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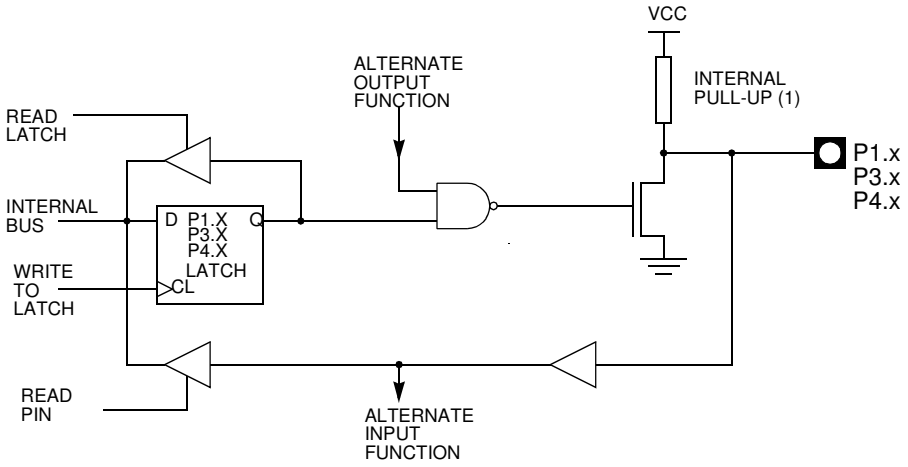
Applications of "Embedded - Microcontrollers"

Details	
Product Status	Obsolete
Core Processor	80C51
Core Size	8-Bit
Speed	60MHz
Connectivity	UART/USART
Peripherals	POR, PWM, WDT
Number of I/O	36
Program Memory Size	64KB (64K x 8)
Program Memory Type	FLASH
EEPROM Size	2K x 8
RAM Size	2.25K x 8
Voltage - Supply (Vcc/Vdd)	3V ~ 5.5V
Data Converters	A/D 8x10b
Oscillator Type	External
Operating Temperature	-40°C ~ 85°C (TA)
Mounting Type	Surface Mount
Package / Case	44-LQFP
Supplier Device Package	44-VQFP (10x10)
Purchase URL	https://www.e-xfl.com/product-detail/microchip-technology/at89c51ac3-rltim

Figure 1. Port 1, Port 3 and Port 4 Structure



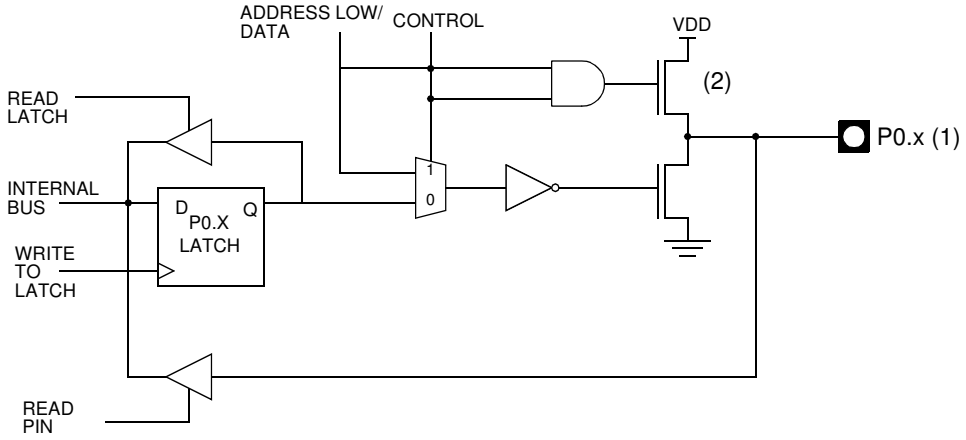
Note: The internal pull-up can be disabled on P1 when analog function is selected.

Port 0 and Port 2

Ports 0 and 2 are used for general-purpose I/O or as the external address/data bus. Port 0, shown in Figure 3, differs from the other Ports in not having internal pull-ups. Figure 3 shows the structure of Port 2. An external source can pull a Port 2 pin low.

To use a pin for general-purpose output, set or clear the corresponding bit in the Px register (x = 0 or 2). To use a pin for general-purpose input, set the bit in the Px register to turn off the output driver FET.

Figure 2. Port 0 Structure



Notes: 1. Port 0 is precluded from use as general-purpose I/O Ports when used as address/data bus drivers.
2. Port 0 internal strong pull-ups assist the logic-one output for memory bus cycles only. Except for these bus cycles, the pull-up FET is off, Port 0 outputs are open-drain.

SFR Mapping

The Special Function Registers (SFRs) of the AT89C51AC3 fall into the following categories:

Mnemonic	Add	Name	7	6	5	4	3	2	1	0
ACC	E0h	Accumulator	–	–	–	–	–	–	–	–
B	F0h	B Register	–	–	–	–	–	–	–	–
PSW	D0h	Program Status Word	CY	AC	F0	RS1	RS0	OV	F1	P
SP	81h	Stack Pointer	–	–	–	–	–	–	–	–
DPL	82h	Data Pointer Low byte LSB of DPTR	–	–	–	–	–	–	–	–
DPH	83h	Data Pointer High byte MSB of DPTR	–	–	–	–	–	–	–	–

Mnemonic	Add	Name	7	6	5	4	3	2	1	0
P0	80h	Port 0	–	–	–	–	–	–	–	–
P1	90h	Port 1	–	–	–	–	–	–	–	–
P2	A0h	Port 2	–	–	–	–	–	–	–	–
P3	B0h	Port 3	–	–	–	–	–	–	–	–
P4	C0h	Port 4 (x5)	–	–	–	P4.4 / MOSI	P4.3 / SCK	P4.2 / MISO	P4.1	P4.0

