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### 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	PIC
Core Size	8-Bit
Speed	4MHz
Connectivity	-
Peripherals	Brown-out Detect/Reset, POR, WDT
Number of I/O	13
Program Memory Size	1.75KB (1K x 14)
Program Memory Type	OTP
EEPROM Size	-
RAM Size	80 x 8
Voltage - Supply (Vcc/Vdd)	2.5V ~ 6V
Data Converters	-
Oscillator Type	External
Operating Temperature	-40°C ~ 125°C (TA)
Mounting Type	Surface Mount
Package / Case	20-SSOP (0.209", 5.30mm Width)
Supplier Device Package	20-SSOP
Purchase URL	<a href="https://www.e-xfl.com/product-detail/microchip-technology/pic16lc621-04e-ss">https://www.e-xfl.com/product-detail/microchip-technology/pic16lc621-04e-ss</a>

# PIC16C62X

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## Device Differences

Device	Voltage Range	Oscillator	Process Technology (Microns)
PIC16C620 <sup>(3)</sup>	2.5 - 6.0	See <b>Note 1</b>	0.9
PIC16C621 <sup>(3)</sup>	2.5 - 6.0	See <b>Note 1</b>	0.9
PIC16C622 <sup>(3)</sup>	2.5 - 6.0	See <b>Note 1</b>	0.9
PIC16C620A <sup>(4)</sup>	2.7 - 5.5	See <b>Note 1</b>	0.7
PIC16CR620A <sup>(2)</sup>	2.5 - 5.5	See <b>Note 1</b>	0.7
PIC16C621A <sup>(4)</sup>	2.7 - 5.5	See <b>Note 1</b>	0.7
PIC16C622A <sup>(4)</sup>	2.7 - 5.5	See <b>Note 1</b>	0.7

**Note 1:** If you change from this device to another device, please verify oscillator characteristics in your application.

**2:** For ROM parts, operation from 2.5V - 3.0V will require the PIC16LCR62X parts.

**3:** For OTP parts, operation from 2.5V - 3.0V will require the PIC16LC62X parts.

**4:** For OTP parts, operations from 2.7V - 3.0V will require the PIC16LC62XA parts.

## 2.0 PIC16C62X DEVICE VARIETIES

A variety of frequency ranges and packaging options are available. Depending on application and production requirements, the proper device option can be selected using the information in the PIC16C62X Product Identification System section at the end of this data sheet. When placing orders, please use this page of the data sheet to specify the correct part number.

### 2.1 UV Erasable Devices

The UV erasable version, offered in Cerdip package, is optimal for prototype development and pilot programs. This version can be erased and reprogrammed to any of the Oscillator modes.

Microchip's PICSTART® and PRO MATE® programmers both support programming of the PIC16C62X.

<b>Note:</b> Microchip does not recommend code protecting windowed devices.
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### 2.2 One-Time-Programmable (OTP) Devices

The availability of OTP devices is especially useful for customers who need the flexibility for frequent code updates and small volume applications. In addition to the program memory, the configuration bits must also be programmed.

### 2.3 Quick-Turnaround-Production (QTP) Devices

Microchip offers a QTP programming service for factory production orders. This service is made available for users who chose not to program a medium to high quantity of units and whose code patterns have stabilized. The devices are identical to the OTP devices, but with all EPROM locations and configuration options already programmed by the factory. Certain code and prototype verification procedures apply before production shipments are available. Please contact your Microchip Technology sales office for more details.

### 2.4 Serialized Quick-Turnaround-Production<sup>SM</sup> (SQTP<sup>SM</sup>) Devices

Microchip offers a unique programming service where a few user-defined locations in each device are programmed with different serial numbers. The serial numbers may be random, pseudo-random or sequential.

Serial programming allows each device to have a unique number, which can serve as an entry-code, password or ID number.

# PIC16C62X

### 3.1 Clocking Scheme/Instruction Cycle

The clock input (OSC1/CLKIN pin) is internally divided by four to generate four non-overlapping quadrature clocks namely Q1, Q2, Q3 and Q4. Internally, the program counter (PC) is incremented every Q1, the instruction is fetched from the program memory and latched into the instruction register in Q4. The instruction is decoded and executed during the following Q1 through Q4. The clocks and instruction execution flow is shown in Figure 3-2.

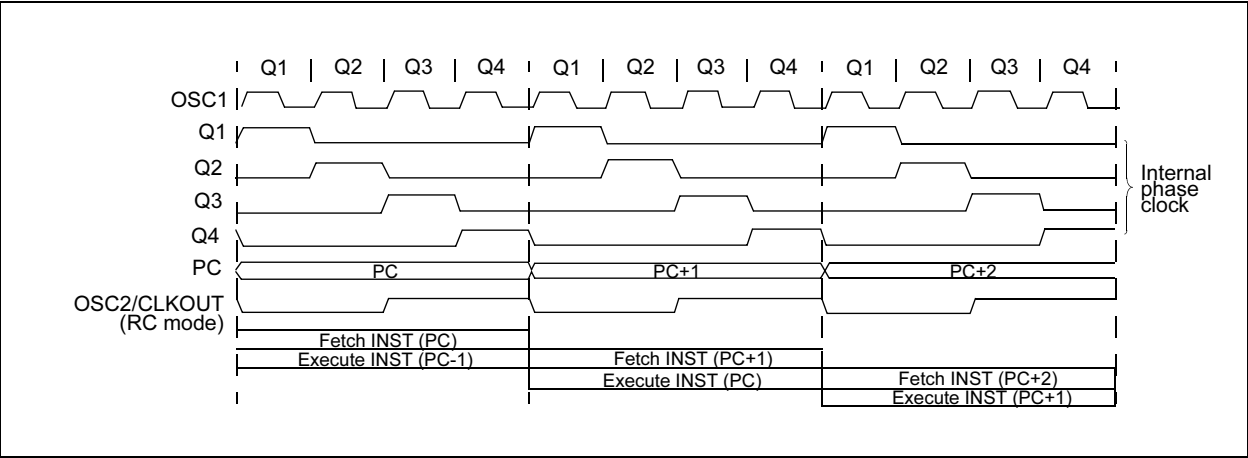
### 3.2 Instruction Flow/Pipelining

An "Instruction Cycle" consists of four Q cycles (Q1, Q2, Q3 and Q4). The instruction fetch and execute are pipelined such that fetch takes one instruction cycle while decode and execute takes another instruction cycle. However, due to the pipelining, each instruction effectively executes in one cycle. If an instruction causes the program counter to change (e.g., GOTO) then two cycles are required to complete the instruction (Example 3-1).

