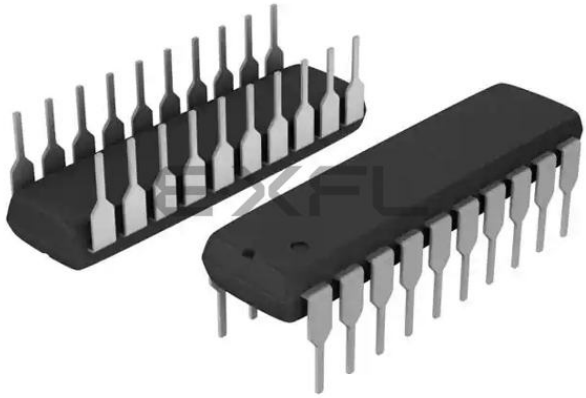


Welcome to E-XFL.COM

What is "Embedded - Microcontrollers"?

"Embedded - Microcontrollers" refer to small, integrated circuits designed to perform specific tasks within larger systems. These microcontrollers are essentially compact computers on a single chip, containing a processor core, memory, and programmable input/output peripherals. They are called "embedded" because they are embedded within electronic devices to control various functions, rather than serving as standalone computers. Microcontrollers are crucial in modern electronics, providing the intelligence and control needed for a wide range of applications.

Applications of "Embedded - Microcontrollers"

Details	
Product Status	Obsolete
Core Processor	8051
Core Size	8-Bit
Speed	20MHz
Connectivity	I²C, UART/USART
Peripherals	Brown-out Detect/Reset, LED, LVD, POR, PWM, WDT
Number of I/O	18
Program Memory Size	2KB (2K x 8)
Program Memory Type	FLASH
EEPROM Size	-
RAM Size	128 x 8
Voltage - Supply (Vcc/Vdd)	2.7V ~ 5.5V
Data Converters	A/D 4x10b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 85°C (TA)
Mounting Type	Through Hole
Package / Case	20-DIP (0.300", 7.62mm)
Supplier Device Package	-
Purchase URL	https://www.e-xfl.com/product-detail/nuvoton-technology-corporation-america/w79e822adg

1. GENERAL DESCRIPTION

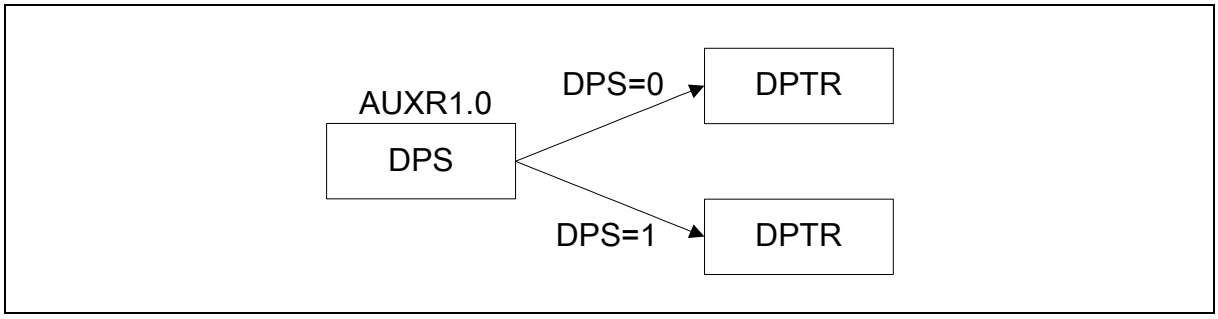
The W79E82X series are an 8-bit Turbo 51 microcontroller which has an in-system programmable Flash EPROM which Flash EPROM can program by ICP (In Circuit Program) or by writer. The instruction set of the W79E82X series are fully compatible with the standard 8052. The W79E82X series contain a **16K/8K/4K/2K/1K** bytes of main Flash EPROM; a **256/128** bytes of RAM; **256/128** bytes NVM Data Flash EPROM; two 8-bit bi-directional, one 2-bit bi-directional and bit-addressable I/O ports; two 16-bit timer/counters; 4-channel multiplexed 10-bit A/D convert; 4-channel 10-bit PWM; two serial ports that include a I2C and an enhanced full duplex serial port. These peripherals are supported by 13 sources four-level interrupt capability. To facilitate programming and verification, the Flash EPROM inside the W79E82X series allow the program memory to be programmed and read electronically. Once the code is confirmed, the user can protect the code for security.

2. FEATURES

- Fully static design 8-bit Turbo 51 CMOS microcontroller up to 20MHz when VDD=4.5V to 5.5V, 12MHz when VDD=2.7V to 5.5V
- **16K/8K/4K/2K/1K** bytes of AP Flash ROM, with ICP and external writer programmable mode.
- **256/128** bytes of on-chip RAM
- **256/128** bytes NVM Data Flash EPROM for customer data storage used and 10K writer cycles
- Instruction-set compatible with MSC-51
- Two 8-bit bi-directional and one 2-bit bi-directional ports
- Two 16-bit timer/counters
- 13 interrupts source with four levels of priority
- One enhanced full duplex serial port with framing error detection and automatic address recognition
- The 4 outputs mode and TTL/Schmitt trigger selectable Port
- Programmable Watchdog Timer
- Four -channel 10-bit PWM (Pulse Width Modulator)
- Four-channel multiplexed with 10-bits A/D convert
- One I2C communication port (Master / Slave)
- Eight keypad interrupt inputs
- Two analog comparators
- Configurable on-chip oscillator
- LED drive capability (20mA) on all port pins
- Low Voltage Detect interrupt and reset
- Development Tools:
  - JTAG ICE(In Circuit Emulation) tool
  - ICP(In Circuit Programming) writer
- Packages:
  - Lead Free (RoHS) DIP 20: W79E825ADG

6.6 Data Pointers

The data pointers of W79E82X series are same as 8052 that has dual 16-bit Data Pointers (DPTR) by setting DPS of AUXR1.0. The figure of dual DPTR is as below diagram.



6.7 Architecture

The W79E82X series are based on the standard 8052 device. It is built around an 8-bit ALU that uses internal registers for temporary storage and control of the peripheral devices. It can execute the standard 8052 instruction set.

6.7.1 ALU

The ALU is the heart of the W79E82X series. It is responsible for the arithmetic and logical functions. It is also used in decision making, in case of jump instructions, and is also used in calculating jump addresses. The user cannot directly use the ALU, but the Instruction Decoder reads the op-code, decodes it, and sequences the data through the ALU and its associated registers to generate the required result. The ALU mainly uses the ACC which is a special function register (SFR) on the chip. Another SFR, namely B register is also used in Multiply and Divide instructions. The ALU generates several status signals which are stored in the Program Status Word register (PSW).

