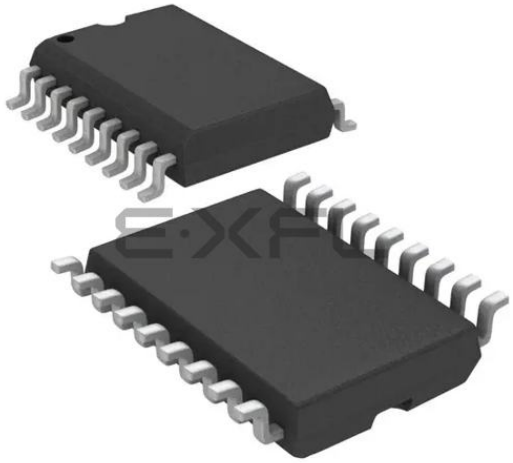


Welcome to E-XFL.COM

What is "Embedded - Microcontrollers"?

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

Applications of "Embedded - Microcontrollers"

Details	
Product Status	Active
Core Processor	PIC
Core Size	8-Bit
Speed	10MHz
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	-40°C ~ 85°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/pic16c54a-10i-so

Table of Contents

TO OUR VALUED CUSTOMERS

It is our intention to provide our valued customers with the best documentation possible to ensure successful use of your Microchip products. To this end, we will continue to improve our publications to better suit your needs. Our publications will be refined and enhanced as new volumes and updates are introduced.

If you have any questions or comments regarding this publication, please contact the Marketing Communications Department via E-mail at **docerrors@mail.microchip.com** or fax the **Reader Response Form** in the back of this data sheet to (480) 792-4150. We welcome your feedback.

Most Current Data Sheet

To obtain the most up-to-date version of this data sheet, please register at our Worldwide Web site at:

http://www.microchip.com

You can determine the version of a data sheet by examining its literature number found on the bottom outside corner of any page. The last character of the literature number is the version number, (e.g., DS30000A is version A of document DS30000).

Errata

An errata sheet, describing minor operational differences from the data sheet and recommended workarounds, may exist for current devices. As device/documentation issues become known to us, we will publish an errata sheet. The errata will specify the revision of silicon and revision of document to which it applies.

To determine if an errata sheet exists for a particular device, please check with one of the following:

- Microchip's Worldwide Web site; http://www.microchip.com
- Your local Microchip sales office (see last page)
- The Microchip Corporate Literature Center; U.S. FAX: (480) 792-7277

When contacting a sales office or the literature center, please specify which device, revision of silicon and data sheet (include literature number) you are using.

Customer Notification System

Register on our web site at **www.microchip.com/cn** to receive the most current information on all of our products.

NOTES:

NOTES:

TABLE 3-1: PINOUT DESCRIPTION - PIC16C54, PIC16CR54, PIC16C56, PIC16CR56, PIC16C58, PIC16CR58

Pin Name	Pin Number			Pin Type	Buffer Type	Description
	DIP	SOIC	SSOP			
RA0	17	17	19	I/O	TTL	Bi-directional I/O port
RA1	18	18	20	I/O	TTL	
RA2	1	1	1	I/O	TTL	
RA3	2	2	2	I/O	TTL	
RB0	6	6	7	I/O	TTL	Bi-directional I/O port
RB1	7	7	8	I/O	TTL	
RB2	8	8	9	I/O	TTL	
RB3	9	9	10	I/O	TTL	
RB4	10	10	11	I/O	TTL	
RB5	11	11	12	I/O	TTL	
RB6	12	12	13	I/O	TTL	
RB7	13	13	14	I/O	TTL	
T0CKI	3	3	3	I	ST	Clock input to Timer0. Must be tied to V_{SS} or V_{DD}, if not in use, to reduce current consumption.
$\overline{MCLR}/V_{PP}$	4	4	4	I	ST	Master clear (RESET) input/programming voltage input. This pin is an active low RESET to the device. Voltage on the $\overline{MCLR}/V_{PP}$ pin must not exceed V_{DD} to avoid unintended entering of Programming mode.
OSC1/CLKIN	16	16	18	I	ST	Oscillator crystal input/external clock source input.
OSC2/CLKOUT	15	15	17	O	—	Oscillator crystal output. Connects to crystal or resonator in crystal Oscillator mode. In RC mode, OSC2 pin outputs CLKOUT, which has 1/4 the frequency of OSC1 and denotes the instruction cycle rate.
V_{DD}	14	14	15,16	P	—	Positive supply for logic and I/O pins.
V_{SS}	5	5	5,6	P	—	Ground reference for logic and I/O pins.