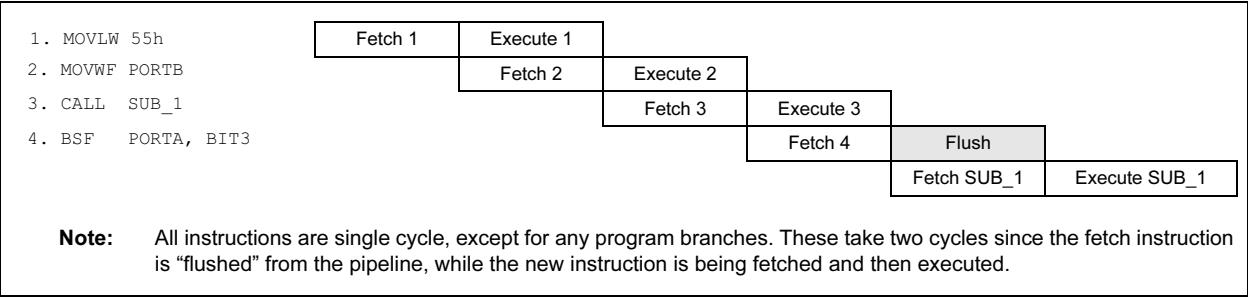
A fetch cycle begins with the program counter (PC) incrementing in Q1.

In the execution cycle, the fetched instruction is latched into the "Instruction Register (IR)" in cycle Q1. This instruction is then decoded and executed during the Q2, Q3 and Q4 cycles. Data memory is read during Q2 (operand read) and written during Q4 (destination write).

FIGURE 3-2: CLOCK/INSTRUCTION CYCLE



EXAMPLE 3-1: INSTRUCTION PIPELINE FLOW



# PIC16C62X

## 4.2.2.1 STATUS Register

The STATUS register, shown in Register 4-1, contains the arithmetic status of the ALU, the RESET status and the bank select bits for data memory.

The STATUS register can be the destination for any instruction, like any other register. If the STATUS 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  $\overline{\text{TO}}$  and  $\overline{\text{PD}}$  bits are not writable. Therefore, the result of an instruction with the STATUS register as destination may be different than intended.

For example, `CLRF STATUS` will clear the upper-three bits and set the Z bit. This leaves the STATUS register as 000uu1uu (where u = unchanged).

It is recommended, therefore, that only `BCF`, `BSF`, `SWAPF` and `MOVWF` instructions are used to alter the STATUS register, because these instructions do not affect any STATUS bit. For other instructions not affecting any STATUS bits, see the "Instruction Set Summary".

**Note 1:** The IRP and RP1 bits (STATUS<7:6>) are not used by the PIC16C62X and should be programmed as '0'. Use of these bits as general purpose R/W bits is NOT recommended, since this may affect upward compatibility with future products.

**2:** The C and DC bits operate as a Borrow and Digit Borrow out bit, respectively, in subtraction. See the `SUBLW` and `SUBWF` instructions for examples.

### REGISTER 4-1: STATUS REGISTER (ADDRESS 03H OR 83H)

Reserved	Reserved	R/W-0	R-1	R-1	R/W-x	R/W-x	R/W-x
IRP	RP1	RP0	$\overline{\text{TO}}$	$\overline{\text{PD}}$	Z	DC	C
bit 7							bit 0

- bit 7 **IRP:** Register Bank Select bit (used for indirect addressing)  
 1 = Bank 2, 3 (100h - 1FFh)  
 0 = Bank 0, 1 (00h - FFh)  
 The IRP bit is reserved on the PIC16C62X; always maintain this bit clear.
- bit 6-5 **RP<1:0>:** Register Bank Select bits (used for direct addressing)  
 01 = Bank 1 (80h - FFh)  
 00 = Bank 0 (00h - 7Fh)  
 Each bank is 128 bytes. The RP1 bit is reserved on the PIC16C62X; always maintain this bit clear.
- bit 4  **$\overline{\text{TO}}$ :** Time-out bit  
 1 = After power-up, `CLRWDT` instruction, or `SLEEP` instruction  
 0 = A WDT time-out occurred
- bit 3  **$\overline{\text{PD}}$ :** Power-down bit  
 1 = After power-up or by the `CLRWDT` instruction  
 0 = By execution of the `SLEEP` instruction
- bit 2 **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
- bit 1 **DC:** Digit carry/borrow bit (`ADDWF`, `ADDLW`, `SUBLW`, `SUBWF` instructions)(for borrow the polarity is reversed)  
 1 = A carry-out from the 4th low order bit of the result occurred  
 0 = No carry-out from the 4th low order bit of the result
- bit 0 **C:** Carry/borrow bit (`ADDWF`, `ADDLW`, `SUBLW`, `SUBWF` instructions)  
 1 = A carry-out from the Most Significant bit of the result occurred  
 0 = No carry-out from the Most Significant bit of the result occurred
- Note:** For borrow the polarity is reversed. A subtraction is executed by adding the two's complement of the second operand. For rotate (`RRF`, `RLF`) instructions, this bit is loaded with either the high or low order bit of the source register.

#### Legend:

R = Readable bit	W = Writable bit	U = Unimplemented bit, read as '0'
- n = Value at POR	'1' = Bit is set	'0' = Bit is cleared    x = Bit is unknown