6.7.2 Accumulator

The Accumulator (ACC) is the primary register used in arithmetic, logical and data transfer operations in the W79E82X series. Since the Accumulator is directly accessible by the CPU, most of the high speed instructions make use of the ACC as one argument.

6.7.3 B Register

This is an 8-bit register that is used as the second argument in the MUL and DIV instructions. For all other instructions it can be used simply as a general purpose register.

6.7.4 Program Status Word:

This is an 8-bit SFR that is used to store the status bits of the ALU. It holds the Carry flag, the Auxiliary Carry flag, General purpose flags, the Register Bank Select, the Overflow flag, and the Parity flag.

Port 1 Output Mode 2

Bit:	7	6	5	4	3	2	1	0
	P1M2.7	P1M2.6	-	P1M2.4	-	-	P1M2.1	P1M2.0

Mnemonic: P1M2 Address: B4h

Port 2 Output Mode 1

Bit:	7	6	5	4	3	2	1	0
	P2S	P1S	P0S	ENCLK	T1OE	T0OE	P2M1.1	P2M1.0

Mnemonic: P2M1 Address: B5h

BIT	NAME	FUNCTION
7	P2S	1: Enables Schmitt trigger inputs on Port 2.
6	P1S	1: Enables Schmitt trigger inputs on Port 1.
5	P0S	1: Enables Schmitt trigger inputs on Port 0.
4	ENCLK	1: To use the on-chip RC oscillator, a clock output is enabled on the XTAL2 pin (P2.0).
3	T1OE	1: The P0.7 pin is toggled whenever Timer 1 overflows. The output frequency is therefore one half of the Timer 1 overflow rate.
2	T0OE	1: The P1.2 pin is toggled whenever Timer 1 overflows. The output frequency is therefore one half of the Timer 1 overflow rate.
1	P2M1.1	To control the output configuration of P2.1.
0	P2M1.0	To control the output configuration of P2.0.

Port 2 Output Mode 2

Bit:	7	6	5	4	3	2	1	0
	-	-	-	-	-	-	P2M2.1	P2M2.0

Mnemonic: P2M2 Address: B6h

Port Output Configuration Settings:

PXM1.Y	PXM2.Y	PORT INPUT/OUTPUT MODE
0	0	Quasi-bidirectional
0	1	Push-Pull
1	0	Input Only (High Impedance) P2M1.PxS=0, TTL input P2M1.PxS=1, Schmitt input
1	1	Open Drain

Interrupt High Priority

Bit:	7	6	5	4	3	2	1	0
	-	PADCH	PBOH	PSH	PT1H	PX1H	PT0H	PX0H

Mnemonic: IP0H Address: B7h

BIT	NAME	FUNCTION
7	-	This bit is un-implemented and will read high.
6	PADCH	1: To set interrupt high priority of ADC is highest priority level.
5	PBOH	1: To set interrupt high priority of Brown Out Detector is highest priority level.
4	PSH	1: To set interrupt high priority of Serial port 0 is highest priority level.
3	PT1H	1: To set interrupt high priority of Timer 1 is highest priority level.
2	PX1H	1: To set interrupt high priority of External interrupt 1 is highest priority level.
1	PT0H	1: To set interrupt high priority of Timer 0 is highest priority level.
0	PX0H	1: To set interrupt high priority of External interrupt 0 is highest priority level.

Interrupt Priority0

Bit:	7	6	5	4	3	2	1	0
	-	PADC	PBO	PS	PT1	PX1	PT0	PX0

Mnemonic: IP0 Address: B8h

BIT	NAME	FUNCTION
7	-	This bit is un-implemented and will read high.
6	PADC	1: To set interrupt priority of ADC is higher priority level.
5	PBO	1: To set interrupt priority of Brown Out Detector is higher priority level.
4	PS	1: To set interrupt priority of Serial port 0 is higher priority level.
3	PT1	1: To set interrupt priority of Timer 1 is higher priority level.
2	PX1	1: To set interrupt priority of External interrupt 1 is higher priority level.
1	PT0	1: To set interrupt priority of Timer 0 is higher priority level.
0	PX0	1: To set interrupt priority of External interrupt 0 is higher priority level.

SLAVE ADDRESS MASK ENABLE

Bit:	7	6	5	4	3	2	1	0

Mnemonic: SADEN Address: B9h

BIT	NAME	FUNCTION
7~0	SADEN	This register enables the Automatic Address Recognition feature of the Serial port 0. When a bit in the SADEN is set to 1, the same bit location in SADDR will be compared with the incoming serial data. When SADEN is 0, then the bit becomes a "don't care" in the comparison. This register enables the Automatic Address Recognition feature of the Serial port 0. When all the bits of SADEN are 0, interrupt will occur for any incoming address.

I2C Data Register

Bit:	7	6	5	4	3	2	1	0
	I2DAT.7	I2DAT.6	I2DAT.5	I2DAT.4	I2DAT.3	I2DAT.2	I2DAT.1	I2DAT.0

Mnemonic: I2DAT Address: BCh

BIT	NAME	FUNCTION
7	EER	NVM page(n) erase bit. 0: Without erase NVM page(n). 1: Set this bit to erase NVM data of page(n) to FFH. The NVM has 4 pages and each page have 64 bytes data memory. Before select page by NVMADDR register that will automatic enable page area, after set this bit, the page will be erased and program counter will halt at this instruction. After finished, program counter will kept next instruction then executed. The NVM page's address define as below table.
6	EWR	NVM data write bit 0: Without write NVM data. 1: Set this bit to write NVM bytes and program counter will halt at this instruction. After write is finished, program counter will kept next instruction then executed.
5~0	-	Reserved

NVM Page(n) Area Definition Table:

PAGE	START ADDRESS	END ADDRESS
0	00H	3FH
1	40H	7FH
2	***80H***	***BFH***
3	***C0H***	***FFH***

Note: The W79E823, W79E822 and W79E821 without page 2 and page 3.

NVM DATA

Bit:	7	6	5	4	3	2	1	0
	NVMDAT.7	NVMDAT.6	NVMDAT.5	NVMDAT.4	NVMDAT.3	NVMDAT.2	NVMDAT.1	NVMDAT.0

Mnemonic: NVMDATA Address: CFh

BIT	NAME	FUNCTION
7~0	NVMDAT.7 ~ NVMDAT.0	The NVM data write register. The read NVM data is by MOVC instruction.