Legend: I = input, O = output, I/O = input/output, P = power, — = Not Used, TTL = TTL input, ST = Schmitt Trigger input

FIGURE 5-3: TIME-OUT SEQUENCE ON POWER-UP ($\overline{MCLR}$ NOT TIED TO VDD)

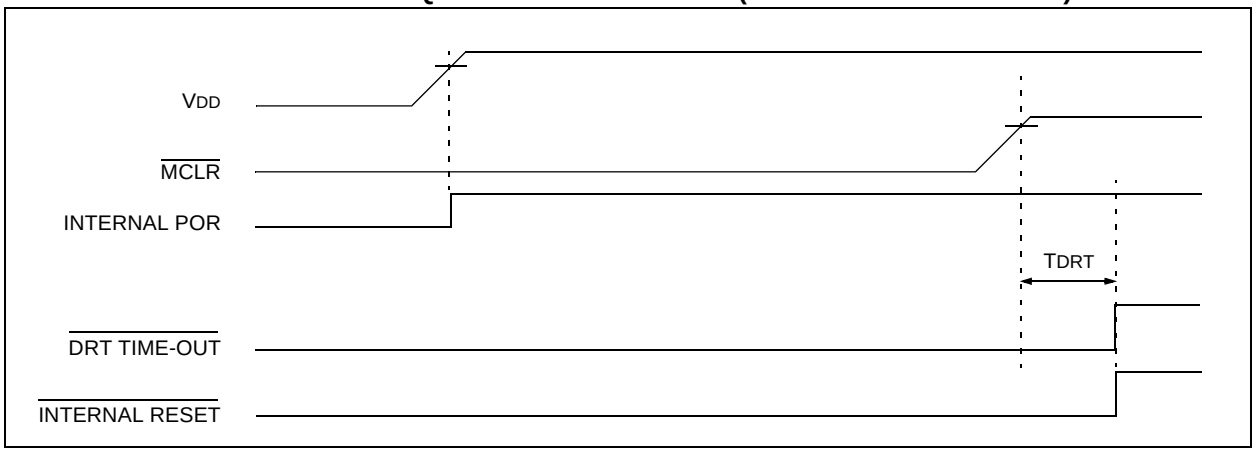


FIGURE 5-4: TIME-OUT SEQUENCE ON POWER-UP ($\overline{MCLR}$ TIED TO VDD): FAST VDD RISE TIME

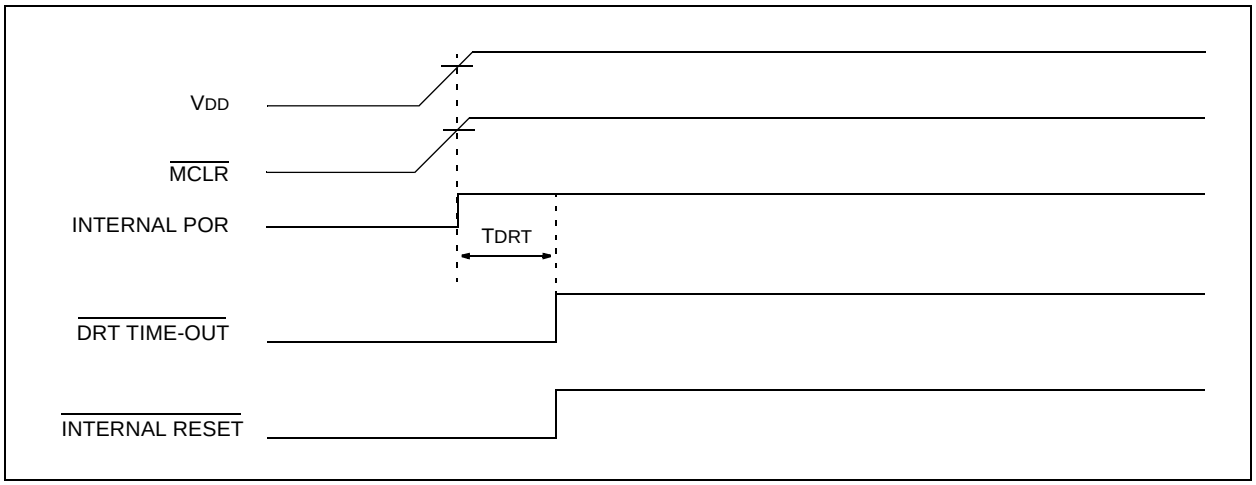
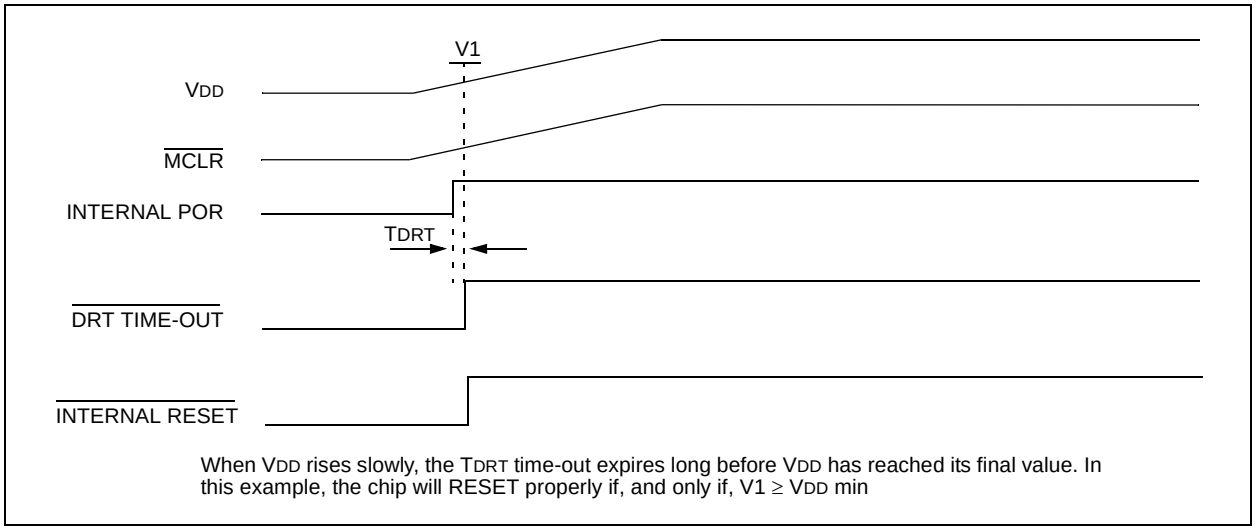


