# PIC24FJ256GA110

## PIC24FJ256GA110 Family Rev. A3 Silicon Errata

The PIC24FJ256GA110 Family Rev. A3 parts you have received conform functionally to the Device Data Sheet (DS39905**B**), except for the anomalies described below. Any Data Sheet Clarification issues related to the PIC24FJ256GA110 Family will be reported in a separate Data Sheet errata. Please check the Microchip web site for any existing issues.

**The following silicon errata apply only to PIC24FJ256GA110 devices with these Device/ Revision IDs**:

| Part Number | Device ID | Revision ID |
|---|---|---|
| PIC24FJ256GA110 | 101Eh | 01h |
| PIC24FJ192GA110 | 1016h | 01h |
| PIC24FJ128GA110 | 100Eh | 01h |
| PIC24FJ256GA108 | 101Ah | 01h |
| PIC24FJ192GA108 | 1012h | 01h |
| PIC24FJ128GA108 | 100Ah | 01h |
| PIC24FJ256GA106 | 1018h | 01h |
| PIC24FJ192GA106 | 1010h | 01h |
| PIC24FJ128GA106 | 1008h | 01h |

The Device IDs (DEVID and REVID) are located at the last two implemented addresses in program memory. They are shown in hexadecimal in the format "DEVID REVID".

### 1. Module: Core (RAM Operation)

If a RAM read is performed on the instruction immediately prior to enabling Doze mode, an extra read event may occur when Doze mode is enabled. This has no effect on most SFRs and on user RAM space. However, this could cause registers which also perform some action on a read (such as auto-incrementing a pointer or removing data from a FIFO buffer) to repeat that action, possibly resulting in lost data or unexpected operation.

#### Work around

Avoid reading registers which perform a secondary action (e.g., UART and SPI FIFO buffers, and the RTCVAL registers) immediately prior to entering Doze mode.

If this cannot be avoided, execute a `NOP` instruction before entering Doze mode.

#### Date Codes that pertain to this issue:

All engineering and production devices.

### 2. Module: Core (BOR)

When the on-chip regulator is enabled (ENVREG tied to VDD), a BOR event may spontaneously occur under the following circumstances:

- VDD is less than 2.5V, and either:
- the internal band gap reference is being used as a reference with the A/D converter (AD1PCFGH<1> or <0> = 0) or comparators (CMxCON<1:0> = 11); or
- the CTMU module is enabled.

#### Work around

Limit the following activities to only those times when the on-chip regulator is not in Tracking mode (LVDIF (IFS4<8>) = 0):

- enabling the CTMU module;
- selecting the internal band gap as a reference for the A/D converter or the comparators.

#### Date Codes that pertain to this issue:

All engineering and production devices.

### 3. Module: JTAG (Device Programming)

The JTAGEN Configuration bit can be programmed to '0' while using the JTAG interface for device programming. This may cause a situation where JTAG programming can lock itself out of being able to program the device.

#### Work around

None.

#### Date Codes that pertain to this issue:

All engineering and production devices.

**4 Module: UART**

When the UART is operating using two Stop bits (STSEL = 1), it may sample the first Stop bit instead of the second one. If the device being communicated with is one using one Stop bit in its communications, this may lead to framing errors.

**Work around**

None.

**Date Codes that pertain to this issue:**

All engineering and production devices.

**5. Module: I/O (PORTB)**

When RB5 is configured as an open-drain output, it remains in a high-impedance state. The settings of LATB5 and TRISB5 have no effect on the pin's state.

**Work around**

If open-drain operation is not required, configure RB5 as a regular I/O (ODCB<5> = 0).

If open-drain operation is required, there are two options:

• select a different I/O pin for the open-drain function; or
• place an external transistor on the pin, and configure the pin as a regular I/O.

**Date Codes that pertain to this issue:**

All engineering and production devices.