# PIC16C62X

FIGURE 6-3:       TIMER0 TIMING: INTERNAL CLOCK/PRESCALE 1:2

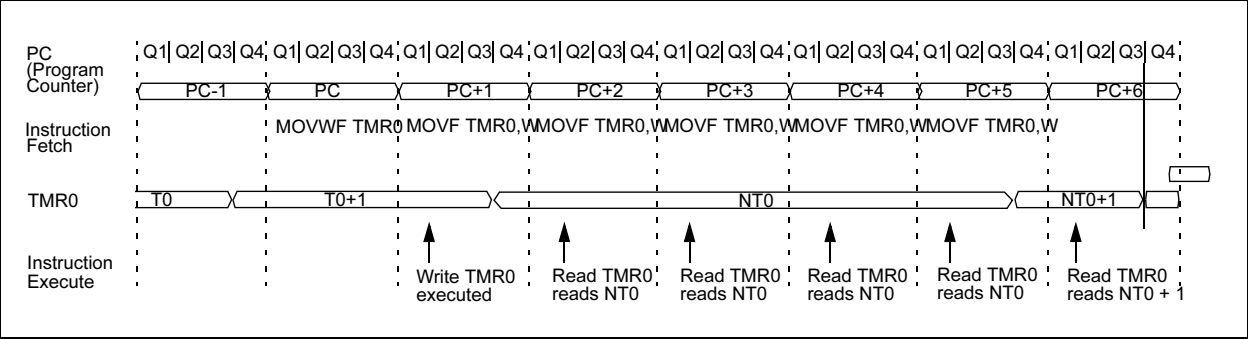
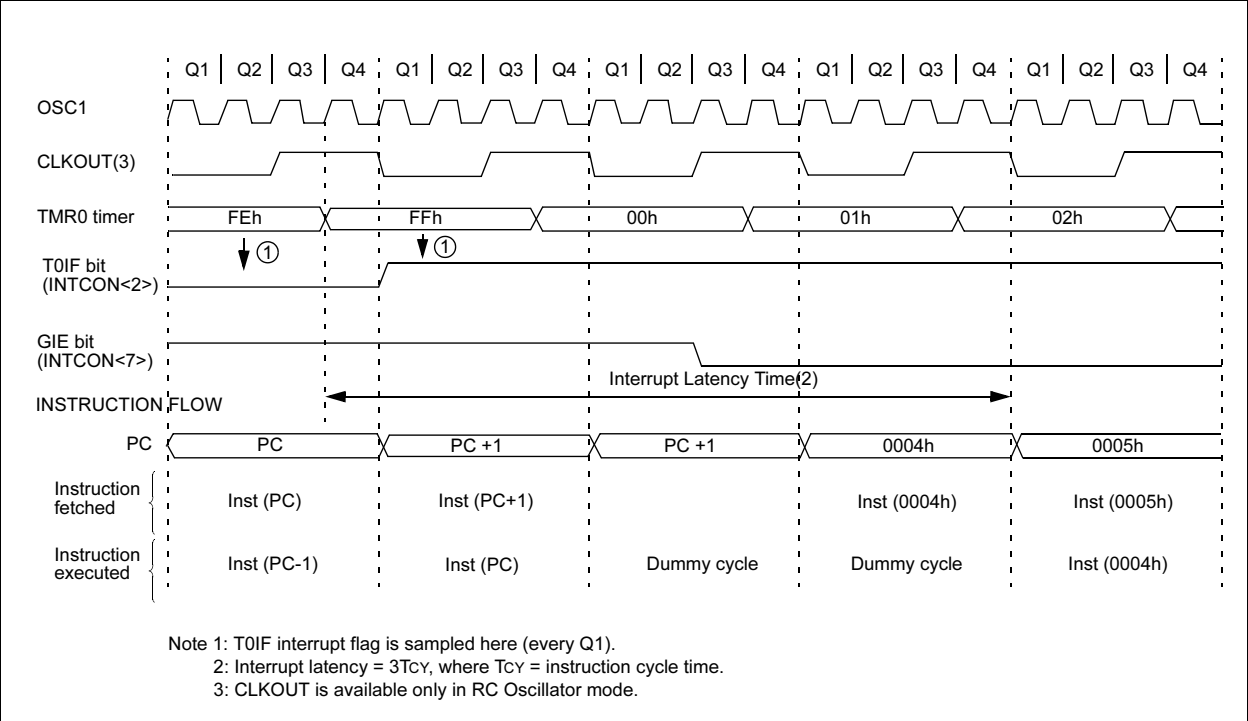


FIGURE 6-4:       TIMER0 INTERRUPT TIMING



## 6.3.1 SWITCHING PRESCALER ASSIGNMENT

The prescaler assignment is fully under software control (i.e., it can be changed “on-the-fly” during program execution). To avoid an unintended device RESET, the following instruction sequence (Example 6-1) must be executed when changing the prescaler assignment from Timer0 to WDT.)

### EXAMPLE 6-1: CHANGING PRESCALER (TIMER0→WDT)

```

1.BCF      STATUS, RP0      ;Skip if already in
                             ;Bank 0
2.CLRWDT                                ;Clear WDT
3.CLRF      TMR0            ;Clear TMR0 & Prescaler
4.BSF      STATUS, RP0      ;Bank 1
5.MOVLW     '00101111'b;    ;These 3 lines (5, 6, 7)
6.MOVWF     OPTION          ;are required only if
                             ;desired PS<2:0> are
7.CLRWDT                                ;000 or 001
8.MOVLW     '00101xxx'b     ;Set Postscaler to
9.MOVWF     OPTION          ;desired WDT rate
10.BCF      STATUS, RP0     ;Return to Bank 0
    
```

To change prescaler from the WDT to the TMR0 module, use the sequence shown in Example 6-2. This precaution must be taken even if the WDT is disabled.

### EXAMPLE 6-2: CHANGING PRESCALER (WDT→TIMER0)

```

CLRWDT                                ;Clear WDT and
                                     ;prescaler
BSF      STATUS, RP0
MOVLW     b'xxxx0xxx'                ;Select TMR0, new
                                     ;prescale value and
                                     ;clock source
MOVWF     OPTION_REG
BCF      STATUS, RP0
    
```

TABLE 6-1: REGISTERS ASSOCIATED WITH TIMER0

Address	Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Value on POR	Value on All Other RESETS
01h	TMR0	Timer0 module register								xxxx xxxx	uuuu uuuu
0Bh/8Bh	INTCON	GIE	PEIE	TOIE	INTE	RBIE	TOIF	INTF	RBIF	0000 000x	0000 000u
81h	OPTION	RBPU	INTEDG	T0CS	T0SE	PSA	PS2	PS1	PS0	1111 1111	1111 1111
85h	TRISA	—	—	—	TRISA4	TRISA3	TRISA2	TRISA1	TRISA0	---1 1111	---1 1111

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

**Note:** Shaded bits are not used by TMR0 module.

# PIC16C62X

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NOTES:

## 7.0 COMPARATOR MODULE

The comparator module contains two analog comparators. The inputs to the comparators are multiplexed with the RA0 through RA3 pins. The On-Chip Voltage Reference (Section 8.0) can also be an input to the comparators.

The CMCON register, shown in Register 7-1, controls the comparator input and output multiplexers. A block diagram of the comparator is shown in Figure 7-1.

### REGISTER 7-1: CMCON REGISTER (ADDRESS 1Fh)

R-0	R-0	U-0	U-0	R/W-0	R/W-0	R/W-0	R/W-0
C2OUT	C1OUT	—	—	CIS	CM2	CM1	CM0
bit 7							bit 0

bit 7 **C2OUT**: Comparator 2 output

1 = C2 VIN+ > C2 VIN-

0 = C2 VIN+ < C2 VIN-

bit 6 **C1OUT**: Comparator 1 output

1 = C1 VIN+ > C1 VIN-

0 = C1 VIN+ < C1 VIN-

bit 5-4 **Unimplemented**: Read as '0'

bit 3 **CIS**: Comparator Input Switch

When CM<2:0> = 001:

1 = C1 VIN- connects to RA3

0 = C1 VIN- connects to RA0

When CM<2:0> = 010:

1 = C1 VIN- connects to RA3

C2 VIN- connects to RA2

0 = C1 VIN- connects to RA0

C2 VIN- connects to RA1

bit 2-0 **CM<2:0>**: Comparator mode.

