

Using The MCP2150 Developer's Board With The MCP2155

Author: Mark Palmer
Microchip Technology Inc.

INTRODUCTION

This Technical Brief describes how the MCP2150 Developer's Board can be used for development of MCP2155 applications.

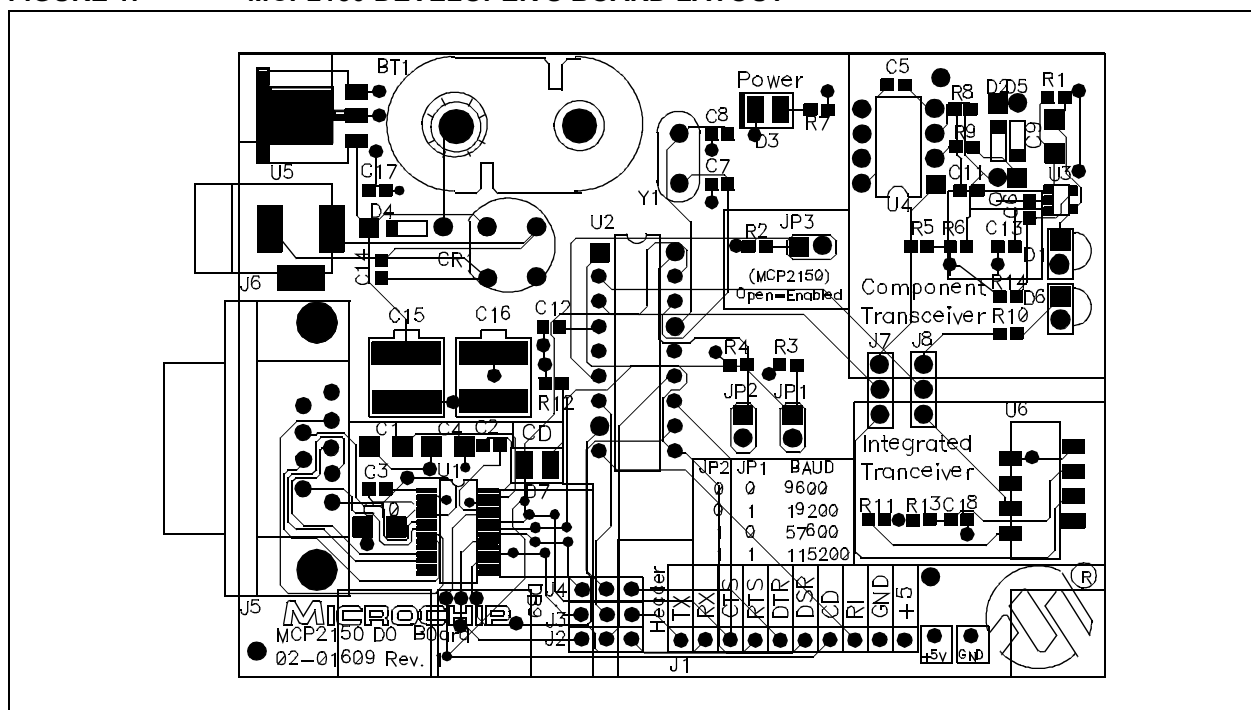
The MCP2150 is designed for use in Data Terminal Equipment (DTE) applications, while the MCP2155 is designed for use in Data Communication Equipment (DCE) applications. This requires some of the UART's non-data circuits to operate differently in these two devices.

While the MCP2150 can be connected to the DB-9 connector (J5) or the interface Header (J1), the MCP2155 can only be connected via the interface Header (J1). The DB-9 connector is useful for easily connecting to a Host PC.

The MCP2150 Developer's Board layout is shown in Figure 1. This Technical Brief focuses on the Host UART signals from the U2 socket (MCP2150/ MCP2155) to the MAX3238 device (U1) and the Header (J1).

The MCP2150 Developer's Board is available in the MCP2120/MCP2150 Developer's Kit (part number DM163008).

