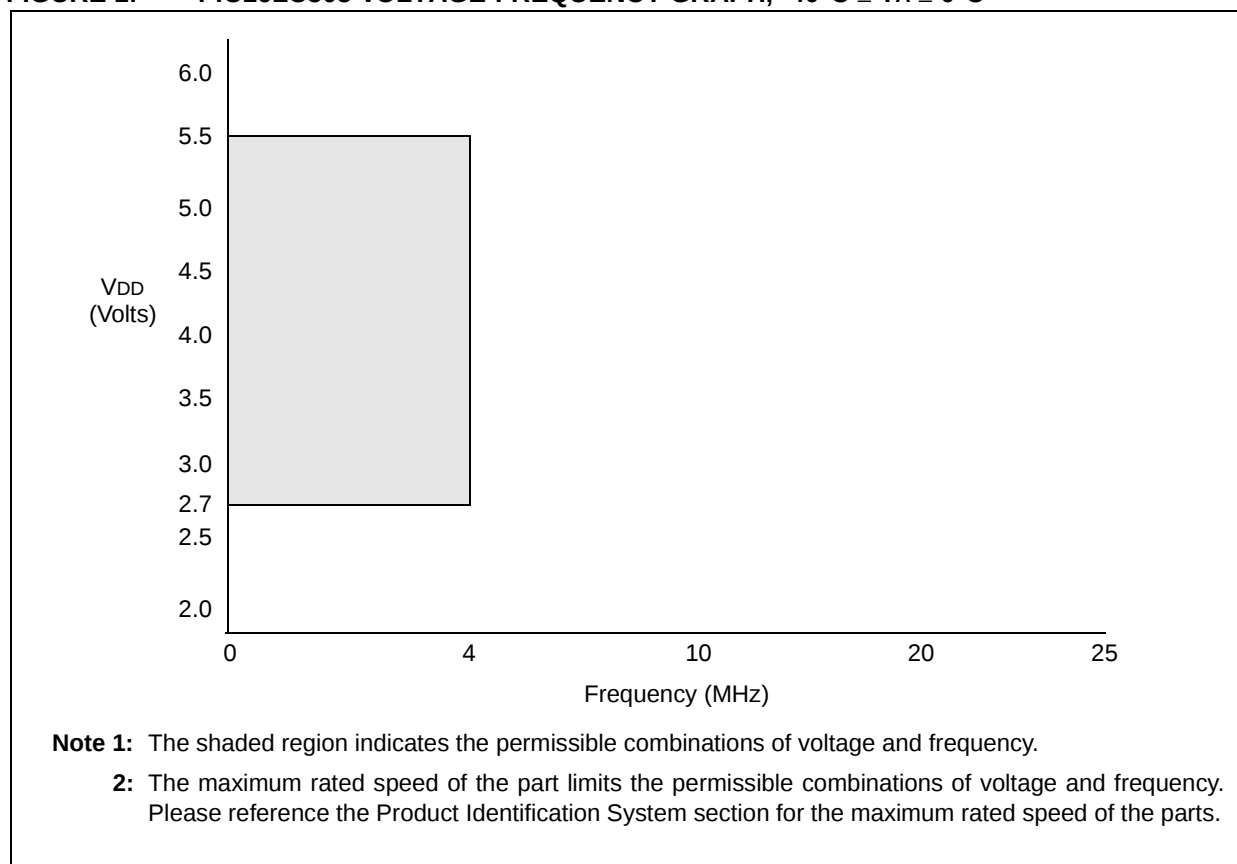


PIC16C505 Rev. A Silicon Errata Sheet

The PIC16C505 (Rev. A) parts you have received conform functionally to the Device Data Sheet (DS40192C), except for the anomalies described below.

