamp current, I _{IK} (V _I < 0 or V _I > V _{DD})	±20 mA
Output clamp current, I _{OK} (V _O < 0 or V _O > V _{DD})	±20 mA
Max. output current sunk by any I/O pin	25 mA
Max. output current sourced by any I/O pin	20 mA
Max. output current sourced by a single I/O port	40 mA
Max. output current sunk by a single I/O port	50 mA

DC Characteristics:

(A) Low Voltage Detector Reset Voltage)

V_{LVR} 1.6~1.9 V

V_{pr}V_{dd} (Power Supply)



(B) The basic WDT time-out cycle time @

Temperature 25, the tyCMSal value as followings :

Voltage (V)	Basic WDT time-out cycle time (ms)
3.0	53
4.0	32.8
5.0	24.2

(C) The standby Current@Temperature25(NW= NO WORK)

Voltage (V)	standby Current (uA)
3.0	2.0
4.0	8.0
5.0	17

External Capacitor Selection For Crystal Oscillator

Osc. Type	Resonator Freq.	Vmin	Vmin	Vmin
		C1=C2=33P	C1=C2=47P	C1=C2=101P
LVXT	455KHz	/	1.9V	1.9V
		C1=C2=0P	C1=C2=22P	C1=C2=33P
LVXT	2 MHz	2.0V	2.2V	2.4V
	4 MHz	2.2V	2.3V	2.7V
XT	2MHz	2.4V	2.5V	2.5V
	4 MHz	2.5V	2.5V	2.7V
	6MHz	2.8V	2.9V	3.9V
	8MHZ	3.6V	3.7V	3.9V

The relationship between R/C and Power Voltage:

A). RC Type OSC

@ V_{dd}=5.0 V

The IC may not oscillate properly if the resistance of rext less than 3.3K. The minimum resistance of rext must be more than 3.3K.

Cext. (F)	Rext. (Ohm)	Frequency (MHz)
C=0P	1.5K	/
	2K	/
	3.3K	/
	4.7K	14.0
	5.1K	13.2
	5.6K	12.5
	6.8K	10.9
	8.2K	9.4
	10.0K	8.0
	15K	5.7

C=10P	1.5K	/
	2K	/
	3.3K	9.5
	4.7K	7.6
	5.1K	7.0
	5.6K	6.7
	6.8K	5.7
	8.2K	4.8
	10.0K	4.1
	15K	2.9
C=22P	1.5K	/
	2K	/
	3.3K	6.4
	4.7K	5.0
	5.1K	4.6
	5.6K	4.4
	6.8K	3.7
	8.2K	3.2
	10.0K	2.6
	15K	1.8
C=33P	1.5K	/
	2K	/
	3.3K	5.1
	4.7K	4.0
	5.1K	3.7
	5.6K	3.5
	6.8K	2.9
	8.2K	2.5
	10.0K	2.1
	15K	1.4

@ $V_{dd}=3.0\text{ V}$

The IC may not oscillate properly if the resistance of R_{ext} less than 4.7K. The minimum resistance of R_{ext} must be more than 4.7K.

Cext. (F)	Rext. (Ohm)	Frequency (Hz)
	1.5K	/
	2K	/
	3.3K	/

C=0P	4.7K	/
	5.1K	/
	5.6K	/
	6.8K	/
	8.2K	9.2
	10.0K	8.8
	15K	6.8
C=10P	1.5K	/
	2K	/
	3.3K	/
	4.7K	7.1
	5.1K	6.8
	5.6K	6.5
	6.8K	5.8
	8.2K	5.1
	10.0K	4.4
	15K	3.2
C=22P	1.5K	/
	2K	/
	3.3K	5.9
	4.7K	5.1
	5.1K	4.9
	5.6K	4.7
	6.8K	4.1
	8.2K	3.6
	10.0K	3.1
	15K	2.2
C=33P	1.5K	/
	2K	5.2
	3.3K	5.1
	4.7K	4.4
	5.1K	4.1
	5.6K	4.0
	6.8K	3.4
	8.2K	3.0
	10.0K	2.5
	15K	1.8

@ $V_{dd} = 2.5V$

The IC may not oscillate properly if the resistance of R_{ext} less than 8.2K. The minimum resistance of R_{ext} must be more than 8.2K.