FIGURE 5-5: TIME-OUT SEQUENCE ON POWER-UP ($\overline{MCLR}$ TIED TO VDD): SLOW VDD RISE TIME



When VDD rises slowly, the TDRT time-out expires long before VDD has reached its final value. In this example, the chip will RESET properly if, and only if, V1 ≥ VDD min

NOTES:

6.4 OPTION Register

The OPTION Register is a 6-bit wide, write-only register which contains various control bits to configure the Timer0/WDT prescaler and Timer0.

By executing the `OPTION` instruction, the contents of the W Register will be transferred to the OPTION Register. A RESET sets the OPTION<5:0> bits.

REGISTER 6-2: OPTION REGISTER

U-0	U-0	W-1	W-1	W-1	W-1	W-1	W-1
—	—	T0CS	TOSE	PSA	PS2	PS1	PS0
bit 7							bit 0

bit 7-6: **Unimplemented**: Read as '0'

bit 5: **T0CS**: Timer0 clock source select bit
1 = Transition on T0CKI pin
0 = Internal instruction cycle clock (CLKOUT)

bit 4: **T0SE**: Timer0 source edge select bit
1 = Increment on high-to-low transition on T0CKI pin
0 = Increment on low-to-high transition on T0CKI pin

bit 3: **PSA**: Prescaler assignment bit
1 = Prescaler assigned to the WDT
0 = Prescaler assigned to Timer0

bit 2-0: **PS<2:0>**: Prescaler rate select bits

Bit Value	Timer0 Rate	WDT Rate
000	1 : 2	1 : 1
001	1 : 4	1 : 2
010	1 : 8	1 : 4
011	1 : 16	1 : 8
100	1 : 32	1 : 16
101	1 : 64	1 : 32
110	1 : 128	1 : 64
111	1 : 256	1 : 128

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

TABLE 11-1: DEVELOPMENT TOOLS FROM MICROCHIP

		PIC12CXXX	PIC14000	PIC16C5X	PIC16C6X	PIC16CXXX	PIC16F62X	PIC16C7X	PIC16C7XX	PIC16C8X	PIC16F8XX	PIC16C9XX	PIC17C4X	PIC17C7XX	PIC18CXX2	PIC18FXXX	24CXX/ 25CXX/ 93CXX	HCSXXX	MCRFXXX	MCP2510
Software Tools	MPLAB® Integrated Development Environment	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
	MPLAB® C17 C Compiler												✓	✓						
	MPLAB® C18 C Compiler														✓	✓				
	MPASM™ Assembler/ MPLINK™ Object Linker	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Emulators	MPLAB® ICE In-Circuit Emulator	✓	✓	✓	✓	✓	✓**	✓	✓	✓	✓	✓	✓	✓	✓	✓				
	ICEPIC™ In-Circuit Emulator	✓		✓	✓	✓		✓	✓	✓		✓								
Debugger	MPLAB® ICD In-Circuit Debugger				✓*			✓*			✓					✓				
Programmers	PICSTART® Plus Entry Level Development Programmer	✓	✓	✓	✓	✓	✓**	✓	✓	✓	✓	✓	✓	✓	✓	✓				
	PRO MATE® II Universal Device Programmer	✓	✓	✓	✓	✓	✓**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Demo Boards and Eval Kits	PICDEM™ 1 Demonstration Board			✓		✓		✓†		✓			✓							
	PICDEM™ 2 Demonstration Board				✓†			✓†							✓	✓				
	PICDEM™ 3 Demonstration Board											✓								
	PICDEM™ 14A Demonstration Board		✓																	
	PICDEM™ 17 Demonstration Board													✓						
	KEELOQ® Evaluation Kit																✓		✓	
	KEELOQ® Transponder Kit																✓			
	microID™ Programmer's Kit																	✓		
	125 kHz microID™ Developer's Kit																		✓	
	125 kHz Anticollision microID™ Developer's Kit																		✓	
	13.56 MHz Anticollision microID™ Developer's Kit																		✓	
	MCP2510 CAN Developer's Kit																			✓