FIGURE 1: PIC16LC505 VOLTAGE-FREQUENCY GRAPH, $-40^{\circ}\text{C} \leq T_A \leq 0^{\circ}\text{C}$



PIC16C505

FIGURE 2: PIC16LC505 VOLTAGE-FREQUENCY GRAPH, $0^{\circ}\text{C} \leq T_A \leq +70^{\circ}\text{C}$

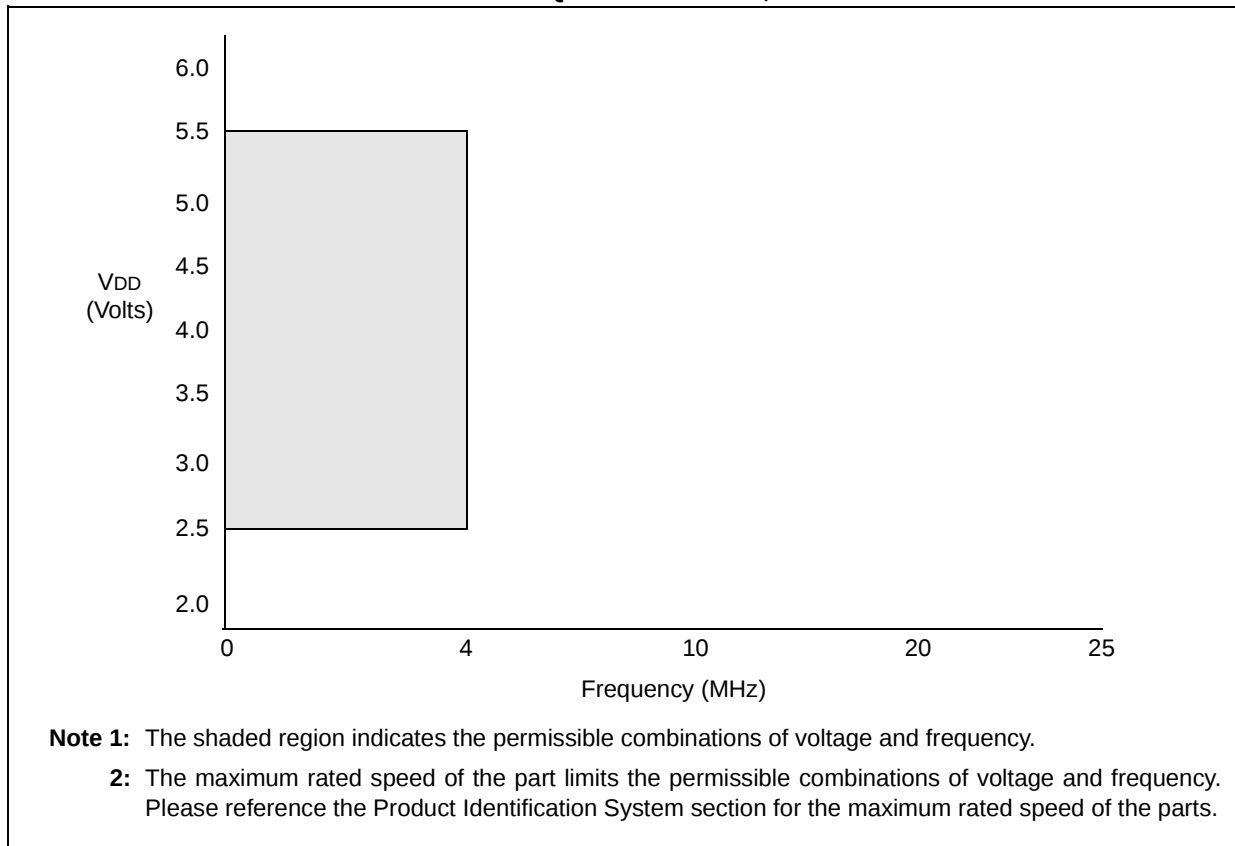
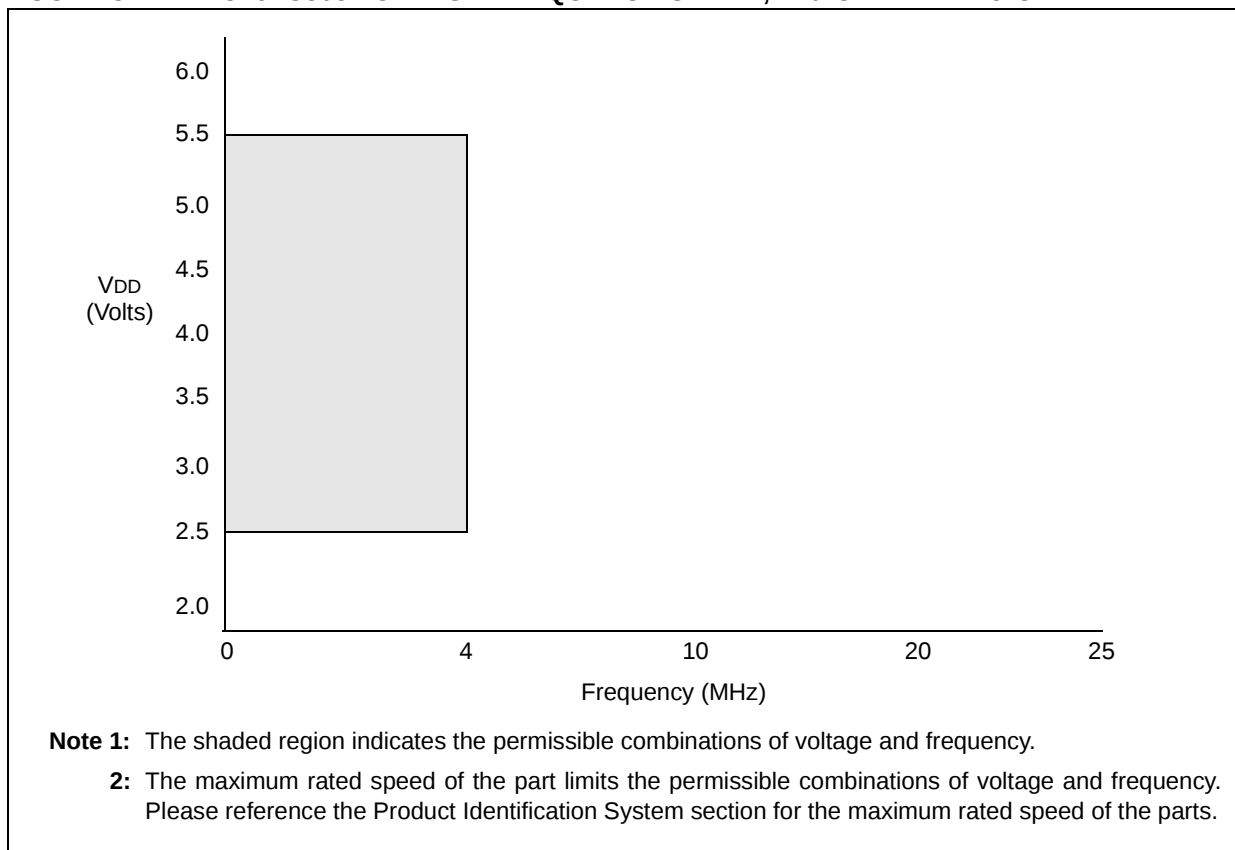