PROGRAM STATUS WORD

Bit:	7	6	5	4	3	2	1	0
	CY	AC	F0	RS1	RS0	OV	F1	P

Mnemonic: PSW Address: D0h

BIT	NAME	FUNCTION
7	CY	Carry flag: Set for an arithmetic operation which results in a carry being generated from the ALU. It is also used as the accumulator for the bit operations.
6	AC	Auxiliary carry: Set when the previous operation resulted in a carry from the high order nibble.

Interrupt Enable Register 1

Bit:	7	6	5	4	3	2	1	0
	-	-	EPWM	EWDI	EC2	EC1	EKB	EI2

Mnemonic: IE1 Address: E8h

BIT	NAME	FUNCTION
7	-	Reserved.
6	-	Reserved.
5	EPWM	0: Disable PWM Interrupt when external brake pin was brake. 1: Enable PWM Interrupt when external brake pin was brake.
4	EWDI	0: Disable Watchdog Timer Interrupt. 1: Enable Watchdog Timer Interrupt.
3	EC2	0: Disable Comparator 2 Interrupt. 1: Enable Comparator 2 Interrupt.
2	EC1	0: Disable Comparator 1 Interrupt. 1: Enable Comparator 1 Interrupt.
1	EKB	0: Disable Keypad Interrupt. 1: Enable Keypad Interrupt.
0	EI2	0: Disable I2C Interrupt. 1: Enable I2C Interrupt.

B REGISTER

Bit:	7	6	5	4	3	2	1	0
	B.7	B.6	B.5	B.4	B.3	B.2	B.1	B.0

Mnemonic: B Address: F0h

B.7-0: The B register is the standard 8052 register that serves as a second accumulator.

Port 0 Digital Input Disable

Bit:	7	6	5	4	3	2	1	0
	P0ID.7	P0ID.6	P0ID.5	P0ID.4	P0ID.3	P0ID.2	P0ID.1	P0ID.0

Mnemonic: P0ID Address: F6h

BIT	NAME	FUNCTION
7~0	P0ID.7 ~P0ID.0	Enable/Disable Port 0 digital inputs. 0: Enable Port 0 digital inputs. 1: Disable Port 0 digital inputs.

13. PROGRAMMABLE TIMERS/COUNTERS

The W79E82X series have two 16-bit programmable timer/counters and one programmable Watchdog Timer. The Watchdog Timer is operationally quite different from the other two timers.

13.1 TIMER/COUNTERS 0 & 1

The W79E82X series have two 16-bit Timer/Counters. Each of these Timer/Counters has two 8 bit registers which form the 16 bit counting register. For Timer/Counter 0 they are TH0, the upper 8 bits register, and TL0, the lower 8 bit register. Similarly Timer/Counter 1 has two 8 bit registers, TH1 and TL1. The two can be configured to operate either as timers, counting machine cycles or as counters counting external inputs.

When configured as a "Timer", the timer counts clock cycles. The timer clock can be programmed to be thought of as 1/12 of the system clock or 1/4 of the system clock. In the "Counter" mode, the register is incremented on the falling edge of the external input pin, T0 in case of Timer 0, and T1 for Timer 1. The T0 and T1 inputs are sampled in every machine cycle at C4. If the sampled value is high in one machine cycle and low in the next, then a valid high to low transition on the pin is recognized and the count register is incremented. Since it takes two machine cycles to recognize a negative transition on the pin, the maximum rate at which counting will take place is 1/8 of the master clock frequency. In either the "Timer" or "Counter" mode, the count register will be updated at C3. Therefore, in the "Timer" mode, the recognized negative transition on pin T0 and T1 can cause the count register value to be updated only in the machine cycle following the one in which the negative edge was detected.

The "Timer" or "Counter" function is selected by the "$C/\overline{T}$" bit in the TMOD Special Function Register. Each Timer/Counter has one selection bit for its own; bit 2 of TMOD selects the function for Timer/Counter 0 and bit 6 of TMOD selects the function for Timer/Counter 1. In addition each Timer/Counter can be set to operate in any one of four possible modes. The mode selection is done by bits M0 and M1 in the TMOD SFR.

13.2 Time-Base Selection

The W79E82X series give the user two modes of operation for the timer. The timers can be programmed to operate like the standard 8051 family, counting at the rate of 1/12 of the clock speed. This will ensure that timing loops on the W79E82X series and the standard 8051 can be matched. This is the default mode of operation of the W79E82X series timers. The user also has the option to count in the turbo mode, where the timers will increment at the rate of 1/4 clock speed. This will straight-away increase the counting speed three times. This selection is done by the T0M and T1M bit in CKCON SFR. A reset sets these bits to 0, and the timers then operate in the standard 8051 mode. The user should set these bits to 1 if the timers are to operate in turbo mode.

13.3 MODE 0

In Mode 0, the timer/counters act as a 8-bit counter with a 5-bit, divide by 32 pre-scale. In this mode we have a 13-bit timer/counter. The 13-bit counter consists of 8 bits of THx and 5 lower bits of TLx. The upper 3 bits of TLx are ignored.

The negative edge of the clock is increments count in the TLx register. When the fifth bit in TLx moves from 1 to 0, then the count in the THx register is incremented. When count in THx moves from FFh to 00h, then the overflow flag TFx in TCON SFR is set. The counted input is enabled only if TRx is set

15.2 CLOCK CONTROL of Watchdog

WD1, WD0: WDCON.5, WDCON.4 - Watchdog Timer Mode select bits. These two bits select the time-out interval for the watchdog timer. The reset time is 512 clocks longer than the interrupt time-out value.

The default Watchdog time-out is 2^{17} clocks, which is the shortest time-out period. The EWRST, WDIF and WDCLR bits are protected by the Timed Access procedure. This prevents software from accidentally enabling or disabling the watchdog timer. More importantly, it makes it highly improbable that errant code can enable or disable the Watchdog Timer.

The security bit WDTE is located at bit 7 of CONFIG register. This bit is user to configure the clock source of watchdog timer either it is from the internal RC or from the uC clock.

