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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	4MHz
Connectivity	-
Peripherals	POR, WDT
Number of I/O	12
Program Memory Size	1.5KB (1K x 12)
Program Memory Type	OTP
EEPROM Size	-
RAM Size	25 x 8
Voltage - Supply (Vcc/Vdd)	3.25V ~ 6V
Data Converters	-
Oscillator Type	External
Operating Temperature	-40°C ~ 125°C (TA)
Mounting Type	Surface Mount
Package / Case	18-SOIC (0.295", 7.50mm Width)
Supplier Device Package	18-SOIC
Purchase URL	https://www.e-xfl.com/product-detail/microchip-technology/pic16c56-xte-so

PIC16C5X

NOTES:

PIC16C5X

NOTES:

4.4 RC Oscillator

For timing insensitive applications, the RC device option offers additional cost savings. The RC oscillator frequency is a function of the supply voltage, the resistor (R_{EXT}) and capacitor (C_{EXT}) values, and the operating temperature. In addition to this, the oscillator frequency will vary from unit to unit due to normal process parameter variation. Furthermore, the difference in lead frame capacitance between package types will also affect the oscillation frequency, especially for low C_{EXT} values. The user also needs to take into account variation due to tolerance of external R and C components used.

Figure 4-5 shows how the R/C combination is connected to the PIC16C5X. For R_{EXT} values below 2.2 k Ω , the oscillator operation may become unstable, or stop completely. For very high R_{EXT} values (e.g., 1 M Ω) the oscillator becomes sensitive to noise, humidity and leakage. Thus, we recommend keeping R_{EXT} between 3 k Ω and 100 k Ω .

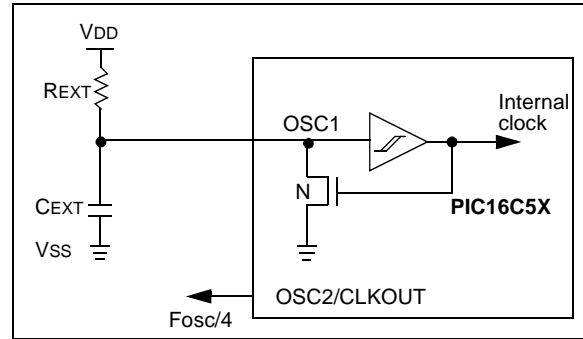
Although the oscillator will operate with no external capacitor ($C_{EXT} = 0$ pF), we recommend using values above 20 pF for noise and stability reasons. With no or small external capacitance, the oscillation frequency can vary dramatically due to changes in external capacitances, such as PCB trace capacitance or package lead frame capacitance.

The Electrical Specifications sections show RC frequency variation from part to part due to normal process variation. The variation is larger for larger R (since leakage current variation will affect RC frequency more for large R) and for smaller C (since variation of input capacitance will affect RC frequency more).

Also, see the Electrical Specifications sections for variation of oscillator frequency due to V_{DD} for given R_{EXT}/C_{EXT} values as well as frequency variation due to operating temperature for given R, C, and V_{DD} values.

The oscillator frequency, divided by 4, is available on the OSC2/CLKOUT pin, and can be used for test purposes or to synchronize other logic.

FIGURE 4-5: RC OSCILLATOR MODE



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

5.2 Device Reset Timer (DRT)

The Device Reset Timer (DRT) provides an 18 ms nominal time-out on RESET regardless of Oscillator mode used. The DRT operates on an internal RC oscillator. The processor is kept in RESET as long as the DRT is active. The DRT delay allows VDD to rise above VDD min., and for the oscillator to stabilize.

Oscillator circuits based on crystals or ceramic resonators require a certain time after power-up to establish a stable oscillation. The on-chip DRT keeps the device in a RESET condition for approximately 18 ms after the voltage on the MCLR/VPP pin has reached a logic high (VIH) level. Thus, external RC networks connected to the MCLR input are not required in most cases, allowing for savings in cost-sensitive and/or space restricted applications.

The Device Reset time delay will vary from chip to chip due to VDD, temperature, and process variation. See AC parameters for details.

The DRT will also be triggered upon a Watchdog Timer time-out. This is particularly important for applications using the WDT to wake the PIC16C5X from SLEEP mode automatically.

5.3 Reset on Brown-Out

A brown-out is a condition where device power (VDD) dips below its minimum value, but not to zero, and then recovers. The device should be RESET in the event of a brown-out.

To RESET PIC16C5X devices when a brown-out occurs, external brown-out protection circuits may be built, as shown in Figure 5-6, Figure 5-7 and Figure 5-8.