**6. Module: SPI (Master Mode)**

In Master mode, both the SPI interrupt flag (SPIxIF) and the SPIRBF bit (SPIxSTAT<0>) may become set one-half clock cycle early, instead of on the clock edge. This occurs only under the following circumstances:

• Enhanced Buffer mode is disabled (SPIBEN = 0); and
• the module is configured for serial data output changes on transition from clock active to clock idle state (CKE = 1)

If the application is using the interrupt flag to determine when data to be transmitted is written to the transmit buffer, the data currently in the buffer may be overwritten.

**Work around**

Before writing to the SPI buffer, check the SCK pin to determine if the last clock edge has passed. Example 1 (below) demonstrates a method for doing this; in this example, pin RD1 functions as the SPI clock SCK, which is configured as idle-low.

**Date Codes that pertain to this issue:**

All engineering and production devices.

**7. Module: CTMU**

When the CTMU module is selected as the trigger source (SYNCSEL4:SYNCSEL0 = 11000), the input capture and/or output compare trigger may not work.

**Work around**

Manually trigger the input capture and/or output compare module(s) after a CTMU event is received. Be certain to compensate for any time latency that results from manually triggering the module.

**Date Codes that pertain to this issue:**

All engineering and production devices.

**EXAMPLE 1:    CHECKING THE STATE OF SPIxIF AGAINST THE SPI CLOCK**

```
while(IFS0bits.SPI1IF == 0){}     //wait for the transmission to complete
while(PORTDbits.RD1 == 1){}       //wait for the last clock to finish
SPI1BUF = 0xFF;                   //write new data to the buffer
```

## 8. Module: UART (UERIF Interrupt)

The UART error interrupt may not occur, or occur at an incorrect time, if multiple errors occur during a short period of time.

### Work around

Read the error flags in the UxSTA register whenever a byte is received to verify the error status. In most cases, these bits will be correct, even if the UART error interrupt fails to occur. For possible exceptions, refer to Errata # 9.

### Date Codes that pertain to this issue:

All engineering and production devices.

## 9. Module: UART (FIFO Error Flags)

Under certain circumstances, the PERR and FERR error bits may not be correct for all bytes in the receive FIFO. This has only been observed when both of the following conditions are met:

- the UART receive interrupt is set to occur when the FIFO is full or ¾ full
  (UxSTA<7:6> = 1x), and
- more than 2 bytes with an error are received.

In these cases, only the first two bytes with a parity or framing error will have the corresponding bits indicate correctly. The error bits will not be set after this.

### Work around

None.

### Date Codes that pertain to this issue:

All engineering and production devices.

## 10. Module: SPI (Enhanced Buffer Modes)

If the SPI event interrupt is configured to occur when the enhanced FIFO buffer is full (SISEL2:SISEL0 = 111), the interrupt may actually occur when the 7th byte is written to the buffer, instead of the 8th byte. The other enhanced buffer interrupts function as previously described.

### Work around

Do not use the Full Buffer Interrupt mode. The SPITBF bit (SPIxSTAT<1>) reliably indicates when the enhanced FIFO buffer is full, and can be polled instead of using the Full Buffer Interrupt mode.

### Date Codes that pertain to this issue:

All engineering and production devices.

## 11. Module: UART (IrDA®)

When the UART is operating in 8-bit mode (PDSEL1:PDSEL0 = 0x) and using the IrDA endec (IREN = 1), the module incorrectly transmits a data payload of 80h as 00h.

### Work around:

None.

### Date Codes that pertain to this issue:

All engineering and production devices.

## 12. Module: UART (IrDA)

When the UART is operating in 8-bit mode (PDSEL1:PDSEL0 = 0x) and using the IrDA endec (IREN = 1), a framing error may occur when transmitting a data payload of 00h.

### Work around:

None.

### Date Codes that pertain to this issue:

All engineering and production devices.

## 13. Module: UART (IrDA)

When the UART is operating in 9-bit mode (PDSEL1:PDSEL0 = 1x) and using the IrDA endec (IREN = 1), the module will incorrectly transmit 10 bits when transmitting data payloads of 00h or 80h.

### Work around:

None.

### Date Codes that pertain to this issue:

All engineering and production devices.