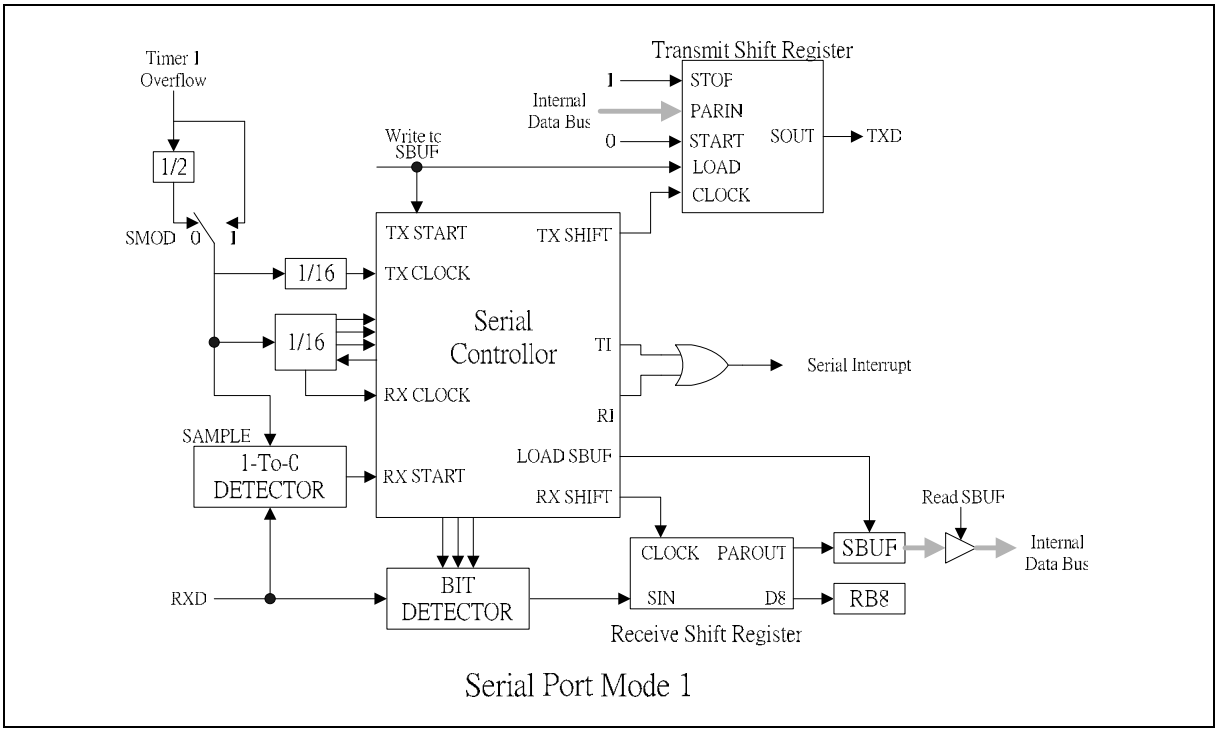
Reception is enabled only if REN is high. The serial port actually starts the receiving of serial data, with the detection of a falling edge on the RxD pin. The 1-to-0 detector continuously monitors the RxD line, sampling it at the rate of 16 times the selected baud rate. When a falling edge is detected, the divide by 16 counter is immediately reset. This helps to align the bit boundaries with the rollovers of the divide by 16 counter.

The 16 states of the counter effectively divide the bit time into 16 slices. The bit detection is done on a best of three basis. The bit detector samples the RxD pin, at the 8th, 9th and 10th counter states. By using a majority 2 of 3 voting system, the bit value is selected. This is done to improve the noise rejection feature of the serial port. If the first bit detected after the falling edge of RxD pin is not 0, then this indicates an invalid start bit, and the reception is immediately aborted. The serial port again looks for a falling edge in the RxD line. If a valid start bit is detected, then the rest of the bits are also detected and shifted into the SBUF.

After shifting in 8 data bits, there is one more shift to do, after which the SBUF and RB8 are loaded and RI is set. However certain conditions must be met before the loading and setting of RI can be done.

1. RI must be 0 and
2. Either SM2 = 0, or the received stop bit = 1.

If these conditions are met, then the stop bit goes to RB8, the 8 data bits go into SBUF and RI is set. Otherwise the received frame may be lost. After the middle of the stop bit, the receiver goes back to looking for a 1-to-0 transition on the RxD pin.



Serial Port Mode 1

If the first bit detected after the falling edge of RxD pin, is not 0, then this indicates an invalid start bit, and the reception is immediately aborted. The serial port again looks for a falling edge in the RxD line. If a valid start bit is detected, then the rest of the bits are also detected and shifted into the SBUF. After shifting in 9 data bits, there is one more shift to do, after which the SBUF and RB8 are loaded and RI is set. However certain conditions must be met before the loading and setting of RI can be done.