FIGURE 1: MCP2150 DEVELOPER'S BOARD LAYOUT



MCP2150 DEVELOPER'S BOARD UART SIGNALS

Table 1 shows the direction of the MCP2150 and MCP2155 UART signals and the direction of the MAX3238 device (U1) with respect to the U2 socket (where the MCP2150 or MCP2155 reside).

Table 1 also shows that only the Carrier Detect (CD) signal has a different direction between the MCP2150 and MCP2155 UART signals. This will not cause a drive conflict because this signal is an input to the MAX3238.

Figure 2 shows the layout of the UART driver signals. Each UART signal from the MAX3238 device (U1) is labeled with the UART signal name and have via's so that they may be cut and then later jumpered back to the original state. If desired, a signal line may be cut for your MCP2155 application development.

USING THE MCP2155

Since the CD signal has a different direction between the MCP2150 and MCP2155, the DB-9 interface (J5) cannot be used. To interface with the MCP2155, the MCP2150 Developer's Board must be connected through the Header (J1). This requires jumpers J2, J3 and J4 to have the Header selected (see Figure 2 and Figure 3).

The application's Host Controller can now implement an IrDA® Standard IRCOMM 9-wire "cooked" service class serial link to communicate with the MCP2155 via the Header J1.

The board can be powered by the +5V and GND connectors next to the J1 header (bottom right of Figure 1). Controlling the power to the MCP2150 Developer's Board allows the application to reset the MCP2150/MCP2155 device when required.