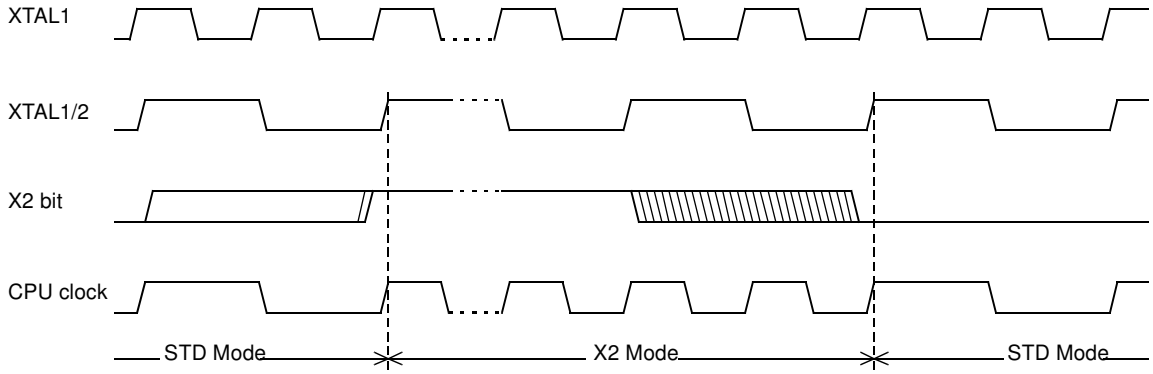
Mnemonic	Add	Name	7	6	5	4	3	2	1	0
TH0	8Ch	Timer/Counter 0 High byte	–	–	–	–	–	–	–	–
TL0	8Ah	Timer/Counter 0 Low byte	–	–	–	–	–	–	–	–
TH1	8Dh	Timer/Counter 1 High byte	–	–	–	–	–	–	–	–
TL1	8Bh	Timer/Counter 1 Low byte	–	–	–	–	–	–	–	–
TH2	CDh	Timer/Counter 2 High byte	–	–	–	–	–	–	–	–
TL2	CCh	Timer/Counter 2 Low byte	–	–	–	–	–	–	–	–
TCON	88h	Timer/Counter 0 and 1 control	TF1	TR1	TF0	TR0	IE1	IT1	IE0	IT0
TMOD	89h	Timer/Counter 0 and 1 Modes	GATE1	C/T1#	M11	M01	GATE0	C/T0#	M10	M00

Mnemonic	Add	Name	7	6	5	4	3	2	1	0
T2CON	C8h	Timer/Counter 2 control	TF2	EXF2	RCLK	TCLK	EXEN2	TR2	C/T2#	CP/RL2#
T2MOD	C9h	Timer/Counter 2 Mode	–	–	–	–	–	–	T2OE	DCEN
RCAP2H	CBh	Timer/Counter 2 Reload/Capture High byte	–	–	–	–	–	–	–	–
RCAP2L	CAh	Timer/Counter 2 Reload/Capture Low byte	–	–	–	–	–	–	–	–
WDTRST	A6h	WatchDog Timer Reset	–	–	–	–	–	–	–	–
WDTPRG	A7h	WatchDog Timer Program	–	–	–	–	–	S2	S1	S0

Mnemonic	Add	Name	7	6	5	4	3	2	1	0
SCON	98h	Serial Control	FE/SM0	SM1	SM2	REN	TB8	RB8	TI	RI
SBUF	99h	Serial Data Buffer	–	–	–	–	–	–	–	–
SADEN	B9h	Slave Address Mask	–	–	–	–	–	–	–	–
SADDR	A9h	Slave Address	–	–	–	–	–	–	–	–