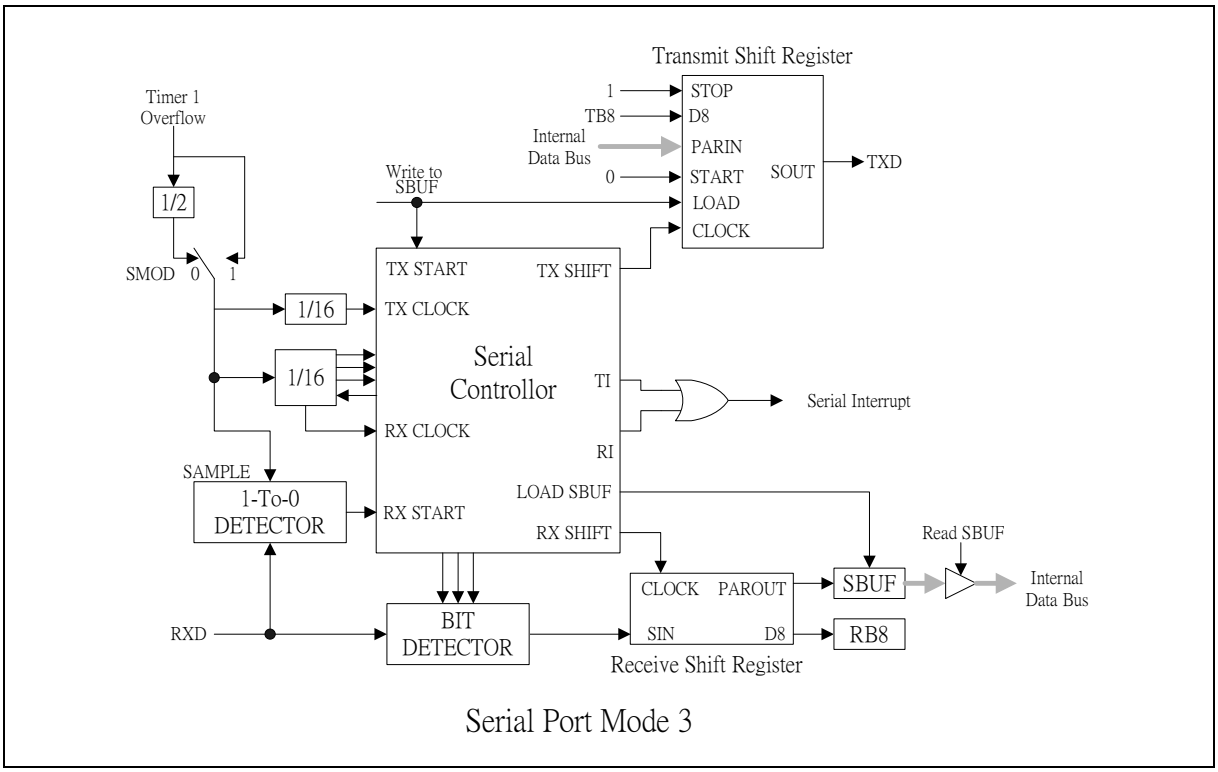
1. RI must be 0 and

2. Either SM2 = 0, or the received stop bit = 1.

If these conditions are met, then the stop bit goes to RB8, the 8 data bits go into SBUF and RI is set. Otherwise the received frame may be lost. After the middle of the stop bit, the receiver goes back to looking for a 1-to-0 transition on the RxD pin.

16.4 MODE 3

This mode is similar to Mode 2 in all respects, except that the baud rate is programmable. The user must first initialize the Serial related SFR SCON before any communication can take place. This involves selection of the Mode and baud rate. The Timer 1 should also be initialized if modes 1 and 3 are used. In all four modes, transmission is started by any instruction that uses SBUF as a destination register. Reception is initiated in Mode 0 by the condition RI = 0 and REN = 1. This will generate a clock on the TxD pin and shift in 8 bits on the RxD pin. Reception is initiated in the other modes by the incoming start bit if REN = 1. The external device will start the communication by transmitting the start bit.

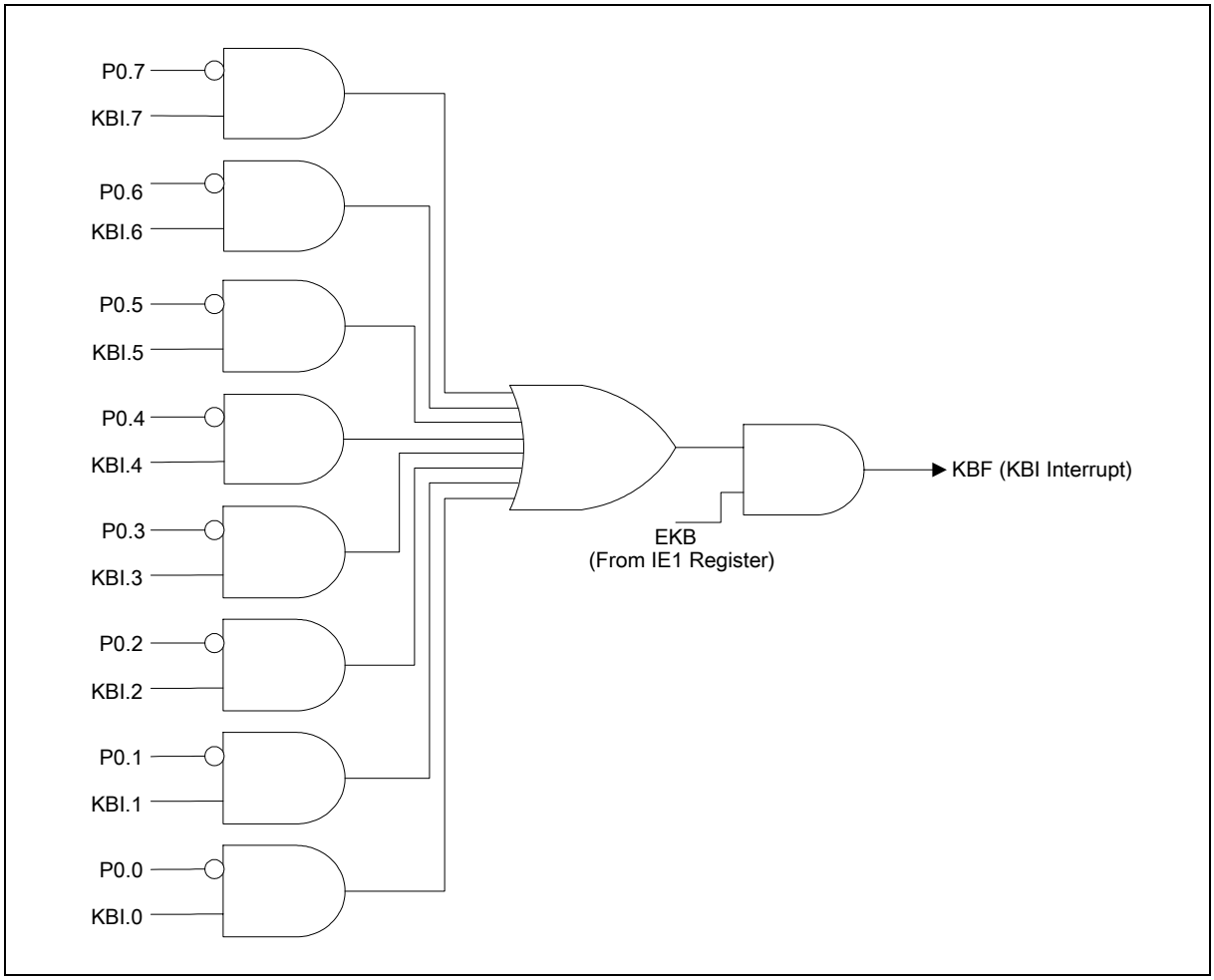


Serial Port Mode 3

18. KEYBOARD INTERRUPT (KBI)

The W79E82X series are provided 8 keyboard interrupt function to detect keypad status which key is acted, and allow a single interrupt to be generated when any key is pressed on a keyboard or keypad connected to specific pins of the W79E82X series, as shown below Figure. This interrupt may be used to wake up the CPU from Idle or Power Down modes, after chip is in Power Down or Idle Mode.

To support keyboard function is by Port 0. It can allow any or all pins of Port 0 to be enabled to cause this interrupt. Port pins are enabled by the setting of bits of KBI0 ~ KBI7 in the KBI register, as shown below Figure. The Keyboard Interrupt Flag (KBF) in the AUXR1 register is set when any enabled pin is pulled low while the KBI interrupt function is active, and the low pulse must more than 1 machine cycle, an interrupt will be generated if it has been enabled. The KBF bit set by hardware and must be cleared by software. In order to determine which key was pressed, the KBI will allow the interrupt service routine to poll port 0.



