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"[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	Active
Core Processor	PIC
Core Size	8-Bit
Speed	40MHz
Connectivity	-
Peripherals	POR, WDT
Number of I/O	12
Program Memory Size	768B (512 x 12)
Program Memory Type	OTP
EEPROM Size	-
RAM Size	25 x 8
Voltage - Supply (Vcc/Vdd)	4.5V ~ 5.5V
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/pic16c54c-40-p

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2.0 PIC16C5X 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 this section. When placing orders, please use the PIC16C5X Product Identification System at the back of this data sheet to specify the correct part number.

For the PIC16C5X family of devices, there are four device types, as indicated in the device number:

1. **C**, as in PIC16**C**54C. These devices have EPROM program memory and operate over the standard voltage range.
2. **LC**, as in PIC16**LC**54A. These devices have EPROM program memory and operate over an extended voltage range.
3. **CR**, as in PIC16**CR**54A. These devices have ROM program memory and operate over the standard voltage range.
4. **LCR**, as in PIC16**LCR**54A. These devices have ROM program memory and operate over an extended voltage range.

2.1 UV Erasable Devices (EPROM)

The UV erasable versions offered in Cerdip packages, are optimal for prototype development and pilot programs.

UV erasable devices can be programmed for any of the four oscillator configurations. Microchip's PICSTART® Plus⁽¹⁾ and PRO MATE® programmers both support programming of the PIC16C5X. Third party programmers also are available. Refer to the Third Party Guide (DS00104) for a list of sources.

2.2 One-Time-Programmable (OTP) Devices

The availability of OTP devices is especially useful for customers expecting frequent code changes and updates, or small volume applications.

The OTP devices, packaged in plastic packages, permit the user to program them once. In addition to the program memory, the configuration bits must be programmed.

Note 1: PIC16LC54C and PIC16C54A devices require OSC2 not to be connected while programming with PICSTART® Plus programmer.

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 choose 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 bit 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 (SQTPSM) Devices

Microchip offers the 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. The devices are identical to the OTP devices but with all EPROM locations and configuration bit options already programmed by the factory.

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

2.5 Read Only Memory (ROM) Devices

Microchip offers masked ROM versions of several of the highest volume parts, giving the customer a low cost option for high volume, mature products.

4.0 OSCILLATOR CONFIGURATIONS

4.1 Oscillator Types

PIC16C5Xs can be operated in four different oscillator modes. The user can program two configuration bits (FOSC1:FOSC0) to select one of these four modes:

1. LP: Low Power Crystal
2. XT: Crystal/Resonator
3. HS: High Speed Crystal/Resonator
4. RC: Resistor/Capacitor

Note: Not all oscillator selections available for all parts. See Section 9.1.

4.2 Crystal Oscillator/Ceramic Resonators

In XT, LP or HS modes, a crystal or ceramic resonator is connected to the OSC1/CLKIN and OSC2/CLKOUT pins to establish oscillation (Figure 4-1). The PIC16C5X oscillator design requires the use of a parallel cut crystal. Use of a series cut crystal may give a frequency out of the crystal manufacturers specifications. When in XT, LP or HS modes, the device can have an external clock source drive the OSC1/CLKIN pin (Figure 4-2).

FIGURE 4-1: CRYSTAL/CERAMIC RESONATOR OPERATION (HS, XT OR LP OSC CONFIGURATION)

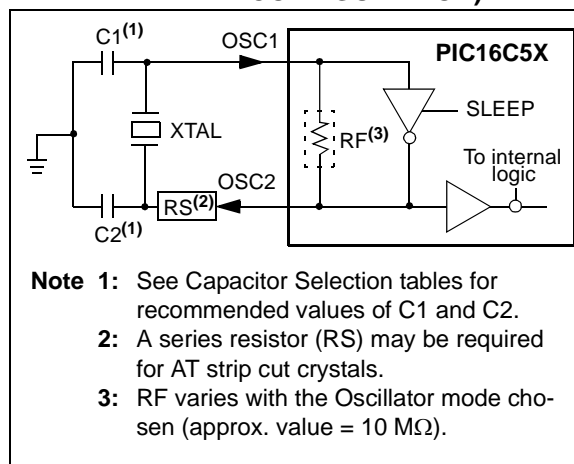


FIGURE 4-2: EXTERNAL CLOCK INPUT OPERATION (HS, XT OR LP OSC CONFIGURATION)

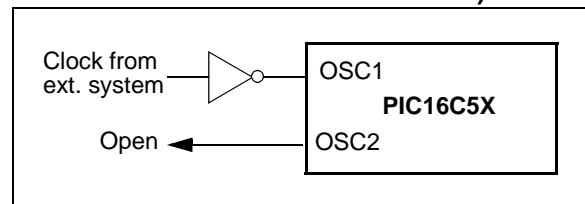


TABLE 4-1: CAPACITOR SELECTION FOR CERAMIC RESONATORS - PIC16C5X, PIC16CR5X

Osc Type	Resonator Freq	Cap. Range C1	Cap. Range C2
XT	455 kHz	68-100 pF	68-100 pF
	2.0 MHz	15-33 pF	15-33 pF
	4.0 MHz	10-22 pF	10-22 pF
HS	8.0 MHz	10-22 pF	10-22 pF
	16.0 MHz	10 pF	10 pF

These values are for design guidance only. Since each resonator has its own characteristics, the user should consult the resonator manufacturer for appropriate values of external components.