FIGURE 5-6: EXTERNAL BROWN-OUT PROTECTION CIRCUIT 1

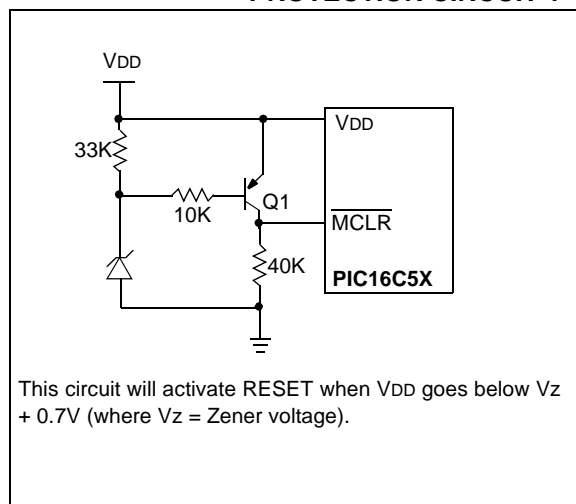


FIGURE 5-7: EXTERNAL BROWN-OUT PROTECTION CIRCUIT 2

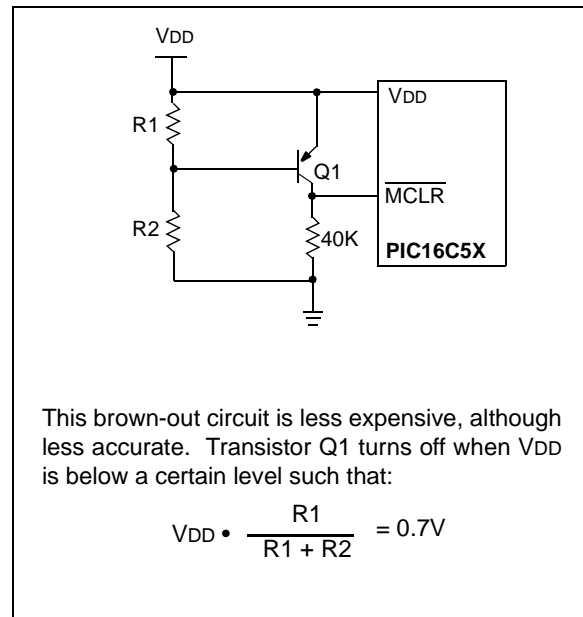
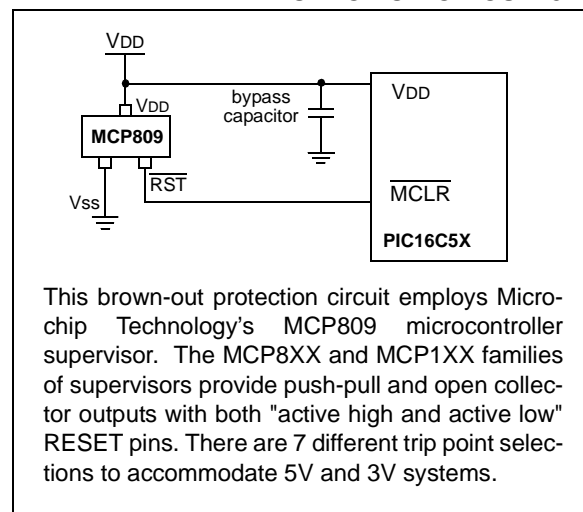


FIGURE 5-8: EXTERNAL BROWN-OUT PROTECTION CIRCUIT 3



REGISTER 9-2: CONFIGURATION WORD FOR PIC16C54/C55/C56/C57

—	—	—	—	—	—	—	—	CP	WDTE	FOSC1	FOSC0
bit 11											bit 0

bit 11-4: **Unimplemented:** Read as '0'

bit 3: **CP:** Code protection bit.

1 = Code protection off

0 = Code protection on

bit 2: **WDTE:** Watchdog timer enable bit

1 = WDT enabled

0 = WDT disabled

bit 1-0: **FOSC1:FOSC0:** Oscillator selection bits⁽²⁾

00 = LP oscillator

01 = XT oscillator

10 = HS oscillator

11 = RC oscillator

Note 1: Refer to the PIC16C5X Programming Specifications (Literature Number DS30190) to determine how to access the configuration word.

2: PIC16LV54A supports XT, RC and LP oscillator only.

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

PIC16C5X

TABLE 10-2: INSTRUCTION SET SUMMARY

Mnemonic, Operands		Description	Cycles	12-Bit Opcode			Status Affected	Notes
				MSb	LSb			
ADDWF	f, d	Add W and f	1	0001	11df	ffff	C, DC, Z	1, 2, 4
ANDWF	f, d	AND W with f	1	0001	01df	ffff	Z	2, 4
CLRF	f	Clear f	1	0000	011f	ffff	Z	4
CLRW	—	Clear W	1	0000	0100	0000	Z	
COMF	f, d	Complement f	1	0010	01df	ffff	Z	
DECF	f, d	Decrement f	1	0000	11df	ffff	Z	2, 4
DECFSZ	f, d	Decrement f, Skip if 0	1 (2)	0010	11df	ffff	None	2, 4
INCF	f, d	Increment f	1	0010	10df	ffff	Z	2, 4
INCFSZ	f, d	Increment f, Skip if 0	1 (2)	0011	11df	ffff	None	2, 4
IORWF	f, d	Inclusive OR W with f	1	0001	00df	ffff	Z	2, 4
MOVF	f, d	Move f	1	0010	00df	ffff	Z	2, 4
MOVWF	f	Move W to f	1	0000	001f	ffff	None	1, 4
NOP	—	No Operation	1	0000	0000	0000	None	
RLF	f, d	Rotate left f through Carry	1	0011	01df	ffff	C	2, 4
RRF	f, d	Rotate right f through Carry	1	0011	00df	ffff	C	2, 4
SUBWF	f, d	Subtract W from f	1	0000	10df	ffff	C, DC, Z	1, 2, 4
SWAPF	f, d	Swap f	1	0011	10df	ffff	None	2, 4
XORWF	f, d	Exclusive OR W with f	1	0001	10df	ffff	Z	2, 4
BIT-ORIENTED FILE REGISTER OPERATIONS								
BCF	f, b	Bit Clear f	1	0100	bbbf	ffff	None	2, 4
BSF	f, b	Bit Set f	1	0101	bbbf	ffff	None	2, 4
BTFSC	f, b	Bit Test f, Skip if Clear	1 (2)	0110	bbbf	ffff	None	
BTFSS	f, b	Bit Test f, Skip if Set	1 (2)	0111	bbbf	ffff	None	
LITERAL AND CONTROL OPERATIONS								
ANDLW	k	AND literal with W	1	1110	kkkk	kkkk	Z	1
CALL	k	Call subroutine	2	1001	kkkk	kkkk	None	
CLRWDT	k	Clear Watchdog Timer	1	0000	0000	0100	TO, PD	
GOTO	k	Unconditional branch	2	101k	kkkk	kkkk	None	
IORLW	k	Inclusive OR Literal with W	1	1101	kkkk	kkkk	Z	
MOVLW	k	Move Literal to W	1	1100	kkkk	kkkk	None	
OPTION	k	Load OPTION register	1	0000	0000	0010	None	
RETLW	k	Return, place Literal in W	2	1000	kkkk	kkkk	None	
SLEEP	—	Go into standby mode	1	0000	0000	0011	TO, PD	
TRIS	f	Load TRIS register	1	0000	0000	0fff	None	3
XORLW	k	Exclusive OR Literal to W	1	1111	kkkk	kkkk	Z	

- Note 1:** The 9th bit of the program counter will be forced to a '0' by any instruction that writes to the PC except for GOTO (see Section 6.5 for more on program counter).
- 2:** 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'.
- 3:** The instruction `TRIS f`, where $f = 5, 6$ or 7 causes the contents of the W register to be written to the tristate latches of PORTA, B or C respectively. A '1' forces the pin to a hi-impedance state and disables the output buffers.
- 4:** If this instruction is executed on the TMR0 register (and, where applicable, $d = 1$), the prescaler will be cleared (if assigned to TMR0).