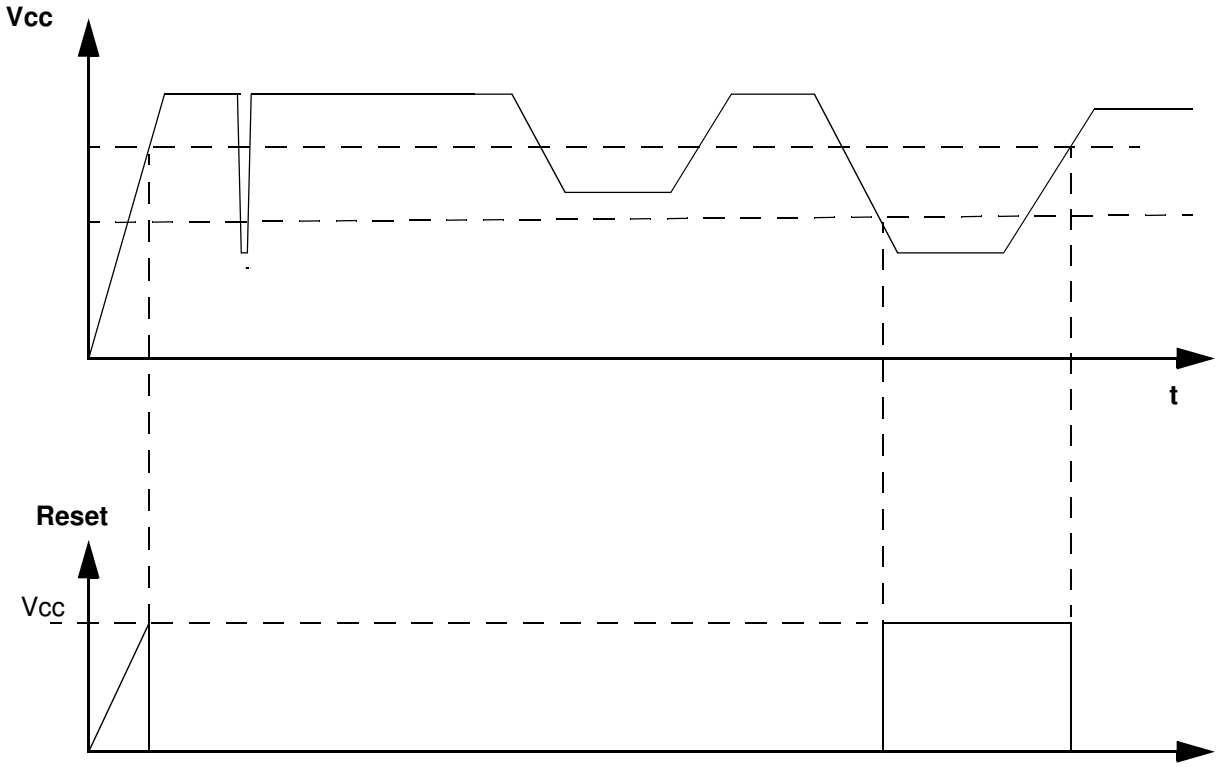
Mnemonic	Add	Name	7	6	5	4	3	2	1	0
CCON	D8h	PCA Timer/Counter Control	CF	CR	–	CCF4	CCF3	CCF2	CCF1	CCF0
CMOD	D9h	PCA Timer/Counter Mode	CIDL	WDTE	–	–	–	CPS1	CPS0	ECF
CL	E9h	PCA Timer/Counter Low byte	–	–	–	–	–	–	–	–
CH	F9h	PCA Timer/Counter High byte	–	–	–	–	–	–	–	–
CCAPM0	DAh	PCA Timer/Counter Mode 0	–	ECOM0	CAPP0	CAPN0	MAT0	TOG0	PWM0	ECCF0
CCAPM1	DBh	PCA Timer/Counter Mode 1		ECOM1	CAPP1	CAPN1	MAT1	TOG1	PWM1	ECCF1
CCAPM2	DCh	PCA Timer/Counter Mode 2		ECOM2	CAPP2	CAPN2	MAT2	TOG2	PWM2	ECCF2
CCAPM3	DDh	PCA Timer/Counter Mode 3		ECOM3	CAPP3	CAPN3	MAT3	TOG3	PWM3	ECCF3
CCAPM4	DEh	PCA Timer/Counter Mode 4		ECOM4	CAPP4	CAPN4	MAT4	TOG4	PWM4	ECCF4
CCAP0H	FAh	PCA Compare Capture Module 0 H	CCAP0H7	CCAP0H6	CCAP0H5	CCAP0H4	CCAP0H3	CCAP0H2	CCAP0H1	CCAP0H0
CCAP1H	FBh	PCA Compare Capture Module 1 H	CCAP1H7	CCAP1H6	CCAP1H5	CCAP1H4	CCAP1H3	CCAP1H2	CCAP1H1	CCAP1H0
CCAP2H	FCh	PCA Compare Capture Module 2 H	CCAP2H7	CCAP2H6	CCAP2H5	CCAP2H4	CCAP2H3	CCAP2H2	CCAP2H1	CCAP2H0
CCAP3H	FDh	PCA Compare Capture Module 3 H	CCAP3H7	CCAP3H6	CCAP3H5	CCAP3H4	CCAP3H3	CCAP3H2	CCAP3H1	CCAP3H0
CCAP4H	FEh	PCA Compare Capture Module 4 H	CCAP4H7	CCAP4H6	CCAP4H5	CCAP4H4	CCAP4H3	CCAP4H2	CCAP4H1	CCAP4H0
CCAP0L	EAh	PCA Compare Capture Module 0 L	CCAP0L7	CCAP0L6	CCAP0L5	CCAP0L4	CCAP0L3	CCAP0L2	CCAP0L1	CCAP0L0
CCAP1L	EBh	PCA Compare Capture Module 1 L	CCAP1L7	CCAP1L6	CCAP1L5	CCAP1L4	CCAP1L3	CCAP1L2	CCAP1L1	CCAP1L0
CCAP2L	ECh	PCA Compare Capture Module 2 L	CCAP2L7	CCAP2L6	CCAP2L5	CCAP2L4	CCAP2L3	CCAP2L2	CCAP2L1	CCAP2L0
CCAP3L	EDh	PCA Compare Capture Module 3 L	CCAP3L7	CCAP3L6	CCAP3L5	CCAP3L4	CCAP3L3	CCAP3L2	CCAP3L1	CCAP3L0
CCAP4L	EEh	PCA Compare Capture Module 4 L	CCAP4L7	CCAP4L6	CCAP4L5	CCAP4L4	CCAP4L3	CCAP4L2	CCAP4L1	CCAP4L0

Figure 6. Mode Switching Waveforms



Note: In order to prevent any incorrect operation while operating in the X2 mode, users must be aware that all peripherals using the clock frequency as a time reference (UART, timers...) will have their time reference divided by two. For example a free running timer generating an interrupt every 20 ms will then generate an interrupt every 10 ms. A UART with a 4800 baud rate will have a 9600 baud rate.

Figure 15. Power Fail Detect



When the power is applied, the Power Monitor immediately asserts a reset. Once the internal supply after the voltage regulator reach a safety level, the power monitor then looks at the XTAL clock input. The internal reset will remain asserted until the Xtal1 levels are above and below VIH and VIL. Further more. An internal counter will count 1024 clock periods before the reset is de-asserted.

If the internal power supply falls below a safety level, a reset is immediately asserted.

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Registers

Table 10. PCON Register

PCON (S87:h) Power configuration Register

7	6	5	4	3	2	1	0
-	-	-	-	GF1	GF0	PD	IDL

Bit Number	Bit Mnemonic	Description
7-4	-	**Reserved** The value read from these bits is indeterminate. Do not set these bits.
3	GF1	**General Purpose flag 1** One use is to indicate whether an interrupt occurred during normal operation or during Idle mode.
2	GF0	**General Purpose flag 0** One use is to indicate whether an interrupt occurred during normal operation or during Idle mode.
1	PD	**Power-Down Mode bit** Cleared by hardware when an interrupt or reset occurs. Set to activate the Power-Down mode. If IDL and PD are both set, PD takes precedence.
0	IDL	**Idle Mode bit** Cleared by hardware when an interrupt or reset occurs. Set to activate the Idle mode. If IDL and PD are both set, PD takes precedence.