* Contact the Microchip Technology Inc. web site at www.microchip.com for information on how to use the MPLAB® ICD In-Circuit Debugger (DV164001) with PIC16C62, 63, 64, 65, 72, 73, 74, 76, 77.

** Contact Microchip Technology Inc. for availability date.

† Development tool is available on select devices.

12.0 ELECTRICAL CHARACTERISTICS - PIC16C54A

Absolute Maximum Ratings(†)

Ambient Temperature under bias ..... –55°C to +125°C

Storage Temperature ..... –65°C to +150°C

Voltage on V_{DD} with respect to V_{SS} .....0V to +7.5V

Voltage on $\overline{MCLR}$ with respect to V_{SS}(1) .....0V to +14V

Voltage on all other pins with respect to V_{SS} .....–0.6V to (V_{DD} + 0.6V)

Total power dissipation(2) ..... 800 mW

Max. current out of V_{SS} pin ..... 150 mA

Max. current into V_{DD} pin ..... 100 mA

Max. current into an input pin (T0CKI only)..... ±500 μA

Input clamp current, I_{IK} (V_I < 0 or V_I > V_{DD}) ..... ±20 mA

Output clamp current, I_{OK} (V_O < 0 or V_O > V_{DD}) ..... ±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 (PORTA, B or C) ..... 40 mA

Max. output current sunk by a single I/O port (PORTA, B or C)..... 50 mA

Note 1: Voltage spikes below V_{SS} at the $\overline{MCLR}$ pin, inducing currents greater than 80 mA, may cause latch-up. Thus, a series resistor of 50 to 100 Ω should be used when applying a "low" level to the $\overline{MCLR}$ pin rather than pulling this pin directly to V_{SS}.

2: 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.

13.2 DC Characteristics: PIC16CR54A-04E, 10E, 20E (Extended)

PIC16CR54A-04E, 10E, 20E (Extended)			Standard Operating Conditions (unless otherwise specified) Operating Temperature –40°C ≤ TA ≤ +125°C for extended				
Param No.	**Symbol**	**Characteristic**	**Min**	**Typ†**	**Max**	**Units**	**Conditions**
D001	VDD	**Supply Voltage** RC, XT and LP modes HS mode	 3.25 4.5	 — —	 6.0 5.5	 V 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) RC(3) and XT modes HS mode HS mode	 — — —	 1.8 4.8 9.0	 3.3 10 20	 mA mA mA	 FOSC = 4.0 MHz, VDD = 5.5V FOSC = 10 MHz, VDD = 5.5V FOSC = 16 MHz, VDD = 5.5V
D020	IPD	**Power-down Current**(2)	— —	5.0 0.8	22 18	µA µA	VDD = 3.25V, WDT enabled VDD = 3.25V, WDT disabled

* These parameters are characterized but not tested.

† Data in the Typical ("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, $\overline{MCLR}$ = 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.

15.4 DC Characteristics: PIC16C54A-04, 10, 20, PIC16LC54A-04, PIC16LV54A-02 (Commercial) PIC16C54A-04I, 10I, 20I, PIC16LC54A-04I, PIC16LV54A-02I (Industrial) PIC16C54A-04E, 10E, 20E, PIC16LC54A-04E (Extended)