## 14. Module: Core (Instruction Set)

If an instruction producing a Read-After-Write stall condition is executed inside a REPEAT loop, the instruction will be executed fewer times than was intended. For example, this loop:

```
repeat #0xf
inc [w1],[++w1]
```

will execute less than 15 times.

### Work around

Avoid using REPEAT to repetitively execute instructions that create a stall condition. Instead, use a software loop using conditional branches. The MPLAB C Compiler will not generate REPEAT loops that cause this erratum.

### Date Codes that pertain to this issue:

All engineering and production devices.

# PIC24FJ256GA110

## 15. Module: Memory (Program Space Visibility)

When accessing data in the PSV area of data RAM, it is possible to generate a false address error trap condition by reading data located precisely at the lower address boundary (8000h). If data is read using an instruction with an auto-decrement, the resulting RAM address will be below the PSV boundary (i.e., at 7FFEh); this will result in an address error trap.

This false address error can also occur if a 32-bit MOV instruction is used to read the data at location 8000h.

### Work around

Do not use the first location of the a PSV page (address 8000h). The MPLAB® C Compiler (v3.11 or later) supports the option "-merrata=psv_trap" to prevent it from generating code that would cause this erratum.

### Date Codes that pertain to this issue:

All engineering and production devices.

## 16. Module: ICSP™

The ICSP/ICD port pair PGEC3/PGED3 (RB5/RB4) cannot be used to read or program the device.

### Work around

Use either PGEC2/PGED2 or PGEC1/PGED1.

### Date Codes that pertain to this issue:

All engineering and production devices.

## 17. Module: RTCC

Under certain circumstances, the value of the Alarm Repeat Counter (ALCFGRPT<7:0>) may be unexpectedly decremented. This happens only when a byte write to the upper byte of ALCFGRPT is performed in the interval between a device POR/BOR, and the first edge from the RTCC clock source.

### Work around

Do not perform byte writes on ALCFGRPT, particularly the upper byte.

Alternatively, wait until one period of the SOSC has completed before performing byte writes to ALCFGRPT.

### Date Codes that pertain to this issue:

All engineering and production devices.

## 18. Module: I²C™ Module (Master Mode)

Under certain circumstances, a module operating in Master mode may acknowledge its own command addressed to a slave device. This happens when the following occurs:

- 10-bit Addressing mode is used (A10M = 1), and:
- the I²C Master has the same two upper address bits (I2CADD<9:8>) as the addressed slave module.

In these cases, the Master also acknowledges the address command and generates an erroneous I²C Slave interrupt, as well as the I²C Master interrupt.

### Work around

Several options are available:

- When using 10-bit Addressing mode, make certain that the Master and Slave devices do not share the same 2 MSBs of their addresses.

If this cannot be avoided:

- Clear the A10M bit (I2CxCON<10> = 0) prior to performing a Master mode transmit.
- Read the ADD10 bit (I2CxSTAT<8>) to check for a full 10-bit match whenever a Slave I²C interrupt occurs on the Master module.

### Date Codes that pertain to this issue:

All engineering and production devices.

## 19. Module: I²C Module (Slave Mode)

Under certain circumstances, a module operating in Slave mode may not respond correctly to some of the special addresses reserved by the I²C protocol. This happens when the following occurs:

- 10-bit Addressing mode is used (A10M = 1), and
- bits A7:A1 of the Slave address (I2CADD<7:1>) fall into the range of the reserved 7-bit address ranges '1111xxx' or '0000xxx'.

In these cases, the Slave module acknowledges the command and triggers an I²C Slave interrupt; it does not copy the data into the I2CxRCV register, or set the RBF bit.

### Work around

Do not set bits A7:A1 of the module's Slave address equal to '1111xxx' or '0000xxx'.

### Date Codes that pertain to this issue:

All engineering and production devices.

## 20. Module: A/D Converter

When using PGEC1 and PGED1 to debug an application on any 64-pin devices in this family, all voltage references will be disabled. This includes Vref+, Vref-, AVdd, and AVss. Any A/D conversion will always equal 0x3FF.