#### Legend:

R = Readable bit

W = Writable bit

U = Unimplemented bit, read as '0'

- n = Value at POR

'1' = Bit is set

'0' = Bit is cleared

x = Bit is unknown

## 9.0 SPECIAL FEATURES OF THE CPU

Special circuits to deal with the needs of real-time applications are what sets a microcontroller apart from other processors. The PIC16C62X family has a host of such features intended to maximize system reliability, minimize cost through elimination of external components, provide power saving operating modes and offer code protection.

These are:

1. OSC selection
2. RESET
  - Power-on Reset (POR)
  - Power-up Timer (PWRT)
  - Oscillator Start-up Timer (OST)
  - Brown-out Reset (BOR)
3. Interrupts
4. Watchdog Timer (WDT)
5. SLEEP
6. Code protection
7. ID Locations
8. In-Circuit Serial Programming™

The PIC16C62X devices have a Watchdog Timer which is controlled by configuration bits. It runs off its own RC oscillator for added reliability. There are two timers that offer necessary delays on power-up. One is the Oscillator Start-up Timer (OST), intended to keep the chip in RESET until the crystal oscillator is stable. The other is the Power-up Timer (PWRT), which provides a fixed delay of 72 ms (nominal) on power-up only, designed to keep the part in RESET while the power supply stabilizes. There is also circuitry to RESET the device if a brown-out occurs, which provides at least a 72 ms RESET. With these three functions on-chip, most applications need no external RESET circuitry.

The SLEEP mode is designed to offer a very low current Power-down mode. The user can wake-up from SLEEP through external RESET, Watchdog Timer wake-up or through an interrupt. Several oscillator options are also made available to allow the part to fit the application. The RC oscillator option saves system cost, while the LP crystal option saves power. A set of configuration bits are used to select various options.

# PIC16C62X

**TABLE 10-2: PIC16C62X INSTRUCTION SET**

Mnemonic, Operands	Description	Cycles	14-Bit Opcode				Status Affected	Notes	
			MSb		LSb				
BYTE-ORIENTED FILE REGISTER OPERATIONS									
ADDWF	f, d	Add W and f	1	00	0111	dfff	ffff	C,DC,Z	1,2
ANDWF	f, d	AND W with f	1	00	0101	dfff	ffff	Z	1,2
CLRF	f	Clear f	1	00	0001	1fff	ffff	Z	2
CLRW	-	Clear W	1	00	0001	0000	0011	Z	
COMF	f, d	Complement f	1	00	1001	dfff	ffff	Z	1,2
DECf	f, d	Decrement f	1	00	0011	dfff	ffff	Z	1,2
DECFSZ	f, d	Decrement f, Skip if 0	1(2)	00	1011	dfff	ffff		1,2,3
INCF	f, d	Increment f	1	00	1010	dfff	ffff	Z	1,2
INCFSZ	f, d	Increment f, Skip if 0	1(2)	00	1111	dfff	ffff		1,2,3
IORWF	f, d	Inclusive OR W with f	1	00	0100	dfff	ffff	Z	1,2
MOVF	f, d	Move f	1	00	1000	dfff	ffff	Z	1,2
MOVWF	f	Move W to f	1	00	0000	1fff	ffff		
NOP	-	No Operation	1	00	0000	0xx0	0000		
RLF	f, d	Rotate Left f through Carry	1	00	1101	dfff	ffff	C	1,2
RRF	f, d	Rotate Right f through Carry	1	00	1100	dfff	ffff	C	1,2
SUBWF	f, d	Subtract W from f	1	00	0010	dfff	ffff	C,DC,Z	1,2
SWAPF	f, d	Swap nibbles in f	1	00	1110	dfff	ffff		1,2
XORWF	f, d	Exclusive OR W with f	1	00	0110	dfff	ffff	Z	1,2
BIT-ORIENTED FILE REGISTER OPERATIONS									
BCF	f, b	Bit Clear f	1	01	00bb	bfff	ffff		1,2
BSF	f, b	Bit Set f	1	01	01bb	bfff	ffff		1,2
BTFSC	f, b	Bit Test f, Skip if Clear	1 (2)	01	10bb	bfff	ffff		3
BTFSS	f, b	Bit Test f, Skip if Set	1 (2)	01	11bb	bfff	ffff		3
LITERAL AND CONTROL OPERATIONS									
ADDLW	k	Add literal and W	1	11	111x	kkkk	kkkk	C,DC,Z	
ANDLW	k	AND literal with W	1	11	1001	kkkk	kkkk	Z	
CALL	k	Call subroutine	2	10	0kkk	kkkk	kkkk		
CLRWDt	-	Clear Watchdog Timer	1	00	0000	0110	0100	$\overline{TO}, \overline{PD}$	
GOTO	k	Go to address	2	10	1kkk	kkkk	kkkk		
IORLW	k	Inclusive OR literal with W	1	11	1000	kkkk	kkkk	Z	
MOVLW	k	Move literal to W	1	11	00xx	kkkk	kkkk		
RETFIE	-	Return from interrupt	2	00	0000	0000	1001		
RETLW	k	Return with literal in W	2	11	01xx	kkkk	kkkk		
RETURN	-	Return from Subroutine	2	00	0000	0000	1000		
SLEEP	-	Go into Standby mode	1	00	0000	0110	0011	$\overline{TO}, \overline{PD}$	
SUBLW	k	Subtract W from literal	1	11	110x	kkkk	kkkk	C,DC,Z	
XORLW	k	Exclusive OR literal with W	1	11	1010	kkkk	kkkk	Z	

**Note 1:** When an I/O register is modified as a function of itself ( e.g., `MOVF PORTB, 1`), the value used will be that value present on the pins themselves. For example, if the data latch is '1' for a pin configured as input and is driven low by an external device, the data will be written back with a '0'.

- If this instruction is executed on the TMR0 register (and, where applicable, d = 1), the prescaler will be cleared if assigned to the Timer0 Module.
- If Program Counter (PC) is modified or a conditional test is true, the instruction requires two cycles. The second cycle is executed as a NOP.

## 11.3 MPLAB C17 and MPLAB C18 C Compilers

The MPLAB C17 and MPLAB C18 Code Development Systems are complete ANSI C compilers for Microchip's PIC17CXXX and PIC18CXXX family of microcontrollers. These compilers provide powerful integration capabilities, superior code optimization and ease of use not found with other compilers.

For easy source level debugging, the compilers provide symbol information that is optimized to the MPLAB IDE debugger.