DC CHARACTERISTICS			Standard Operating Conditions (unless otherwise specified) Operating Temperature 0°C ≤ TA ≤ +70°C for commercial –40°C ≤ TA ≤ +85°C for industrial –20°C ≤ TA ≤ +85°C for industrial-PIC16LV54A-02I –40°C ≤ TA ≤ +125°C for extended				
Param No.	**Symbol**	**Characteristic**	**Min**	**Typ†**	**Max**	**Units**	**Conditions**
D030	VIL	**Input Low Voltage**					
		I/O ports	VSS	—	0.2 VDD	V	Pin at hi-impedance
		MCLR (Schmitt Trigger)	VSS	—	0.15 VDD	V	
		T0CKI (Schmitt Trigger)	VSS	—	0.15 VDD	V	
		OSC1 (Schmitt Trigger)	VSS	—	0.15 VDD	V	RC mode only(3)
		OSC1	VSS	—	0.3 VDD		XT, HS and LP modes
D040	VIH	**Input High Voltage**					
		I/O ports	0.2 VDD + 1	—	VDD	V	For all VDD(4)
		I/O ports	2.0	—	VDD	V	4.0V < VDD ≤ 5.5V(4)
		MCLR (Schmitt Trigger)	0.85 VDD	—	VDD	V	
		T0CKI (Schmitt Trigger)	0.85 VDD	—	VDD	V	
		OSC1 (Schmitt Trigger)	0.85 VDD	—	VDD	V	RC mode only(3)
		OSC1	0.7 VDD	—	VDD	V	XT, HS and LP modes
D050	VHYS	**Hysteresis of Schmitt Trigger inputs**	0.15 VDD*	—	—	V	
D060	IIL	**Input Leakage Current(1,2)**					**For VDD ≤ 5.5V:**
		I/O ports	-1.0	0.5	+1.0	µA	VSS ≤ VPIN ≤ VDD, pin at hi-impedance
		MCLR	-5.0	—	+5.0	µA	VPIN = VSS +0.25V
		MCLR	—	0.5	+3.0	µA	VPIN = VDD
		T0CKI	-3.0	0.5	+3.0	µA	VSS ≤ VPIN ≤ VDD
		OSC1	-3.0	0.5	—	µA	VSS ≤ VPIN ≤ VDD, XT, HS and LP modes
D080	VOL	**Output Low Voltage**					
		I/O ports	—	—	0.6	V	IOL = 8.7 mA, VDD = 4.5V
		OSC2/CLKOUT	—	—	0.6	V	IOL = 1.6 mA, VDD = 4.5V, RC mode only
	VOH	**Output High Voltage(2)**					
		I/O ports	VDD - 0.7	—	—	V	IOH = -5.4 mA, VDD = 4.5V
		OSC2/CLKOUT	VDD - 0.7	—	—	V	IOH = -1.0 mA, VDD = 4.5V, RC mode only

* These parameters are characterized but not tested.

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

Note 1: The leakage current on the MCLR/VPP pin is strongly dependent on the applied voltage level. The specified levels represent normal operating conditions. Higher leakage current may be measured at different input voltage.

2: Negative current is defined as coming out of the pin.

3: For the RC mode, the OSC1/CLKIN pin is a Schmitt Trigger input. It is not recommended that the PIC16C5X be driven with external clock in RC mode.

TABLE 15-1: EXTERNAL CLOCK TIMING REQUIREMENTS - PIC16C54A

AC Characteristics	Standard Operating Conditions (unless otherwise specified) Operating Temperature 0°C ≤ TA ≤ +70°C for commercial –40°C ≤ TA ≤ +85°C for industrial –20°C ≤ TA ≤ +85°C for industrial - PIC16LV54A-02I –40°C ≤ TA ≤ +125°C for extended						
Param No.	**Symbol**	**Characteristic**	**Min**	**Typ†**	**Max**	**Units**	**Conditions**
1	TOSC	External CLKIN Period(1)	250	—	—	ns	XT OSC mode
			500	—	—	ns	XT OSC mode (PIC16LV54A)
			250	—	—	ns	HS OSC mode (04)
			100	—	—	ns	HS OSC mode (10)
			50	—	—	ns	HS OSC mode (20)
			5.0	—	—	µs	LP OSC mode
		Oscillator Period(1)	250	—	—	ns	RC OSC mode
			500	—	—	ns	RC OSC mode (PIC16LV54A)
			250	—	10,000	ns	XT OSC mode
			500	—	—	ns	XT OSC mode (PIC16LV54A)
			250	—	250	ns	HS OSC mode (04)
			100	—	250	ns	HS OSC mode (10)
			50	—	250	ns	HS OSC mode (20)
			5.0	—	200	µs	LP OSC mode
2	Tcy	Instruction Cycle Time(2)	—	4/FOSC	—	—	
3	TosL, TosH	Clock in (OSC1) Low or High Time	85*	—	—	ns	XT oscillator
			20*	—	—	ns	HS oscillator
			2.0*	—	—	µs	LP oscillator
4	TosR, TosF	Clock in (OSC1) Rise or Fall Time	—	—	25*	ns	XT oscillator
			—	—	25*	ns	HS oscillator
			—	—	50*	ns	LP oscillator