Reset Value= XXXX 0000b

Examples

```
;*F*****************************************************************************;* NAME: api_rd_eeprom_byte
;* DPTR contain address to read.
;* Acc contain the reading value
;* NOTE: before execute this function, be sure the EEPROM is not BUSY
;*****************************************************************************
api_rd_eeprom_byte:
 MOV   EECON, #02h; map EEPROM in XRAM space
 MOVX A, @DPTR
 MOV   EECON, #00h; unmap EEPROM
ret

;*F*****************************************************************************
;* NAME: api_ld_eeprom_cl
;* DPTR contain address to load
;* Acc contain value to load
;* NOTE: in this example we load only 1 byte, but it is possible upto
;* 128 Bytes.
;* before execute this function, be sure the EEPROM is not BUSY
;*****************************************************************************
api_ld_eeprom_cl:
 MOV   EECON, #02h ; map EEPROM in XRAM space
 MOVX @DPTR, A
 MOVEECON, #00h; unmap EEPROM
ret

;*F*****************************************************************************
;* NAME: api_wr_eeprom
;* NOTE: before execute this function, be sure the EEPROM is not BUSY
;*****************************************************************************
api_wr_eeprom:
 MOV   EECON, #050h
 MOV   EECON, #0A0h
ret
```

Registers

Table 11. EECON Register

EECON (S:0D2h)
EEPROM Control Register

7	6	5	4	3	2	1	0
EEPL3	**EEPL2**	**EEPL1**	**EEPL0**	**-**	**-**	**EEE**	**EEBUSY**

Bit Number	Bit Mnemonic	Description
7-4	EEPL3-0	**Programming Launch command bits** Write 5Xh followed by AXh to EEPL to launch the programming.
3	-	**Reserved** The value read from this bit is indeterminate. Do not set this bit.
2	-	**Reserved** The value read from this bit is indeterminate. Do not set this bit.
1	EEE	**Enable EEPROM Space bit** Set to map the EEPROM space during MOVX instructions (Write in the column latches) Clear to map the XRAM space during MOVX.
0	EEBUSY	**Programming Busy flag** Set by hardware when programming is in progress. Cleared by hardware when programming is done. Can not be set or cleared by software.

Reset Value = XXXX XX00b
Not bit addressable

Cross Flash Memory Access

Code executing from		Action	FM0 (user Flash)	FM1 (boot Flash)
	FM0 (user Flash)	Read	ok	-
		Load column latch	ok	-
		Write	-	-
	FM1 (boot Flash)	Read	ok	ok
		Load column latch	ok	-
		Write	ok	-
	External memory EA = 0	Read	(a)	-
		Load column latch	-	-
		Write	-	-

(a) Depend upon general lock bit configuration.

Sharing Instructions

Table 19. Instructions shared

Action	RAM	XRAM ERAM	EEPROM DATA	Boot FLASH	FM0	Hardware Byte	XROW
Read	MOV	MOVX	MOVX	MOVC	MOVC	MOVC	MOVC
Write	MOV	MOVX	MOVX	-	by cl	by cl	by cl

Note: by cl : using Column Latch

Table 20. Read MOVX A, @DPTR

EEE bit in EECON Register	FPS in FCON Register	ENBOOT	EA	XRAM ERAM	EEPROM DATA	Flash Column Latch
0	0	X	X	OK		
0	1	X	X	OK		
1	0	X	X		OK	
1	1	X	X	OK		

Table 21. Write MOVX @DPTR,A

EEE bit in EECON Register	FPS bit in FCON Register	ENBOOT	EA	XRAM ERAM	EEPROM Data	Flash Column Latch
0	0	X	X	OK		
0	1	X	1			OK
			0	OK		
1	0	X	X		OK	
1	1	X	1			OK
			0	OK		

Timer 1

Timer 1 is identical to Timer 0 excepted for Mode 3 which is a hold-count mode. The following comments help to understand the differences:

- Timer 1 functions as either a Timer or event Counter in three modes of operation. Figure 35 to Figure 37 show the logical configuration for modes 0, 1, and 2. Timer 1's mode 3 is a hold-count mode.
- Timer 1 is controlled by the four high-order bits of TMOD register (see Figure 31) and bits 2, 3, 6 and 7 of TCON register (see Figure 30). TMOD register selects the method of Timer gating (GATE1), Timer or Counter operation (C/T1#) and mode of operation (M11 and M01). TCON register provides Timer 1 control functions: overflow flag (TF1), run control bit (TR1), interrupt flag (IE1) and interrupt type control bit (IT1).
- Timer 1 can serve as the Baud Rate Generator for the Serial Port. Mode 2 is best suited for this purpose.
- For normal Timer operation (GATE1 = 0), setting TR1 allows TL1 to be incremented by the selected input. Setting GATE1 and TR1 allows external pin INT1# to control Timer operation.
- Timer 1 overflow (count rolls over from all 1s to all 0s) sets the TF1 flag generating an interrupt request.
- When Timer 0 is in mode 3, it uses Timer 1's overflow flag (TF1) and run control bit (TR1). For this situation, use Timer 1 only for applications that do not require an interrupt (such as a Baud Rate Generator for the Serial Port) and switch Timer 1 in and out of mode 3 to turn it off and on.
- It is important to stop Timer/Counter before changing mode.

Mode 0 (13-bit Timer)

Mode 0 configures Timer 1 as a 13-bit Timer, which is set up as an 8-bit Timer (TH1 register) with a modulo-32 prescaler implemented with the lower 5 bits of the TL1 register (see Figure 35). The upper 3 bits of TL1 register are ignored. Prescaler overflow increments TH1 register.