## 11.4 MPLINK Object Linker/ MPLIB Object Librarian

The MPLINK object linker combines relocatable objects created by the MPASM assembler and the MPLAB C17 and MPLAB C18 C compilers. It can link relocatable objects from pre-compiled libraries, using directives from a linker script.

The MPLIB object librarian manages the creation and modification of library files of pre-compiled code. When a routine from a library is called from a source file, only the modules that contain that routine will be linked in with the application. This allows large libraries to be used efficiently in many different applications.

The object linker/librarian features include:

- Efficient linking of single libraries instead of many smaller files
- Enhanced code maintainability by grouping related modules together
- Flexible creation of libraries with easy module listing, replacement, deletion and extraction

## 11.5 MPLAB C30 C Compiler

The MPLAB C30 C compiler is a full-featured, ANSI compliant, optimizing compiler that translates standard ANSI C programs into dsPIC30F assembly language source. The compiler also supports many command-line options and language extensions to take full advantage of the dsPIC30F device hardware capabilities, and afford fine control of the compiler code generator.

MPLAB C30 is distributed with a complete ANSI C standard library. All library functions have been validated and conform to the ANSI C library standard. The library includes functions for string manipulation, dynamic memory allocation, data conversion, time-keeping, and math functions (trigonometric, exponential and hyperbolic). The compiler provides symbolic information for high level source debugging with the MPLAB IDE.

## 11.6 MPLAB ASM30 Assembler, Linker, and Librarian

MPLAB ASM30 assembler produces relocatable machine code from symbolic assembly language for dsPIC30F devices. MPLAB C30 compiler uses the assembler to produce its object file. The assembler generates relocatable object files that can then be archived or linked with other relocatable object files and archives to create an executable file. Notable features of the assembler include:

- Support for the entire dsPIC30F instruction set
- Support for fixed-point and floating-point data
- Command line interface
- Rich directive set
- Flexible macro language
- MPLAB IDE compatibility

## 11.7 MPLAB SIM Software Simulator

The MPLAB SIM software simulator allows code development in a PC hosted environment by simulating the PICmicro series microcontrollers on an instruction level. On any given instruction, the data areas can be examined or modified and stimuli can be applied from a file, or user defined key press, to any pin. The execution can be performed in Single-Step, Execute Until Break, or Trace mode.

The MPLAB SIM simulator fully supports symbolic debugging using the MPLAB C17 and MPLAB C18 C Compilers, as well as the MPASM assembler. The software simulator offers the flexibility to develop and debug code outside of the laboratory environment, making it an excellent, economical software development tool.

## 11.8 MPLAB SIM30 Software Simulator

The MPLAB SIM30 software simulator allows code development in a PC hosted environment by simulating the dsPIC30F series microcontrollers on an instruction level. On any given instruction, the data areas can be examined or modified and stimuli can be applied from a file, or user defined key press, to any of the pins.

The MPLAB SIM30 simulator fully supports symbolic debugging using the MPLAB C30 C Compiler and MPLAB ASM30 assembler. The simulator runs in either a Command Line mode for automated tasks, or from MPLAB IDE. This high speed simulator is designed to debug, analyze and optimize time intensive DSP routines.

## 11.20 PICDEM 18R PIC18C601/801 Demonstration Board

The PICDEM 18R demonstration board serves to assist development of the PIC18C601/801 family of Microchip microcontrollers. It provides hardware implementation of both 8-bit Multiplexed/De-multiplexed and 16-bit Memory modes. The board includes 2 Mb external FLASH memory and 128 Kb SRAM memory, as well as serial EEPROM, allowing access to the wide range of memory types supported by the PIC18C601/801.

## 11.21 PICDEM LIN PIC16C43X Demonstration Board

The powerful LIN hardware and software kit includes a series of boards and three PICmicro microcontrollers. The small footprint PIC16C432 and PIC16C433 are used as slaves in the LIN communication and feature on-board LIN transceivers. A PIC16F874 FLASH microcontroller serves as the master. All three microcontrollers are programmed with firmware to provide LIN bus communication.

## 11.22 PICKit™ 1 FLASH Starter Kit

A complete "development system in a box", the PICKit FLASH Starter Kit includes a convenient multi-section board for programming, evaluation, and development of 8/14-pin FLASH PIC® microcontrollers. Powered via USB, the board operates under a simple Windows GUI. The PICKit 1 Starter Kit includes the user's guide (on CD ROM), PICKit 1 tutorial software and code for various applications. Also included are MPLAB® IDE (Integrated Development Environment) software, software and hardware "Tips 'n Tricks for 8-pin FLASH PIC® Microcontrollers" Handbook and a USB Interface Cable. Supports all current 8/14-pin FLASH PIC microcontrollers, as well as many future planned devices.

## 11.23 PICDEM USB PIC16C7X5 Demonstration Board

The PICDEM USB Demonstration Board shows off the capabilities of the PIC16C745 and PIC16C765 USB microcontrollers. This board provides the basis for future USB products.