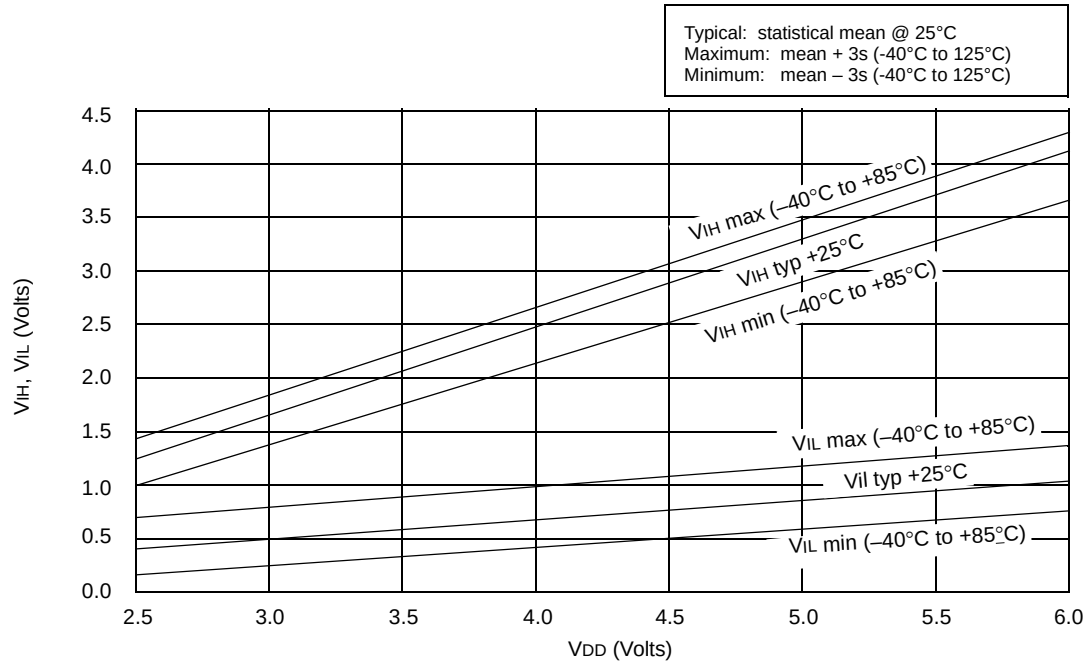
* These parameters are characterized but not tested.

† Data in the Typical ("Typ") column is based on characterization results at 25°C. This data is for design guidance only and is 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 16-9: VIH, VIL OF $\overline{\text{MCLR}}$, T0CKI AND OSC1 (IN RC MODE) vs. VDD



Note: These input pins have Schmitt Trigger input buffers.

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**
	IPD	**Power-down Current(2)**					
D020		PIC16LC5X	—	0.25	2	µA	VDD = 2.5V, WDT disabled, Commercial
			—	0.25	3	µA	VDD = 2.5V, WDT disabled, Industrial
			—	1	5	µA	VDD = 2.5V, WDT enabled, Commercial
			—	1.25	8	µA	VDD = 2.5V, WDT enabled, Industrial
D020A		PIC16C5X	—	0.25	4.0	µA	VDD = 3.0V, WDT disabled, Commercial
			—	0.25	5.0	µA	VDD = 3.0V, WDT disabled, Industrial
			—	1.8	7.0*	µA	VDD = 5.5V, WDT disabled, Commercial
			—	2.0	8.0*	µA	VDD = 5.5V, WDT disabled, Industrial
			—	4	12*	µA	VDD = 3.0V, WDT enabled, Commercial
			—	4	14*	µA	VDD = 3.0V, WDT enabled, Industrial
			—	9.8	27*	µA	VDD = 5.5V, WDT enabled, Commercial
			—	12	30*	µA	VDD = 5.5V, WDT enabled, 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, $\overline{MCLR}$ = 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.

19.0 ELECTRICAL CHARACTERISTICS - PIC16LC54C 40MHz

Absolute Maximum Ratings(†)

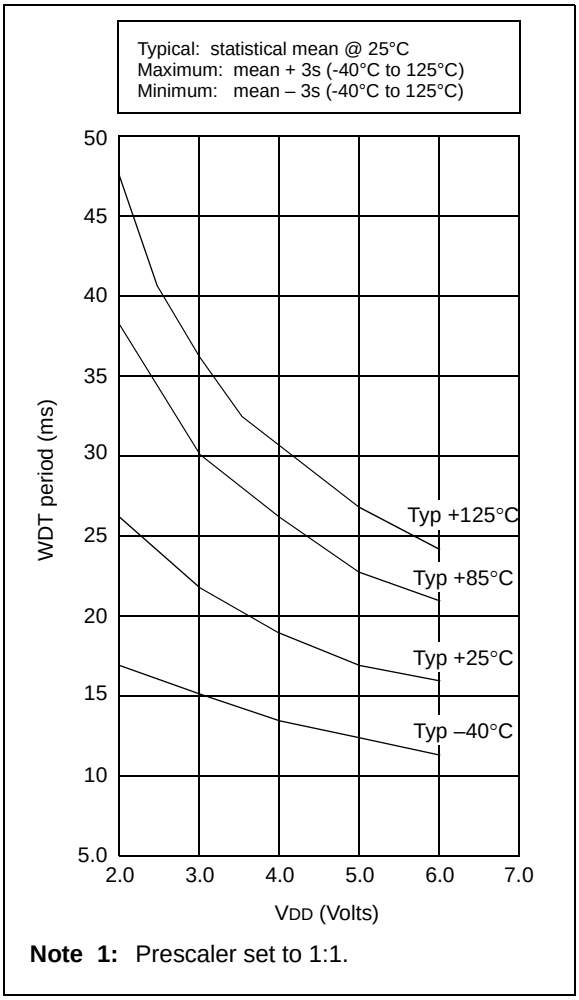
Ambient temperature under bias ..... –55°C to +125°C
Storage temperature ..... –65°C to +150°C
Voltage on V_{DD} with respect to V_{SS} ..... 0 to +7.5V
Voltage on $\overline{MCLR}$ with respect to V_{SS} ..... 0 to +14V
Voltage on all other pins with respect to V_{SS} ..... –0.6V to (V_{DD} + 0.6V)
Total power dissipation(1) ..... 800 mW
Max. current out of V_{SS} pin ..... 150 mA
Max. current into V_{DD} pin ..... 100 mA
Max. current into an input pin (T0CKI only) ..... ±500 μA
Input clamp current, I_{IK} (V_I < 0 or V_I > V_{DD}) ..... ±20 mA
Output clamp current, I_{OK} (V_O < 0 or V_O > V_{DD}) ..... ±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.