TABLE 1: MCP2155 SIGNAL DIRECTION

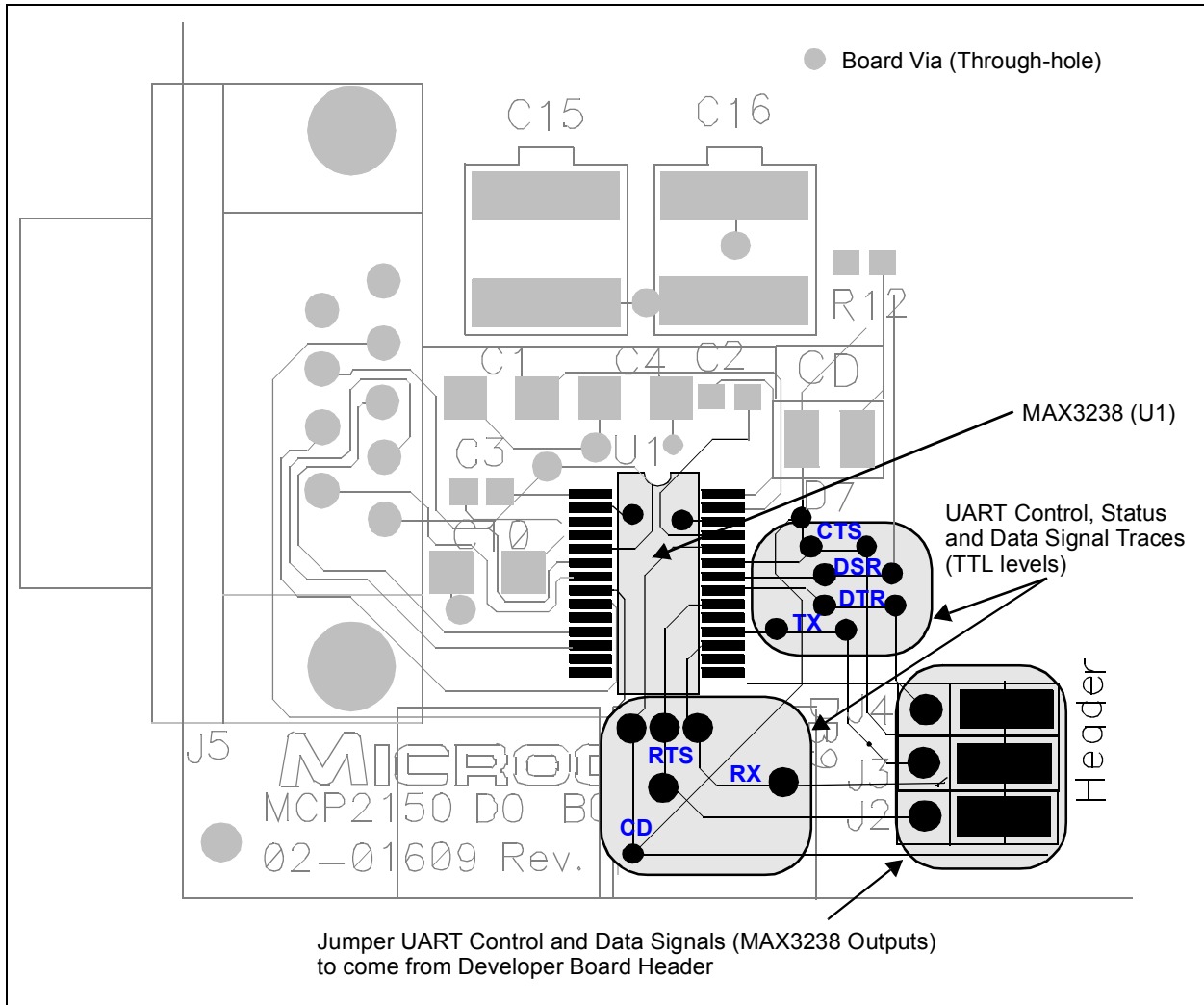
DB-9 Pin #	Signal		Signal Direction		MAX3238 (U1) to U2			Comment
	Name	Function	MCP2150	MCP2155	Pin Direction	U1 Pin Number	U2 Pin Number	
1	CD	Carrier Detect	MCP2150 → HC	HC → MCP2155	Input	24	17	Different Direction. No drive conflict, MAX3238 pin is input.
2	RX	Received Data	MCP2150 → HC	MCP2155 → HC	Input	17	8	Same Direction.
3	TX	Transmit Data	HC → MCP2150	HC → MCP2155	Output	18	7	Same Direction.
4	DTR ⁽¹⁾	Data Terminal Ready	HC → MCP2150	HC → MCP2155	Output	21	11	Same Direction.
5	GND	Ground	—	—	—	—	—	
6	DSR	Data Set Ready	MCP2150 → HC	MCP2155 → HC	Input	22	10	Same Direction.
7	RTS	Request to Send	HC → MCP2150	HC → MCP2155	Output	20	13	Same Direction.
8	CTS	Clear to Send	MCP2150 → HC	MCP2155 → HC	Input	23	12	Same Direction.
9	RI ⁽²⁾	Ring Indicator	—	HC → MCP2155	—	—	9	No issue. Not connected to MAX3238.

Legend: HC = Host Controller

Note 1: This signal is used for Device Programmable ID mode entry.

2: This signal is not implemented in the MCP2150.

FIGURE 2: MCP2150 DEVELOPER'S BOARD UART DRIVER LAYOUT



MCP2150 AND MCP2155 PIN DESCRIPTIONS

Table 2 gives the pin descriptions for the MCP2150, while Table 3 gives the pin descriptions for the MCP2155.

SUMMARY

The MCP2150 Developer's Board (available in the MCP2120/MCP2150 Developer's Kit, part number DM163008) can also be used for developing MCP2155 applications. This development is straight forward through the use of the Header interface (J1) and appropriate configuration of board jumpers.