## 11.24 Evaluation and Programming Tools

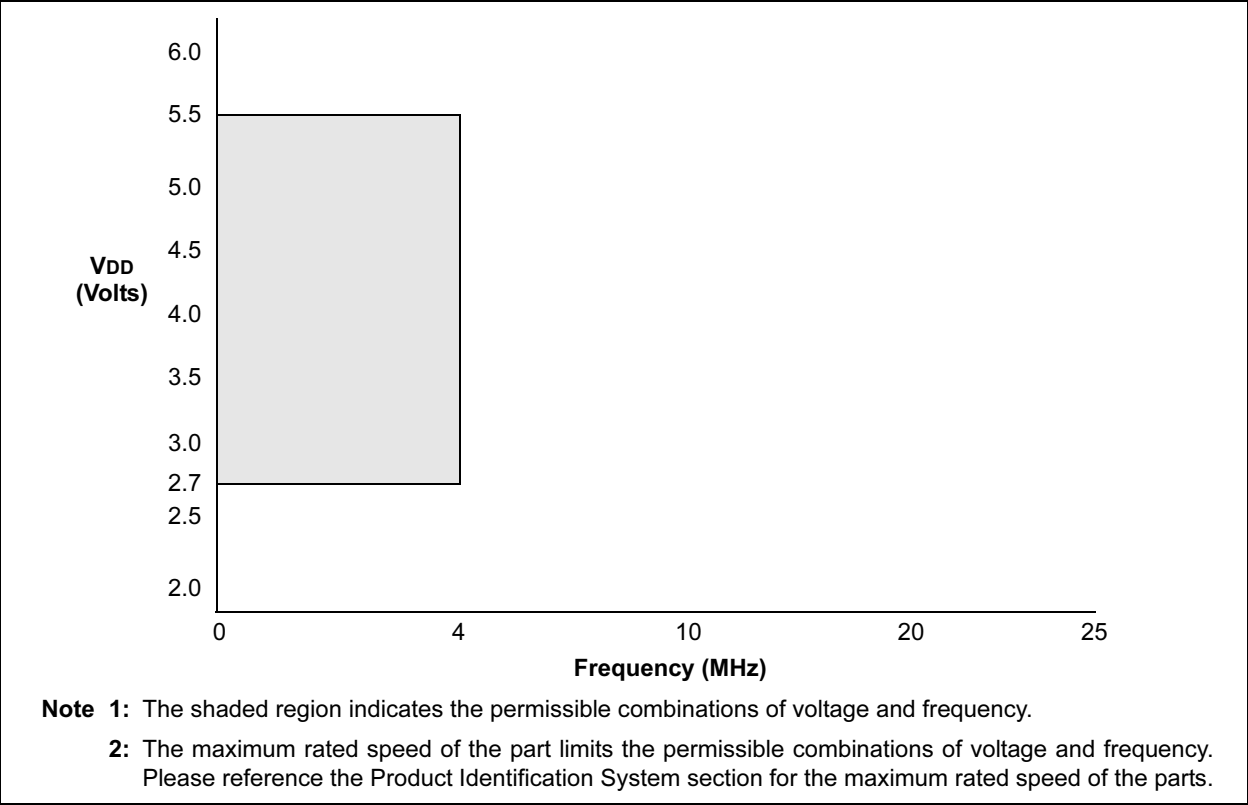
In addition to the PICDEM series of circuits, Microchip has a line of evaluation kits and demonstration software for these products.

- KEELOQ evaluation and programming tools for Microchip's HCS Secure Data Products
- CAN developers kit for automotive network applications
- Analog design boards and filter design software
- PowerSmart battery charging evaluation/calibration kits
- IrDA® development kit
- microID development and rLab™ development software
- SEEVAL® designer kit for memory evaluation and endurance calculations
- PICDEM MSC demo boards for Switching mode power supply, high power IR driver, delta sigma ADC, and flow rate sensor

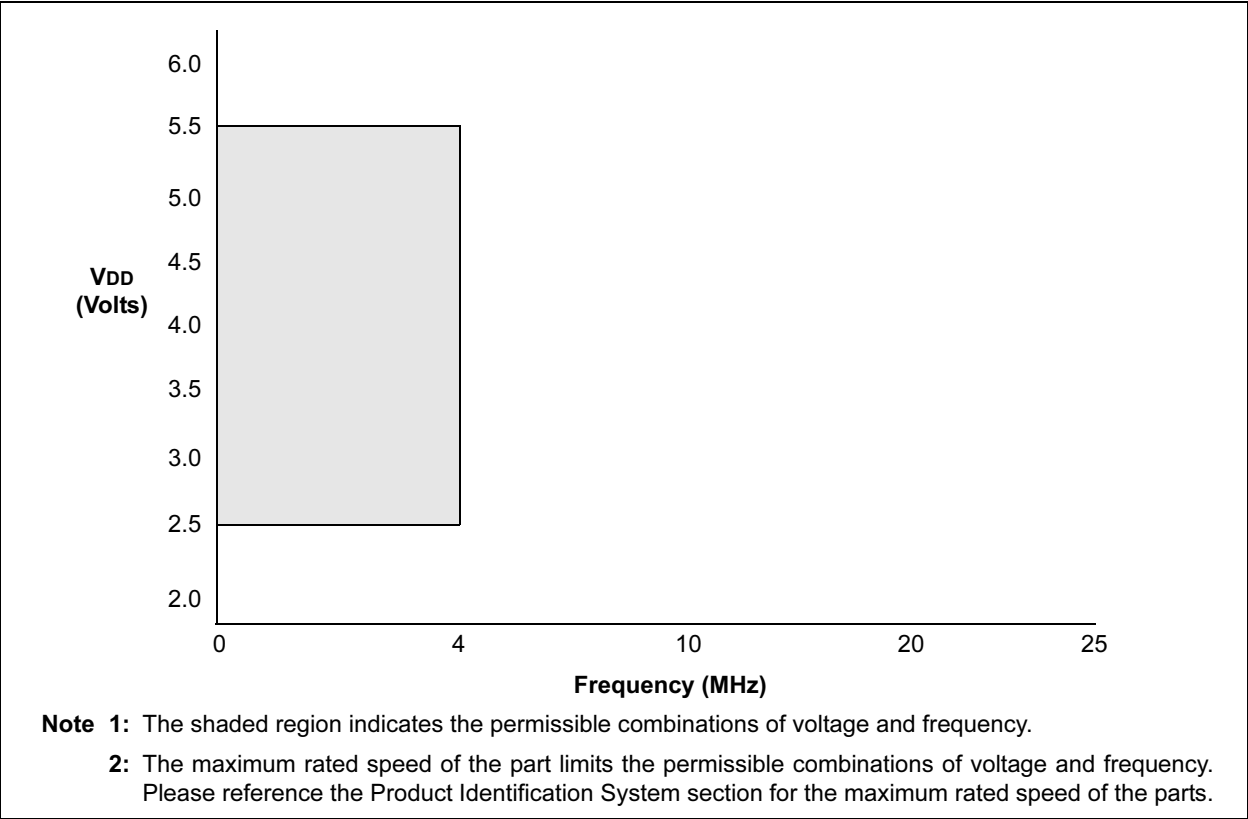
Check the Microchip web page and the latest Product Line Card for the complete list of demonstration and evaluation kits.

# PIC16C62X

**FIGURE 12-5: PIC16LC620A/LC621A/LC622A VOLTAGE-FREQUENCY GRAPH,  $-40^{\circ}\text{C} \leq T_A \leq 0^{\circ}\text{C}$**



**FIGURE 12-6: PIC16LC620A/LC621A/LC622A VOLTAGE-FREQUENCY GRAPH,  $0^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$**



# PIC16C62X

## 12.4 DC Characteristics: PIC16C62X/C62XA/CR62XA (Commercial, Industrial, Extended) PIC16LC62X/LC62XA/LCR62XA (Commercial, Industrial, Extended)

