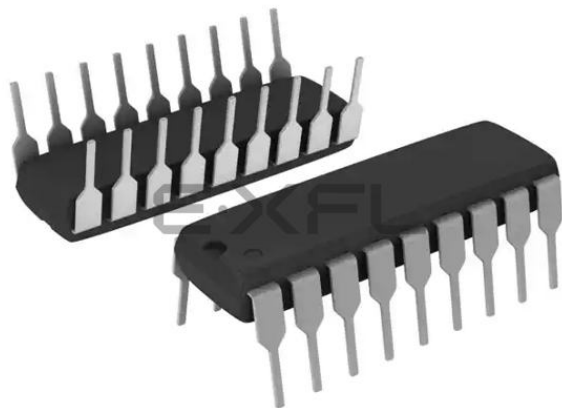




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Details

Product Status	Obsolete
Core Processor	PIC
Core Size	8-Bit
Speed	20MHz
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)	3V ~ 6V
Data Converters	-
Oscillator Type	External
Operating Temperature	0°C ~ 70°C (TA)
Mounting Type	Through Hole
Package / Case	18-DIP (0.300", 7.62mm)
Supplier Device Package	18-PDIP
Purchase URL	https://www.e-xfl.com/product-detail/microchip-technology/pic16c621-20-p

Table of Contents

1.0	General Description	5
2.0	PIC16C62X Device Varieties	7
3.0	Architectural Overview	9
4.0	Memory Organization	13
5.0	I/O Ports	25
6.0	Timer0 Module	31
7.0	Comparator Module	37
8.0	Voltage Reference Module	43
9.0	Special Features of the CPU	45
10.0	Instruction Set Summary	61
11.0	Development Support	75
12.0	Electrical Specifications	81
13.0	Device Characterization Information	109
14.0	Packaging Information	113
Appendix A: Enhancements		119
Appendix B: Compatibility		119
Index		121
On-Line Support		123
Systems Information and Upgrade Hot Line		123
Reader Response		124
Product Identification System		125

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PIC16C62X

NOTES:

PIC16C62X

TABLE 1-1: PIC16C62X FAMILY OF DEVICES

		PIC16C620 ⁽³⁾	PIC16C620A ⁽¹⁾⁽⁴⁾	PIC16CR620A ⁽²⁾	PIC16C621 ⁽³⁾	PIC16C621A ⁽¹⁾⁽⁴⁾	PIC16C622 ⁽³⁾	PIC16C622A ⁽¹⁾⁽⁴⁾
Clock	Maximum Frequency of Operation (MHz)	20	40	20	20	40	20	40
Memory	EPROM Program Memory (x14 words)	512	512	512	1K	1K	2K	2K
	Data Memory (bytes)	80	96	96	80	96	128	128
Peripherals	Timer Module(s)	TMR0	TMR0	TMRO	TMR0	TMR0	TMR0	TMR0
	Comparators(s)	2	2	2	2	2	2	2
	Internal Reference Voltage	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Features	Interrupt Sources	4	4	4	4	4	4	4
	I/O Pins	13	13	13	13	13	13	13
	Voltage Range (Volts)	2.5-6.0	2.7-5.5	2.5-5.5	2.5-6.0	2.7-5.5	2.5-6.0	2.7-5.5
	Brown-out Reset	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Packages	18-pin DIP, SOIC, 20-pin SSOP	18-pin DIP, SOIC, 20-pin SSOP	18-pin DIP, SOIC, 20-pin SSOP	18-pin DIP, SOIC, 20-pin SSOP	18-pin DIP, SOIC, 20-pin SSOP	18-pin DIP, SOIC, 20-pin SSOP	18-pin DIP, SOIC, 20-pin SSOP

All PICmicro[®] Family devices have Power-on Reset, selectable Watchdog Timer, selectable code protect and high I/O current capability. All PIC16C62X Family devices use serial programming with clock pin RB6 and data pin RB7.

- Note 1:** If you change from this device to another device, please verify oscillator characteristics in your application.
- 2:** For ROM parts, operation from 2.0V - 2.5V will require the PIC16LCR62XA parts.
- 3:** For OTP parts, operation from 2.5V - 3.0V will require the PIC16LC62X part.
- 4:** For OTP parts, operation from 2.7V - 3.0V will require the PIC16LC62XA part.

3.0 ARCHITECTURAL OVERVIEW

The high performance of the PIC16C62X family can be attributed to a number of architectural features commonly found in RISC microprocessors. To begin with, the PIC16C62X uses a Harvard architecture, in which, program and data are accessed from separate memories using separate busses. This improves bandwidth over traditional von Neumann architecture, where program and data are fetched from the same memory. Separating program and data memory further allows instructions to be sized differently than 8-bit wide data word. Instruction opcodes are 14-bits wide making it possible to have all single word instructions. A 14-bit wide program memory access bus fetches a 14-bit instruction in a single cycle. A two-stage pipeline overlaps fetch and execution of instructions. Consequently, all instructions (35) execute in a single cycle (200 ns @ 20 MHz) except for program branches.

The PIC16C620(A) and PIC16CR620A address 512 x 14 on-chip program memory. The PIC16C621(A) addresses 1K x 14 program memory. The PIC16C622(A) addresses 2K x 14 program memory. All program memory is internal.

The PIC16C62X can directly or indirectly address its register files or data memory. All special function registers including the program counter are mapped in the data memory. The PIC16C62X has an orthogonal (symmetrical) instruction set that makes it possible to carry out any operation on any register using any Addressing mode. This symmetrical nature and lack of 'special optimal situations' make programming with the PIC16C62X simple yet efficient. In addition, the learning curve is reduced significantly.

The PIC16C62X devices contain an 8-bit ALU and working register. The ALU is a general purpose arithmetic unit. It performs arithmetic and Boolean functions between data in the working register and any register file.

The ALU is 8-bits wide and capable of addition, subtraction, shift and logical operations. Unless otherwise mentioned, arithmetic operations are two's complement in nature. In two-operand instructions, typically one operand is the working register (W register). The other operand is a file register or an immediate constant. In single operand instructions, the operand is either the W register or a file register.

The W register is an 8-bit working register used for ALU operations. It is not an addressable register.

Depending on the instruction executed, the ALU may affect the values of the Carry (C), Digit Carry (DC), and Zero (Z) bits in the STATUS register. The C and DC bits operate as a Borrow and Digit Borrow out bit, respectively, bit in subtraction. See the `SUBLW` and `SUBWF` instructions for examples.

A simplified block diagram is shown in Figure 3-1, with a description of the device pins in Table 3-1.