TABLE 2: MCP2150 PIN DESCRIPTIONS

Pin Name	Pin Number			Pin Type	Buffer Type	Description
	PDIP	SOIC	SSOP			
BAUD0	1	1	1	I	ST	BAUD1:BAUD0 specify the baud rate of the device.
TXIR	2	2	2	O	—	Asynchronous transmit to Infrared transceiver.
RXIR	3	3	3	I	ST	Asynchronous receive from Infrared transceiver.
RESET	4	4	4	I	ST	1 = Device is operating. 0 = Device is in reset.
Vss	5	5	5, 6	—	P	Ground reference for logic and I/O pins.
EN	6	6	7	I	TTL	Device enable. 1 = Device is enabled. 0 = Device is disabled (low power). MCP2150 only monitors this pin when in the NDM state.
TX	7	7	8	I	TTL	Asynchronous receive; from Host Controller UART.
RX	8	8	9	O	—	Asynchronous transmit; to Host Controller UART.
RI	9	9	10	—	—	Ring Indicator. The value on this pin is driven high.
DSR	10	10	11	O	—	Data Set Ready. Indicates that the MCP2150 has completed reset. 1 = MCP2150 is initialized. 0 = MCP2150 is not initialized.
DTR	11	11	12	I	TTL	Data Terminal Ready. The value on this pin is ignored once the MCP2150 is initialized. It is recommended that this pin be connected such that the voltage level is either Vss or Vcc. At device power-up, this signal is used with the RTS signal to enter device ID programming. 1 = Enter Device ID programming mode (if RTS is cleared). 0 = Do not enter Device ID programming mode.
CTS	12	12	13	O	—	Clear to Send. Indicates that the MCP2150 is ready to receive data from the Host Controller. 1 = Host Controller should not send data. 0 = Host Controller may send data.
RTS	13	13	14	I	TTL	Request to Send. Indicates that a Host Controller is ready to receive data from the MCP2150. The MCP2150 prepares to send data, if available. 1 = Host Controller not ready to receive data. 0 = Host Controller ready to receive data. At device power-up, this signal is used with the DTR signal to enter device ID programming. 1 = Do not enter Device ID programming mode. 0 = Enter Device ID programming mode (if DTR is set).
VDD	14	14	15, 16	—	P	Positive supply for logic and I/O pins.
OSC2	15	15	17	O	—	Oscillator crystal output.

Legend: TTL = TTL compatible input ST = Schmitt Trigger input with CMOS levels
I = Input
O = Output
P = Power CMOS = CMOS compatible input

TABLE 2: MCP2150 PIN DESCRIPTIONS (CONTINUED)

Pin Name	Pin Number			Pin Type	Buffer Type	Description
	PDIP	SOIC	SSOP			
OSC1/CLKIN	16	16	18	I	CMOS	Oscillator crystal input/external clock source input.
CD	17	17	19	O	—	Carrier Detect. Indicates that the MCP2150 has established a valid link with a Primary Device. 1 = An IR link has not been established (No IR Link). 0 = An IR link has been established (IR Link).
BAUD1	18	18	20	I	ST	BAUD1:BAUD0 specify the baud rate of the device.

Legend: TTL = TTL compatible input ST = Schmitt Trigger input with CMOS levels
I = Input O = Output
P = Power CMOS = CMOS compatible input

TABLE 3: MCP2155 PIN DESCRIPTIONS

Pin Name	Pin Number			Pin Type	Buffer Type	Description
	PDIP	SOIC	SSOP			
BAUD0	1	1	1	I	ST	BAUD1:BAUD0 specify the baud rate of the device.
TXIR	2	2	2	O	—	Asynchronous transmit to Infrared transceiver.
RXIR	3	3	3	I	ST	Asynchronous receive from Infrared transceiver.
RESET	4	4	4	I	ST	1 = Device is operating. 0 = Device is in reset.
Vss	5	5	5, 6	—	P	Ground reference for logic and I/O pins.
EN	6	6	7	I	TTL	Device enable. 1 = Device is enabled. 0 = Device is disabled (low power). MCP2155 only monitors this pin when in the NDM state.
TX	7	7	8	I	TTL	Asynchronous receive; from Host Controller UART.
RX	8	8	9	O	—	Asynchronous transmit; to Host Controller UART.
RI	9	9	10	I	TTL	Ring Indicator. The state of this bit is communicated to the IrDA Primary Device. 1 = No Ring Indicate Present. 0 = Ring Indicate Present.
DSR	10	10	11	O	—	Data Set Ready. Indicates that the MCP2155 has established a valid link with a Primary Device. This signal is locally emulated and not related to the DTR bit of the IrDA Primary Device. 1 = An IR link has not been established (No IR Link). 0 = An IR link has been established (IR Link).
DTR	11	11	12	I	TTL	Data Terminal Ready. Indicates that the Embedded device connected to the MCP2155 is ready for IR data. The state of this bit is communicated to the IrDA Primary Device, via the IrDA DSR bit carried by IrCOMM. 1 = Embedded device not ready, clear IrDA DSR bit. 0 = Embedded device ready, set IrDA DSR bit. At device power-up, this signal is used with RTS to enter device ID programming. 1 = Enter Device ID programming mode (if RTS is cleared). 0 = Do not enter Device ID programming mode.
CTS	12	12	13	O	—	Clear to Send. Indicates that the MCP2155 is ready to receive data form the Host Controller. This signal is locally emulated and not related to the CTS/RTS bit of the IrDA Primary Device. 1 = Host Controller should not send data. 0 = Host Controller may send data.