Cext. (F)	Rext. (Ohm)	Frequency (Hz)
C=0P	1.5K	/
	2K	/
	3.3K	/
	4.7K	/
	5.1K	/
	5.6K	/
	6.8K	/
	8.2K	/
	10.0K	/
	15K	5.6
C=10P	1.5K	/
	2K	/
	3.3K	/
	4.7K	5.9
	5.1K	5.7
	5.6K	5.6
	6.8K	5.2
	8.2K	5.1
	10.0K	4.2
	15K	3.2
C=22P	1.5K	/
	2K	/
	3.3K	4.8
	4.7K	4.6
	5.1K	4.4
	5.6K	4.3
	6.8K	3.8
	8.2K	3.4
	10.0K	3.0
	15K	2.1

C=33P	1.5K	/
	2K	/
	3.3K	4.1
	4.7K	3.8
	5.1K	3.7
	5.6K	3.6
	6.8K	3.2
	8.2K	2.9
	10.0K	2.2
	15K	1.9

b). INTRC OSC (Internal C and R)

F=3.4MHZ

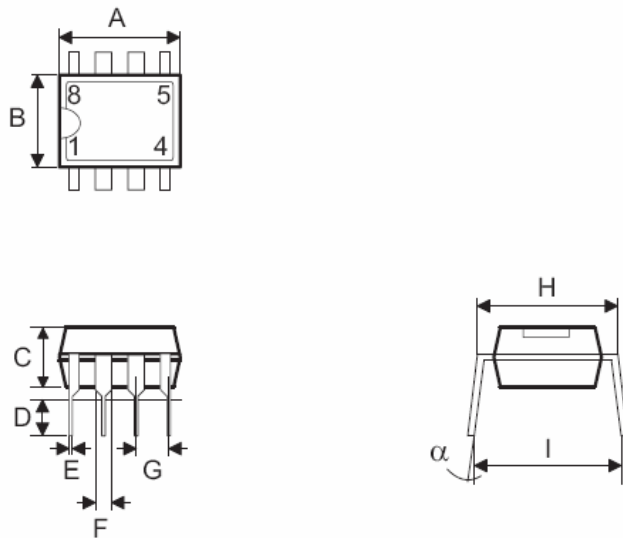
2.2v	2.3v	2.4v	2.5v	2.6v	2.8v	3.0v	3.5v	4.0v	5v	5.5v
NW	NW	NW	3.34	3.31	3.31	3.3	3.3	3.26	3.20	3.16

NW: Not WORK

10.Package Information

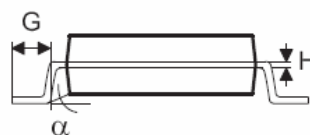
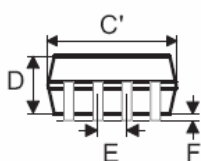
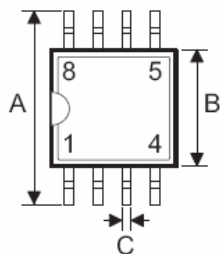
The CMS16P52 is available in a 8-pin DIP package, a 8-pin SOP package. Package dimensions are shown below.

