

8051 Family Special Function Registers

PCON – Power Control Register

D7	D6	D5	D4	D3	D2	D1	D0
SMOD	x	x	x	GF1	GF0	PD	IDL

Address: 87H (not bit addressable)

SMOD – Serial mode bit used to determine the baud rate with Timer 1.

$$\text{Baud rate} = \frac{\text{Oscillator frequency in Hz}}{N[256 - (TH1)]}$$

If SMOD = 0 then N = 384. If SMOD = 1 then N = 192. TH1 is the high byte of timer 1 when it is in 8-bit autoreload mode.

GF1 and GF0 are General purpose flags not implemented on the standard device

PD is the power down bit. Not implemented on the standard device

IDL activate the idle mode to save power. Not implemented on the standard device

TCON – Timer Control Register

D7	D6	D5	D4	D3	D2	D1	D0
TF1	TR1	TF0	TR0	IE1	IT1	IE0	IT0

Address: 88H (bit addressable)

TF1 – Timer 1 overflow flag

TR1 – Timer 1 run control bit

TF0 – Timer 0 overflow flag

TR0 – Timer 0 run control bit

IE1 – External interrupt 1 edge flag. Set to 1 when edge detected.

IT1 – Edge control bit for external interrupt 1. 1 = edge, 0 = level

IE0 – External interrupt 0 edge flag. Set to 1 when edge detected

IT0 – Edge control bit for external interrupt 0. 1 = edge, 0 = level

SCON – Serial Control Register

D7	D6	D5	D4	D3	D2	D1	D0
SM0	SM1	SM2	REN	TB8	RB8	TI	RI

Address: 98H (bit-addressable)

SM0	SM1	Operation	Baud rate
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0	0	Shift register	Osc/12
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0	1	8-bit UART	Set by timer
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1	0	9-bit UART	Osc/12 or Osc/64
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1	1	9-bit UART	Set by timer
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SM2 – Enables multiprocessor communication in modes 2 and 3.

REN – Receiver enable

TB8 – Transmit bit 8. This is the 9th bit transmitted in modes 2 and 3.

RB8 – Receive bit 8. This is the 9th bit received in modes 2 and 3.

TI – Transmit interrupt flag. Set at end of character transmission. Cleared in software.

RI – Receive interrupt flag. Set at end of character reception. Cleared in software.

TMOD – Timer Mode Control Register

D7	D6	D5	D4	D3	D2	D1	D0
Gate	C/T	M1	M0	Gate	C/T	M1	M0
Timer 1				Timer 0			

Gate – if 1 timer x is enabled when intx is high and TRx is high. if 0 timer x is enabled when TRx is high.

C/T – if 1 timer x is clocked from Tx pin. if 0 timer x is clocked from oscillator/12

M1 M0 Mode

0	0	13-bit mode for compatibility to 8048 family
0	1	16-bit Timer/Counter. User must reload in software
1	0	8-bit autoreload. TLx is automatically reloaded from THx
1	1	TL0 is 8-bit counter controlled by Timer0 control bits. TH0 is 8-bit counter controlled by Timer1 control bits. Timer 1 is stopped

IE – Interrupt Enable Register

D7	D6	D5	D4	D3	D2	D1	D0
EA	x	ET2	ES	ET1	EX1	ET0	EX0

Address: 0A8H (bit addressable)

EA – Global interrupt enable

x – not defined

ET2 – Timer 2 interrupt enable

ES – Serial port interrupt enable

ET1 – Timer 1 interrupt enable

EX1 – External interrupt 1 enable

ET0 – Timer 0 interrupt enable

EX0 – External interrupt 0 enable

IP – Interrupt Priority Register

D7	D6	D5	D4	D3	D2	D1	D0
x	x	PT2	PS	PT1	PX1	PT0	PX0

Address: 0B8H (bit addressable)

x – not defined

PT2 – Priority for timer 2 interrupt

PS – Priority for serial port interrupt

PT1 – Priority for timer 1 interrupt

PX1 – Priority for external interrupt 1

PT0 – Priority for timer 0 interrupt

PX0 – Priority for external interrupt 0

T2CON – Timer 2 Control Register

D7	D6	D5	D4	D3	D2	D1	D0
TF2	EXF2	RCLK	TCLK	EXEN2	TR2	C/T2	CP/RL2

Address: 0C8H (bit addressable)

TF2 – Timer 2 overflow flag

EXF2 – Timer 2 external flag.

RCLK – Receive clock. When set causes the serial port to use timer 2 for reception.

TCLK – Transmit clock. When set causes the serial port to use timer 2 for transmission.

C/T2 – Counter/Timer select. if 0 use internal timer. if 1 use external pin

CP/RL2 – Capture/reload flag.