20. I/O PORT CONFIGURATION

The W79E82X series have three I/O ports, port 0, port 1 and port 2. All pins of I/O ports can be configured to one of four types by software except P1.5 is only input pin. When P1.5 is configured reset pin by RPD=0 in the CONFIG 1 register, the W79E82X series can support 15 pins by use Crystal. If used on-chip RC oscillator the P1.5 is configured input pin, the W79E82X series can be supported up to 18 pins. The I/O ports configuration setting as below table.

I/O port configuration table

PXM1.Y	PXM2.Y	PORT INPUT/OUTPUT MODE
0	0	Quasi-bidirectional
0	1	Push-Pull
1	0	Input Only (High Impedance) P2M1.PxS=0, TTL input P2M1.PxS=1, Schmitt input
1	1	Open Drain

All port pins can be determined to high or low after reset by configure PRHI bit in the CONFIG1 register. After reset, these pins are in quasi-bidirectional mode. The port pin of P1.5 only is a Schmitt trigger input.

Enabled toggle outputs from Timer 0 and Timer 1 by ENT0 and ENT1 on P2M1 register, the output frequency of Timer 0 or Timer 1 is by Timer overflow.

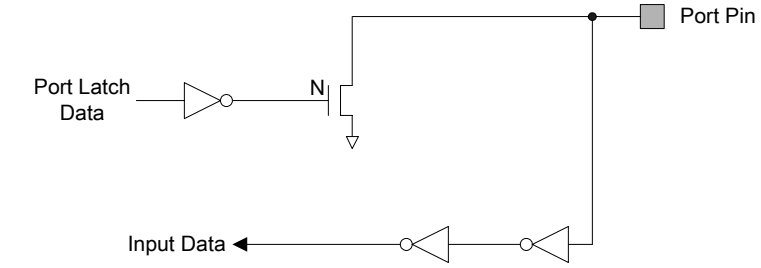
Each I/O port of the W79E82X series may be selected to use TTL level inputs or Schmitt inputs by P(n)S bit on P2M1 register, where n is 0, 1 or 2. When P(n)S is set to 1, Ports are selected Schmitt trigger inputs on Port(n). The P2.0(XTAL2) can be configured clock output when used on-chip RC or external Oscillator is clock source, and the frequency of clock output is divided by 4 on on-chip RC clock or external Oscillator.

20.1 Quasi-Bidirectional Output Configuration

After chip was power on or reset, the all ports output are this mode, and output is common with the 8051. This mode can be used as both an input and output without the need to reconfigure the port.

When the pin is pulled low, it is driven strongly and able to sink a fairly large current. These features are somewhat similar to an open drain output except that there are three pull-up transistors in the quasi-bidirectional output that serve different purposes.

This mode has three pull-up resisters that are “strong” pull-up, “weak” pull-up and “very weak” pull-up. The “strong” pull-up is used fast transition from logic “0” change to logic “1”, and it is fast latch and transition. When port pins is occur from logic “0” to logic “1”, the strong pull-up will quickly turn on two CPU clocks to pull high then turn off.

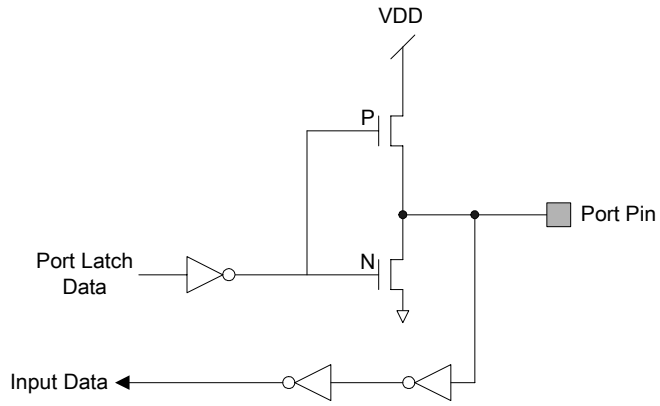


Open Drain Output

20.3 Push-Pull Output Configuration

The push-pull output mode has two strong pull-up and pull-down structure that support large source and sink current output. it remove “weak” pull-up and “very weak” pull-up resister and remain “strong pull-up resister on quasi-bidirectional output mode. The “strong” pull-up is always turns on when port latch is logic “1” to support source current. The push-pull port configuration is shown in below Figure.

The W79E82X series have three port pins that can’t be configured are P1.2, P1.3, and P1.5. The port pins P1.2 and P1.3 are configured to open drain outputs. They may be used as inputs by writing ones to their respective port latches.



Push-Pull Output

20.4 Input Only Configuration

By configure this mode, the ports are only digital input and disable digital output. The W79E82X series can select input pin to Schmitt trigger or TTL level input by PxM1.y and PxM2.y registers.

PWM Control Register 3 PWMCON3(D7H)