FIGURE 3: PIC16LC505 VOLTAGE-FREQUENCY GRAPH, $+70^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$



Clarifications/Corrections to the Data Sheet:

In the Device Data Sheet (DS40192C), the following clarifications and corrections should be noted.

Section 4: Corrections to the Special Function Register (SFR) Summary are shown in Table 4-1.

Section 10: Corrections for the DC Characteristics, Sections 10.1, 10.2 and 10.3 are shown.

Corrections for the PORTB pull-up resistor ranges are shown in Table 10-1.

For the section titled "Reset", additional information is provided on OSC1/CLKIN and OSC2/CLKOUT pin states during a MCLR.

TABLE 4-1: SPECIAL FUNCTION REGISTER (SFR) SUMMARY

Address	Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Value on Power-On Reset	Value on All Other Resets ⁽²⁾
04h	FSR	Indirect data memory address pointer								100x xxxx	10uu uuuu

Legend: Shaded cells not used by Port Registers, read as '0', — = unimplemented, read as '0', x = unknown, u = unchanged, q = depends on condition.

Note 1: If RESET was due to wake-up on pin change, then bit 7 = 1. All other RESETS will cause bit 7 = 0.

2: Other (non-power-up) RESETS include external RESET through MCLR, Watchdog Timer and wake-up on pin change RESET.

PIC16C505

10.1 DC CHARACTERISTICS: PIC16C505-04 (Commercial, Industrial, Extended) PIC16C505-20 (Commercial, Industrial, Extended)

Standard Operating Conditions (unless otherwise specified) DC Characteristics Power Supply Pins Operating Temperature $0^{\circ}\text{C} \leq T_A \leq +70^{\circ}\text{C}$ (commercial) $-40^{\circ}\text{C} \leq T_A \leq +85^{\circ}\text{C}$ (industrial) $-40^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$ (extended)							
Parm. No.	Characteristic	Sym	Min	Typ ⁽¹⁾	Max	Units	Conditions
D010	Supply Current ⁽³⁾	IDD	—	0.8	1.4	mA	FOSC = 4MHz, VDD = 5.5V, WDT disabled, XT mode (Note 4)
			—	0.6	1.0	mA	FOSC = 4MHz, VDD = 3.0V, WDT disabled, XT mode (Note 4)
			—	3	7	mA	FOSC = 10MHz, VDD = 3.0V, WDT disabled, HS mode (Note 6)
			—	4	12	mA	FOSC = 20MHz, VDD = 4.5V, WDT disabled, HS mode
			—	4.5	16	mA	FOSC = 20MHz, VDD = 5.5V, WDT disabled, HS mode
			—	19	27	μA	FOSC = 32kHz, VDD = 3.0V, WDT disabled, LP mode (Note 6)
D020	Power-Down Current ⁽⁵⁾	IPD	—	0.25	4	μA	VDD = 3.0V (Note 6)
			—	0.4	5.5	μA	VDD = 4.5V (Note 6)
			—	3	8	μA	VDD = 5.5V, Industrial
			—	5	14	μA	VDD = 5.5V, Extended Temp.

- Note 1:** 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.
- 2:** This is the limit to which VDD can be lowered in SLEEP mode without losing RAM data.
- 3:** 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.
- 4:** Does not include current through Rext. The current through the resistor can be estimated by the formula:
 $I_R = V_{DD}/2R_{ext}$ (mA) with Rext in kOhm.
- 5:** 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.
- 6:** Commercial temperature range only.

10.2 DC CHARACTERISTICS: PIC16LC505-04 (Commercial, Industrial)

DC Characteristics Power Supply Pins		Standard Operating Conditions (unless otherwise specified)					
		Operating Temperature $0^{\circ}\text{C} \leq T_A \leq +70^{\circ}\text{C}$ (commercial)					
		$-40^{\circ}\text{C} \leq T_A \leq +85^{\circ}\text{C}$ (industrial)					
Parm. No.	Characteristic	Sym	Min	Typ ⁽¹⁾	Max	Units	Conditions
D010	Supply Current ⁽³⁾	IDD	—	0.8	1.4	mA	FOSC = 4MHz, VDD = 5.5V, WDT disabled, XT mode (Note 4)
			—	0.4	0.8	mA	FOSC = 4MHz, VDD = 2.5V, WDT disabled, XT mode (Note 4)
			—	15	23	μA	FOSC = 32kHz, VDD = 2.5V, WDT disabled, LP mode (Note 6)
D020	Power-Down Current ⁽⁵⁾	IPD	—	0.25	3	μA	VDD = 2.5V (Note 6)
			—	0.25	4	μA	VDD = 3.0V (Note 6)
			—	3	8	μA	VDD = 5.5V Industrial