8-Pin DIP



Symbol	Dimensions in mil		
	Min.	Nom.	Max.
A	355	—	375
B	240	—	260
C	125	—	135
D	125	—	145
E	16	—	20
F	50	—	70
G	—	100	—
H	295	—	315
I	335	—	375
α	0°	—	15°

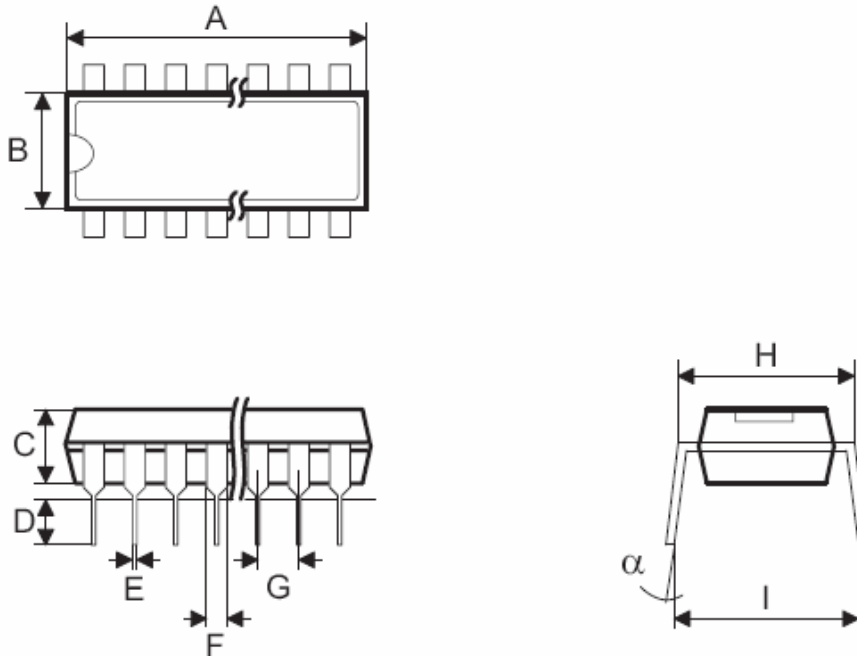
8-Pin SOP



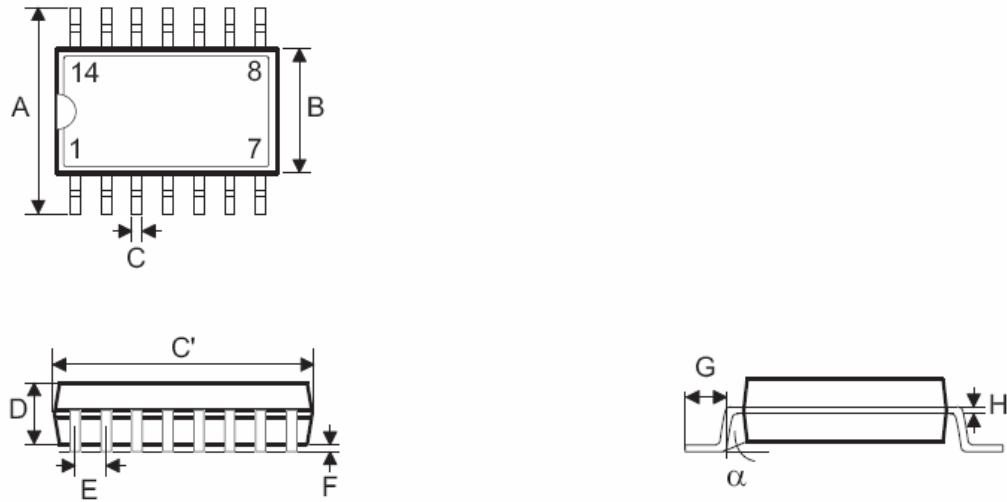
Symbol	Dimensions in mil		
	Min.	Nom.	Max.
A	228	—	244
B	149	—	157
C	14	—	20
C'	189	—	197
D	53	—	69
E	—	50	—
F	4	—	10
G	22	—	28
H	4	—	12
α	0°	—	10°

The CMS16P53 is available in a 14-Pin DIP package, a 14-Pin SOP package. Package dimensions are shown below.