> **Note:** This issue applies only 64-pin devices in this family (PIC24FJ256GA106, PIC24FJ192GA106, and PIC24FJ128GA106).

### Work around

Use PGEC2 and PGED2 to debug any A/D functionality.

### Date Codes that pertain to this issue:

All engineering and production devices.

## 21. Module: SPI (Enhanced Buffer Mode)

In Enhanced Master mode, the SRMPT bit (SPIxSTAT<7>) may erroneously become set for several clock cycles in the middle of a FIFO transfer, indicating that the shift register is empty when it is not. This happens when both SPI clock prescalers are set to values other than their maximum (SPIxCON<4:2> ≠ 000 and SPIxCON<1:0> ≠ 00).

### Work around

Configure the module to generate an SPI event interrupt whenever the last bit is shifted out of the shift register (SPIxSTAT<4:2> = 101). When the SPIxIF flag becomes set, the shift register is empty.

# PIC24FJ256GA110

## REVISION HISTORY

Rev A Document (2/2008)

First revision of this document. Includes silicon issues 1 (Core, RAM Operation), 2 (Core, BOR), 3 (JTAG, Programming), 4 (UART), 5 (I/O, PORTB), 6 (SPI) and 7 (Input Capture).

Rev B Document (4/2008)

Revised silicon issues 7 to clarify the requirement for latency compensation. Added silicon issues 8 (UART – UERIF Interrupt), 9 (UART – FIFO Error Flags) and 10 (SPI – Enhanced Buffer Modes).

Rev C Document (7/2008)

Revised silicon issues 4 (UART) and 6 (SPI, Master Mode) to reflect updated definition of issues. Added silicon issues 11 through 13 (UART, IrDA), 14 (Core, Instruction Set), 15 (Memory, Program Space Visibility), 16 (ICSP), 17 (RTCC), 18 ($I^2C$, Master Mode), 19 (I2C Module (Slave Mode) and 20 (A/D Converter).

Rev D Document (10/2008)

Added silicon issue 21 (SPI – Enhanced Buffer Mode).

**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.

**Trademarks**

The Microchip name and logo, the Microchip logo, Accuron, dsPIC, KEELOQ, KEELOQ logo, MPLAB, PIC, PICmicro, PICSTART, rfPIC, SmartShunt and UNI/O are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

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

Analog-for-the-Digital Age, Application Maestro, CodeGuard, dsPICDEM, dsPICDEM.net, dsPICworks, dsSPEAK, ECAN, ECONOMONITOR, FanSense, In-Circuit Serial Programming, ICSP, ICEPIC, Mindi, MiWi, MPASM, MPLAB Certified logo, MPLIB, MPLINK, mTouch, PICkit, PICDEM, PICDEM.net, PICtail, PIC$^{32}$ logo, PowerCal, PowerInfo, PowerMate, PowerTool, REAL ICE, rfLAB, Select Mode, Total Endurance, WiperLock and ZENA are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

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.

**QUALITY MANAGEMENT SYSTEM**
**CERTIFIED BY DNV**
**═ ISO/TS 16949:2002 ═**

# 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:
http://support.microchip.com
Web Address:
www.microchip.com

**Atlanta**
Duluth, GA
Tel: 678-957-9614
Fax: 678-957-1455

**Boston**
Westborough, MA
Tel: 774-760-0087
Fax: 774-760-0088

**Chicago**
Itasca, IL
Tel: 630-285-0071
Fax: 630-285-0075

**Dallas**
Addison, TX
Tel: 972-818-7423
Fax: 972-818-2924

**Detroit**
Farmington Hills, MI
Tel: 248-538-2250
Fax: 248-538-2260

**Kokomo**
Kokomo, IN
Tel: 765-864-8360
Fax: 765-864-8387

**Los Angeles**
Mission Viejo, CA
Tel: 949-462-9523
Fax: 949-462-9608

**Santa Clara**
Santa Clara, CA
Tel: 408-961-6444
Fax: 408-961-6445

**Toronto**
Mississauga, Ontario,
Canada
Tel: 905-673-0699
Fax: 905-673-6509

## ASIA/PACIFIC

**Asia Pacific Office**
Suites 3707-14, 37th Floor
Tower 6, The Gateway
Harbour City, Kowloon
Hong Kong
Tel: 852-2401-1200
Fax: 852-2401-3431