PIC16C62X/C62XA/CR62XA			Standard Operating Conditions (unless otherwise stated) Operating temperature $-40^{\circ}\text{C} \leq T_A \leq +85^{\circ}\text{C}$ for industrial and $0^{\circ}\text{C} \leq T_A \leq +70^{\circ}\text{C}$ for commercial and $-40^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$ for extended				
PIC16LC62X/LC62XA/LCR62XA			Standard Operating Conditions (unless otherwise stated) Operating temperature $-40^{\circ}\text{C} \leq T_A \leq +85^{\circ}\text{C}$ for industrial and $0^{\circ}\text{C} \leq T_A \leq +70^{\circ}\text{C}$ for commercial and $-40^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$ for extended				
Param. No.	Sym	Characteristic	Min	Typ†	Max	Units	Conditions
D030 D031 D032 D033	V <sub>IL</sub>	<b>Input Low Voltage</b> I/O ports					V <sub>DD</sub> = 4.5V to 5.5V otherwise  (Note 1)
		with TTL buffer	V <sub>SS</sub>	—	0.8V 0.15 V <sub>DD</sub>	V	
		with Schmitt Trigger input	V <sub>SS</sub>	—	0.2 V <sub>DD</sub>	V	
		$\overline{\text{MCLR}}$ , RA4/T0CKI, OSC1 (in RC mode)	V <sub>SS</sub>	—	0.2 V <sub>DD</sub>	V	
		OSC1 (in XT and HS) OSC1 (in LP)	V <sub>SS</sub> V <sub>SS</sub>	— —	0.3 V <sub>DD</sub> 0.6 V <sub>DD</sub> - 1.0	V V	
D030 D031 D032 D033	V <sub>IL</sub>	<b>Input Low Voltage</b> I/O ports					V <sub>DD</sub> = 4.5V to 5.5V otherwise  (Note 1)
		with TTL buffer	V <sub>SS</sub>	—	0.8V 0.15 V <sub>DD</sub>	V	
		with Schmitt Trigger input	V <sub>SS</sub>	—	0.2 V <sub>DD</sub>	V	
		$\overline{\text{MCLR}}$ , RA4/T0CKI, OSC1 (in RC mode)	V <sub>SS</sub>	—	0.2 V <sub>DD</sub>	V	
		OSC1 (in XT and HS) OSC1 (in LP)	V <sub>SS</sub> V <sub>SS</sub>	— —	0.3 V <sub>DD</sub> 0.6 V <sub>DD</sub> - 1.0	V V	
D040 D041 D042 D043 D043A	V <sub>IH</sub>	<b>Input High Voltage</b> I/O ports					V <sub>DD</sub> = 4.5V to 5.5V otherwise  (Note 1)
		with TTL buffer	2.0V 0.25 V <sub>DD</sub> + 0.8V	—	V <sub>DD</sub> V <sub>DD</sub>	V	
		with Schmitt Trigger input	0.8 V <sub>DD</sub>	—	V <sub>DD</sub>	V	
		$\overline{\text{MCLR}}$ RA4/T0CKI	0.8 V <sub>DD</sub>	—	V <sub>DD</sub>	V	
		OSC1 (XT, HS and LP) OSC1 (in RC mode)	0.7 V <sub>DD</sub> 0.9 V <sub>DD</sub>	— —	V <sub>DD</sub> V <sub>DD</sub>	V V	

\* These parameters are characterized but not tested.

† Data in "Typ" column is at 5V, 25°C unless otherwise stated. These parameters are for design guidance only and are not tested.

- Note 1:** In RC oscillator configuration, the OSC1 pin is a Schmitt Trigger input. It is not recommended that the PIC16C62X(A) be driven with external clock in RC mode.
- 2:** The leakage current on the  $\overline{\text{MCLR}}$  pin is strongly dependent on applied voltage level. The specified levels represent normal operating conditions. Higher leakage current may be measured at different input voltages.
- 3:** Negative current is defined as coming out of the pin.