Legend: TTL = TTL compatible input ST = Schmitt Trigger input with CMOS levels
I = Input O = Output
P = Power CMOS = CMOS compatible input

TABLE 3: MCP2155 PIN DESCRIPTIONS (CONTINUED)

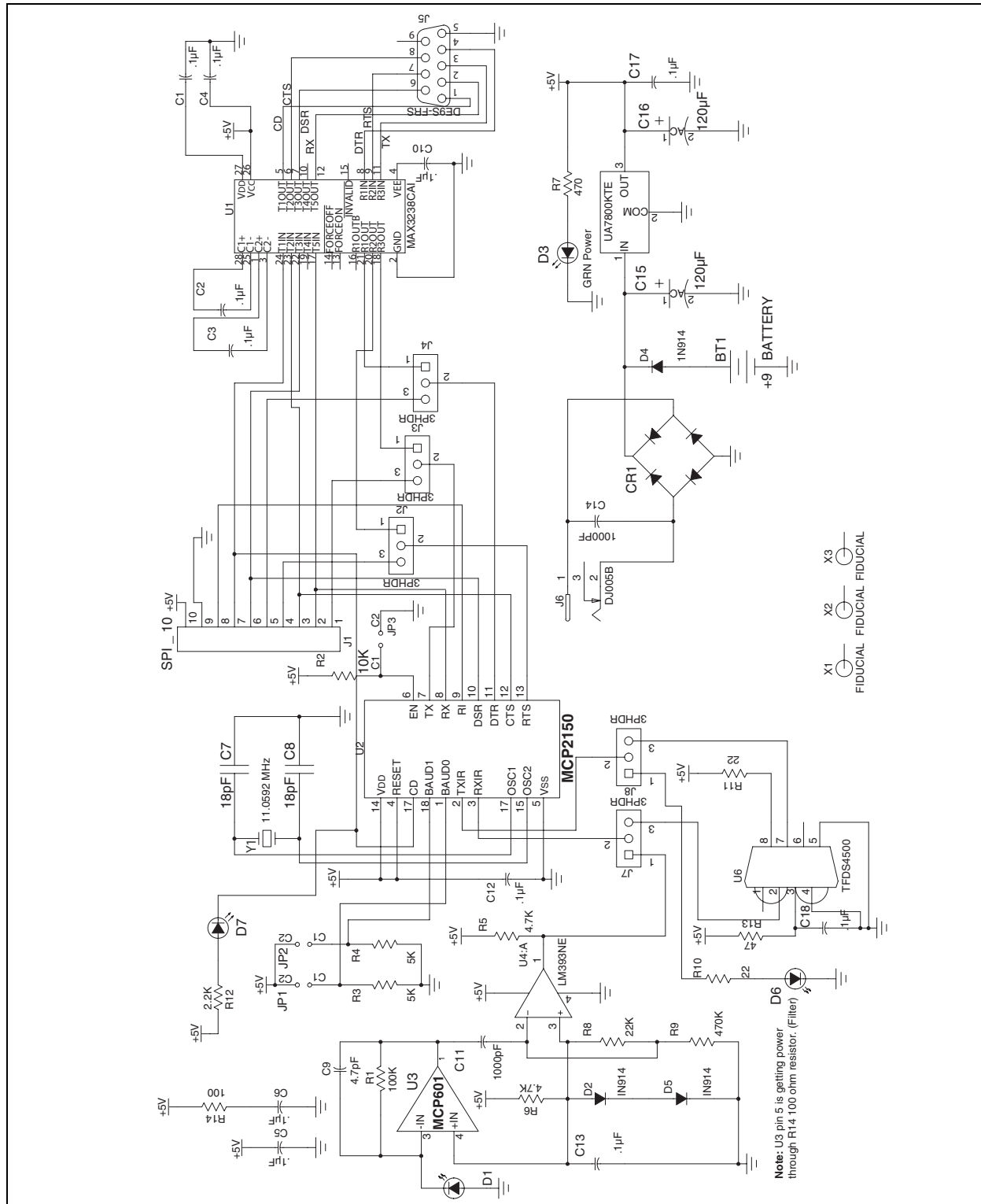
Pin Name	Pin Number			Pin Type	Buffer Type	Description
	PDIP	SOIC	SSOP			
RTS	13	13	14	I	TTL	Request to Send. Indicates that the Host Controller is ready to receive data from the MCP2155. This signal is locally emulated and not related to the CTS/RTS bit of the IrDA Primary Device. 1 = Host Controller not ready to receive data. 0 = Host Controller ready to receive data. At device power-up, this signal is used with DTR to enter device ID programming. 1 = Do not enter Device ID programming mode. 0 = Enter Device ID programming mode (if DTR is set).
VDD	14	14	15, 16	—	P	Positive supply for logic and I/O pins.
OSC2	15	15	17	O	—	Oscillator crystal output.
OSC1/CLKIN	16	16	18	I	CMOS	Oscillator crystal input/external clock source input.
CD	17	17	19	I	ST	Carrier Detect. The state of this bit is communicated to the IrDA Primary Device. 1 = No Carrier Present. 0 = Carrier Present.
BAUD1	18	18	20	I	ST	BAUD1:BAUD0 specify the baud rate of the device.