**Australia - Sydney**
Tel: 61-2-9868-6733
Fax: 61-2-9868-6755

**China - Beijing**
Tel: 86-10-8528-2100
Fax: 86-10-8528-2104

**China - Chengdu**
Tel: 86-28-8665-5511
Fax: 86-28-8665-7889

**China - Hong Kong SAR**
Tel: 852-2401-1200
Fax: 852-2401-3431

**China - Nanjing**
Tel: 86-25-8473-2460
Fax: 86-25-8473-2470

**China - Qingdao**
Tel: 86-532-8502-7355
Fax: 86-532-8502-7205

**China - Shanghai**
Tel: 86-21-5407-5533
Fax: 86-21-5407-5066

**China - Shenyang**
Tel: 86-24-2334-2829
Fax: 86-24-2334-2393

**China - Shenzhen**
Tel: 86-755-8203-2660
Fax: 86-755-8203-1760

**China - Wuhan**
Tel: 86-27-5980-5300
Fax: 86-27-5980-5118

**China - Xiamen**
Tel: 86-592-2388138
Fax: 86-592-2388130

**China - Xian**
Tel: 86-29-8833-7252
Fax: 86-29-8833-7256

**China - Zhuhai**
Tel: 86-756-3210040
Fax: 86-756-3210049

## ASIA/PACIFIC

**India - Bangalore**
Tel: 91-80-4182-8400
Fax: 91-80-4182-8422

**India - New Delhi**
Tel: 91-11-4160-8631
Fax: 91-11-4160-8632

**India - Pune**
Tel: 91-20-2566-1512
Fax: 91-20-2566-1513

**Japan - Yokohama**
Tel: 81-45-471- 6166
Fax: 81-45-471-6122

**Korea - Daegu**
Tel: 82-53-744-4301
Fax: 82-53-744-4302

**Korea - Seoul**
Tel: 82-2-554-7200
Fax: 82-2-558-5932 or
82-2-558-5934

**Malaysia - Kuala Lumpur**
Tel: 60-3-6201-9857
Fax: 60-3-6201-9859

**Malaysia - Penang**
Tel: 60-4-227-8870
Fax: 60-4-227-4068

**Philippines - Manila**
Tel: 63-2-634-9065
Fax: 63-2-634-9069

**Singapore**
Tel: 65-6334-8870
Fax: 65-6334-8850

**Taiwan - Hsin Chu**
Tel: 886-3-572-9526
Fax: 886-3-572-6459

**Taiwan - Kaohsiung**
Tel: 886-7-536-4818
Fax: 886-7-536-4803

**Taiwan - Taipei**
Tel: 886-2-2500-6610
Fax: 886-2-2508-0102

**Thailand - Bangkok**
Tel: 66-2-694-1351
Fax: 66-2-694-1350

## EUROPE

**Austria - Wels**
Tel: 43-7242-2244-39
Fax: 43-7242-2244-393

**Denmark - Copenhagen**
Tel: 45-4450-2828
Fax: 45-4485-2829

**France - Paris**
Tel: 33-1-69-53-63-20
Fax: 33-1-69-30-90-79

**Germany - Munich**
Tel: 49-89-627-144-0
Fax: 49-89-627-144-44

**Italy - Milan**
Tel: 39-0331-742611
Fax: 39-0331-466781

**Netherlands - Drunen**
Tel: 31-416-690399
Fax: 31-416-690340

**Spain - Madrid**
Tel: 34-91-708-08-90
Fax: 34-91-708-08-91

**UK - Wokingham**
Tel: 44-118-921-5869
Fax: 44-118-921-5820

01/02/08