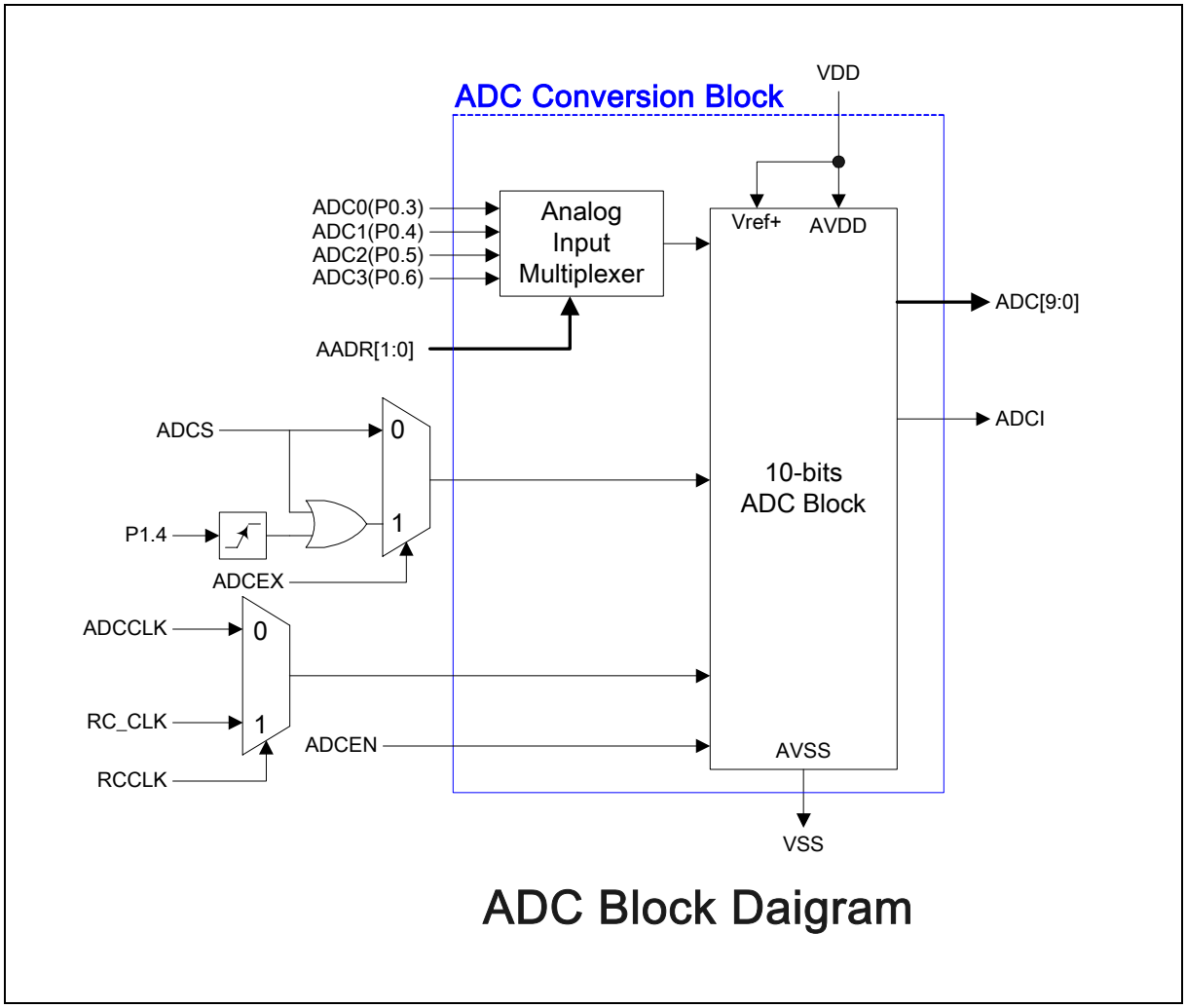
BIT	NAME	FUNCTION
7~1	-	Reserved
0	BKF	The external brake pin flag. 0: The PWM is not brake. 1: The PWM is brake by external brake pin. It will be cleared by software. If this bit is set, PWMRUN can't be set.

The W79E82X series chips have support brake function by software or external pin(P0.2). That brake control is by PWMCON2 register. The software brake and external pin brake setting as refer brake condition table. When brake is asserted, the PWM outputs are by PWMnB setting. By the software brake, the BKEN is set to "1" that will enable brake function and determined by BPEN and BKCH bits. The (BPEN, BKCH) = (0,0), brake is asserted. The (BPEN, BKCH) = (0,1), the PWM outputs are follow PWMRUN bit; When PWM is not running that mean is PWMRUN = 0, the PWM outputs are asserted by PWMnB setting; When PWM is running, the PWMRUN = 1, and keeping PWM outputs.

By the external brake pin(P0.2) brake, W79E82X series chips have brake interrupt service or polling brake flag (BKF) if external pin is asserted. If to decide P0.2 is low is asserted by BKPS = 0, the BKF(PWMCON3.0) will be set to "1" and PWNRUN will be cleared to stop PWM run, the PWM outputs condition are by PWMnB setting. After brake pin is release,

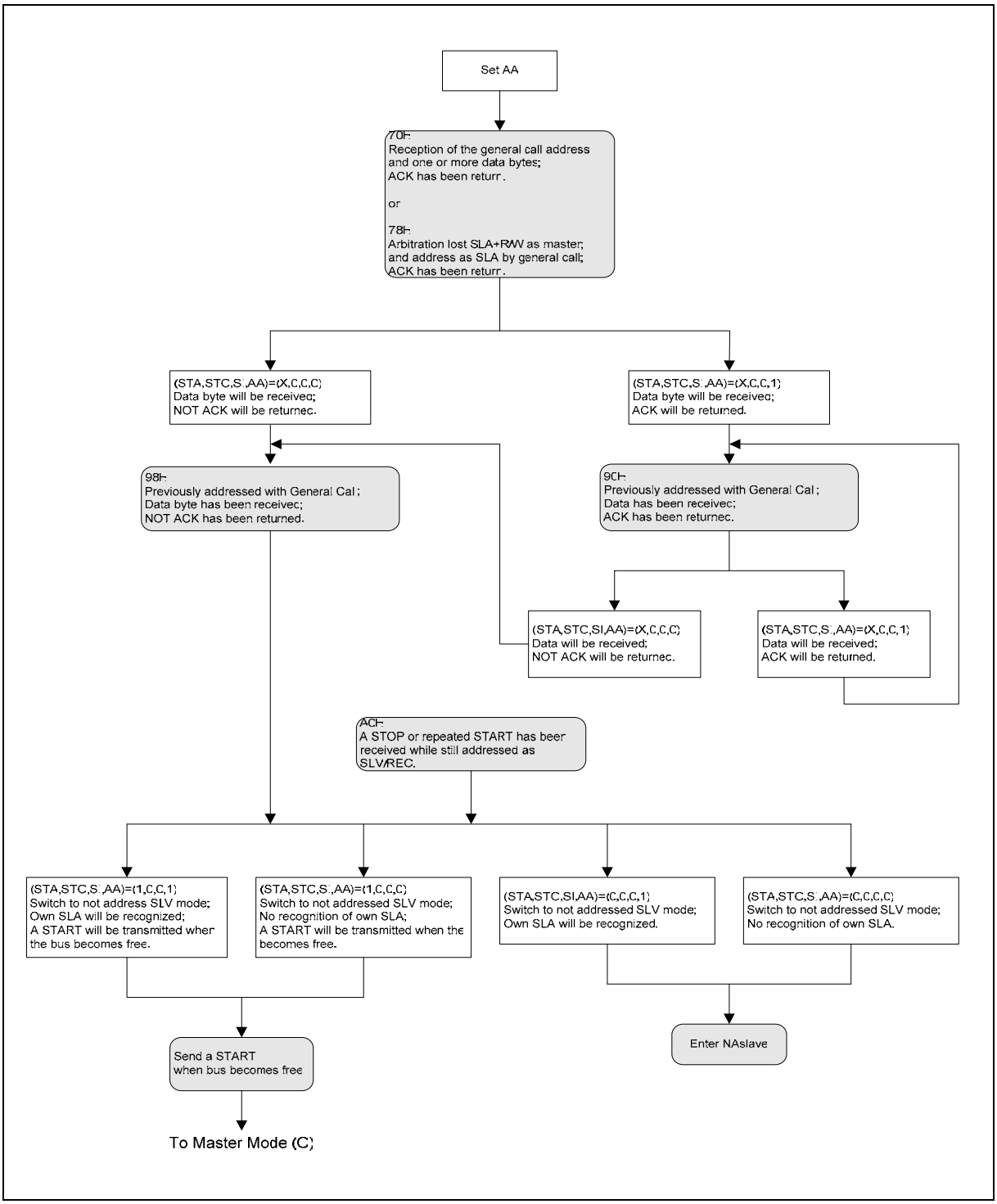
Since the Brake Pin being asserted will automatically clear the Run bit and BKF(PWMCON3.0) flag will be set, PWMCON1.7, the user program can poll this bit or enable PWM's brake interrupt to determine when the Brake Pin causes a brake to occur. The other method for detecting a brake caused by the Brake Pin would be to tie the Brake Pin to one of the external interrupt pins. This latter approach is needed if the Brake signal can be of insufficient length to ensure that it can be captured by a polling routine. When, after being asserted, the condition causing the brake is removed, the PWM outputs go to whatever state that had immediately prior to the brake. This means that in order to go from brake being asserted to having the PWM run without going through an indeterminate state care must be taken. If the