- Note 1:** 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.
- 2:** This is the limit to which VDD can be lowered in SLEEP mode without losing RAM data.
- 3:** 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.
- 4:** Does not include current through Rext. The current through the resistor can be estimated by the formula:
 $I_R = V_{DD}/2R_{ext}$ (mA) with Rext in kOhm.
- 5:** 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.
- 6:** Commercial temperature range only.

PIC16C505

10.3 DC CHARACTERISTICS: PIC16C505-04 (Commercial, Industrial, Extended) PIC16C505-20 (Commercial, Industrial, Extended) PIC16C505-04 (Commercial, Industrial))

Standard Operating Conditions (unless otherwise specified) Operating temperature $0^{\circ}\text{C} \leq T_A \leq +70^{\circ}\text{C}$ (commercial) $-40^{\circ}\text{C} \leq T_A \leq +85^{\circ}\text{C}$ (industrial) $-40^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$ (extended)							
DC CHARACTERISTICS							
Param No.	Characteristic	Sym	Min	Typ †	Max	Units	Conditions
D040 D040A	Input High Voltage I/O ports with TTL buffer	V_{IH}		-			
			2.0	-	V_{DD}	V	$4.5 \leq V_{DD} \leq 5.5\text{V}$
			$0.25V_{DD} + 0.8\text{V}$	-	V_{DD}	V	Otherwise
D061 D061A	Input Leakage Current (Notes 2, 3)	I_{IL}					
	RB3/ $\overline{\text{MCLR}}$ (Note 5)		8	130	250	μA	$V_{SS} \leq V_{PIN} \leq V_{DD}$
	RB3/ $\overline{\text{MCLR}}$ (Note 6)		-	-	± 5	μA	$V_{SS} \leq V_{PIN} \leq V_{DD}$
D070	RB weak pull-up current (Note 4)	I_{PUR}	179	250	333	μA	$V_{DD} = 5\text{V}, V_{PIN} = V_{SS}$

† 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 EXTRC oscillator configuration, the OSC1/CLKIN pin is a Schmitt Trigger input. It is not recommended that the PIC16C505 be driven with external clock in RC mode.

2: The leakage current on the MCLR 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 voltages.

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

4: Does not include RB3. For RB3 see parameters D0061 and D0061A.

5: This spec. applies to RB3/ $\overline{\text{MCLR}}$ configured as external MCLR and RB3/ $\overline{\text{MCLR}}$ configured as input with internal pull-up enabled.

6: This spec. applies to RB3/ $\overline{\text{MCLR}}$ configured as external MCLR and RB3/ $\overline{\text{MCLR}}$ configured as input with pull-up disabled. The leakage current of the MCLR circuit is higher than the standard I/O logic.

TABLE 10-1: PULL-UP RESISTOR RANGES - PIC16C505

V _{DD} (Volts)	Temperature (°C)	Min	Typ	Max	Units
RB0/RB1/RB4					
2.5	–40	38K	42K	63K	Ω
	25	42K	48K	63K	Ω
	85	42K	49K	63K	Ω
	125	50K	55K	63K	Ω
5.5	–40	15K	17K	20K	Ω
	25	18K	20K	23K	Ω
	85	19K	22K	25K	Ω
	125	22K	24K	28K	Ω
RB3⁽¹⁾					
2.5	–40	65K	80K	850K	Ω
	25	80K	100K	1150K	Ω
	85	85K	110K	1300K	Ω
	125	100K	120K	1500K	Ω
5.5	–40	50K	60K	600K	Ω
	25	60K	65K	750K	Ω
	85	65K	80K	900K	Ω
	125	75K	90K	990K	Ω

* These parameters are characterized but not tested.

