



MSSP MODULE

MSSP Module Silicon/Data Sheet Errata

The PICmicro[®] microcontrollers you have received all exhibit anomalous behavior in their Master SSP (MSSP) modules, as described in this document. They otherwise conform functionally to the descriptions provided in their respective Device Data Sheets and Reference Manuals, as amended by silicon release errata for particular devices.

Users are encouraged to review the latest Device Data Sheets and errata available for additional information concerning an individual device. These documents may be obtained directly from the Microchip corporate web site, at www.microchip.com.

This issue is expected to be resolved in future silicon revisions of the designated parts.

This issue effects all silicon revisions of the following devices:

- PIC16C717
- PIC16C770
- PIC16C771
- PIC16C773
- PIC16C774
- PIC16F872
- PIC16F873
- PIC16F873A
- PIC16F874
- PIC16F874A
- PIC16F876
- PIC16F876A
- PIC16F877
- PIC16F877A
- PIC17C752
- PIC17C756
- PIC17C756A
- PIC17C762
- PIC17C766
- PIC18C242
- PIC18C252
- PIC18C442
- PIC18C452
- PIC18C601
- PIC18C801
- PIC18C658
- PIC18C858
- PIC18F2220
- PIC18F2320
- PIC18F242
- PIC18F2439
- PIC18F248
- PIC18F252
- PIC18F2539
- PIC18F258
- PIC18F4220
- PIC18F4320
- PIC18F442
- PIC18F4439
- PIC18F448
- PIC18F452
- PIC18F4539
- PIC18F458
- PIC18F6620
- PIC18F6720
- PIC18F8620
- PIC18F8720

1. Issue: I²C™ (Slave Mode)

In its current implementation, the module may fail to correctly recognize certain Repeated START conditions. For this discussion, a Repeated START is defined as a START condition presented to the bus after an initial valid START condition has been recognized and the START status bit (SSPSTAT<3>) has been set, and before a valid STOP condition is received.

If a Repeated START is not recognized, a loss of synchronization between the Master and Slave may occur; the condition may continue until the module is reset. A NACK condition, generated by the Slave for any reason, will not reset the module.

This failure has been observed only under two circumstances:

- A Repeated START occurs within the frame of a data or address byte. The unexpected START condition may be erroneously interpreted as a data bit, provided that the required conditions for setup and hold times are met.
- A Repeated START condition occurs between two back-to-back slave address matches in the same Slave, with the R/W bit set to Read (= 1) in both cases. (This circumstance is regarded as being unlikely in normal operation.)

Work around

A time-out routine should be used to monitor the module's operation. The timer is enabled upon the receipt of a valid START condition; if a time-out occurs, the module is reset. The length of the time-out period will vary from application to application, and will need to be determined by the user.

Two methods are suggested to reset the module:

1. Change the mode of the module to something other than the desired mode by changing the settings of bits SSPM3:SSPM0 (SSPCON1<3:0>); then, change the bits back to desired configuration.
2. Disable the module by clearing the SSPEN bit (SSPCON1<5>); then, re-enable the module by setting the bit.

Other methods may be available.

MSSP MODULE

Clarifications/Corrections to the Data Sheets

Note: All corrections apply to the Data Sheets for the following devices:

- PIC16C717/770/771 (DS41120B)
- PIC16C773/774 (DS30275A)
- PIC16F872 (DS30221B)
- PIC16F873/874/876/877 (DS30292C)
- PIC16F873A/874A/876A/877A (DS39582A)
- PIC17C752/756A/762/766 (DS30289B)
- PIC18C242/252/442/452 (DS39026C)
- PIC18C601/801 (DS39541A)
- PIC18C658/858 (DS30475A)
- PIC18F242/252/442/452 (DS39564B)
- PIC18F248/258/448/458 (DS41159C)
- PIC18F2220/2320/4220/4320 (DS39599B)
- PIC18F2439/2539/4439/4539 (DS30485A)
- PIC18F6620/6720/8620/8720 (DS39580A)

1. Module: MSSP (SPI Mode)

The description of the operation of the CKE bit (SSPSTAT<6>) is clarified. Please substitute the description in Register 1, below, for all occurrences of the existing text for the SSPSTAT register, bit 6 (new text in **bold**).