Legend: TTL = TTL compatible input ST = Schmitt Trigger input with CMOS levels
I = Input O = Output
P = Power CMOS = CMOS compatible input

MCP2150 DEVELOPER'S BOARD SCHEMATIC

Figure 3 shows the schematic for the MCP2150 Developer's Board.

FIGURE 3: MCP2150 DEVELOPER'S BOARD SCHEMATIC



APPENDIX A: REVISION HISTORY

Revision A

- Initial Release of Document.

Revision B

- Corrected DTR and RTS pin descriptions for Programmable Device ID mode (Page 4).
- Added Revision History Section (Appendix A).

NOTES:

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, under any intellectual property rights.

Trademarks

The Microchip name and logo, the Microchip logo, KEELOQ, MPLAB, PIC, PICmicro, PICSTART and PRO MATE are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.


FilterLab, microID, MXDEV, MXLAB, PICMASTER, SEEVAL and The Embedded Control Solutions Company are registered trademarks of Microchip Technology Incorporated in the U.S.A.

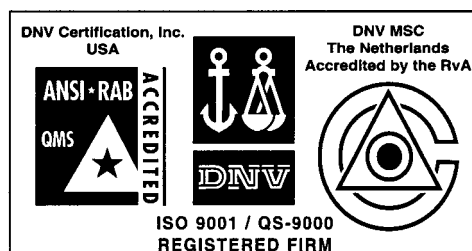
dsPIC, dsPICDEM.net, ECONOMONITOR, FanSense, FlexROM, fuzzyLAB, In-Circuit Serial Programming, ICSP, ICEPIC, microPort, Migratable Memory, MPASM, MPLIB, MPLINK, MPSIM, PICC, PICDEM, PICDEM.net, rPIC, Select Mode and Total Endurance are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

Serialized Quick Turn Programming (SQTP) is a service mark of Microchip Technology Incorporated in the U.S.A.