PIC16C5X

IORLW Inclusive OR literal with W

Syntax: [*label*] IORLW *k*
Operands: $0 \leq k \leq 255$
Operation: (W).OR. (*k*) \rightarrow (W)
Status Affected: Z
Encoding:

1101	kkkk	kkkk
------	------	------

Description: The contents of the W register are OR'ed with the eight bit literal 'k'. The result is placed in the W register.
Words: 1
Cycles: 1
Example: IORLW 0x35

Before Instruction
W = 0x9A
After Instruction
W = 0xBF
Z = 0

IORWF Inclusive OR W with f

Syntax: [*label*] IORWF *f*,*d*
Operands: $0 \leq f \leq 31$
 $d \in [0,1]$
Operation: (W).OR. (*f*) \rightarrow (*dest*)
Status Affected: Z
Encoding:

0001	00df	ffff
------	------	------

Description: Inclusive OR the W register with register 'f'. If 'd' is 0 the result is placed in the W register. If 'd' is 1 the result is placed back in register 'f'.
Words: 1
Cycles: 1
Example: IORWF RESULT, 0

Before Instruction
RESULT = 0x13
W = 0x91
After Instruction
RESULT = 0x13
W = 0x93
Z = 0

MOVF Move f

Syntax: [*label*] MOVF *f*,*d*
Operands: $0 \leq f \leq 31$
 $d \in [0,1]$
Operation: (*f*) \rightarrow (*dest*)
Status Affected: Z
Encoding:

0010	00df	ffff
------	------	------

Description: The contents of register 'f' is moved to destination 'd'. If 'd' is 0, destination is the W register. If 'd' is 1, the destination is file register 'f'. 'd' is 1 is useful to test a file register since status flag Z is affected.
Words: 1
Cycles: 1
Example: MOVF FSR, 0

After Instruction
W = value in FSR register

MOVLW Move Literal to W

Syntax: [*label*] MOVLW *k*
Operands: $0 \leq k \leq 255$
Operation: *k* \rightarrow (W)
Status Affected: None
Encoding:

1100	kkkk	kkkk
------	------	------

Description: The eight bit literal 'k' is loaded into the W register.
Words: 1
Cycles: 1
Example: MOVLW 0x5A

After Instruction
W = 0x5A

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

11.8 MPLAB ICD In-Circuit Debugger

Microchip's In-Circuit Debugger, MPLAB ICD, is a powerful, low cost, run-time development tool. This tool is based on the FLASH PIC MCUs and can be used to develop for this and other PIC microcontrollers. The MPLAB ICD utilizes the in-circuit debugging capability built into the FLASH devices. This feature, along with Microchip's In-Circuit Serial Programming™ 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 watching variables, single-stepping and setting break points. Running at full speed enables testing hardware in real-time.

11.9 PRO MATE II Universal Device Programmer

The PRO MATE II universal device programmer is a full-featured programmer, capable of operating in Stand-alone mode, as well as PC-hosted mode. The PRO MATE II device programmer is CE compliant.

The PRO MATE II device programmer has programmable VDD and VPP supplies, which allow it to verify programmed memory at VDD min and VDD max for maximum reliability. It has an LCD display for instructions and error messages, keys to enter commands and a modular detachable socket assembly to support various package types. In Stand-alone mode, the PRO MATE II device programmer can read, verify, or program PIC devices. It can also set code protection in this mode.

11.10 PICSTART Plus Entry Level 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 all PIC devices with 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.

11.11 PICDEM 1 Low Cost PIC MCU Demonstration Board

The PICDEM 1 demonstration board is a simple board which demonstrates the capabilities of several of Microchip's microcontrollers. The microcontrollers supported are: PIC16C5X (PIC16C54 to PIC16C58A), PIC16C61, PIC16C62X, PIC16C71, PIC16C8X, PIC17C42, PIC17C43 and PIC17C44. All necessary hardware and software is included to run basic demo programs. The user can program the sample microcontrollers provided with the PICDEM 1 demonstration board on a PRO MATE II device programmer, or a PICSTART Plus development programmer, and easily test firmware. The user can also connect the PICDEM 1 demonstration board to the MPLAB ICE in-circuit emulator and download the firmware to the emulator for testing. A prototype area is available for the user to build some additional hardware and connect it to the microcontroller socket(s). Some of the features include an RS-232 interface, a potentiometer for simulated analog input, push button switches and eight LEDs connected to PORTB.

11.12 PICDEM 2 Low Cost PIC16CXX Demonstration Board

The PICDEM 2 demonstration board is a simple demonstration board that supports the PIC16C62, PIC16C64, PIC16C65, PIC16C73 and PIC16C74 microcontrollers. All the necessary hardware and software is included to run the basic demonstration programs. The user can program the sample microcontrollers provided with the PICDEM 2 demonstration board on a PRO MATE II device programmer, or a PICSTART Plus development programmer, and easily test firmware. The MPLAB ICE in-circuit emulator may also be used with the PICDEM 2 demonstration board to test firmware. A prototype area has been provided to the user for adding additional hardware and connecting it to the microcontroller socket(s). Some of the features include a RS-232 interface, push button switches, a potentiometer for simulated analog input, a serial EEPROM to demonstrate usage of the I²C™ bus and separate headers for connection to an LCD module and a keypad.

FIGURE 14-13: MAXIMUM IDD VS. FREQUENCY (EXTERNAL CLOCK, -40°C TO +85°C)