Mode 1 (16-bit Timer)

Mode 1 configures Timer 1 as a 16-bit Timer with TH1 and TL1 registers connected in cascade (see Figure 36). The selected input increments TL1 register.

Mode 2 (8-bit Timer with Auto-Reload)

Mode 2 configures Timer 1 as an 8-bit Timer (TL1 register) with automatic reload from TH1 register on overflow (see Figure 37). TL1 overflow sets TF1 flag in TCON register and reloads TL1 with the contents of TH1, which is preset by software. The reload leaves TH1 unchanged.

Mode 3 (Halt)

Placing Timer 1 in mode 3 causes it to halt and hold its count. This can be used to halt Timer 1 when TR1 run control bit is not available i.e. when Timer 0 is in mode 3.

Table 31. TMOD Register

TMOD (S:89h)
Timer/Counter Mode Control Register

7	6	5	4	3	2	1	0
GATE1	**C/T1#**	**M11**	**M01**	**GATE0**	**C/T0#**	**M10**	**M00**

Bit Number	Bit Mnemonic	Description
7	GATE1	**Timer 1 Gating Control Bit** Clear to enable Timer 1 whenever TR1 bit is set. Set to enable Timer 1 only while INT1# pin is high and TR1 bit is set.
6	C/T1#	**Timer 1 Counter/Timer Select Bit** Clear for Timer operation: Timer 1 counts the divided-down system clock. Set for Counter operation: Timer 1 counts negative transitions on external pin T1.
5	M11	**Timer 1 Mode Select Bits** M11 M01 Operating mode 0 0 Mode 0: 8-bit Timer/Counter (TH1) with 5-bit prescaler (TL1). 0 1 Mode 1: 16-bit Timer/Counter. 1 0 Mode 2: 8-bit auto-reload Timer/Counter (TL1) (1) 1 1 Mode 3: Timer 1 halted. Retains count
4	M01	
3	GATE0	**Timer 0 Gating Control Bit** Clear to enable Timer 0 whenever TR0 bit is set. Set to enable Timer/Counter 0 only while INT0# pin is high and TR0 bit is set.
2	C/T0#	**Timer 0 Counter/Timer Select Bit** Clear for Timer operation: Timer 0 counts the divided-down system clock. Set for Counter operation: Timer 0 counts negative transitions on external pin T0.
1	M10	**Timer 0 Mode Select Bit** M10 M00 Operating mode 0 0 Mode 0: 8-bit Timer/Counter (TH0) with 5-bit prescaler (TL0). 0 1 Mode 1: 16-bit Timer/Counter. 1 0 Mode 2: 8-bit auto-reload Timer/Counter (TL0) (2) 1 1 Mode 3: TL0 is an 8-bit Timer/Counter TH0 is an 8-bit Timer using Timer 1's TR0 and TF0 bits.
0	M00	

1. Reloaded from TH1 at overflow.
2. Reloaded from TH0 at overflow.

Reset Value = 0000 0000b

Watchdog Timer

AT89C51AC3 contains a powerful programmable hardware Watchdog Timer (WDT) that automatically resets the chip if it software fails to reset the WDT before the selected time interval has elapsed. It permits large Time-Out ranking from 16ms to 2s @Fosc = 12MHz in X1 mode.

This WDT consists of a 14-bit counter plus a 7-bit programmable counter, a Watchdog Timer reset register (WDTRST) and a Watchdog Timer programming (WDTPRG) register. When exiting reset, the WDT is -by default- disable.

To enable the WDT, the user has to write the sequence 1EH and E1H into WDTRST register no instruction in between. When the Watchdog Timer is enabled, it will increment every machine cycle while the oscillator is running and there is no way to disable the WDT except through reset (either hardware reset or WDT overflow reset). When WDT overflows, it will generate an output RESET pulse at the RST pin. The RESET pulse duration is $96xT_{OSC}$, where $T_{OSC}=1/F_{OSC}$. To make the best use of the WDT, it should be serviced in those sections of code that will periodically be executed within the time required to prevent a WDT reset

Note: When the Watchdog is enable it is impossible to change its period.

Figure 42. Watchdog Timer

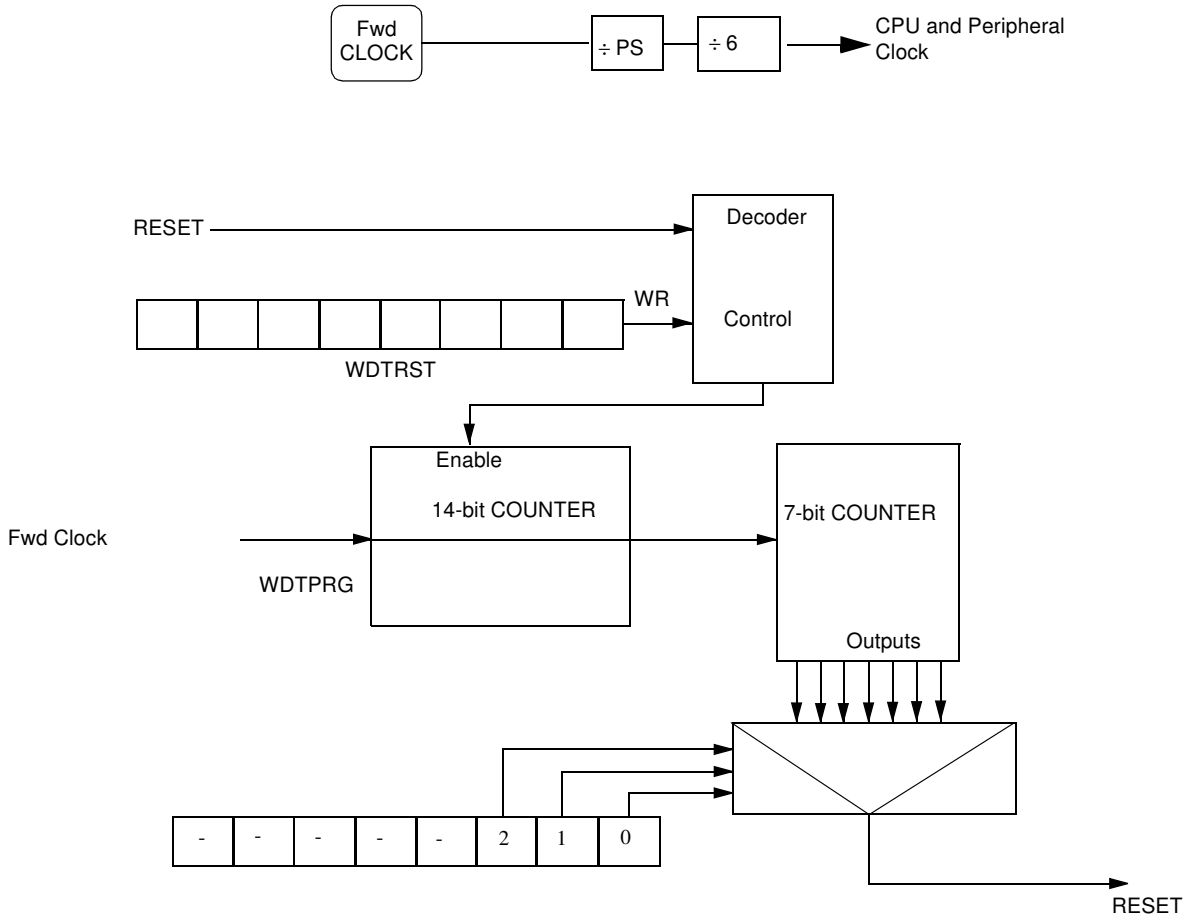


Table 45. WDTRST Register

WDTRST (S:A6h Write only)
Watchdog Timer Enable Register

7	6	5	4	3	2	1	0
–	–	–	–	–	–	–	–

Bit Number	Bit Mnemonic	Description
7	-	Watchdog Control Value

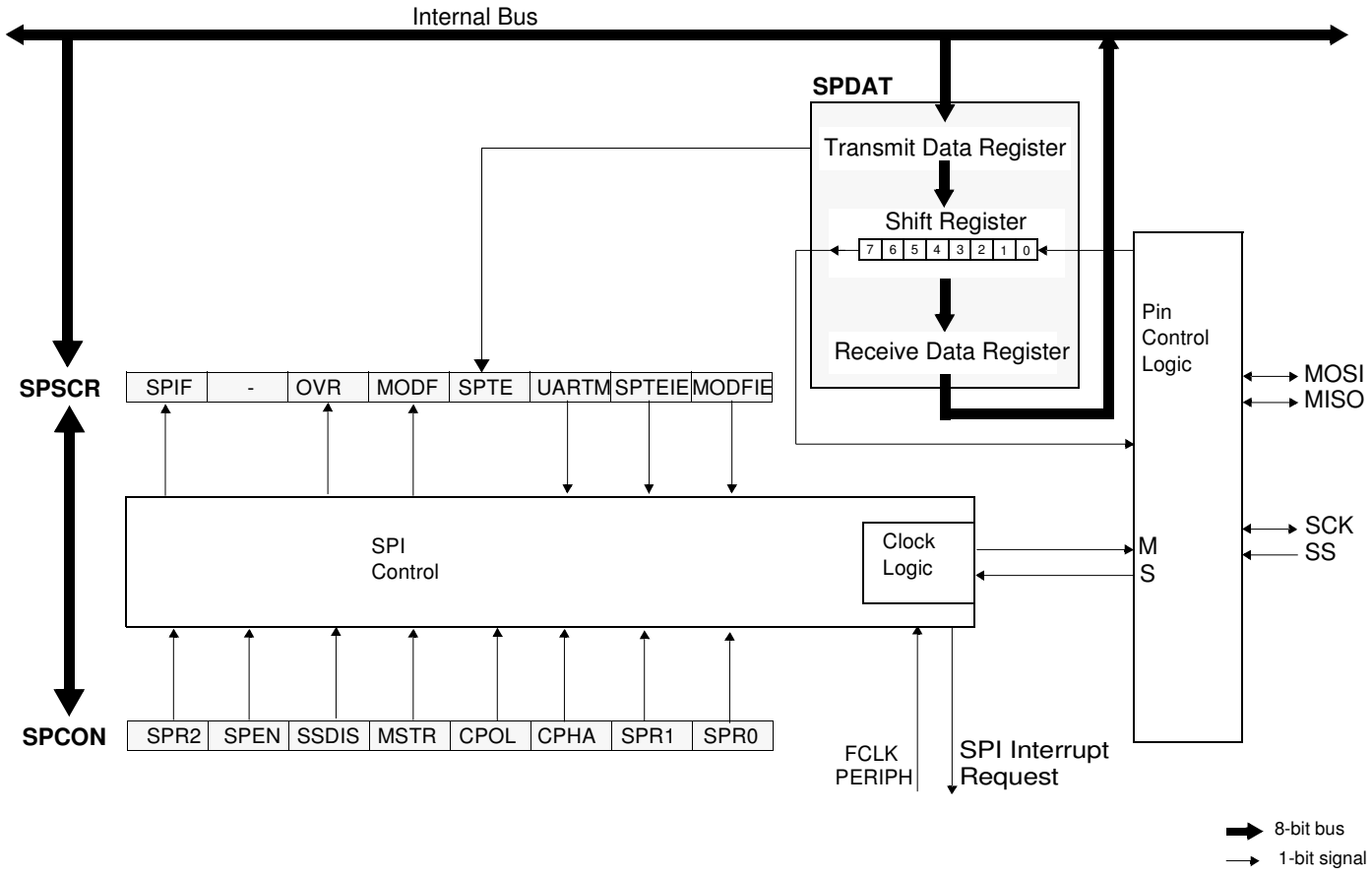
Reset Value = 1111 1111b

Note: The WDRST register is used to reset/enable the WDT by writing 1EH then E1H in sequence without instruction between these two sequences.

Functional Description

Figure 44 shows a detailed structure of the SPI Module.

Figure 44. SPI Module Block Diagram



Operating Modes

The Serial Peripheral Interface can be configured in one of the two modes: Master mode or Slave mode. The configuration and initialization of the SPI Module is made through two registers:

- The Serial Peripheral Control register (SPCON)
- The Serial Peripheral Status and Control Register (SPSCR)

Once the SPI is configured, the data exchange is made using:

- The Serial Peripheral DATa register (SPDAT)

During an SPI transmission, data is simultaneously transmitted (shifted out serially) and received (shifted in serially). A serial clock line (SCK) synchronizes shifting and sampling on the two serial data lines (MOSI and MISO). A Slave Select line ($\overline{SS}$) allows individual selection of a Slave SPI device; Slave devices that are not selected do not interfere with SPI bus activities.

Analog-to-Digital Converter (ADC)

This section describes the on-chip 10 bit analog-to-digital converter of the AT89C51AC3. Eight ADC channels are available for sampling of the external sources AN0 to AN7. An analog multiplexer allows the single ADC converter to select one from the 8 ADC channels as ADC input voltage (ADCIN). ADCIN is converted by the 10-bit cascaded potentiometric ADC.

Two kinds of conversion are available:
- Standard conversion (8 bits).
- Precision conversion (10 bits).

For the precision conversion, set bit PSIDLE in ADCON register and start conversion. The device is in a pseudo-idle mode, the CPU does not run but the peripherals are always running. This mode allows digital noise to be as low as possible, to ensure high precision conversion.

For this mode it is necessary to work with end of conversion interrupt, which is the only way to wake the device up.

If another interrupt occurs during the precision conversion, it will be treated only after this conversion is ended.

Features

- 8 channels with multiplexed inputs
- 10-bit cascaded potentiometric ADC
- Conversion time 16 micro-seconds (typ.)
- Zero Error (offset) ± 2 LSB max
- Positive External Reference Voltage Range (VREF) 2.4 to 3.0Volt (typ.)
- ADCIN Range 0 to 3Volt
- Integral non-linearity typical 1 LSB, max. 2 LSB
- Differential non-linearity typical 0.5 LSB, max. 1 LSB
- Conversion Complete Flag or Conversion Complete Interrupt
- Selectable ADC Clock

ADC Port1 I/O Functions

Port 1 pins are general I/O that are shared with the ADC channels. The channel select bit in ADCF register define which ADC channel/port1 pin will be used as ADCIN. The remaining ADC channels/port1 pins can be used as general-purpose I/O or as the alternate function that is available.

A conversion launched on a channel which are not selected on ADCF register will not have any effect.

Table 70. IPH1 Register

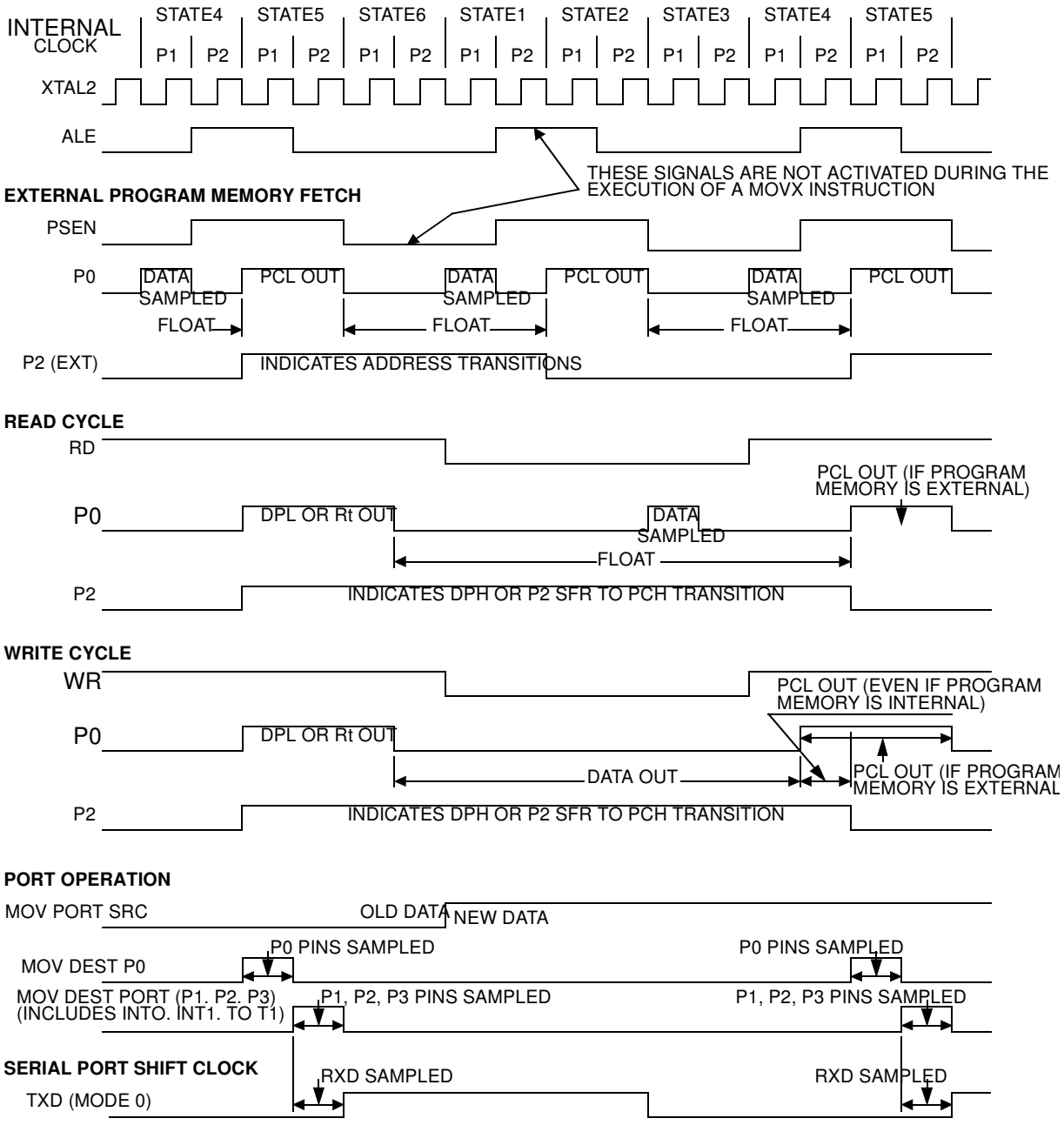
IPH1 (S:F7h)
Interrupt High Priority Register 1