# PIC16C62X

FIGURE 12-16:     TIMER0 CLOCK TIMING

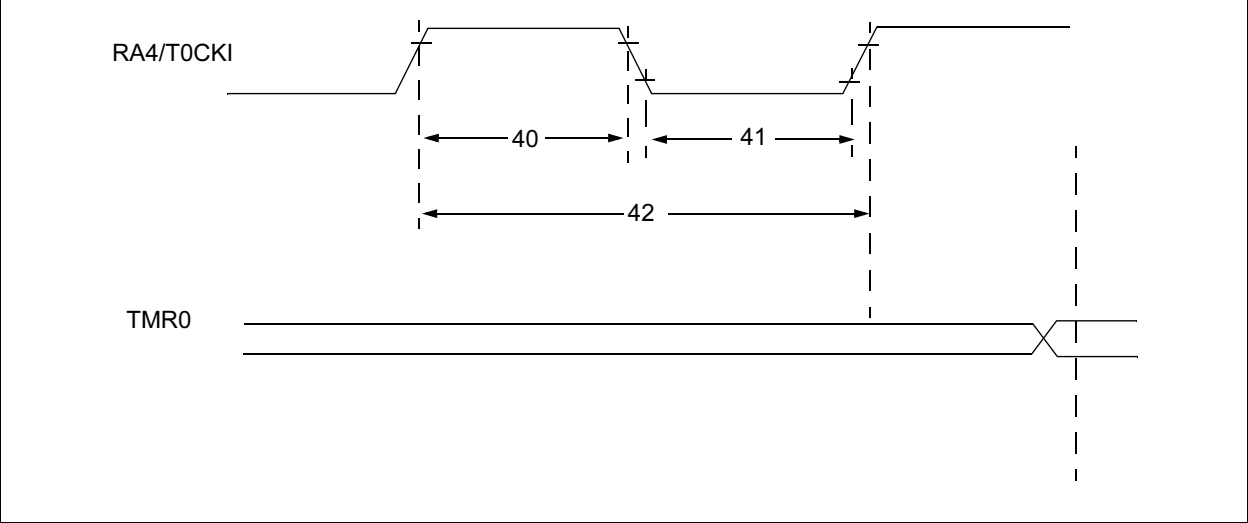


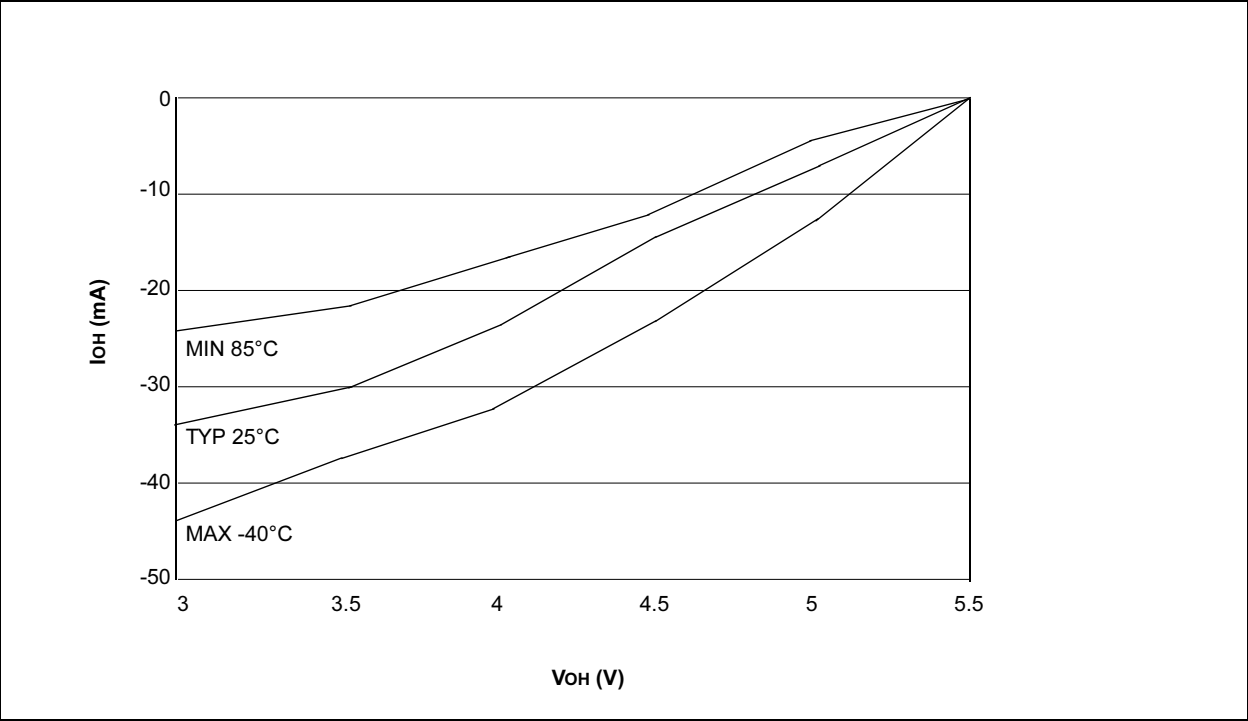
TABLE 12-6:     TIMER0 CLOCK REQUIREMENTS

Parameter No.	Sym	Characteristic		Min	Typ†	Max	Units	Conditions
40	Tt0H	T0CKI High Pulse Width	No Prescaler	$0.5 T_{CY} + 20^*$	—	—	ns	
			With Prescaler	$10^*$	—	—	ns	
41	Tt0L	T0CKI Low Pulse Width	No Prescaler	$0.5 T_{CY} + 20^*$	—	—	ns	
			With Prescaler	$10^*$	—	—	ns	
42	Tt0P	T0CKI Period		$\frac{T_{CY} + 40^*}{N}$	—	—	ns	N = prescale value (1, 2, 4, ..., 256)

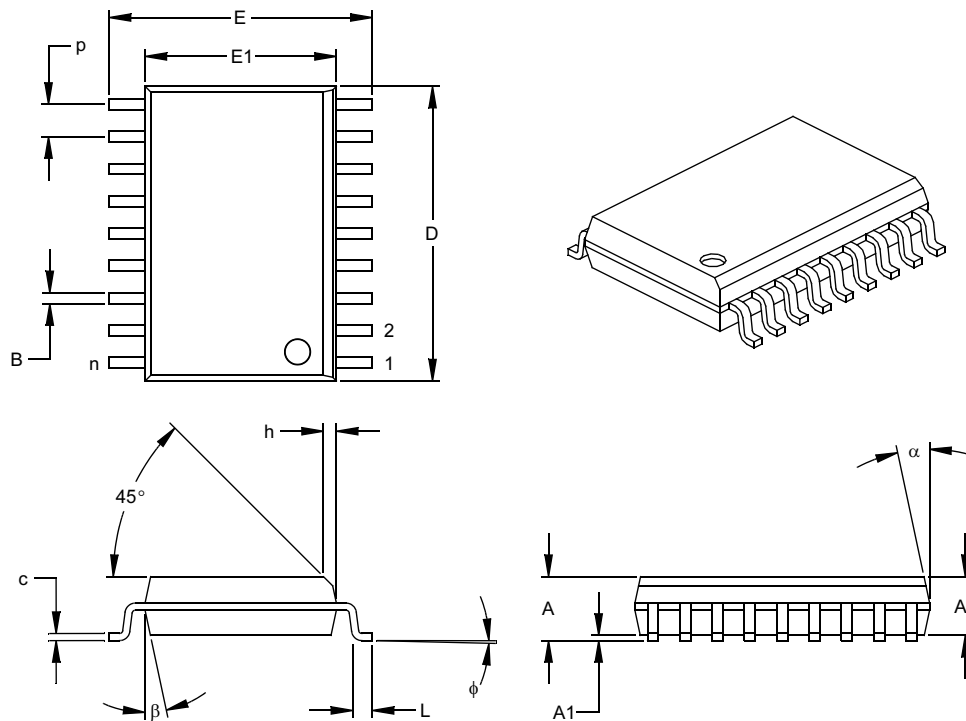
\* These parameters are characterized but not tested.  
† Data in "Typ" column is at 5.0V, 25°C, unless otherwise stated. These parameters are for design guidance only and are not tested.

# PIC16C62X

FIGURE 13-7:  $I_{OH}$  vs.  $V_{OH}$ ,  $V_{DD} = 5.5V$



## 18-Lead Plastic Small Outline (SO) – Wide, 300 mil (SOIC)



Units		INCHES*			MILLIMETERS		
Dimension Limits		MIN	NOM	MAX	MIN	NOM	MAX
Number of Pins	n		18			18	
Pitch	p		.050			1.27	
Overall Height	A	.093	.099	.104	2.36	2.50	2.64
Molded Package Thickness	A2	.088	.091	.094	2.24	2.31	2.39
Standoff §	A1	.004	.008	.012	0.10	0.20	0.30
Overall Width	E	.394	.407	.420	10.01	10.34	10.67
Molded Package Width	E1	.291	.295	.299	7.39	7.49	7.59
Overall Length	D	.446	.454	.462	11.33	11.53	11.73
Chamfer Distance	h	.010	.020	.029	0.25	0.50	0.74
Foot Length	L	.016	.033	.050	0.41	0.84	1.27
Foot Angle	φ	0	4	8	0	4	8
Lead Thickness	c	.009	.011	.012	0.23	0.27	0.30
Lead Width	B	.014	.017	.020	0.36	0.42	0.51
Mold Draft Angle Top	α	0	12	15	0	12	15
Mold Draft Angle Bottom	β	0	12	15	0	12	15

\* Controlling Parameter

§ Significant Characteristic

### Notes:

Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" (0.254mm) per side.

JEDEC Equivalent: MS-013

Drawing No. C04-051

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