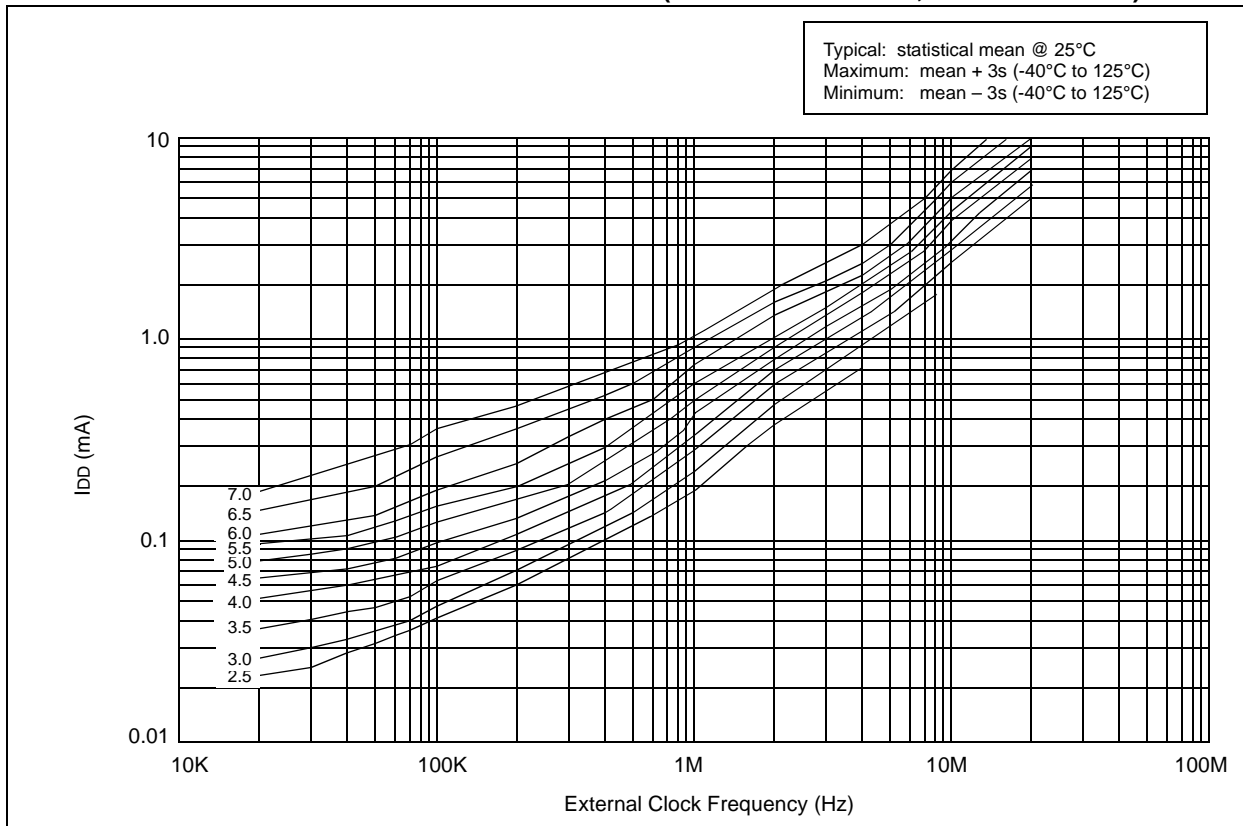


FIGURE 14-14: MAXIMUM I_{DD} vs. FREQUENCY (EXTERNAL CLOCK -55°C TO +125°C)