14-Pin SDIP



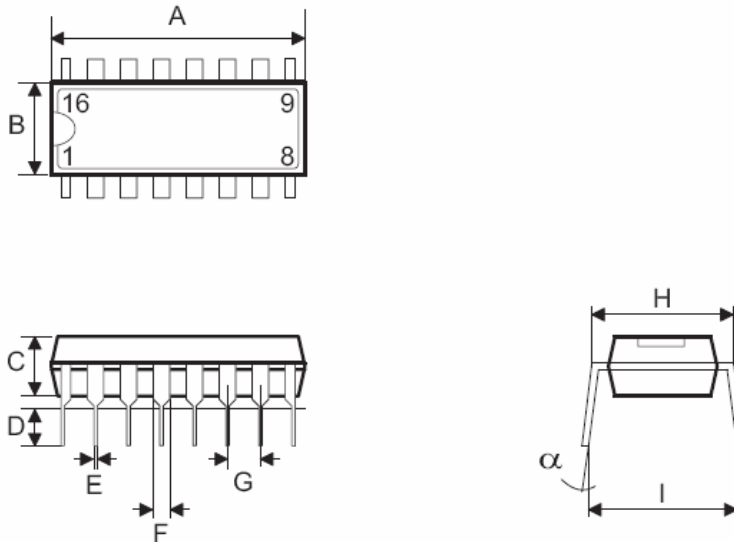
Symbol	Dimensions in mil		
	Min.	Nom.	Max.
A	745	—	775
B	240	—	260
C	125	—	135
D	125	—	145
E	16	—	20
F	50	—	70
G	—	100	—
H	295	—	315
I	335	—	375
α	0°	—	15°



Symbol	Dimensions in mil		
	Min.	Nom.	Max.
A	228	—	244
B	149	—	157
C	14	—	20
C'	336	—	344
D	53	—	69
E	—	50	—
F	4	—	10
G	22	—	28
H	4	—	12
α	0°	—	10°

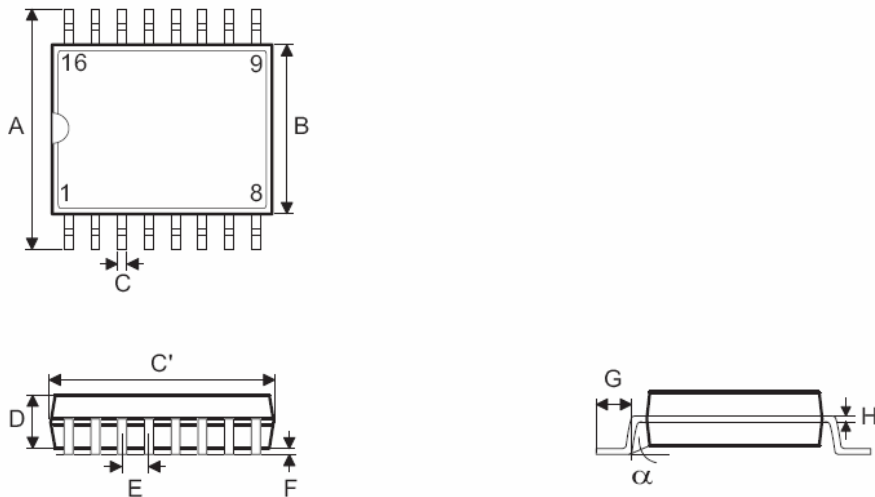
The CMS16P55 is available in a 16-pin DIP package, a 16-pin SOP package. Package dimensions are shown bellow.

16-Pin DIP



Symbol	Dimensions in mil		
	Min.	Nom.	Max.
A	745	—	775
B	240	—	260
C	125	—	135
D	125	—	145
E	16	—	20
F	50	—	70
G	—	100	—
H	295	—	315
I	335	—	375
α	0°	—	15°

16-Pin SOP



Symbol	Dimensions in mil		
	Min.	Nom.	Max.
A	228	—	244
B	150	—	157
C	8	—	12
C'	189	—	197
D	54	—	60
E	—	25	—
F	4	—	10
G	22	—	28
H	7	—	10
α	0°	—	8°



CMS16P52/53/55

11.Company Information

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