7	6	5	4	3	2	1	0
-	-	-	-	SPIH	-	PADCH	-

Bit Number	Bit Mnemonic	Description
7	-	**Reserved** The value read from this bit is indeterminate. Do not set this bit.
6	-	**Reserved** The value read from this bit is indeterminate. Do not set this bit.
5	-	**Reserved** The value read from this bit is indeterminate. Do not set this bit.
4	-	**Reserved** The value read from this bit is indeterminate. Do not set this bit.
3	SPIH	**SPI Interrupt Priority Level Most Significant bit** SPIH SPIL Priority level 0 0 Lowest 0 1 1 0 1 1 Highest
2	-	**Reserved** The value read from this bit is indeterminate. Do not set this bit.
1	PADCH	**ADC Interrupt Priority Level Most Significant bit** PADCH PADCL Priority level 0 0 Lowest 0 1 1 0 1 1 Highest
0	-	**Reserved** The value read from this bit is indeterminate. Do not set this bit.

Reset Value = XXXX 0X0Xb

Clock Waveforms Valid in normal clock mode. In X2 mode XTAL2 must be changed to XTAL2/2.



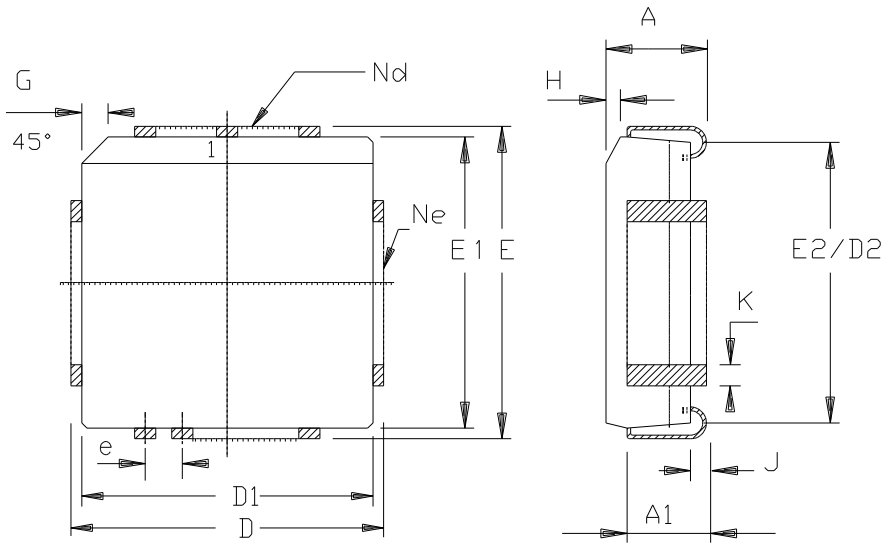
This diagram indicates when signals are clocked internally. The time it takes the signals to propagate to the pins, however, ranges from 25 to 125 ns. This propagation delay is dependent on variables such as temperature and pin loading. Propagation also varies from output to output and component. Typically though (T_A=25°C fully loaded) RD and WR propagation delays are approximately 50ns. The other signals are typically 85 ns. Propagation delays are incorporated in the AC specifications.

Ordering Information

Table 85. Possible Order Entries

Part Number	Boot Loader	Temperature Range	Package	Packing	Product Marking
AT89C51AC3-RLTIM	OBSOLETE				
AT89C51AC3-SLSIM					
AT89C51AC3-RDTIM					
AT89C51AC3-S3SIM					
AT89C51AC3-RLTUM	UART	Industrial & Green	VQFP44	Tray	AT89C51AC3-M
AT89C51AC3-SLSUM	UART	Industrial & Green	PLCC44	Stick	AT89C51AC3-IM
AT89C51AC3-RDTUM	UART	Industrial & Green	VQFP64	Tray	AT89C51AC3-IM
AT89C51AC3-S3SUM	UART	Industrial & Green	PLCC52	Stick	AT89C51AC3-IM

PLCC52



	MM		INCH	
A	4.20	4.57	.165	.180
A1	2.29	3.30	.090	.130
D	19.94	20.19	.785	.795
D1	19.05	19.25	.750	.758
D2	17.53	18.54	.690	.730
E	19.94	20.19	.785	.795
E1	19.05	19.25	.750	.758
E2	17.53	18.54	.690	.730
e	1.27	BSC	.050	BSC
G	1.07	1.22	.042	.048
H	1.07	1.42	.042	.056
J	0.51	-	.020	-
K	0.33	0.53	.013	.021
Nd	13		13	
Ne	13		13	
PKG STD	00			