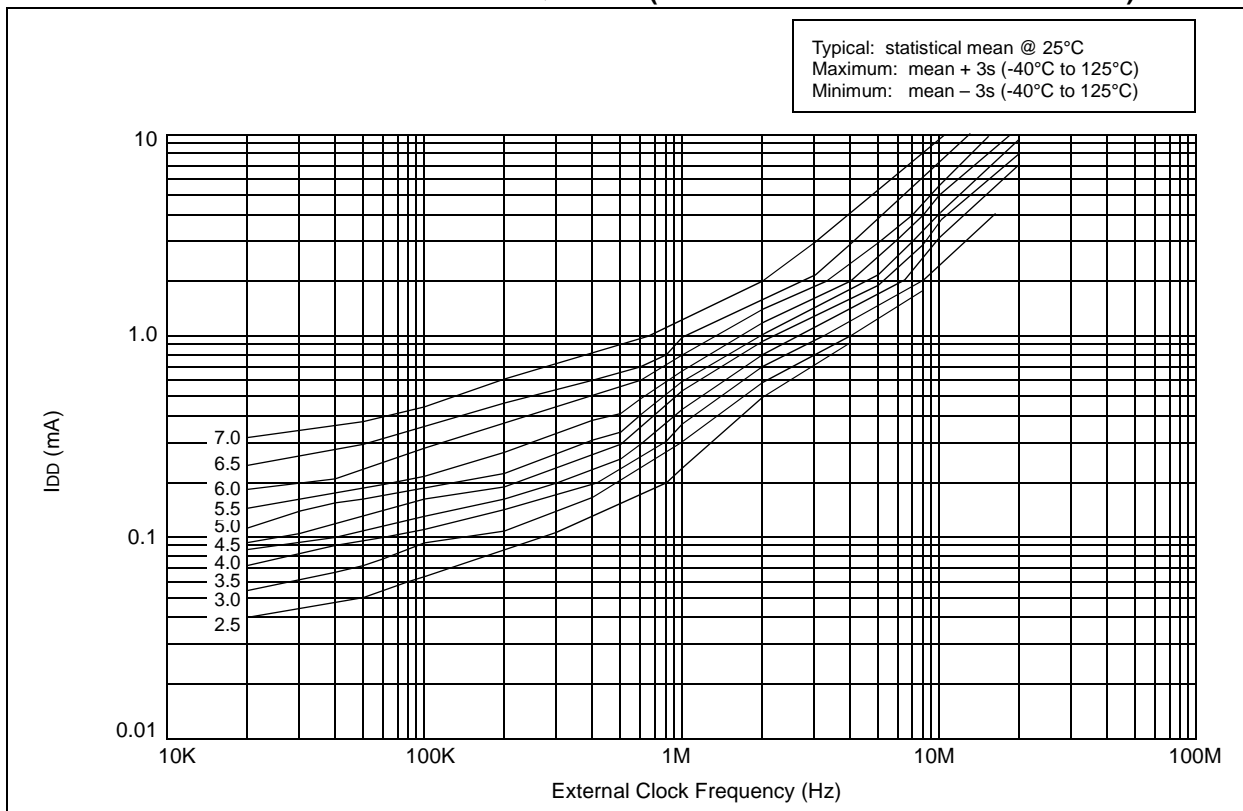


FIGURE 14-21: PORTA, B AND C IoL vs. VOL, VDD = 3 V

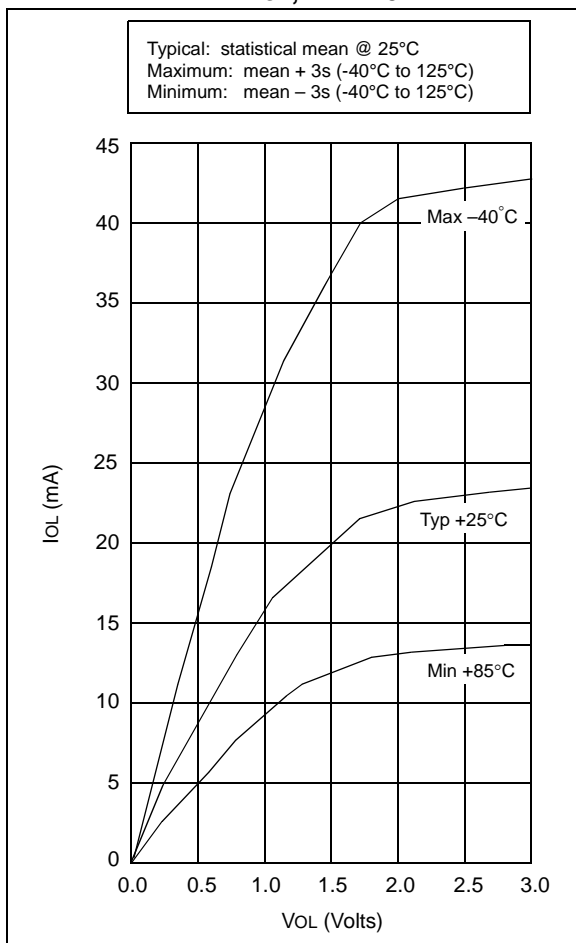


FIGURE 14-22: PORTA, B AND C IoL vs. VOL, VDD = 5 V

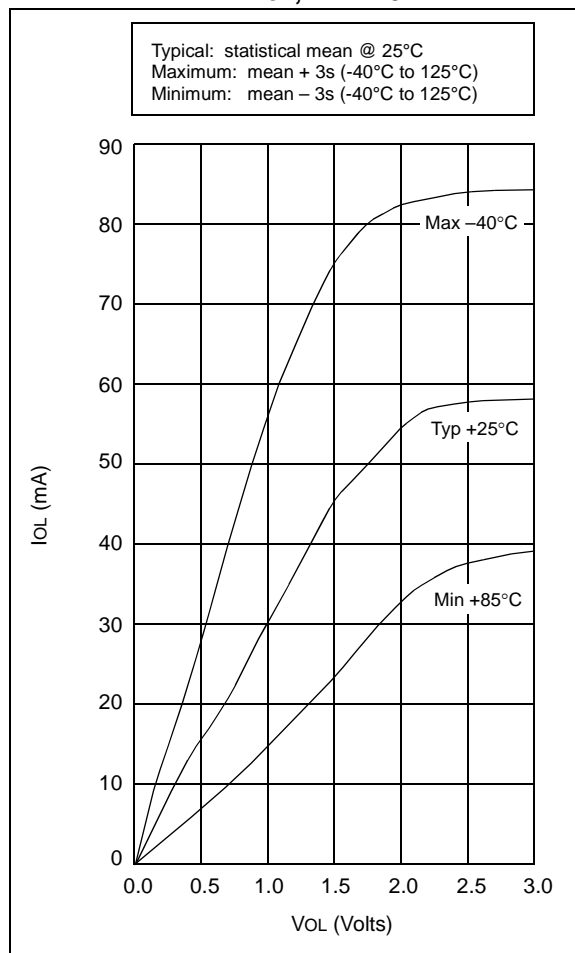


FIGURE 16-16: WDT TIMER TIME-OUT PERIOD vs. VDD⁽¹⁾

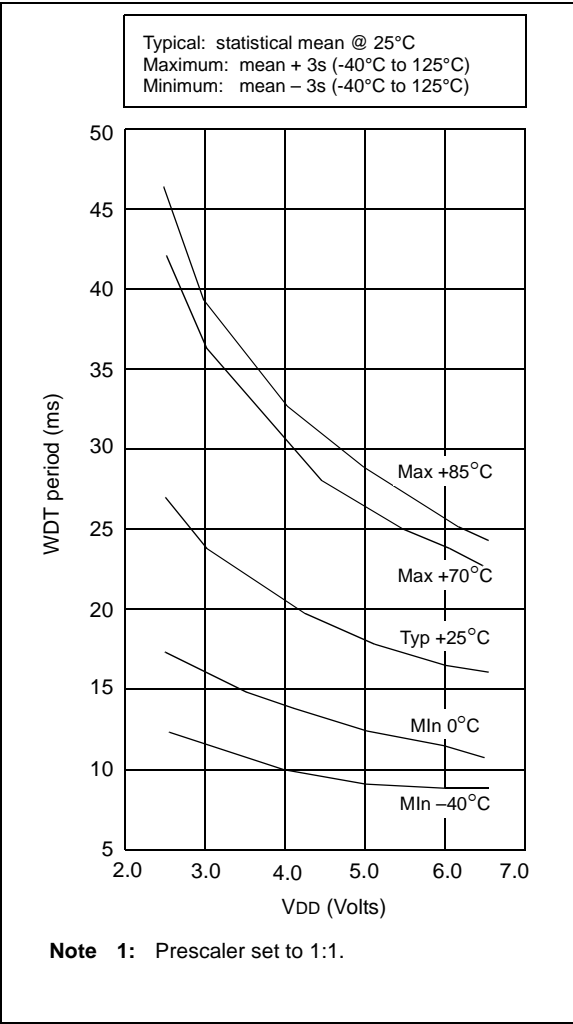


FIGURE 16-17: TRANSCONDUCTANCE (gm) OF HS OSCILLATOR vs. VDD

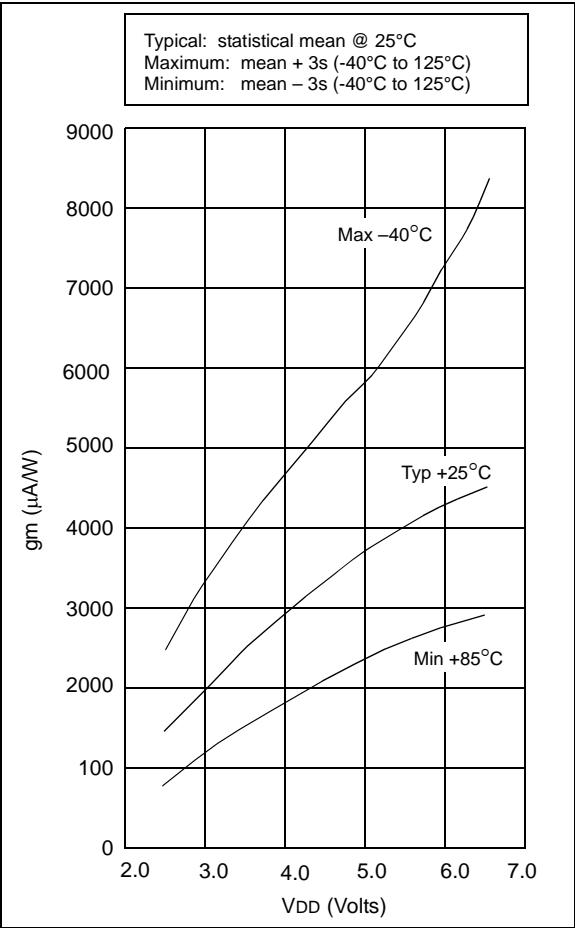


FIGURE 16-18: TRANSCONDUCTANCE (gm) OF LP OSCILLATOR vs. VDD

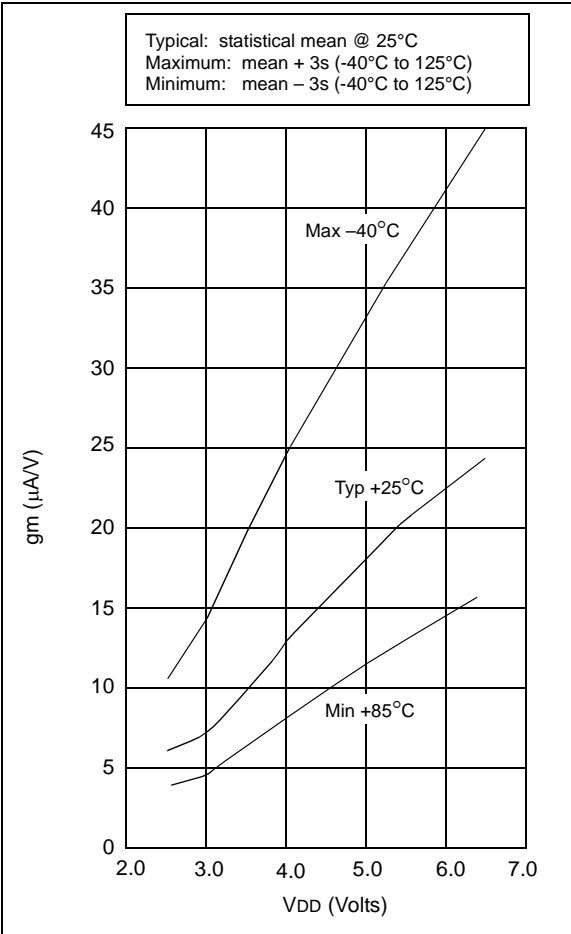
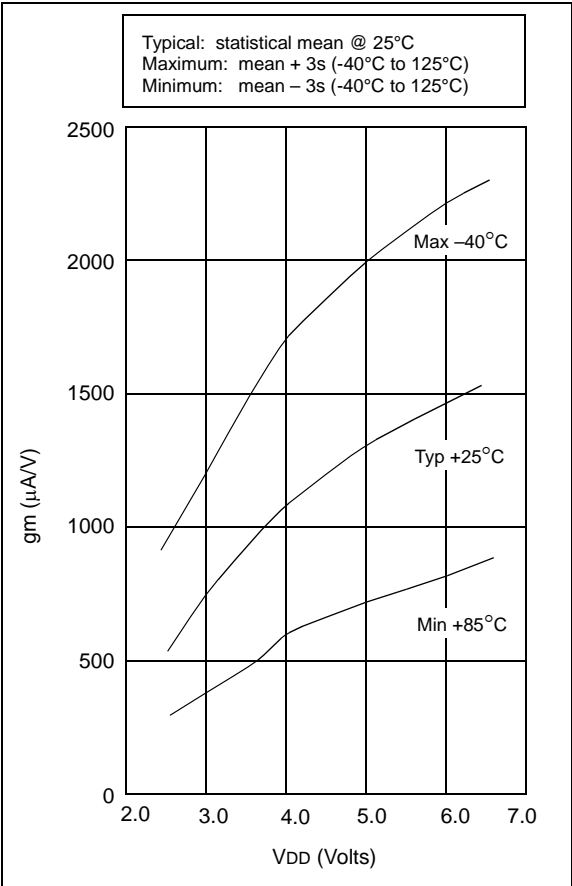


FIGURE 16-19: TRANSCONDUCTANCE (gm) OF XT OSCILLATOR vs. VDD



17.0 ELECTRICAL CHARACTERISTICS - PIC16LC54A

Absolute Maximum Ratings^(†)

Ambient temperature under bias	–55°C to +125°C
Storage temperature	–65°C to +150°C
Voltage on VDD with respect to VSS	0 to +7.5V
Voltage on MCLR with respect to VSS.....	0 to +14V
Voltage on all other pins with respect to VSS	–0.6V to (VDD + 0.6V)
Total power dissipation ⁽¹⁾	800 mW
Max. current out of VSS pin	150 mA
Max. current into VDD pin	100 mA
Max. current into an input pin (T0CKI only)	±500 µA
Input clamp current, I _{IK} (V _I < 0 or V _I > VDD).....	±20 mA
Output clamp current, I _{OK} (V _O < 0 or V _O > VDD)	±20 mA