NOTES:

FIGURE 20-7: WDT TIMER TIME-OUT PERIOD vs. V_{DD}(1)



Note 1: Prescaler set to 1:1.

FIGURE 20-8: I_{OH} vs. V_{OH}, V_{DD} = 5 V

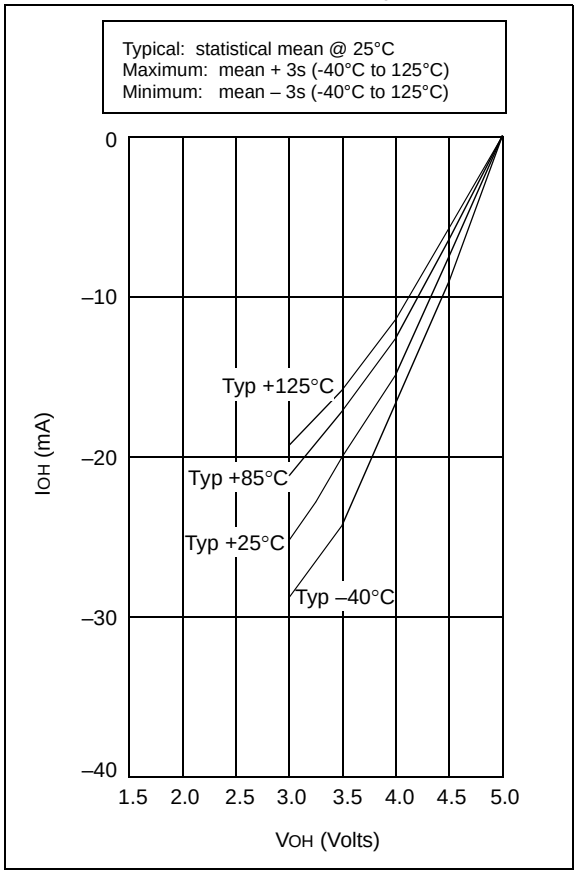


TABLE 20-1: INPUT CAPACITANCE

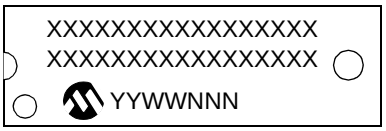
Pin	Typical Capacitance (pF)	
	18L PDIP	18L SOIC
RA port	5.0	4.3
RB port	5.0	4.3
$\overline{MCLR}$	17.0	17.0
OSC1	4.0	3.5
OSC2/CLKOUT	4.3	3.5
T0CKI	3.2	2.8

All capacitance values are typical at 25°C. A part-to-part variation of ±25% (three standard deviations) should be taken into account.

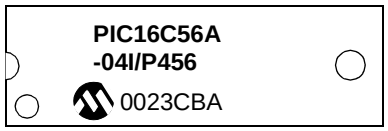
21.0 PACKAGING INFORMATION

21.1 Package Marketing Information

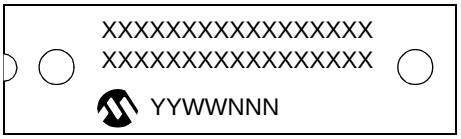
18-Lead PDIP



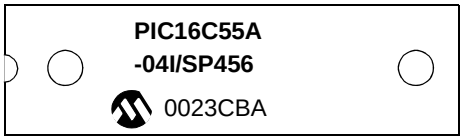
Example



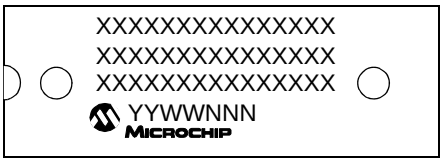
28-Lead Skinny PDIP (.300")