Note 1: The weak pull-up resistor and associated current for the RB3/ $\overline{\text{MCLR}}$ pin is non-linear when the respective pin voltage is less than V_{DD} - 1.0V. See parameter D061 for RB3/MCLR pin current specifications.

Reset

When $\overline{\text{MCLR}}$ is asserted, the state of the OSC1/CLKIN and CLKOUT/OSC2 pins are as follows:

CLKIN/CLKOUT PIN STATES WHEN $\overline{\text{MCLR}}$ ASSERTED

Oscillator Mode	OSC1/CLKIN Pin	OSC2/CLKOUT Pin
EXTRC, CLKOUT on OSC2	OSC1 pin is tristated and driven by external circuit	OSC2 pin is driven low
EXTRC, OSC2 is I/O	OSC1 pin is tristated and driven by external circuit	OSC2 pin is tristate input
INTRC, CLKOUT on OSC2	OSC1 pin is tristate input	OSC2 pin is driven low
INTRC, OSC2 is I/O	OSC1 pin is tristate input	OSC2 pin is tristate input



WORLDWIDE SALES AND SERVICE

AMERICAS

Corporate Office

2355 West Chandler Blvd.
Chandler, AZ 85224-6199
Tel: 480-786-7200 Fax: 480-786-7277
Technical Support: 480-786-7627
Web Address: <http://www.microchip.com>

Rocky Mountain

2355 West Chandler Blvd.
Chandler, AZ 85224-6199
Tel: 480-786-7966 Fax: 480-786-7456

Atlanta

500 Sugar Mill Road, Suite 200B
Atlanta, GA 30350
Tel: 770-640-0034 Fax: 770-640-0307

Boston

2 Lan Drive, Suite 120
Westford, MA 01886
Tel: 978-692-3838 Fax: 978-692-3821

Chicago

333 Pierce Road, Suite 180
Itasca, IL 60143
Tel: 630-285-0071 Fax: 630-285-0075

Dallas

4570 Westgrove Drive, Suite 160
Addison, TX 75001
Tel: 972-818-7423 Fax: 972-818-2924

Dayton

Two Prestige Place, Suite 130
Miamisburg, OH 45342
Tel: 937-291-1654 Fax: 937-291-9175

Detroit

Tri-Atria Office Building
32255 Northwestern Highway, Suite 190
Farmington Hills, MI 48334
Tel: 248-538-2250 Fax: 248-538-2260

Los Angeles

18201 Von Karman, Suite 1090
Irvine, CA 92612
Tel: 949-263-1888 Fax: 949-263-1338

New York

150 Motor Parkway, Suite 202
Hauppauge, NY 11788
Tel: 631-273-5305 Fax: 631-273-5335

San Jose

Microchip Technology Inc.
2107 North First Street, Suite 590
San Jose, CA 95131
Tel: 408-436-7950 Fax: 408-436-7955

Toronto

6285 Northam Drive, Suite 108
Mississauga, Ontario L4V 1X5, Canada
Tel: 905-673-0699 Fax: 905-673-6509

ASIA/PACIFIC

China - Beijing

Microchip Technology Beijing Office
Unit 915
New China Hong Kong Manhattan Bldg.
No. 6 Chaoyangmen Beidajie
Beijing, 100027, No. China
Tel: 86-10-85282100 Fax: 86-10-85282104

China - Shanghai

Microchip Technology Shanghai Office
Room 701, Bldg. B
Far East International Plaza
No. 317 Xian Xia Road
Shanghai, 200051
Tel: 86-21-6275-5700 Fax: 86-21-6275-5060

Hong Kong

Microchip Asia Pacific
RM 2101, Tower 2, Metroplaza
223 Hing Fong Road
Kwai Fong, N.T., Hong Kong
Tel: 852-2401-1200 Fax: 852-2401-3431