Max. output current sunk by any I/O pin	25 mA
Max. output current sourced by any I/O pin	20 mA
Max. output current sourced by a single I/O (Port A, B or C)	50 mA
Max. output current sunk by a single I/O (Port A, B or C).....	50 mA

Note 1: Power dissipation is calculated as follows: $P_{dis} = V_{DD} \times \{I_{DD} - \sum I_{OH}\} + \sum \{(V_{DD} - V_{OH}) \times I_{OH}\} + \sum (V_{OL} \times I_{OL})$

† NOTICE: Stresses above those listed under "Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operation listings of this specification is not implied. Exposure to maximum rating conditions for extended periods may affect device reliability.

PIC16C5X

FIGURE 17-9: TIMER0 CLOCK TIMINGS - PIC16C5X, PIC16CR5X

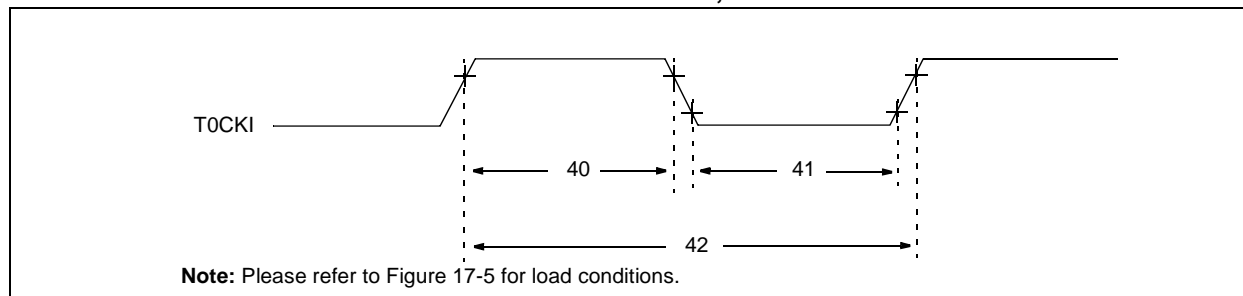


TABLE 17-4: TIMER0 CLOCK REQUIREMENTS - PIC16C5X, PIC16CR5X

AC Characteristics		Standard Operating Conditions (unless otherwise specified)					
		Operating Temperature					
		0°C ≤ TA ≤ +70°C for commercial					
		–40°C ≤ TA ≤ +85°C for industrial					
		–40°C ≤ TA ≤ +125°C for extended					
Param No.	Symbol	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	20 or $\frac{Tcy + 40}{N}$ *	—	—	ns	Whichever is greater. N = Prescale Value (1, 2, 4,..., 256)

* 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.