All other trademarks mentioned herein are property of their respective companies.

© 2002, Microchip Technology Incorporated, Printed in the U.S.A., All Rights Reserved.

 Printed on recycled paper.



Microchip received QS-9000 quality system certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona in July 1999 and Mountain View, California in March 2002. The Company's quality system processes and procedures are QS-9000 compliant for its PICmicro® 8-bit MCUs, KEELOQ® code hopping devices, Serial EEPROMs, microperipherals, non-volatile memory and analog products. In addition, Microchip's quality system for the design and manufacture of development systems is ISO 9001 certified.

WORLDWIDE SALES AND SERVICE

AMERICAS

Corporate Office

2355 West Chandler Blvd.
Chandler, AZ 85224-6199
Tel: 480-792-7200 Fax: 480-792-7277
Technical Support: 480-792-7627
Web Address: <http://www.microchip.com>

Rocky Mountain

2355 West Chandler Blvd.
Chandler, AZ 85224-6199
Tel: 480-792-7966 Fax: 480-792-4338

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: 978-692-3848 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

Detroit

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

Kokomo

2767 S. Albright Road
Kokomo, Indiana 46902
Tel: 765-864-8360 Fax: 765-864-8387

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

Australia

Microchip Technology Australia Pty Ltd
Suite 22, 41 Rawson Street
Epping 2121, NSW
Australia
Tel: 61-2-9868-6733 Fax: 61-2-9868-6755

China - Beijing

Microchip Technology Consulting (Shanghai)
Co., Ltd., Beijing Liaison Office
Unit 915
Bei Hai Wan Tai Bldg.
No. 6 Chaoyangmen Beidajie
Beijing, 100027, No. China
Tel: 86-10-85282100 Fax: 86-10-85282104

China - Chengdu

Microchip Technology Consulting (Shanghai)
Co., Ltd., Chengdu Liaison Office
Rm. 2401, 24th Floor,
Ming Xing Financial Tower
No. 88 TIDU Street
Chengdu 610016, China
Tel: 86-28-86766200 Fax: 86-28-86766599

China - Fuzhou

Microchip Technology Consulting (Shanghai)
Co., Ltd., Fuzhou Liaison Office
Unit 28F, World Trade Plaza
No. 71 Wusi Road
Fuzhou 350001, China
Tel: 86-591-7503506 Fax: 86-591-7503521

China - Shanghai

Microchip Technology Consulting (Shanghai)
Co., Ltd.
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

China - Shenzhen

Microchip Technology Consulting (Shanghai)
Co., Ltd., Shenzhen Liaison Office
Rm. 1315, 13/F, Shenzhen Kerry Centre,
Renminnan Lu
Shenzhen 518001, China
Tel: 86-755-2350361 Fax: 86-755-2366086

China - Hong Kong SAR

Microchip Technology Hongkong Ltd.
Unit 901-6, 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'Shaugnessey Road
Bangalore, 560 025, India
Tel: 91-80-2290061 Fax: 91-80-2290062

Japan

Microchip Technology Japan K.K.
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 135-882
Tel: 82-2-554-7200 Fax: 82-2-558-5934

Singapore

Microchip Technology Singapore Pte Ltd.
200 Middle Road
#07-02 Prime Centre
Singapore, 188980
Tel: 65-6334-8870 Fax: 65-6334-8850

Taiwan

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

EUROPE

Austria

Microchip Technology Austria GmbH
Durisolstrasse 2
A-4600 Wels
Austria
Tel: 43-7242-2244-399
Fax: 43-7242-2244-393

Denmark

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

France

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

Microchip Technology GmbH
Steinheilstrasse 10
D-85737 Ismaning, Germany
Tel: 49-89-627-144 0 Fax: 49-89-627-144-44

Italy

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

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