India

Microchip Technology Inc.
India Liaison Office
Divyasree Chambers
1 Floor, Wing A (A3/A4)
No. 11, O'Shaughnessy Road
Bangalore, 560 027, India
Tel: 91-80-207-2165 Fax: 91-80-207-2171

Japan

Microchip Technology Intl. Inc.
Benex S-1 6F
3-18-20, Shinyokohama
Kohoku-Ku, Yokohama-shi
Kanagawa, 222-0033, Japan
Tel: 81-45-471-6166 Fax: 81-45-471-6122

Korea

Microchip Technology Korea
168-1, Youngbo Bldg. 3 Floor
Samsung-Dong, Kangnam-Ku
Seoul, Korea
Tel: 82-2-554-7200 Fax: 82-2-558-5934

ASIA/PACIFIC (continued)

Singapore

Microchip Technology Singapore Pte Ltd.
200 Middle Road
#07-02 Prime Centre
Singapore, 188980
Tel: 65-334-8870 Fax: 65-334-8850

Taiwan

Microchip Technology Taiwan
11F-3, No. 207
Tung Hua North Road
Taipei, 105, Taiwan
Tel: 886-2-2717-7175 Fax: 886-2-2545-0139

EUROPE

Denmark

Microchip Technology Denmark ApS
Regus Business Centre
Lautrup hof 1-3
Ballerup DK-2750 Denmark
Tel: 45 4420 9895 Fax: 45 4420 9910

France

Arizona Microchip Technology SARL
Parc d'Activite du Moulin de Massy
43 Rue du Saule Trappu
Batiment A - 1er Etage
91300 Massy, France
Tel: 33-1-69-53-63-20 Fax: 33-1-69-30-90-79

Germany

Arizona Microchip Technology GmbH
Gustav-Heinemann Ring 125
D-81739 Munich, Germany
Tel: 49-89-627-144 0 Fax: 49-89-627-144-44

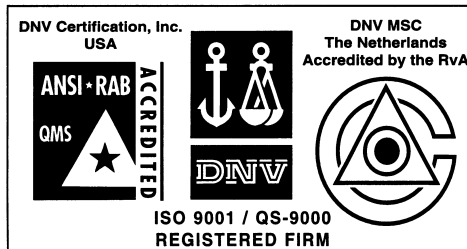
Italy

Arizona Microchip Technology SRL
Centro Direzionale Colleoni
Palazzo Taurus 1 V. Le Colleoni 1
20041 Agrate Brianza
Milan, Italy
Tel: 39-039-65791-1 Fax: 39-039-6899883

United Kingdom

Arizona Microchip Technology Ltd.
505 Eskdale Road
Winnersh Triangle
Wokingham
Berkshire, England RG41 5TU
Tel: 44 118 921 5869 Fax: 44-118 921-5820

9/01/00



Microchip received QS-9000 quality system certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona in July 1999. The Company's quality system processes and procedures are QS-9000 compliant for its PICmicro® 8-bit MCUs, KEELoc® code hopping devices, Serial EEPROMs and microperipheral products. In addition, Microchip's quality system for the design and manufacture of development systems is ISO 9001 certified.

All rights reserved. © 2000 Microchip Technology Incorporated. Printed in the USA. 10/00 Printed on recycled paper.

Information contained in this publication regarding device applications and the like is intended through suggestion only and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. No representation or warranty is given and no liability is assumed by Microchip Technology Incorporated with respect to the accuracy or use of such information, or infringement of patents or other intellectual property rights arising from such use or otherwise. Use of Microchip's products as critical components in life support systems is not authorized except with express written approval by Microchip. No licenses are conveyed, implicitly or otherwise, except as maybe explicitly expressed herein, under any intellectual property rights. The Microchip logo and name are registered trademarks of Microchip Technology Inc. in the U.S.A. and other countries. All rights reserved. All other trademarks mentioned herein are the property of their respective companies.