In order to smoothly release brake by external brake pin is asserted then PWM is going to run, the step interval as refer below figure.



The ADC Block Diagram

GC Mode


Set AA
70H
Reception of the general call address and one or more data bytes;
ACK has been returr.
or
78H
Arbitration lost SLA+R/W as master;
and address as SLA by general call;
ACK has been returr.
(STA,STC,S:,AA)=(X,C,C,C)
Data byte will be receiveo;
NOT ACK will be returnec.
(STA,STC,S:,AA)=(X,C,C,1)
Data byte will be receiveo;
ACK will be returned.
98H
Previously addressed with General Cal;
Data byte has been receivec;
NOT ACK has been returned.
9CH
Previously addressed with General Cal;
Data has been receivec;
ACK has been returnec.
(STA,STC,SI,AA)=(X,C,C,C)
Data will be received;
NOT ACK will be returnec.
(STA,STC,S:,AA)=(X,C,C,1)
Data will be received;
ACK will be returned.
A0H
A STOP or repeated START has beer
received while still addressed as
SLV/REC.
(STA,STC,S:,AA)=(1,C,C,1)
Switch to not address SLV mode;
Own SLA will be recognized;
A START will be transmitted wher
the bus becomes free.
(STA,STC,S:,AA)=(1,C,C,C)
Switch to not addressed SLV mode;
No recognition of own SLA;
A START will be transmitted when the
becomes free.
(STA,STC,SI,AA)=(C,C,C,1)
Switch to not addressed SLV mode;
Own SLA will be recognized.
(STA,STC,S:,AA)=(C,C,C,C)
Switch to not addressed SLV mode;
No recognition of own SLA.
Send a START
when bus becomes free
Enter NAslave
To Master Mode (C)

27. CONFIG BITS

The W79E82X series have two CONFIG bits(CONFIG1, CONFIG2) that must be define at power up and can not be set after the program start of execution. Those features are configured through the use of two flash EPROM bytes, and the flash EPROM can be programmed and verified repeatedly. Until the code inside the Flash EPROM is confirmed OK, the code can be protected. The protection of flash EPROM (CONFIG2) and those operations on it are described below. The data of these bytes may be read by the MOVC instruction at the addresses.

27.1 CONFIG1

CONFIG 1 :

7	6	5	4	3	2	1	0	
WDTE	RPD	PRHI	BOV	-	-	Fosc1	Fosc0	CONFIG Bit

WDTE: Watchdog Timer clock source Bit.
RPD: Reset Pin Disable Bit.
PRHI: Port Reset High or Low Bit.
BOV: Brownout voltage select Bit.
Fosc1: CPU oscillator type select Bit 1.
Fosc0: CPU oscillator type select Bit 0.

CONFIG Register 1

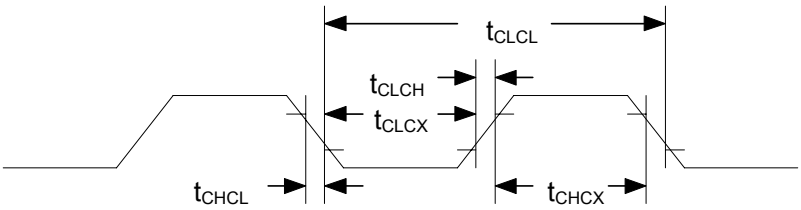
BIT	NAME	FUNCTION
7	WDTE	Clock source of Watchdog Timer select bit: 0: The internal RC oscillator clock is for Watchdog Timer clock used. 1: The uC clock is for Watchdog Timer clock used.
6	RPD	Reset Pin Disable bit: 0: Enable Reset function of Pin 1.5. 1: Disable Reset function of Pin 1.5, and it to be used as an input port pin.
5	PRHI	Port Reset High or Low bit: 0: Port reset to low state. 1: Port reset to high state.
4	BOV	Brownout Voltage Select bit: 0: Brownout detect voltage is 3.8V. 1: Brownout detect voltage is 2.5V.

29.2 The COMPARATOR ELECTRICAL CHARACTERISTICS

(V_{DD}–V_{SS} = 3.0~5V, TA = -40~85°C, Fosc = 20MHz, unless otherwise specified.)

PARAMETER	SYMBOL	SPECIFICATION				TEST CONDITIONS
		MIN.	TYP.	MAX.	UNIT	
Common mode range comparator inputs	V_{CR}	0		V_{DD}-0.3	V	
Common mode rejection ratio	CMRR			-50	dB	
Response time	t_{RS}	-	30	100	ns	
Comparator enable to output valid time	t_{EN}	-	1	5	us	
Input leakage current, comparator	I_{IL}	-10	0	10	uA	0< V_{IN} <V_{DD}

30. AC ELECTRICAL CHARACTERISTICS



Note: Duty cycle is 50%.

31. EXTERNAL CLOCK CHARACTERISTICS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS	NOTES
Clock High Time	t_{CHCX}	12.5	-	-	nS	
Clock Low Time	t_{CLCX}	12.5	-	-	nS	
Clock Rise Time	t_{CLCH}	-	-	10	nS	
Clock Fall Time	t_{CHCL}	-	-	10	nS	