18.0 DEVICE CHARACTERIZATION - PIC16LC54A

The graphs and tables provided following this note are a statistical summary based on a limited number of samples and are provided for informational purposes only. The performance characteristics listed herein are not tested or guaranteed. In some graphs or tables, the data presented may be outside the specified operating range (e.g., outside specified power supply range) and therefore outside the warranted range.

“Typical” represents the mean of the distribution at 25°C. “Maximum” or “minimum” represents (mean + 3 σ) or (mean – 3 σ) respectively, where σ is a standard deviation, over the whole temperature range.

FIGURE 18-1: TYPICAL RC OSCILLATOR FREQUENCY vs. TEMPERATURE

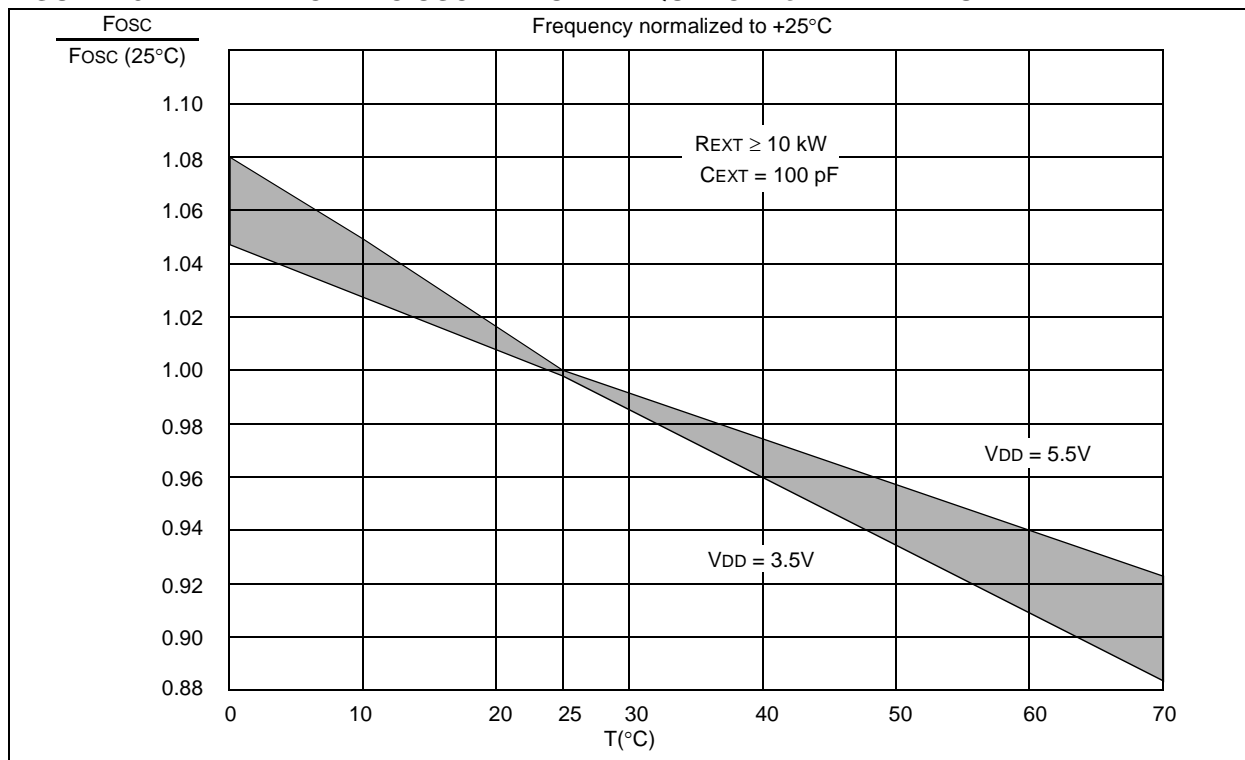


TABLE 18-1: RC OSCILLATOR FREQUENCIES

C_{EXT}	R_{EXT}	Average F_{osc} @ 5V, 25°C	
20 pF	3.3K	5 MHz	± 27%
	5K	3.8 MHz	± 21%
	10K	2.2 MHz	± 21%
	100K	262 kHz	± 31%
100 pF	3.3K	1.63 MHz	± 13%
	5K	1.2 MHz	± 13%
	10K	684 kHz	± 18%
	100K	71 kHz	± 25%
300 pF	3.3K	660 kHz	± 10%
	5.0K	484 kHz	± 14%
	10K	267 kHz	± 15%
	100K	29 kHz	± 19%

The frequencies are measured on DIP packages.

The percentage variation indicated here is part-to-part variation due to normal process distribution. The variation indicated is ± 3 standard deviation from average value for $V_{DD} = 5\text{V}$.