Note: This text refers only to the operation of the CKE bit in SPI mode; its operation in I²C mode is unchanged. For those data sheets that describe the SSPSTAT register in separate locations for SPI and I²C modes, this description applies only to the register titled "SSPSTAT Register (SPI Mode)".

2. Module: MSSP (SPI Slave Mode)

The description of the operation of SPI Slave mode is clarified as follows: the state of the clock line (SCK) must match the polarity for the IDLE state before enabling the module.

The subsection of the "MSSP Module" chapter entitled "Slave Mode" (Subsection 3.6 in the majority of data sheets, Subsection 3.5 in others) is amended by adding the following paragraph to the end of the existing text:

"Before enabling the module in SPI Slave mode, the clock line must match the proper IDLE state. The clock line can be observed by reading the SCK pin. The IDLE state is determined by the CKP bit (SSPCON1<4>)." ."

REGISTER 1: SSPSTAT: MSSP STATUS REGISTER (EXCERPT)

bit 6

CKE: SPI Clock Select bit

1 = **Transmit occurs on transition from active to IDLE clock state**

0 = **Transmit occurs on transition from IDLE to active clock state**

Note: Polarity of clock state is set by the CKP bit (SSPCON1<4>).

REVISION HISTORY

Revision A Document (7/2002):

Original version (I²C Slave Issue)

Revision B Document (1/2003):

Clarification of original issue to include Restart conditions. Addition of data sheet clarification 1 (SPI Mode, CKE bit).

Revision C Document (3/2003):

Addition of data sheet clarification 2 (SPI Slave Mode, operation).

MSSP MODULE

NOTES:

Note the following details of the code protection feature on Microchip devices:

- Microchip products meet the specification contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.
- Microchip is willing to work with the customer who is concerned about the integrity of their code.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as "unbreakable."

Code protection is constantly evolving. We at Microchip are committed to continuously improving the code protection features of our products. Attempts to break Microchip's code protection feature may be a violation of the Digital Millennium Copyright Act. If such acts allow unauthorized access to your software or other copyrighted work, you may have a right to sue for relief under that Act.

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, PRO MATE and PowerSmart 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.

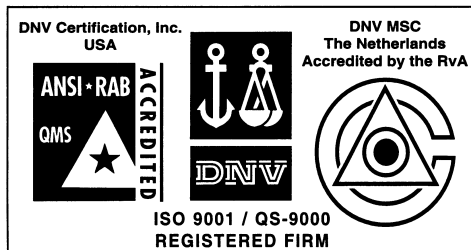
Accuron, Application Maestro, dsPIC, dsPICDEM, dsPICDEM.net, ECONOMONITOR, FanSense, FlexROM, fuzzyLAB, In-Circuit Serial Programming, ICSP, ICEPIC, microPort, Migratable Memory, MPASM, MPLIB, MPLINK, MPSIM, PICC, PICkit, PICDEM, PICDEM.net, PowerCal, PowerInfo, PowerMate, PowerTool, rLAB, rPIC, Select Mode, SmartSensor, SmartShunt, SmartTel 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.

© 2003, 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>

Atlanta

3780 Mansell Road, Suite 130
Alpharetta, GA 30022
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

Phoenix

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

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
Marketing Support Division
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. 2401-2402, 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 - 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

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. 1812, 18/F, Building A, United Plaza
No. 5022 Binhe Road, Futian District
Shenzhen 518033, China
Tel: 86-755-82901380 Fax: 86-755-82966626

China - Qingdao

Rm. B505A, Fullhope Plaza,
No. 12 Hong Kong Central Rd.
Qingdao 266071, China
Tel: 86-532-5027355 Fax: 86-532-5027205

India

Microchip Technology Inc.
India Liaison Office
Marketing Support Division
Divyasree Chambers
1 Floor, Wing A (A3/A4)
No. 11, O'Shaughnessy 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 Trapu
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
Via Quasimodo, 12
20025 Legnano (MI)
Milan, Italy
Tel: 39-0331-742611 Fax: 39-0331-466781

United Kingdom

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

03/25/03