4.2.2 SPECIAL FUNCTION REGISTERS

The Special Function Registers are registers used by the CPU and Peripheral functions for controlling the desired operation of the device (Table 4-1). These registers are static RAM.

The Special Function Registers can be classified into two sets (core and peripheral). The Special Function Registers associated with the “core” functions are described in this section. Those related to the operation of the peripheral features are described in the section of that peripheral feature.

TABLE 4-1: SPECIAL REGISTERS FOR THE PIC16C62X

Address	Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Value on POR Reset	Value on all other RESETS ⁽¹⁾
Bank 0											
00h	INDF	Addressing this location uses contents of FSR to address data memory (not a physical register)								xxxx xxxx	xxxx xxxx
01h	TMR0	Timer0 Module's Register								xxxx xxxx	uuuu uuuu
02h	PCL	Program Counter's (PC) Least Significant Byte								0000 0000	0000 0000
03h	STATUS	IRP ⁽²⁾	RP1 ⁽²⁾	RP0	$\overline{TO}$	$\overline{PD}$	Z	DC	C	0001 1xxx	000q quuu
04h	FSR	Indirect data memory address pointer								xxxx xxxx	uuuu uuuu
05h	PORTA	—	—	—	$\overline{RA4}$	$\overline{RA3}$	$\overline{RA2}$	$\overline{RA1}$	RA0	---x 0000	---u 0000
06h	PORTB	RB7	RB6	RB5	$\overline{RB4}$	$\overline{RB3}$	$\overline{RB2}$	$\overline{RB1}$	RB0	xxxx xxxx	uuuu uuuu
07h-09h	Unimplemented									—	—
0Ah	PCLATH	—	—	—	Write buffer for upper 5 bits of program counter					---0 0000	---0 0000
0Bh	INTCON	GIE	PEIE	TOIE	INTE	RBIE	TOIF	INTF	RBIF	0000 000x	0000 000u
0Ch	PIR1	—	CMIF	—	—	—	—	—	—	-0-- ----	-0-- ----
0Dh-1Eh	Unimplemented									—	—
1Fh	CMCON	C2OUT	C1OUT	—	—	CIS	CM2	CM1	CM0	00-- 0000	00-- 0000
Bank 1											
80h	INDF	Addressing this location uses contents of FSR to address data memory (not a physical register)								xxxx xxxx	xxxx xxxx
81h	OPTION	$\overline{RBPU}$	INTEDG	T0CS	T0SE	PSA	PS2	PS1	PS0	1111 1111	1111 1111
82h	PCL	Program Counter's (PC) Least Significant Byte								0000 0000	0000 0000
83h	STATUS	IRP ⁽²⁾	RP1 ⁽²⁾	RP0	$\overline{TO}$	$\overline{PD}$	Z	DC	C	0001 1xxx	000q quuu
84h	FSR	Indirect data memory address pointer								xxxx xxxx	uuuu uuuu
85h	TRISA	—	—	—	TRISA4	TRISA3	TRISA2	TRISA1	TRISA0	---1 1111	---1 1111
86h	TRISB	TRISB7	TRISB6	TRISB5	TRISB4	TRISB3	TRISB2	TRISB1	TRISB0	1111 1111	1111 1111
87h-89h	Unimplemented									—	—
8Ah	PCLATH	—	—	—	Write buffer for upper 5 bits of program counter					---0 0000	---0 0000
8Bh	INTCON	GIE	PEIE	TOIE	INTE	RBIE	TOIF	INTF	RBIF	0000 000x	0000 000u
8Ch	PIE1	—	CMIE	—	—	—	—	—	—	-0-- ----	-0-- ----
8Dh	Unimplemented									—	—
8Eh	PCON	—	—	—	—	—	—	POR	$\overline{BOR}$	---- -0x	---- -uq
8Fh-9Eh	Unimplemented									—	—
9Fh	VRCON	VREN	VROE	VRR	—	VR3	VR2	VR1	VR0	000- 0000	000- 0000

Legend: — = Unimplemented locations read as '0', u = unchanged, x = unknown,
q = value depends on condition, shaded = unimplemented

Note 1: Other (non Power-up) Resets include MCLR Reset, Brown-out Reset and Watchdog Timer Reset during normal operation.

2: IRP & RP1 bits are reserved; always maintain these bits clear.

PIC16C62X

4.4 Indirect Addressing, INDF and FSR Registers

The INDF register is not a physical register. Addressing the INDF register will cause indirect addressing.

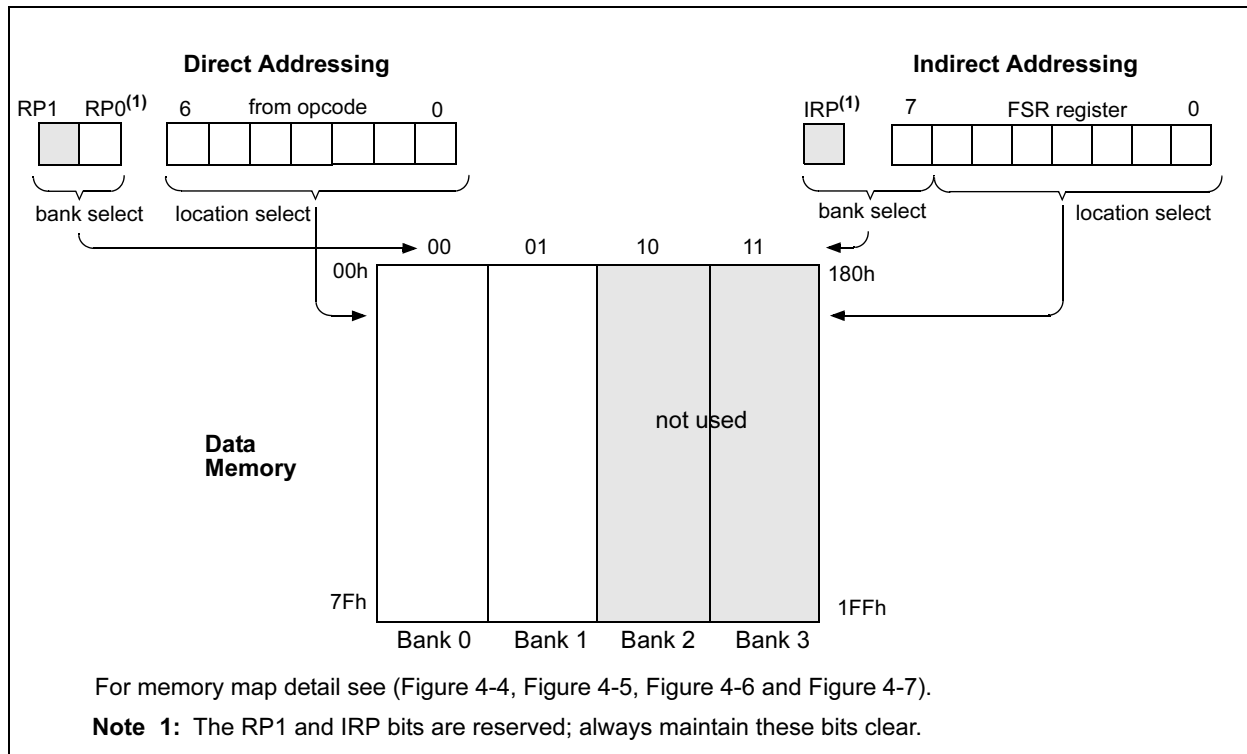
Indirect addressing is possible by using the INDF register. Any instruction using the INDF register actually accesses data pointed to by the File Select Register (FSR). Reading INDF itself indirectly will produce 00h. Writing to the INDF register indirectly results in a no-operation (although STATUS bits may be affected). An effective 9-bit address is obtained by concatenating the 8-bit FSR register and the IRP bit (STATUS<7>), as shown in Figure 4-9. However, IRP is not used in the PIC16C62X.

A simple program to clear RAM location 20h-7Fh using indirect addressing is shown in Example 4-1.

EXAMPLE 4-1: INDIRECT ADDRESSING

```
movlw 0x20      ;initialize pointer
movwf FSR       ;to RAM
NEXT clrf INDF   ;clear INDF register
      incf FSR   ;inc pointer
      btfss FSR,7 ;all done?
      goto NEXT  ;no clear next
                  ;yes continue
CONTINUE:
```

FIGURE 4-9: DIRECT/INDIRECT ADDRESSING PIC16C62X



8.0 VOLTAGE REFERENCE MODULE

The Voltage Reference is a 16-tap resistor ladder network that provides a selectable voltage reference. The resistor ladder is segmented to provide two ranges of VREF values and has a power-down function to conserve power when the reference is not being used. The VRCON register controls the operation of the reference as shown in Register 8-1. The block diagram is given in Figure 8-1.

8.1 Configuring the Voltage Reference

The Voltage Reference can output 16 distinct voltage levels for each range. The equations used to calculate the output of the Voltage Reference are as follows:

$$\text{if } VRR = 1: VREF = (VR<3:0>/24) \times VDD$$

$$\text{if } VRR = 0: VREF = (VDD \times 1/4) + (VR<3:0>/32) \times VDD$$

The setting time of the Voltage Reference must be considered when changing the VREF output (Table 12-1). Example 8-1 shows an example of how to configure the Voltage Reference for an output voltage of 1.25V with VDD = 5.0V.

REGISTER 8-1: VRCON REGISTER (ADDRESS 9Fh)

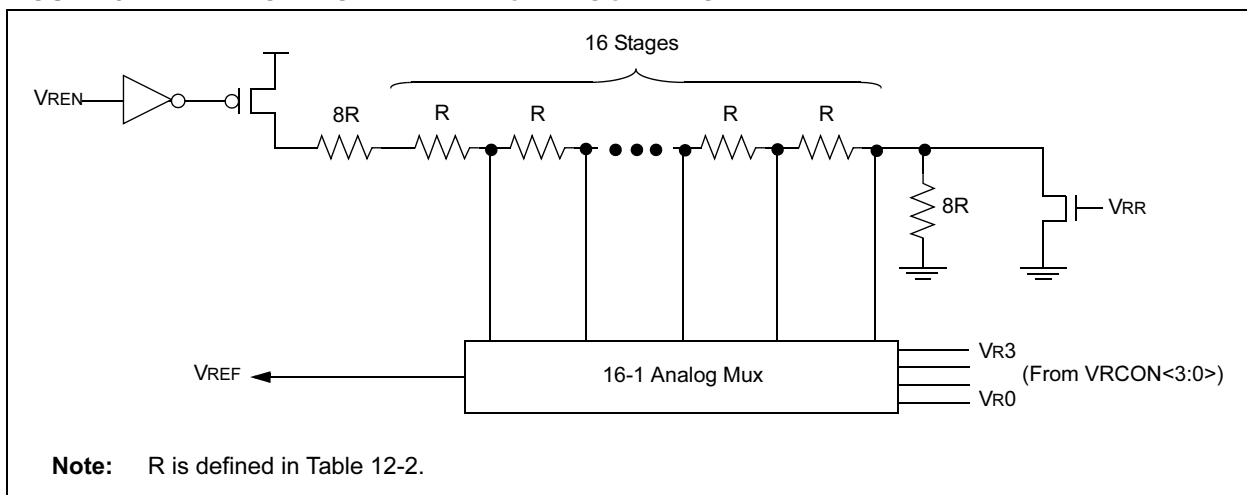
R/W-0	R/W-0	R/W-0	U-0	R/W-0	R/W-0	R/W-0	R/W-0
VREN	VROE	VRR	—	VR3	VR2	VR1	VR0
bit 7							bit 0

- bit 7 **VREN:** VREF Enable
 1 = VREF circuit powered on
 0 = VREF circuit powered down, no IDD drain
- bit 6 **VROE:** VREF Output Enable
 1 = VREF is output on RA2 pin
 0 = VREF is disconnected from RA2 pin
- bit 5 **VRR:** VREF Range selection
 1 = Low Range
 0 = High Range
- bit 4 **Unimplemented:** Read as '0'
- bit 3-0 **VR<3:0>:** VREF value selection $0 \leq VR[3:0] \leq 15$
 when VRR = 1: $VREF = (VR<3:0>/24) \times VDD$
 when VRR = 0: $VREF = 1/4 \times VDD + (VR<3:0>/32) \times VDD$

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

FIGURE 8-1: VOLTAGE REFERENCE BLOCK DIAGRAM



PIC16C62X

9.9 Code Protection

If the code protection bit(s) have not been programmed, the on-chip program memory can be read out for verification purposes.

Note: Microchip does not recommend code protecting windowed devices.

9.10 ID Locations

Four memory locations (2000h-2003h) are designated as ID locations where the user can store checksum or other code identification numbers. These locations are not accessible during normal execution, but are readable and writable during Program/Verify. Only the Least Significant 4 bits of the ID locations are used.

9.11 In-Circuit Serial Programming™

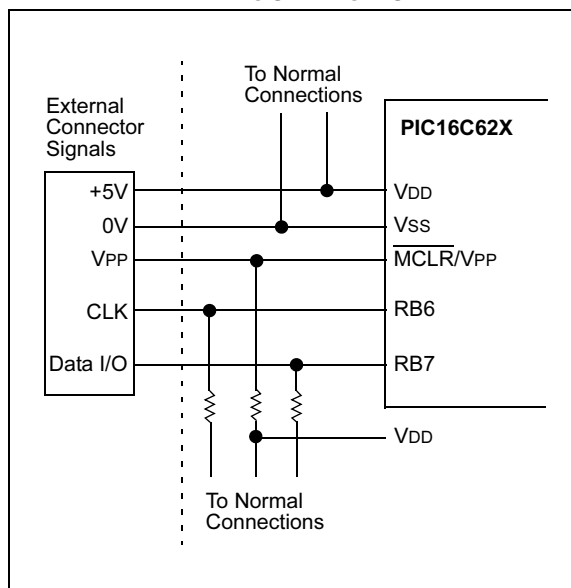
The PIC16C62X microcontrollers can be serially programmed while in the end application circuit. This is simply done with two lines for clock and data and three other lines for power, ground and the programming voltage. This allows customers to manufacture boards with unprogrammed devices and then program the microcontroller just before shipping the product. This also allows the most recent firmware or a custom firmware to be programmed.

The device is placed into a Program/Verify mode by holding the RB6 and RB7 pins low, while raising the MCLR (VPP) pin from VIL to VIH (see programming specification). RB6 becomes the programming clock and RB7 becomes the programming data. Both RB6 and RB7 are Schmitt Trigger inputs in this mode.

After RESET, to place the device into Programming/Verify mode, the program counter (PC) is at location 00h. A 6-bit command is then supplied to the device. Depending on the command, 14-bits of program data are then supplied to or from the device, depending if the command was a load or a read. For complete details of serial programming, please refer to the PIC16C6X/7X/9XX Programming Specification (DS30228).

A typical In-Circuit Serial Programming connection is shown in Figure 9-19.

FIGURE 9-19: TYPICAL IN-CIRCUIT SERIAL PROGRAMMING CONNECTION



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.

11.9 MPLAB ICE 2000 High Performance Universal In-Circuit Emulator

The MPLAB ICE 2000 universal in-circuit emulator is intended to provide the product development engineer with a complete microcontroller design tool set for PICmicro microcontrollers. Software control of the MPLAB ICE 2000 in-circuit emulator is advanced by the MPLAB Integrated Development Environment, which allows editing, building, downloading and source debugging from a single environment.

The MPLAB ICE 2000 is a full-featured emulator system with enhanced trace, trigger and data monitoring features. Interchangeable processor modules allow the system to be easily reconfigured for emulation of different processors. The universal architecture of the MPLAB ICE in-circuit emulator allows expansion to support new PICmicro microcontrollers.

The MPLAB ICE 2000 in-circuit emulator system has been designed as a real-time emulation system with advanced features that are typically found on more expensive development tools. The PC platform and Microsoft® Windows 32-bit operating system were chosen to best make these features available in a simple, unified application.

11.10 MPLAB ICE 4000 High Performance Universal In-Circuit Emulator

The MPLAB ICE 4000 universal in-circuit emulator is intended to provide the product development engineer with a complete microcontroller design tool set for high-end PICmicro microcontrollers. Software control of the MPLAB ICE in-circuit emulator is provided by the MPLAB Integrated Development Environment, which allows editing, building, downloading and source debugging from a single environment.

The MPLAB ICE 4000 is a premium emulator system, providing the features of MPLAB ICE 2000, but with increased emulation memory and high speed performance for dsPIC30F and PIC18XXXX devices. Its advanced emulator features include complex triggering and timing, up to 2 Mb of emulation memory, and the ability to view variables in real-time.

The MPLAB ICE 4000 in-circuit emulator system has been designed as a real-time emulation system with advanced features that are typically found on more expensive development tools. The PC platform and Microsoft Windows 32-bit operating system were chosen to best make these features available in a simple, unified application.

11.11 MPLAB ICD 2 In-Circuit Debugger

Microchip's In-Circuit Debugger, MPLAB ICD 2, is a powerful, low cost, run-time development tool, connecting to the host PC via an RS-232 or high speed USB interface. This tool is based on the FLASH PICmicro MCUs and can be used to develop for these and other PICmicro microcontrollers. The MPLAB ICD 2 utilizes the in-circuit debugging capability built into the FLASH devices. This feature, along with Microchip's In-Circuit Serial Programming™ (ICSP™) protocol, offers cost effective in-circuit FLASH debugging from the graphical user interface of the MPLAB Integrated Development Environment. This enables a designer to develop and debug source code by setting breakpoints, single-stepping and watching variables, CPU status and peripheral registers. Running at full speed enables testing hardware and applications in real-time. MPLAB ICD 2 also serves as a development programmer for selected PICmicro devices.

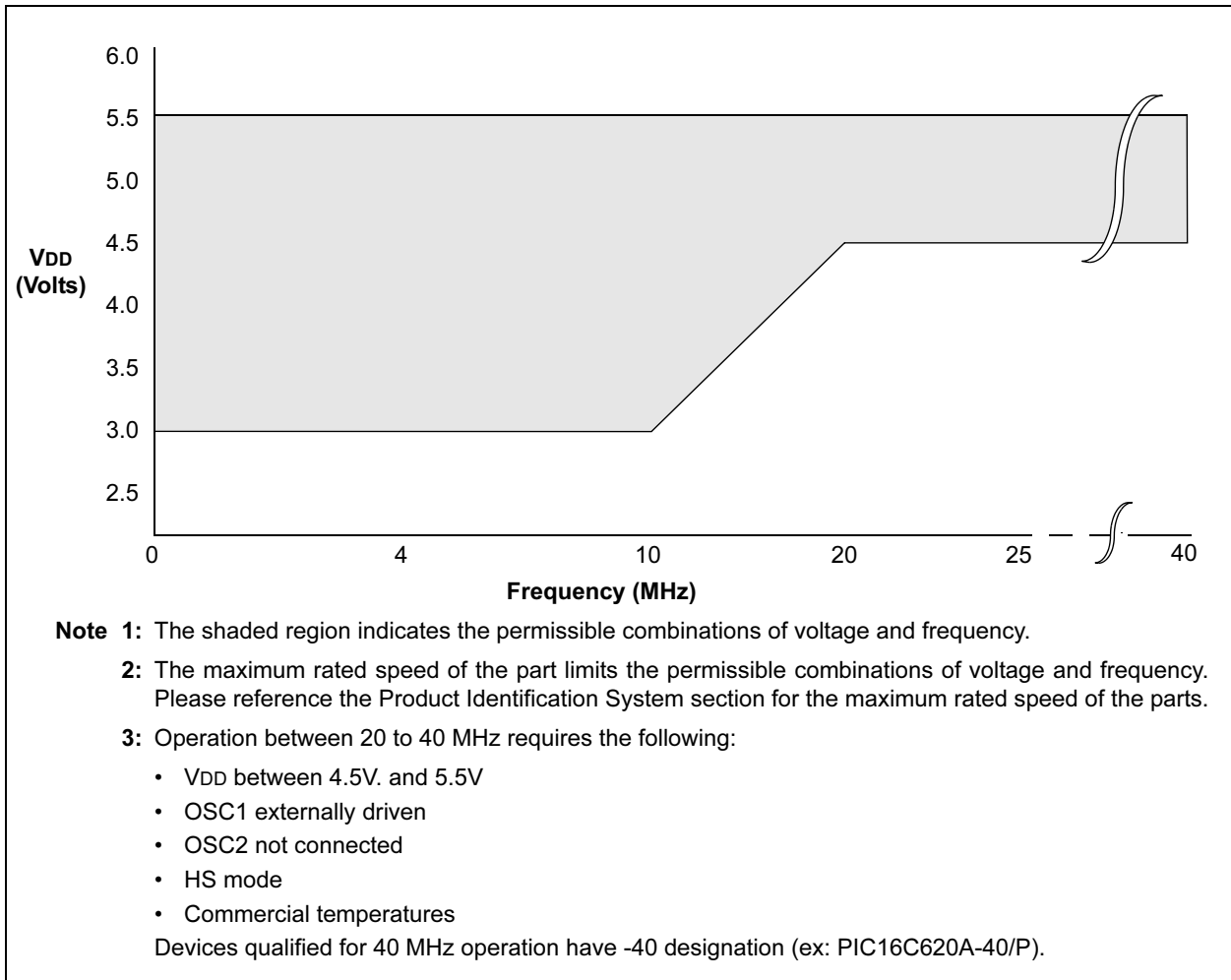
11.12 PRO MATE II Universal Device Programmer

The PRO MATE II is a universal, CE compliant device programmer with programmable voltage verification at VDDMIN and VDDMAX for maximum reliability. It features an LCD display for instructions and error messages and a modular detachable socket assembly to support various package types. In Stand-Alone mode, the PRO MATE II device programmer can read, verify, and program PICmicro devices without a PC connection. It can also set code protection in this mode.

11.13 PICSTART Plus Development Programmer

The PICSTART Plus development programmer is an easy-to-use, low cost, prototype programmer. It connects to the PC via a COM (RS-232) port. MPLAB Integrated Development Environment software makes using the programmer simple and efficient. The PICSTART Plus development programmer supports most PICmicro devices up to 40 pins. Larger pin count devices, such as the PIC16C92X and PIC17C76X, may be supported with an adapter socket. The PICSTART Plus development programmer is CE compliant.

FIGURE 12-10: PIC16C620A/C621A/C622A/CR620A - 40 VOLTAGE-FREQUENCY GRAPH, $0^{\circ}\text{C} \leq T_A \leq +70^{\circ}\text{C}$



PIC16C62X

12.2 DC Characteristics: PIC16C62XA-04 (Commercial, Industrial, Extended) PIC16C62XA-20 (Commercial, Industrial, Extended) PIC16LC62XA-04 (Commercial, Industrial, Extended)

PIC16C62XA		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					
PIC16LC62XA		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
D001	VDD	Supply Voltage	3.0	—	5.5	V	See Figures 12-1, 12-2, 12-3, 12-4, and 12-5
D001	VDD	Supply Voltage	2.5	—	5.5	V	See Figures 12-1, 12-2, 12-3, 12-4, and 12-5
D002	VDR	RAM Data Retention Voltage ⁽¹⁾	—	1.5*	—	V	Device in SLEEP mode
D002	VDR	RAM Data Retention Voltage ⁽¹⁾	—	1.5*	—	V	Device in SLEEP mode
D003	VPOR	VDD start voltage to ensure Power-on Reset	—	VSS	—	V	See section on Power-on Reset for details
D003	VPOR	VDD start voltage to ensure Power-on Reset	—	VSS	—	V	See section on Power-on Reset for details
D004	SVDD	VDD rise rate to ensure Power-on Reset	0.05*	—	—	V/ms	See section on Power-on Reset for details
D004	SVDD	VDD rise rate to ensure Power-on Reset	0.05*	—	—	V/ms	See section on Power-on Reset for details
D005	VBOR	Brown-out Detect Voltage	3.7	4.0	4.35	V	BOREN configuration bit is cleared
D005	VBOR	Brown-out Detect Voltage	3.7	4.0	4.35	V	BOREN configuration bit is cleared

* 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: This is the limit to which VDD can be lowered without losing RAM data.

2: The supply current is mainly a function of the operating voltage and frequency. Other factors such as I/O pin loading and switching rate, oscillator type, internal code execution pattern, and temperature also have an impact on the current consumption.

The test conditions for all IDD measurements in Active Operation mode are:

OSC1 = external square wave, from rail to rail; all I/O pins tri-stated, pulled to VDD,

MCLR = VDD; WDT enabled/disabled as specified.

3: The power-down current in SLEEP mode does not depend on the oscillator type. Power-down current is measured with the part in SLEEP mode, with all I/O pins in hi-impedance state and tied to VDD or VSS.

4: For RC osc configuration, current through REXT is not included. The current through the resistor can be estimated by the formula: $I_r = V_{DD}/2R_{EXT}$ (mA) with REXT in kΩ.

5: The Δ current is the additional current consumed when this peripheral is enabled. This current should be added to the base IDD or IPD measurement.

6: Commercial temperature range only.

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

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
D040	V _{IH}	Input High Voltage I/O ports with TTL buffer	2.0V 0.25 V _{DD} + 0.8V	—	V _{DD} V _{DD}	V	V _{DD} = 4.5V to 5.5V otherwise (Note 1)
D041		with Schmitt Trigger input	0.8 V _{DD}	—	V _{DD}	V	
D042		MCLR RA4/T0CKI	0.8 V _{DD}	—	V _{DD}	V	
D043 D043A		OSC1 (XT, HS and LP) OSC1 (in RC mode)	0.7 V _{DD} 0.9 V _{DD}	—	V _{DD}	V	
D070	IPURB	PORTB weak pull-up current	50	200	400	μA	V _{DD} = 5.0V, V _{PIN} = V _{SS}
D070	IPURB	PORTB weak pull-up current	50	200	400	μA	V _{DD} = 5.0V, V _{PIN} = V _{SS}
D060	I _{IL}	Input Leakage Current ^(2, 3) I/O ports (Except PORTA)	—	—	±1.0	μA	V _{SS} ≤ V _{PIN} ≤ V _{DD} , pin at hi-impedance
D061		PORTA	—	—	±0.5	μA	V _{SS} ≤ V _{PIN} ≤ V _{DD} , pin at hi-impedance
D063		RA4/T0CKI	—	—	±1.0	μA	V _{SS} ≤ V _{PIN} ≤ V _{DD}
D063		OSC1, MCLR	—	—	±5.0	μA	V _{SS} ≤ V _{PIN} ≤ V _{DD} , XT, HS and LP osc configuration
D060	I _{IL}	Input Leakage Current ^(2, 3) I/O ports (Except PORTA)	—	—	±1.0	μA	V _{SS} ≤ V _{PIN} ≤ V _{DD} , pin at hi-impedance
D061		PORTA	—	—	±0.5	μA	V _{SS} ≤ V _{PIN} ≤ V _{DD} , pin at hi-impedance
D063		RA4/T0CKI	—	—	±1.0	μA	V _{SS} ≤ V _{PIN} ≤ V _{DD}
D063		OSC1, MCLR	—	—	±5.0	μA	V _{SS} ≤ V _{PIN} ≤ V _{DD} , XT, HS and LP osc configuration
D080	V _{OL}	Output Low Voltage I/O ports	—	—	0.6	V	I _{OL} = 8.5 mA, V _{DD} = 4.5V, -40° to $+85^{\circ}\text{C}$
D083		OSC2/CLKOUT (RC only)	—	—	0.6	V	I _{OL} = 7.0 mA, V _{DD} = 4.5V, $+125^{\circ}\text{C}$
D083		OSC2/CLKOUT (RC only)	—	—	0.6	V	I _{OL} = 1.6 mA, V _{DD} = 4.5V, -40° to $+85^{\circ}\text{C}$
D083		OSC2/CLKOUT (RC only)	—	—	0.6	V	I _{OL} = 1.2 mA, V _{DD} = 4.5V, $+125^{\circ}\text{C}$

* 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 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.

FIGURE 12-14: RESET, WATCHDOG TIMER, OSCILLATOR START-UP TIMER AND POWER-UP TIMER TIMING

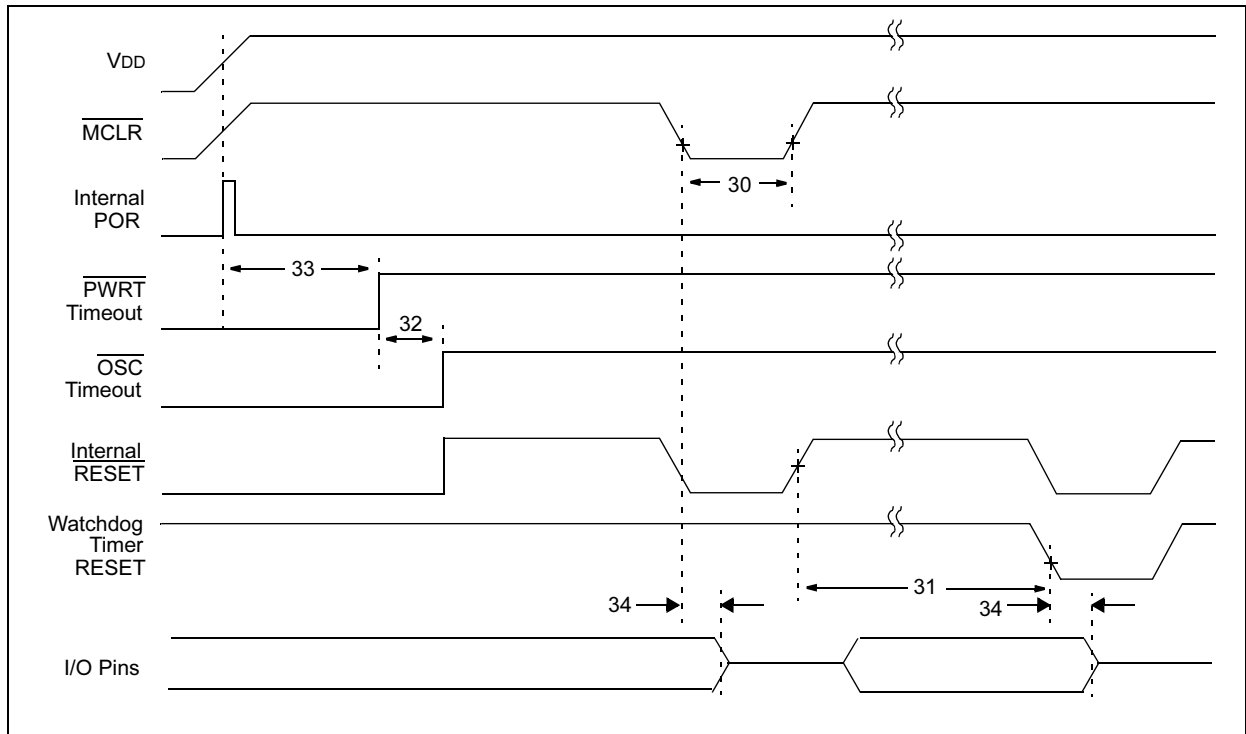


FIGURE 12-15: BROWN-OUT RESET TIMING

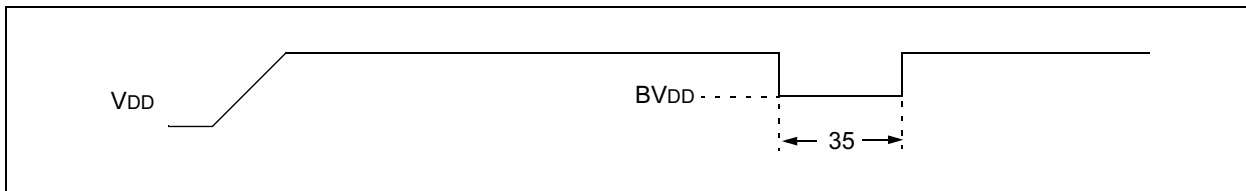


TABLE 12-5: RESET, WATCHDOG TIMER, OSCILLATOR START-UP TIMER AND POWER-UP TIMER REQUIREMENTS

Parameter No.	Sym	Characteristic	Min	Typ†	Max	Units	Conditions
30	Tmcl	MCLR Pulse Width (low)	2000	—	—	ns	-40° to +85°C
31	Twdt	Watchdog Timer Time-out Period (No Prescaler)	7*	18	33*	ms	VDD = 5.0V, -40° to +85°C
32	Tost	Oscillation Start-up Timer Period	—	1024 TOSC	—	—	TOSC = OSC1 period
33	Tpwrt	Power-up Timer Period	28*	72	132*	ms	VDD = 5.0V, -40° to +85°C
34	TIOZ	I/O hi-impedance from MCLR low	—	—	2.0	μs	
35	TBOR	Brown-out Reset Pulse Width	100*	—	—	μs	3.7V ≤ VDD ≤ 4.3V

* 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 12-16: TIMER0 CLOCK TIMING

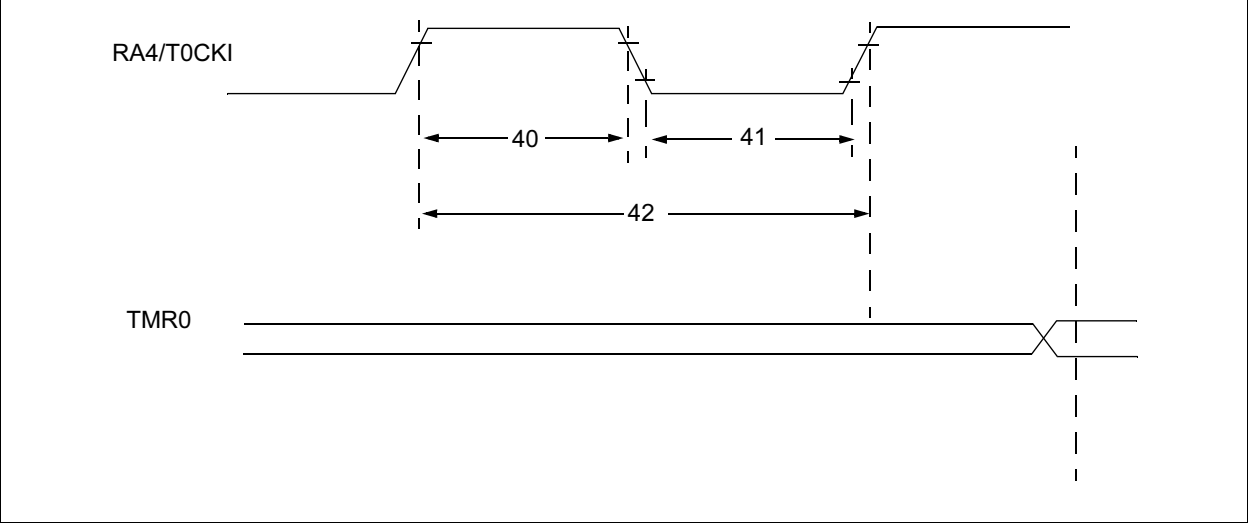


TABLE 12-6: TIMER0 CLOCK REQUIREMENTS

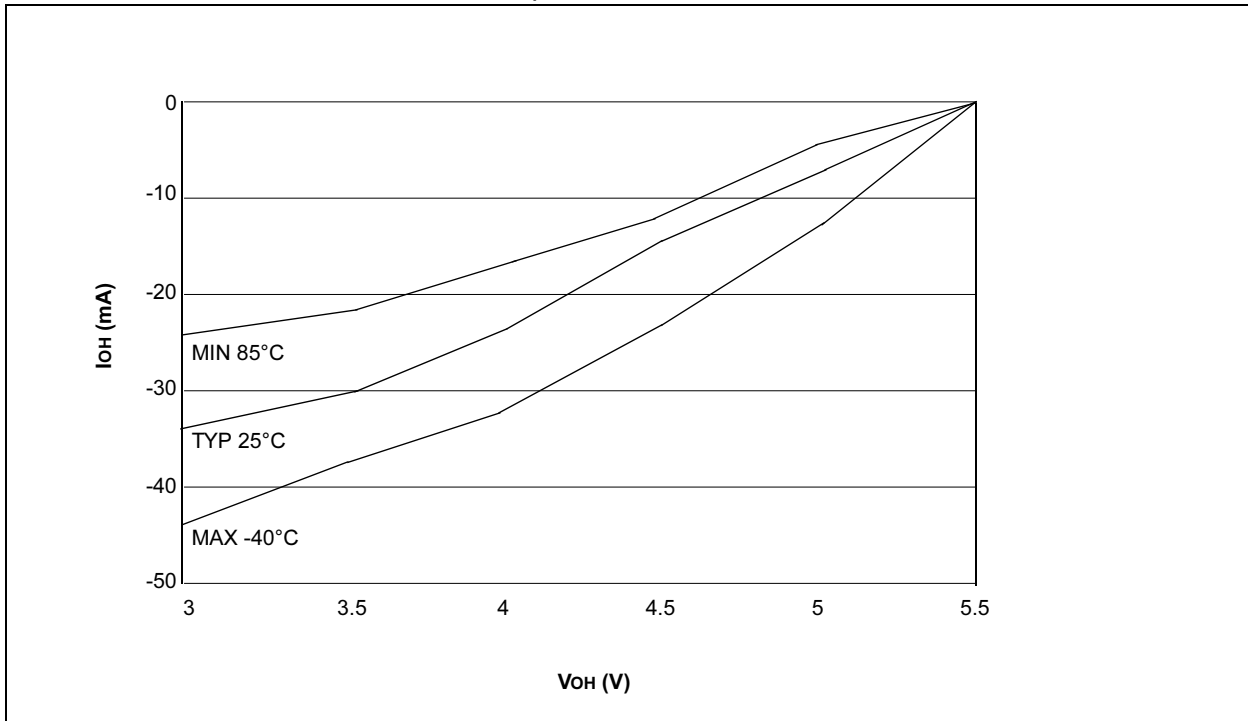
Parameter No.	Sym	Characteristic		Min	Typ†	Max	Units	Conditions
40	Tt0H	T0CKI High Pulse Width	No Prescaler	0.5 TcY + 20*	—	—	ns	
			With Prescaler	10*	—	—	ns	
41	Tt0L	T0CKI Low Pulse Width	No Prescaler	0.5 TcY + 20*	—	—	ns	
			With Prescaler	10*	—	—	ns	
42	Tt0P	T0CKI Period		$\frac{TcY + 40^*}{N}$	—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

* These parameters are characterized but not tested.

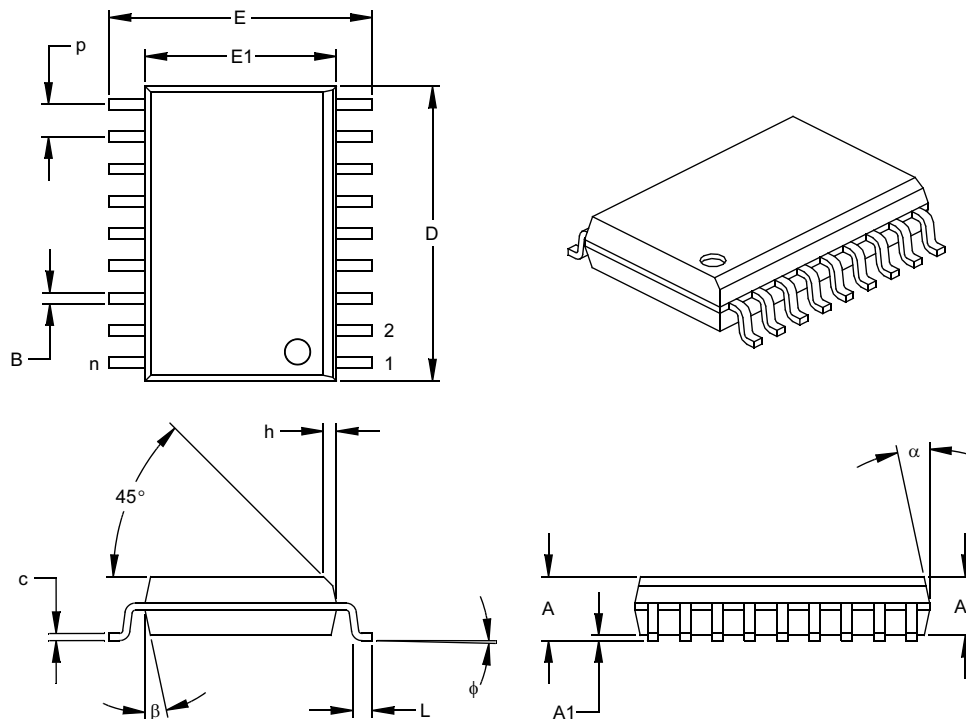
† Data in "Typ" column is at 5.0V, 25°C, unless otherwise stated. These parameters are for design guidance only and are not tested.

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:

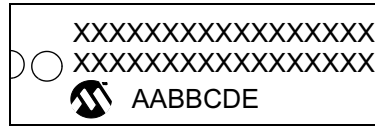
Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" (0.254mm) per side.

JEDEC Equivalent: MS-013

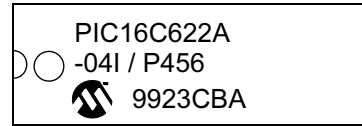
Drawing No. C04-051

14.1 Package Marking Information

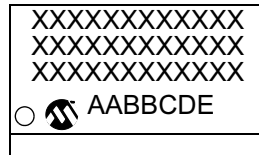
18-Lead PDIP



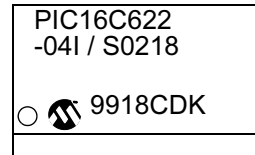
Example



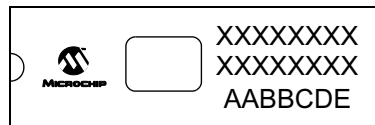
18-Lead SOIC (.300")



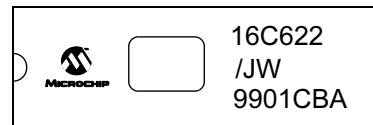
Example



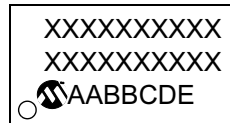
18-Lead Cerdip Windowed



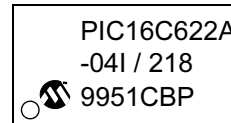
Example



20-Lead SSOP



Example



Legend: XX...X Customer specific information*
 Y Year code (last digit of calendar year)
 YY Year code (last 2 digits of calendar year)
 WW Week code (week of January 1 is week '01')
 NNN Alphanumeric traceability code

Note: In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line thus limiting the number of available characters for customer specific information.

* Standard PICmicro device marking consists of Microchip part number, year code, week code, and traceability code. For PICmicro device marking beyond this, certain price adders apply. Please check with your Microchip Sales Office. For QTP devices, any special marking adders are included in QTP price.

PIC16C62X

N

NOP Instruction 69

O

One-Time-Programmable (OTP) Devices 7

OPTION Instruction 69

OPTION Register 19

Oscillator Configurations 47

Oscillator Start-up Timer (OST) 50

P

Package Marking Information 117

Packaging Information 113

PCL and PCLATH 23

PCON Register 22

PICKit 1 FLASH Starter Kit 79

PICSTART Plus Development Programmer 77

PIE1 Register 21

PIR1 Register 21

Port RB Interrupt 56

PORTA 25

PORTB 28

Power Control/Status Register (PCON) 51

Power-Down Mode (SLEEP) 59

Power-On Reset (POR) 50

Power-up Timer (PWRT) 50

Prescaler 34

PRO MATE II Universal Device Programmer 77

Program Memory Organization 13

Q

Quick-Turnaround-Production (QTP) Devices 7

R

RC Oscillator 48

Reset 49

RETFIE Instruction 70

RETLW Instruction 70

RETURN Instruction 70

RLF Instruction 71

RRF Instruction 71

S

Serialized Quick-Turnaround-Production (SQTP) Devices ... 7

SLEEP Instruction 71

Software Simulator (MPLAB SIM) 76

Software Simulator (MPLAB SIM30) 76

Special Features of the CPU 45

Special Function Registers 17

Stack 23

Status Register 18

SUBLW Instruction 72

SUBWF Instruction 72

SWAPF Instruction 73

T

Timer0

TIMER0 31

TIMER0 (TMR0) Interrupt 31

TIMER0 (TMR0) Module 31

TMR0 with External Clock 33

Timer1

Switching Prescaler Assignment 35

Timing Diagrams and Specifications 104

TMR0 Interrupt 56

TRIS Instruction 73

TRISA 25

TRISB 28

V

Voltage Reference Module 43

VRCON Register 43

W

Watchdog Timer (WDT) 58

WWW, On-Line Support 3

X

XORLW Instruction 73

XORWF Instruction 73



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