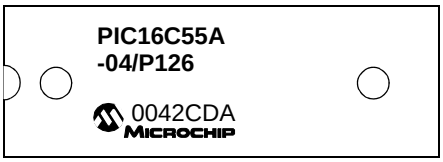
Example



28-Lead PDIP (.600")



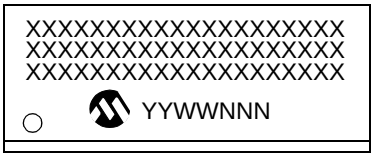
Example



18-Lead SOIC

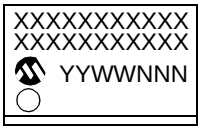
Example

28-Lead SOIC



Example

20-Lead SSOP



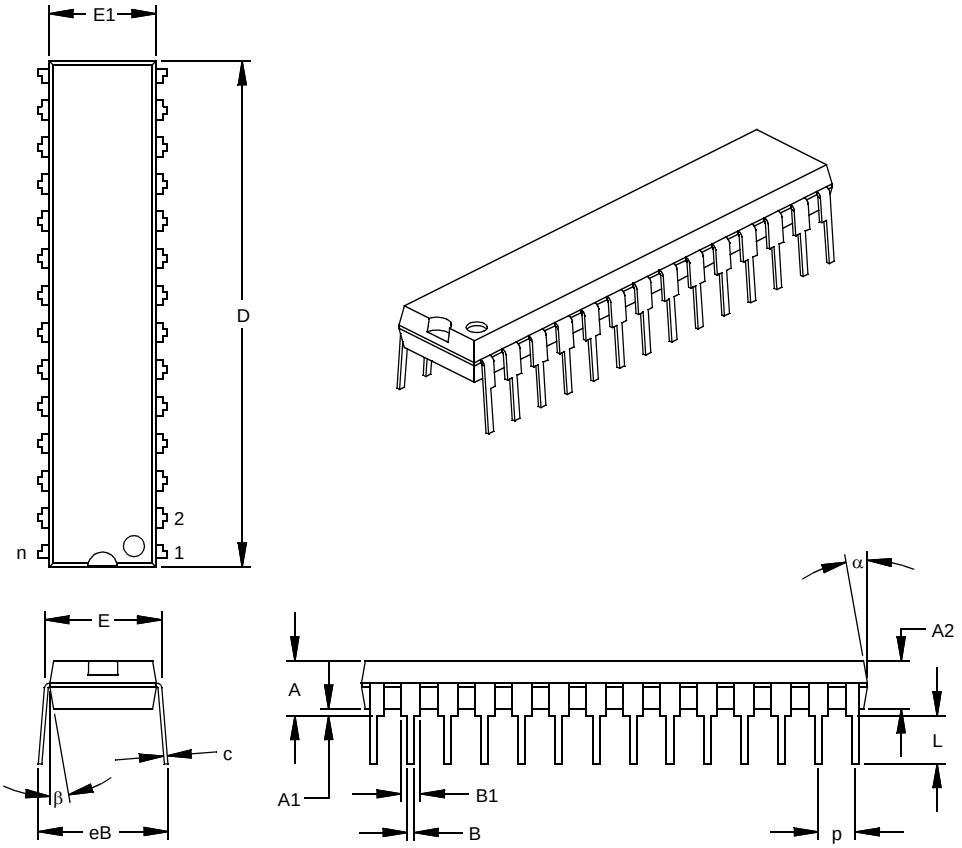
Example

28-Lead SSOP

Example

28-Lead Skinny Plastic Dual In-line (SP) – 300 mil (PDIP)

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		.100			2.54	
Top to Seating Plane	A	.140	.150	.160	3.56	3.81	4.06
Molded Package Thickness	A2	.125	.130	.135	3.18	3.30	3.43
Base to Seating Plane	A1	.015			0.38		
Shoulder to Shoulder Width	E	.300	.310	.325	7.62	7.87	8.26
Molded Package Width	E1	.275	.285	.295	6.99	7.24	7.49
Overall Length	D	1.345	1.365	1.385	34.16	34.67	35.18
Tip to Seating Plane	L	.125	.130	.135	3.18	3.30	3.43
Lead Thickness	c	.008	.012	.015	0.20	0.29	0.38
Upper Lead Width	B1	.040	.053	.065	1.02	1.33	1.65
Lower Lead Width	B	.016	.019	.022	0.41	0.48	0.56
Overall Row Spacing §	eB	.320	.350	.430	8.13	8.89	10.92
Mold Draft Angle Top	α	5	10	15	5	10	15
Mold Draft Angle Bottom	β	5	10	15	5	10	15

* Controlling Parameter
§ Significant Characteristic
Notes:
Dimension D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010” (0.254mm) per side.
JEDEC Equivalent: MO-095
Drawing No. C04-070

INDEX