TABLE 4-2: CAPACITOR SELECTION FOR CRYSTAL OSCILLATOR - PIC16C5X, PIC16CR5X

Osc Type	Crystal Freq	Cap. Range C1	Cap. Range C2
LP	32 kHz ⁽¹⁾	15 pF	15 pF
XT	100 kHz	15-30 pF	200-300 pF
	200 kHz	15-30 pF	100-200 pF
	455 kHz	15-30 pF	15-100 pF
	1 MHz	15-30 pF	15-30 pF
	2 MHz	15 pF	15 pF
	4 MHz	15 pF	15 pF
HS	4 MHz	15 pF	15 pF
	8 MHz	15 pF	15 pF
	20 MHz	15 pF	15 pF

Note 1: For VDD > 4.5V, C1 = C2 ≈ 30 pF is recommended.

These values are for design guidance only. Rs may be required in HS mode as well as XT mode to avoid overdriving crystals with low drive level specification. Since each crystal has its own characteristics, the user should consult the crystal manufacturer for appropriate values of external components.

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

5.1 Power-On Reset (POR)

The PIC16C5X family incorporates on-chip Power-On Reset (POR) circuitry which provides an internal chip RESET for most power-up situations. To use this feature, the user merely ties the $\overline{\text{MCLR}}/\text{VPP}$ pin to VDD . A simplified block diagram of the on-chip Power-On Reset circuit is shown in Figure 5-1.

The Power-On Reset circuit and the Device Reset Timer (Section 5.2) circuit are closely related. On power-up, the RESET latch is set and the DRT is RESET. The DRT timer begins counting once it detects $\overline{\text{MCLR}}$ to be high. After the time-out period, which is typically 18 ms, it will RESET the reset latch and thus end the on-chip RESET signal.

A power-up example where $\overline{\text{MCLR}}$ is not tied to VDD is shown in Figure 5-3. VDD is allowed to rise and stabilize before bringing $\overline{\text{MCLR}}$ high. The chip will actually come out of reset T_{DRT} msec after $\overline{\text{MCLR}}$ goes high.

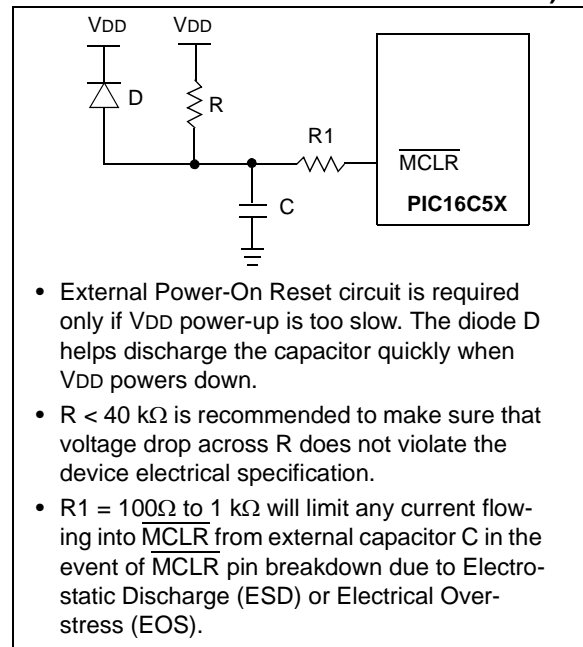
In Figure 5-4, the on-chip Power-On Reset feature is being used ($\overline{\text{MCLR}}$ and VDD are tied together). The VDD is stable before the start-up timer times out and there is no problem in getting a proper RESET. However, Figure 5-5 depicts a problem situation where VDD rises too slowly. The time between when the DRT senses a high on the $\overline{\text{MCLR}}/\text{VPP}$ pin, and when the $\overline{\text{MCLR}}/\text{VPP}$ pin (and VDD) actually reach their full value, is too long. In this situation, when the start-up timer times out, VDD has not reached the $\text{VDD}(\text{min})$ value and the chip is, therefore, not guaranteed to function correctly. For such situations, we recommend that external RC circuits be used to achieve longer POR delay times (Figure 5-2).

Note: When the device starts normal operation (exits the RESET condition), device operating parameters (voltage, frequency, temperature, etc.) must be met to ensure operation. If these conditions are not met, the device must be held in RESET until the operating conditions are met.

For more information on PIC16C5X POR, see *Power-Up Considerations* - AN522 in the [Embedded Control Handbook](#).

The POR circuit does not produce an internal RESET when VDD declines.

FIGURE 5-2: EXTERNAL POWER-ON RESET CIRCUIT (FOR SLOW VDD POWER-UP)



PIC16C5X

NOTES:

PIC16C5X

NOTES:

9.0 SPECIAL FEATURES OF THE CPU

What sets a microcontroller apart from other processors are special circuits that deal with the needs of real-time applications. The PIC16C5X family of microcontrollers have 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 features are:

- Oscillator Selection (Section 4.0)
- RESET (Section 5.0)
- Power-On Reset (Section 5.1)
- Device Reset Timer (Section 5.2)
- Watchdog Timer (WDT) (Section 9.2)
- SLEEP (Section 9.3)
- Code protection (Section 9.4)
- ID locations (Section 9.5)

The PIC16C5X Family has a Watchdog Timer which can be shut off only through configuration bit WDTE. It runs off of its own RC oscillator for added reliability. There is an 18 ms delay provided by the Device Reset Timer (DRT), intended to keep the chip in RESET until the crystal oscillator is stable. With this timer 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 or through a Watchdog Timer time-out. 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.

SUBWF Subtract W from f

Syntax: `[label] SUBWF f,d`

Operands: $0 \leq f \leq 31$
 $d \in [0,1]$

Operation: $(f) - (W) \rightarrow (\text{dest})$

Status Affected: C, DC, Z

Encoding:

0000	10df	ffff
------	------	------

Description: Subtract (2's complement method) the W register from register 'f'. If 'd' is 0 the result is stored in the W register. If 'd' is 1 the result is stored back in register 'f'.

Words: 1

Cycles: 1

Example 1: `SUBWF REG1, 1`

Before Instruction

REG1	=	3
W	=	2
C	=	?

After Instruction

REG1	=	1
W	=	2
C	=	1 ; result is positive

Example 2:

Before Instruction

REG1	=	2
W	=	2
C	=	?

After Instruction

REG1	=	0
W	=	2
C	=	1 ; result is zero

Example 3:

Before Instruction

REG1	=	1
W	=	2
C	=	?

After Instruction

REG1	=	0xFF
W	=	2
C	=	0 ; result is negative

SWAPF Swap Nibbles in f

Syntax: `[label] SWAPF f,d`

Operands: $0 \leq f \leq 31$
 $d \in [0,1]$

Operation: $(f<3:0>) \rightarrow (\text{dest}<7:4>);$
 $(f<7:4>) \rightarrow (\text{dest}<3:0>)$

Status Affected: None

Encoding:

0011	10df	ffff
------	------	------

Description: The upper and lower nibbles of register 'f' are exchanged. If 'd' is 0 the result is placed in W register. If 'd' is 1 the result is placed in register 'f'.

Words: 1

Cycles: 1

Example `SWAPF REG1, 0`

Before Instruction

REG1	=	0xA5
------	---	------

After Instruction

REG1	=	0xA5
W	=	0x5A

TRIS Load TRIS Register

Syntax: `[label] TRIS f`

Operands: $f = 5, 6 \text{ or } 7$

Operation: $(W) \rightarrow \text{TRIS register } f$

Status Affected: None

Encoding:

0000	0000	0fff
------	------	------

Description: TRIS register 'f' ($f = 5, 6, \text{ or } 7$) is loaded with the contents of the W register.

Words: 1

Cycles: 1

Example `TRIS PORTB`

Before Instruction

W	=	0xA5
---	---	------

After Instruction

TRISB	=	0xA5
-------	---	------

12.2 DC Characteristics: PIC16C54/55/56/57-RCI, XTI, 10I, HSI, LPI (Industrial)

PIC16C54/55/56/57-RCI, XTI, 10I, HSI, LPI (Industrial)			Standard Operating Conditions (unless otherwise specified) Operating Temperature $-40^{\circ}\text{C} \leq T_A \leq +85^{\circ}\text{C}$ for industrial				
Param No.	Symbol	Characteristic/Device	Min	Typ†	Max	Units	Conditions
D001	VDD	Supply Voltage					
		PIC16C5X-RCI	3.0	—	6.25	V	
		PIC16C5X-XTI	3.0	—	6.25	V	
		PIC16C5X-10I	4.5	—	5.5	V	
		PIC16C5X-HSI	4.5	—	5.5	V	
		PIC16C5X-LPI	2.5	—	6.25	V	
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 5.1 for details on Power-on Reset
D004	SVDD	VDD Rise Rate to ensure Power-on Reset	0.05*	—	—	V/ms	See Section 5.1 for details on Power-on Reset
D010	IDD	Supply Current ⁽²⁾					
		PIC16C5X-RCI ⁽³⁾	—	1.8	3.3	mA	FOSC = 4 MHz, VDD = 5.5V
		PIC16C5X-XTI	—	1.8	3.3	mA	FOSC = 4 MHz, VDD = 5.5V
		PIC16C5X-10I	—	4.8	10	mA	FOSC = 10 MHz, VDD = 5.5V
		PIC16C5X-HSI	—	4.8	10	mA	FOSC = 10 MHz, VDD = 5.5V
		PIC16C5X-HSI	—	9.0	20	mA	FOSC = 20 MHz, VDD = 5.5V
		PIC16C5X-LPI	—	15	40	μA	FOSC = 32 kHz, VDD = 3.0V, WDT disabled
D020	IPD	Power-down Current ⁽²⁾	—	4.0	14	μA	VDD = 3.0V, WDT enabled
			—	0.6	12	μA	VDD = 3.0V, WDT disabled

* These parameters are characterized but not tested.

† Data in "Typ" column is based on characterization results at 25°C. This data is for design guidance only and is not tested.

Note 1: This is the limit to which VDD can be lowered in SLEEP mode without losing RAM data.

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

a) The test conditions for all IDD measurements in active Operation mode are: OSC1 = external square wave, from rail-to-rail; all I/O pins tristated, pulled to VSS, T0CKI = VDD, MCLR = VDD; WDT enabled/disabled as specified.

b) For standby current measurements, the conditions are the same, except that the device is in SLEEP mode. The power-down current in SLEEP mode does not depend on the oscillator type.

3: Does not include current through REXT. The current through the resistor can be estimated by the formula: $I_R = VDD/2R_{EXT}$ (mA) with REXT in kΩ.

PIC16C5X

12.3 DC Characteristics: PIC16C54/55/56/57-RCE, XTE, 10E, HSE, LPE (Extended)

PIC16C54/55/56/57-RCE, XTE, 10E, HSE, LPE (Extended)			Standard Operating Conditions (unless otherwise specified) Operating Temperature $-40^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$ for extended				
Param No.	Symbol	Characteristic/Device	Min	Typ†	Max	Units	Conditions
D001	VDD	Supply Voltage					
		PIC16C5X-RCE	3.25	—	6.0	V	
		PIC16C5X-XTE	3.25	—	6.0	V	
		PIC16C5X-10E	4.5	—	5.5	V	
		PIC16C5X-HSE	4.5	—	5.5	V	
		PIC16C5X-LPE	2.5	—	6.0	V	
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 5.1 for details on Power-on Reset
D004	SVDD	VDD Rise Rate to ensure Power-on Reset	0.05*	—	—	V/ms	See Section 5.1 for details on Power-on Reset
D010	IDD	Supply Current ⁽²⁾					
		PIC16C5X-RCE ⁽³⁾	—	1.8	3.3	mA	FOSC = 4 MHz, VDD = 5.5V
		PIC16C5X-XTE	—	1.8	3.3	mA	FOSC = 4 MHz, VDD = 5.5V
		PIC16C5X-10E	—	4.8	10	mA	FOSC = 10 MHz, VDD = 5.5V
		PIC16C5X-HSE	—	4.8	10	mA	FOSC = 10 MHz, VDD = 5.5V
		PIC16C5X-HSE	—	9.0	20	mA	FOSC = 16 MHz, VDD = 5.5V
		PIC16C5X-LPE	—	19	55	μA	FOSC = 32 kHz, VDD = 3.25V, WDT disabled
D020	IPD	Power-down Current ⁽²⁾	—	5.0	22	μA	VDD = 3.25V, WDT enabled
			—	0.8	18	μA	VDD = 3.25V, WDT disabled

* These parameters are characterized but not tested.

† Data in "Typ" column is based on characterization results at 25°C. This data is for design guidance only and is not tested.

- Note 1:** This is the limit to which VDD can be lowered in SLEEP mode without losing RAM data.
- 2:** The supply current is mainly a function of the operating voltage and frequency. Other factors such as bus loading, oscillator type, bus rate, 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 tristated, pulled to VSS, T0CKI = VDD, MCLR = VDD; WDT enabled/disabled as specified.
 - For standby current measurements, the conditions are the same, except that the device is in SLEEP mode. The power-down current in SLEEP mode does not depend on the oscillator type.
- 3:** Does not include current through REXT. The current through the resistor can be estimated by the formula: $I_R = VDD/2R_{EXT}$ (mA) with REXT in kΩ.

FIGURE 14-2: TYPICAL RC OSC FREQUENCY vs. VDD, CEXT = 20 PF

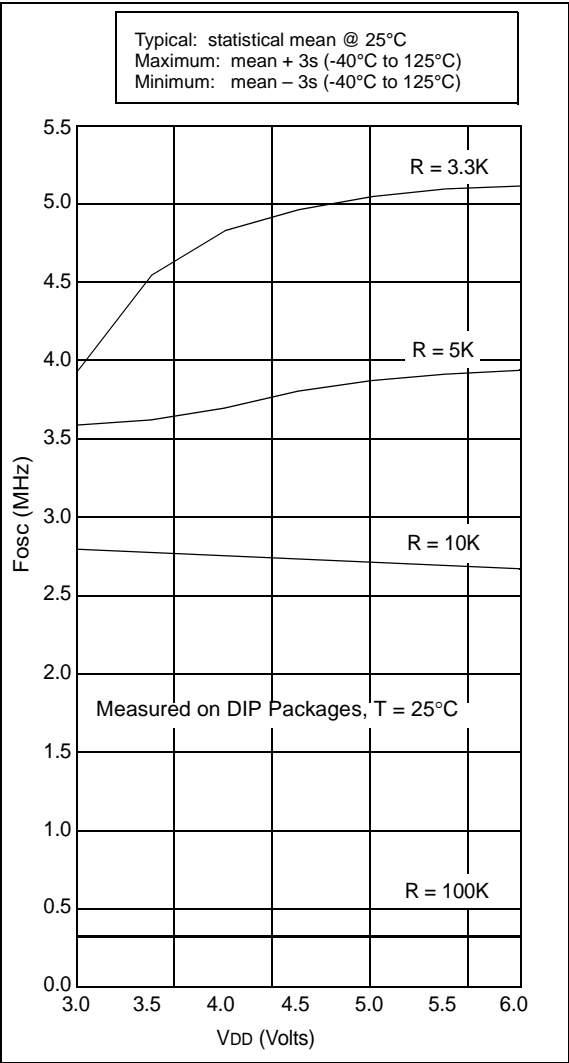


FIGURE 14-3: TYPICAL RC OSC FREQUENCY vs. VDD, CEXT = 100 PF

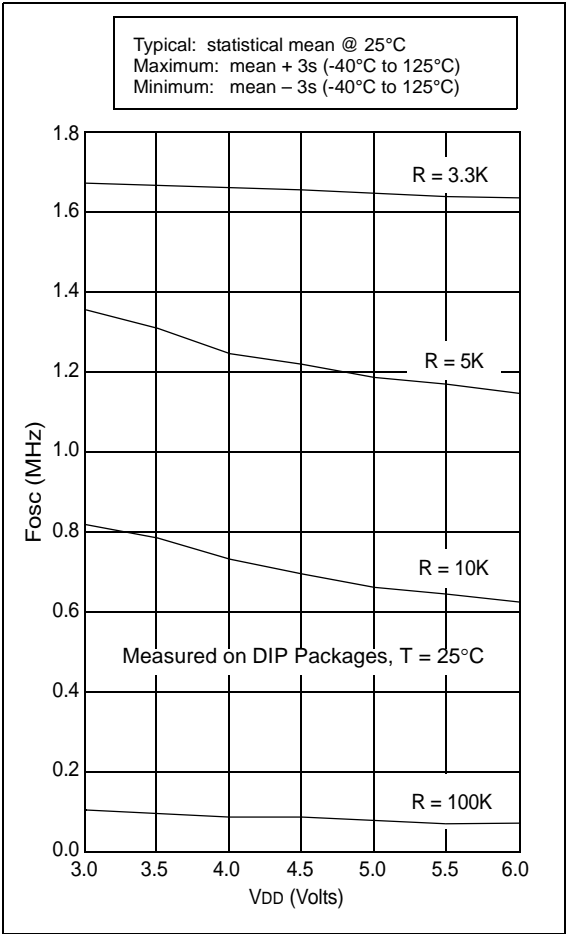


FIGURE 16-18: TRANSCONDUCTANCE (gm) OF LP OSCILLATOR vs. VDD

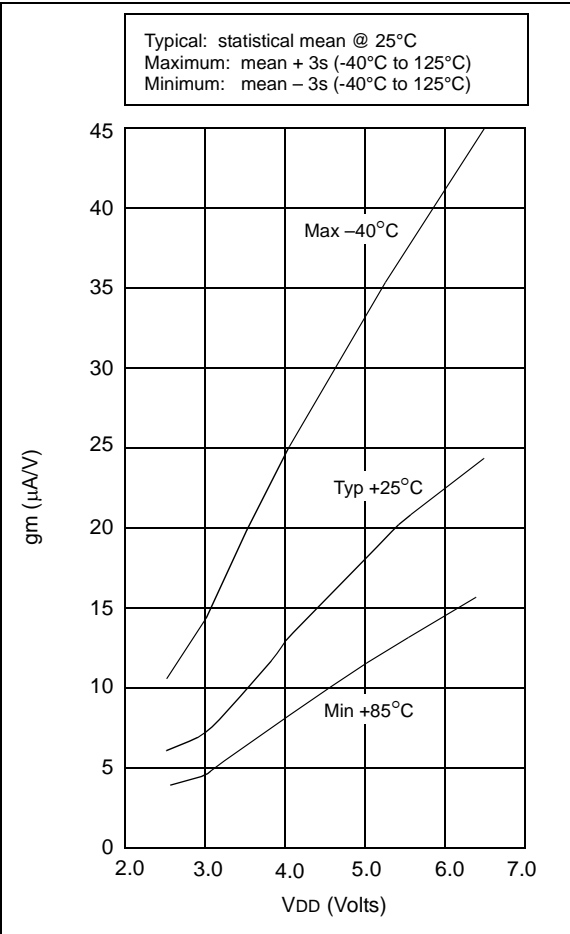


FIGURE 16-19: TRANSCONDUCTANCE (gm) OF XT OSCILLATOR vs. VDD

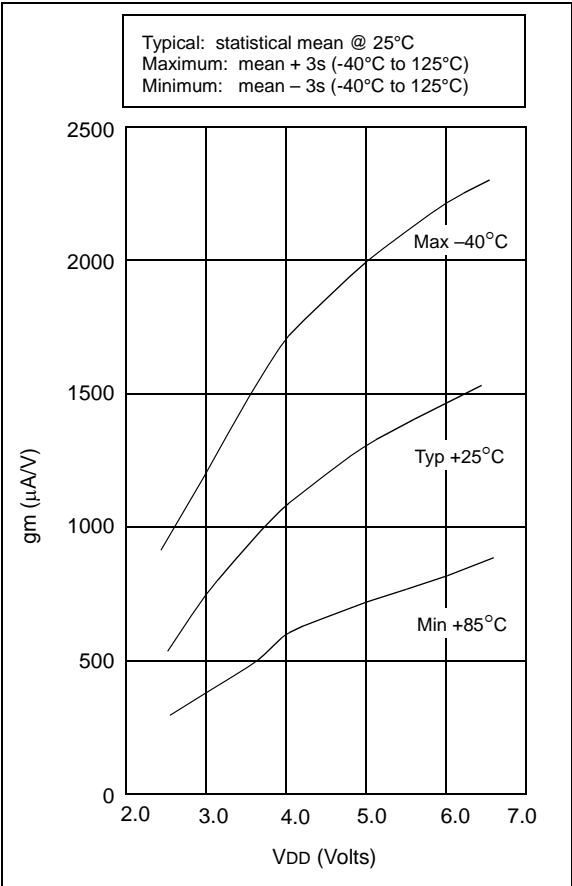


FIGURE 16-20: PORTA, B AND C I_{OH} vs. V_{OH}, V_{DD} = 3V

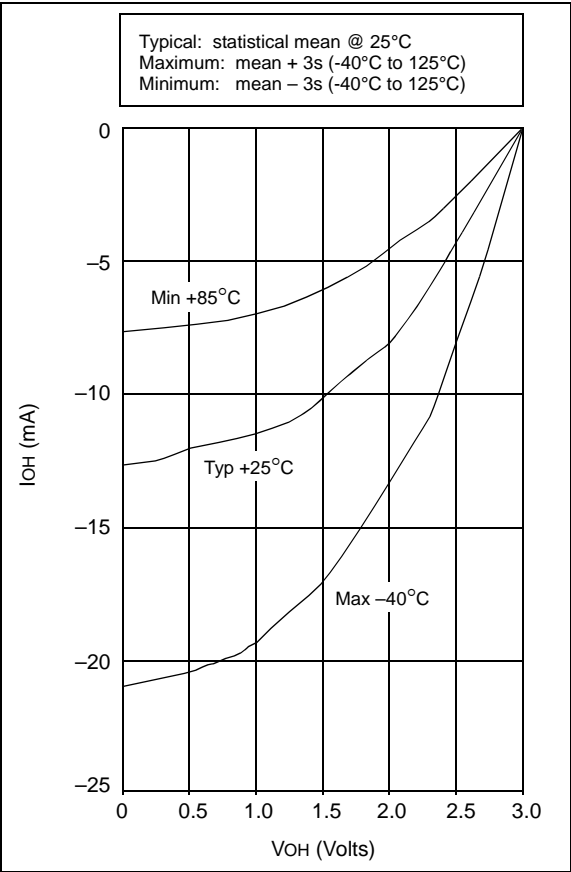
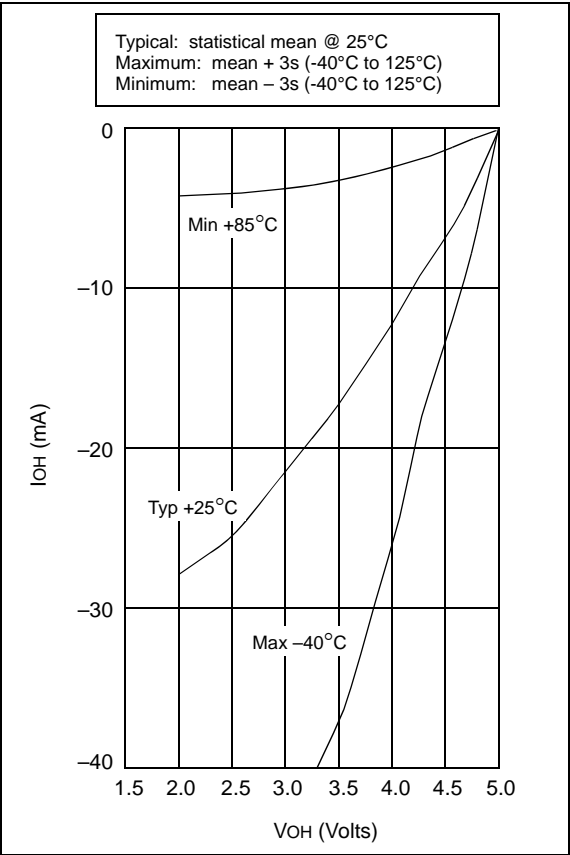


FIGURE 16-21: PORTA, B AND C I_{OH} vs. V_{OH}, V_{DD} = 5V



17.1 DC Characteristics: PIC16C54C/C55A/C56A/C57C/C58B-04, 20 (Commercial, Industrial) PIC16LC54C/LC55A/LC56A/LC57C/LC58B-04 (Commercial, Industrial) PIC16CR54C/CR56A/CR57C/CR58B-04, 20 (Commercial, Industrial) PIC16LCR54C/LCR56A/LCR57C/LCR58B-04 (Commercial, Industrial)

PIC16LC5X PIC16LCR5X (Commercial, Industrial)		Standard Operating Conditions (unless otherwise specified) Operating Temperature 0°C ≤ TA ≤ +70°C for commercial -40°C ≤ TA ≤ +85°C for industrial					
PIC16C5X PIC16CR5X (Commercial, Industrial)		Standard Operating Conditions (unless otherwise specified) Operating Temperature 0°C ≤ TA ≤ +70°C for commercial -40°C ≤ TA ≤ +85°C for industrial					
Param No.	Symbol	Characteristic/Device	Min	Typ†	Max	Units	Conditions
D010	IDD	Supply Current^(2,3)					
		PIC16LC5X	—	0.5	2.4	mA	FOSC = 4.0 MHz, VDD = 5.5V, XT and RC modes
			—	11	27	μA	FOSC = 32 kHz, VDD = 2.5V, LP mode, Commercial
D010A		PIC16C5X	—	14	35	μA	FOSC = 32 kHz, VDD = 2.5V, LP mode, Industrial
			—	1.8	2.4	mA	FOSC = 4 MHz, VDD = 5.5V, XT and RC modes
			—	2.6	3.6*	mA	FOSC = 10 MHz, VDD = 3.0V, HS mode
			—	4.5	16	mA	FOSC = 20 MHz, VDD = 5.5V, HS mode
			—	14	32	μA	FOSC = 32 kHz, VDD = 3.0V, LP mode, Commercial
			—	17	40	μA	FOSC = 32 kHz, VDD = 3.0V, LP mode, Industrial

Legend: Rows with standard voltage device data only are shaded for improved readability.

* 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 in SLEEP mode without losing RAM data.

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

a) The test conditions for all IDD measurements in active Operation mode are: OSC1 = external square wave, from rail-to-rail; all I/O pins tristated, pulled to VSS, T0CKI = VDD, MCLR = VDD; WDT enabled/disabled as specified.

b) For standby current measurements, the conditions are the same, except that the device is in SLEEP mode. The power-down current in SLEEP mode does not depend on the oscillator type.

3: Does not include current through REXT. The current through the resistor can be estimated by the formula: IR = VDD/2REXT (mA) with REXT in kΩ.

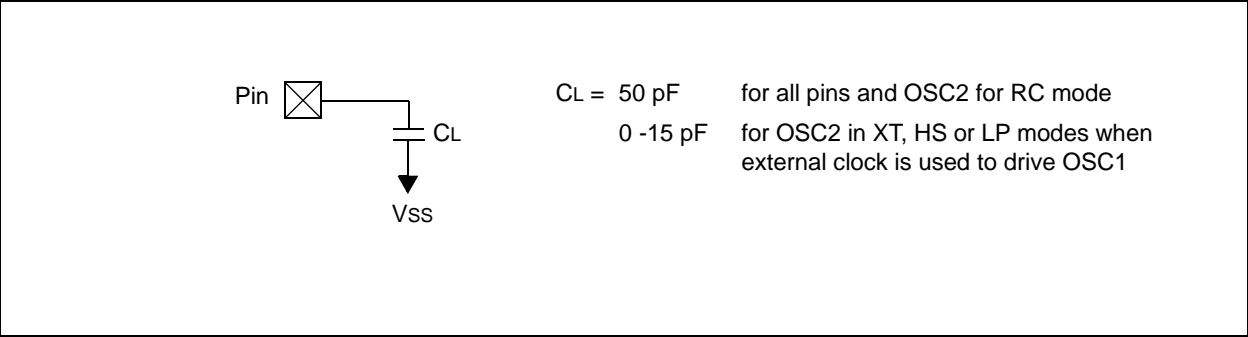
17.4 Timing Parameter Symbolology and Load Conditions

The timing parameter symbols have been created with one of the following formats:

- 1. TppS2ppS
- 2. TppS

T			
F	Frequency	T	Time
Lowercase letters (pp) and their meanings:			
pp		mc	MCLR
2	to	osc	oscillator
ck	CLKOUT	os	OSC1
cy	cycle time	t0	T0CKI
drt	device reset timer	wdt	watchdog timer
io	I/O port		
Uppercase letters and their meanings:			
S		P	Period
F	Fall	R	Rise
H	High	V	Valid
I	Invalid (Hi-impedance)	Z	Hi-impedance
L	Low		

FIGURE 17-5: LOAD CONDITIONS FOR DEVICE TIMING SPECIFICATIONS - PIC16C54C/CR54C/C55A/C56A/CR56A/C57C/CR57C/C58B/CR58B-04, 20



PIC16C5X

17.5 Timing Diagrams and Specifications

FIGURE 17-6: EXTERNAL CLOCK TIMING - PIC16C5X, PIC16CR5X

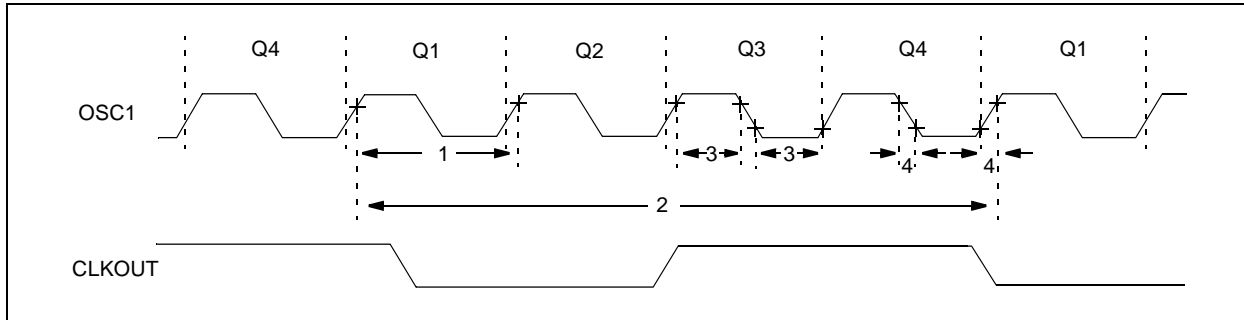


TABLE 17-1: EXTERNAL CLOCK TIMING REQUIREMENTS - PIC16C5X, PIC16CR5X

Standard Operating Conditions (unless otherwise specified) Operating Temperature $0^{\circ}\text{C} \leq T_A \leq +70^{\circ}\text{C}$ for commercial $-40^{\circ}\text{C} \leq T_A \leq +85^{\circ}\text{C}$ for industrial $-40^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$ for extended							
AC Characteristics							
Param No.	Symbol	Characteristic	Min	Typ†	Max	Units	Conditions
	FOSC	External CLKIN Frequency ⁽¹⁾	DC	—	4.0	MHz	XT osc mode
			DC	—	4.0	MHz	HS osc mode (04)
			DC	—	20	MHz	HS osc mode (20)
			DC	—	200	kHz	LP osc mode
		Oscillator Frequency ⁽¹⁾	DC	—	4.0	MHz	RC osc mode
			0.45	—	4.0	MHz	XT osc mode
			4.0	—	4.0	MHz	HS osc mode (04)
			4.0	—	20	MHz	HS osc mode (20)
			5.0	—	200	kHz	LP osc mode
1	TOSC	External CLKIN Period ⁽¹⁾	250	—	—	ns	XT osc mode
			250	—	—	ns	HS osc mode (04)
			50	—	—	ns	HS osc mode (20)
			5.0	—	—	μs	LP osc mode
		Oscillator Period ⁽¹⁾	250	—	—	ns	RC osc mode
			250	—	2,200	ns	XT osc mode
			250	—	250	ns	HS osc mode (04)
			50	—	250	ns	HS osc mode (20)
			5.0	—	200	μs	LP osc mode

* These parameters are characterized but not tested.

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

Note 1: All specified values are based on characterization data for that particular oscillator type under standard operating conditions with the device executing code. Exceeding these specified limits may result in an unstable oscillator operation and/or higher than expected current consumption.

When an external clock input is used, the "max" cycle time limit is "DC" (no clock) for all devices.

2: Instruction cycle period (TCY) equals four times the input oscillator time base period.

FIGURE 18-6: TYPICAL I_{PD} vs. V_{DD} , WATCHDOG ENABLED (25°C)

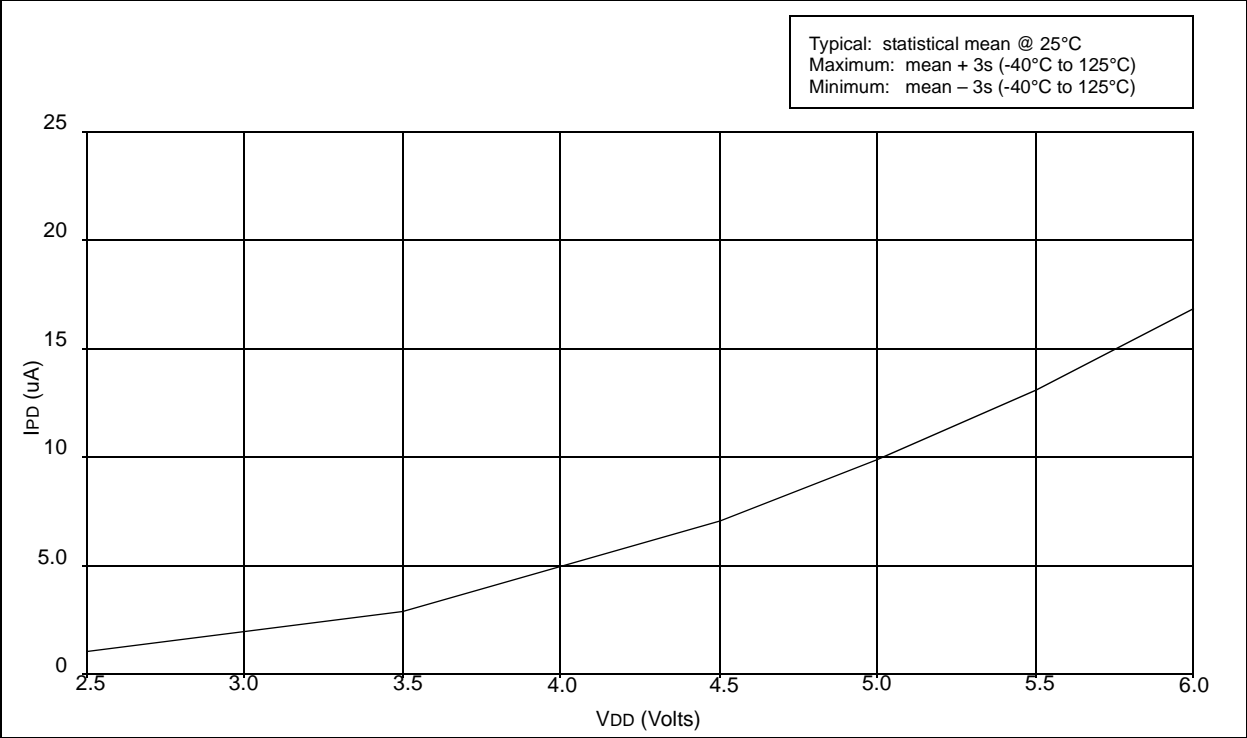
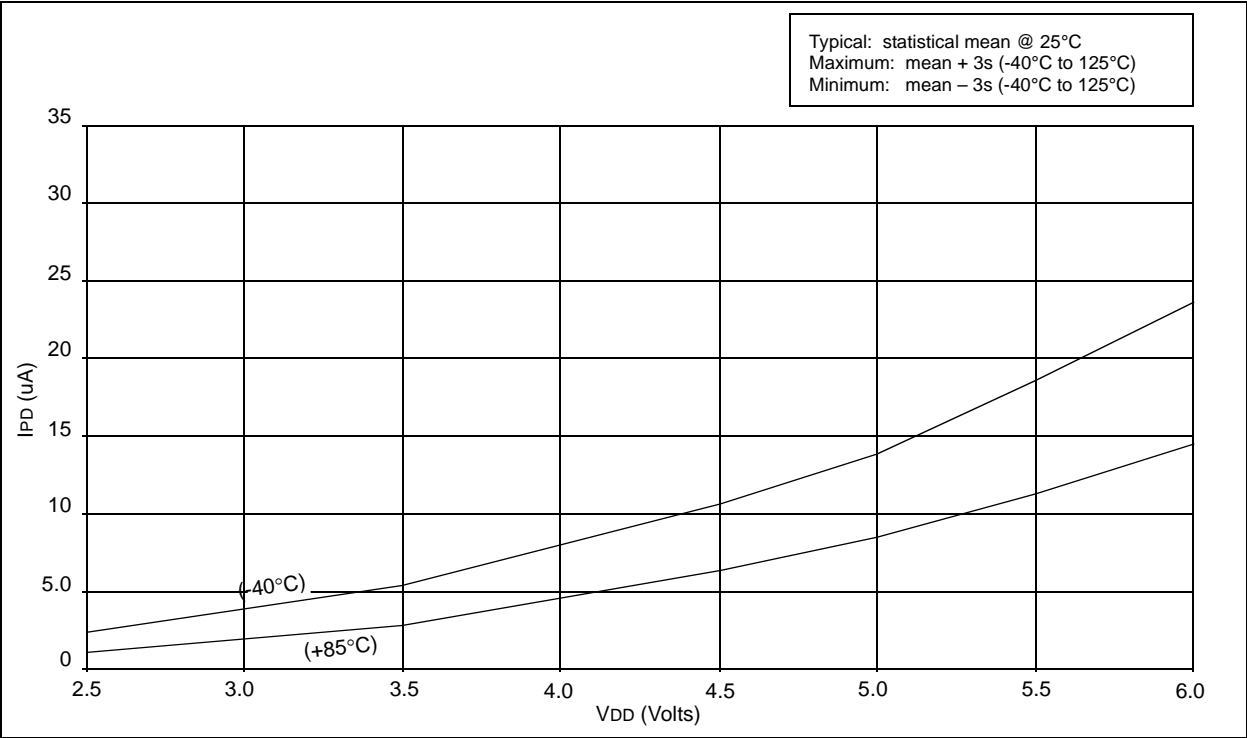


FIGURE 18-7: TYPICAL I_{PD} vs. V_{DD} , WATCHDOG ENABLED (-40°C, 85°C)



PIC16C5X

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