FIGURE 18-14: WDT TIMER TIME-OUT PERIOD vs. VDD⁽¹⁾

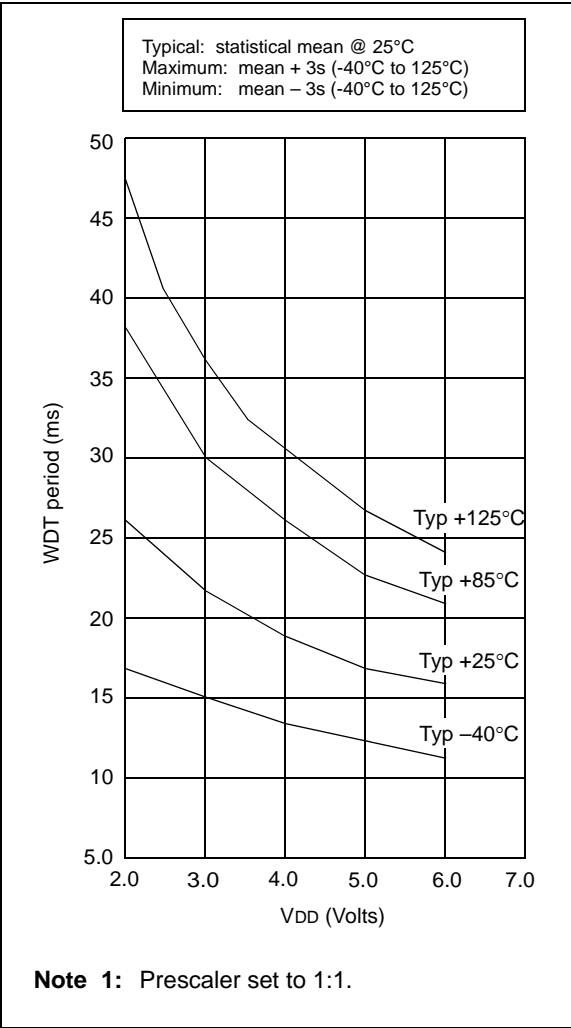


FIGURE 18-15: PORTA, B AND C I_{OH} vs. V_{OH}, VDD = 3 V

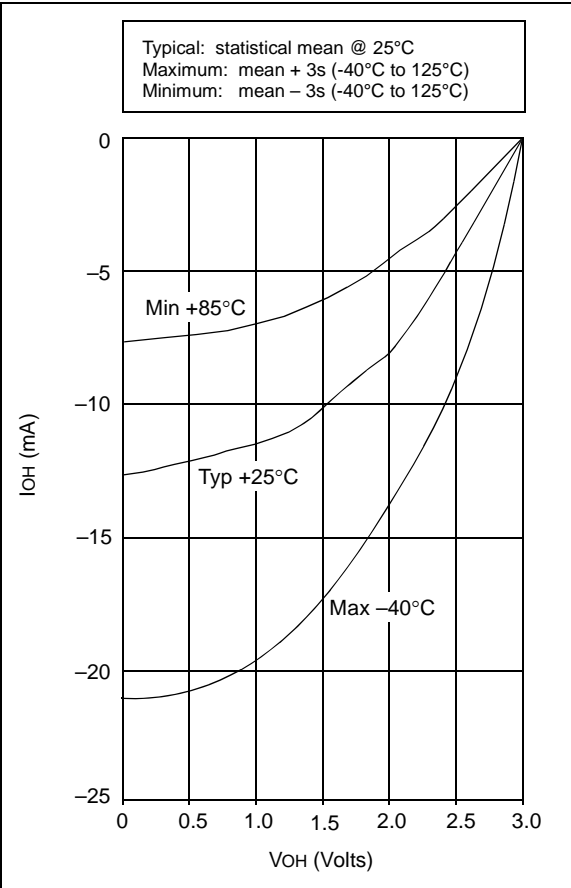


FIGURE 19-6: TIMER0 CLOCK TIMINGS - PIC16C5X-40

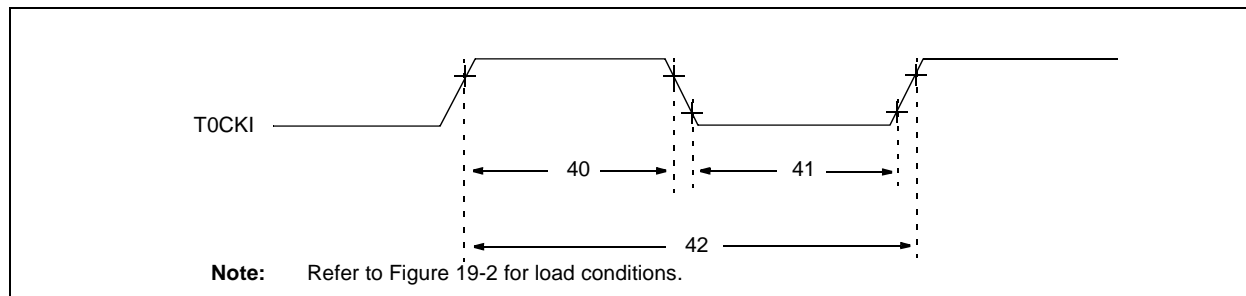


TABLE 19-4: TIMER0 CLOCK REQUIREMENTS PIC16C5X-40

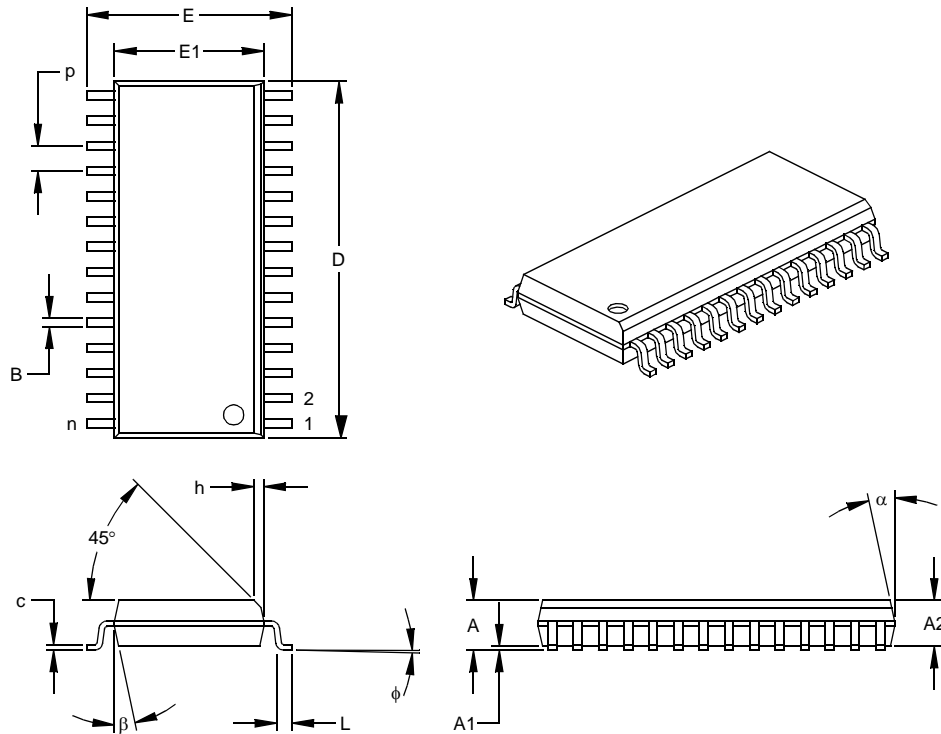
AC Characteristics			Standard Operating Conditions (unless otherwise specified)				
			Operating Temperature $0^{\circ}\text{C} \leq T_A \leq +70^{\circ}\text{C}$ for commercial				
Param No.	Symbol	Characteristic	Min	Typ†	Max	Units	Conditions
40	Tt0H	T0CKI High Pulse Width - No Prescaler	$0.5 T_{CY} + 20^*$	—	—	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	20 or $\frac{T_{CY} + 40^*}{N}$	—	—	ns	Whichever is greater. N = Prescale Value (1, 2, 4,..., 256)

* 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.

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

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		INCHES*			MILLIMETERS		
Dimension Limits		MIN	NOM	MAX	MIN	NOM	MAX
Number of Pins	n		28			28	
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	.288	.295	.299	7.32	7.49	7.59
Overall Length	D	.695	.704	.712	17.65	17.87	18.08
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 Top	φ	0	4	8	0	4	8
Lead Thickness	c	.009	.011	.013	0.23	0.28	0.33
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. C04-052

PIC16C5X

NOTES: