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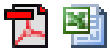
Date: 12 Aug 2011

Product Category: 8-bit Microcontrollers

Device Family: 

Notification subject: ERRATA - PIC18(L)F25/45K22 Rev. A2/A3/A4/A5 Silicon Errata and Data Sheet Clarification Errata Document Revision

Notification text:

SYST-12YCQQ339

Microchip has released a new DeviceDoc for the PIC18(L)F25/45K22 Rev. A2/A3/A4/A5 Silicon Errata and Data Sheet Clarification of devices. If you are using one of these devices please read the document located at PIC18(L)F25/45K22 Rev. A2/A3/A4/A5 Silicon Errata and Data Sheet Clarification.

Notification Status: Final
Description of Change: Added EUSART Errata.
Pre Change: NA
Post Change: NA
Impacts to Data Sheet: None
Reason for Change: To Improve Productivity

Change Implementation Status: Complete
Date Document Changes Effective: 12 Aug 2011
NOTE: Please be advised that this is a change to the document only the product has not been changed..
Markings to Distinguish Revised from Unrevised Devices:N/A

Attachment(s): PIC18(L)F25/45K22 Rev. A2/A3/A4/A5 Silicon Errata and Data Sheet Clarification

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Product Change Notification - SYST-12YCQQ339

SYST-12YCQQ339 - ERRATA - PIC18(L)F25/45K22 Rev. A2/A3/A4/A5 Silicon Errata and Data Sheet Clarification Errata Document Revision

Parts Affected

PIC18F45K22
PIC18F25K22

Date: Friday, August 12, 2011

PIC18(L)F25/45K22 Rev. A2/A3/A4/A5 Silicon Errata and Data Sheet Clarification

The PIC18(L)F25/45K22 family devices that you have received conform functionally to the current Device Data Sheet (DS41412**D**), except for the anomalies described in this document.

The silicon issues discussed in the following pages are for silicon revisions with the Device and Revision IDs listed in Table 1. The silicon issues are summarized in Table 2.

The errata described in this document will be addressed in future revisions of the PIC18(L)F25/45K22 silicon.

Note:	This document summarizes all silicon errata issues from all revisions of silicon, previous as well as current. Only the issues indicated in the last column of Table 2 apply to the current silicon revision (**A5**).

Data Sheet clarifications and corrections start on page 6, following the discussion of silicon issues.

The silicon revision level can be identified using the current version of MPLAB® IDE and Microchip's programmers, debuggers, and emulation tools, which are available at the Microchip corporate web site (www.microchip.com).

For example, to identify the silicon revision level using MPLAB IDE in conjunction with MPLAB ICD 2 or PICkit™ 3:

1. Using the appropriate interface, connect the device to the MPLAB ICD 2 programmer/ debugger or PICkit™ 3.
2. From the main menu in MPLAB IDE, select *Configure>Select Device*, and then select the target part number in the dialog box.
3. Select the MPLAB hardware tool (*Debugger>Select Tool*).
4. Perform a "Connect" operation to the device (*Debugger>Connect*). Depending on the development tool used, the part number *and* Device Revision ID value appear in the **Output** window.

Note:	If you are unable to extract the silicon revision level, please contact your local Microchip sales office for assistance.

The DEVREV values for the various PIC18(L)F25/ 45K22 silicon revisions are shown in Table 1.

TABLE 1: SILICON DEVREV VALUES

Part Number	Device ID(1)	Revision ID for Silicon Revision(2)			
		A2	A3	A4	A5
PIC18F25K22	0101 0101 010x xxxx	0 0010	0 0011	0 0100	0 0101
PIC18LF25K22	0101 0101 011x xxxx	0 0010	0 0011	0 0100	0 0101
PIC18F45K22	0101 0101 000x xxxx	0 0010	0 0011	0 0100	0 0101
PIC18LF45K22	0101 0101 001x xxxx	0 0010	0 0011	0 0100	0 0101

Note 1: The Device ID is located in the last configuration memory space.

2: Refer to the *"PIC18(L)F2XK22/4XK22 Flash Memory Programming Specification"* (DS41398) for detailed information on Device and Revision IDs for your specific device.

TABLE 2: SILICON ISSUE SUMMARY

Module	Feature	Item Number	Issue Summary	Affected Revisions(1)			
				A2	A3	A4	A5
Voltage Reference	Default Value	1.1	VREFCON0 = 0x00 at Reset.	X	X		
Voltage Reference	Internal Reference	1.2	Reference may be unstable at low temperatures.	X	X		
HLVD	HLVD module	2.	The HLVD module does not function.	X	X		
Comparators	CxSYNC Control	3.	The comparator output to the device pin (Cx) always bypasses the Timer1 synchronization latch.	X	X		
HS Oscillator	HS Oscillator Start-up	4.	HS oscillator may not start at low voltage/ high temperature.	X	X		
Clock Switching	Fail-Safe mode	5.1	Execution is delayed when waking from Sleep.	X	X		
Clock Switching	Fail-Safe Clock Monitor	5.2	When the FCMEN Configuration bit is set and the IESO Configuration bit is not set, then a clock failure during Sleep will not be detected.			X	X
CTMU	Current Source	6.1	Current source is noisy.	X	X		
CTMU	Control Register	6.2	Control registers are not cleared by Resets.	X	X		
CCP3, CCP4 and CCP5	PWM mode	7.	Clock selection by CCP2 only.	X	X		
ADC	GO/$\overline{\text{DONE}}$ bit	8.	GO/$\overline{\text{DONE}}$ bit gets stuck.	X	X		
Power-on Reset (POR)	Power-on Reset	9.1	Transient current spikes on some parts during power-up may cause the part to become stuck in Reset.	X	X	X	
Power-on Reset (POR)	Power-on Reset	9.2	Min VDD for PIC18F2X/4XK22 parts is limited to 2.3V. Min VDD for PIC18LF2X/4XK22 parts is 1.8V.	X	X	X	X
Timer1/3/5 Gate	Timer1/3/5 Gate	10.	The Timer1/3/5 gate times cannot be resolved to the two Least Significant bits, when using Fosc as the Timer1/3/5 source.	X	X	X	X
EUSART	EUSART Asynchronous Operation	11.	The EUSART asynchronous operation may miss the Start bit edge.	X	X	X	

Note 1: Only those issues indicated in the last column apply to the current silicon revision.

Silicon Errata Issues

Note: This document summarizes all silicon errata issues from all revisions of silicon, previous as well as current. Only the issues indicated by the shaded column in the following tables apply to the current silicon revision (**A5**).

1. Module: Voltage Reference

1.1 The default value of VREFCON0 after Reset is `0x00` instead of `0x10`.

Work around

Select the desired fixed voltage reference buffer as part of initialization.

Affected Silicon Revisions

A2	A3	A4	A5				
X	X						

1.2 Internal voltage reference may become unstable at cold temperature.

Work around

None.

Affected Silicon Revisions

A2	A3	A4	A5				
X	X						

2. Module: HLVD

Although the HLVDIF flag will be set immediately after enabling the HLVD circuit, the HLVD module is not functional and should not be used.

Work around

None.

Affected Silicon Revisions

A2	A3	A4	A5				
X	X						

3. Module: Comparators

The CxSYNC controls are inoperative. The comparator output (Cx) always bypasses the Timer1 synchronization latch.

Work around

None.

Affected Silicon Revisions

A2	A3	A4	A5				
X	X						

4. Module: HS Oscillator

The HS oscillator may not start when V_{DD} is less than 3V, especially at high temperatures.

Work around

None.

Affected Silicon Revisions

A2	A3	A4	A5				
X	X						

5. Module: Clock Switching

5.1 When Clock Fail-Safe mode or Clock Switchover mode is selected, then code execution will be delayed after waking from Sleep by the start-up time of the HFINTOSC.

Work around

Disable HFINTOSC stabilization time by setting the HFOFST bit of the Configuration register 3H.

Affected Silicon Revisions

A2	A3	A4	A5				
X	X						

5.2 When the FCMEN Configuration bit is set and the IESO Configuration bit is not set, then a clock failure during Sleep will not be detected.

Work around

The IESO Configuration bit must also be set when the FCMEN Configuration bit is set.

Affected Silicon Revisions

A2	A3	A4	A5				
		X	X				

6. Module: CTMU

6.1 Current source may be noisy to the CTMU module.

Work around

None.

Affected Silicon Revisions

A2	A3	A4	A5				
X	X						

6.2 CTMU control registers are not cleared by the RESET instruction or MCLR Reset.

Work around

Clear the CTMU control registers as part of device initialization.

Affected Silicon Revisions

A2	A3	A4	A5				
X	X						

7. Module: CCP3, CCP4 and CCP5

PWM mode does not work independently of CCP2. Clock selection is cross-wired with that of CCP2.

Work around

Use CCP1 and/or CCP2 for PWM applications. Reserve CCP3, CCP4 and CCP5 for capture and compare applications.

Affected Silicon Revisions

A2	A3	A4	A5				
X	X						

8. Module: ADC

GO/$\overline{\text{DONE}}$ bit may become stuck in GO mode.

Work around

Use the ADC FRC clock selection to reduce the probability of the GO bit becoming stuck. To capture the events when the GO bit does become stuck, use one of the timers to determine if the GO bit stays set longer than expected. When this occurs, restart the ADC conversion by clearing the GO/$\overline{\text{DONE}}$ bit and then setting the GO/$\overline{\text{DONE}}$ bit.

Affected Silicon Revisions

A2	A3	A4	A5				
X	X						

9. Module: Power-on Reset (POR)

9.1 There may be transient current spikes on some parts during power-up. If the application cannot supply enough current to get past these transients, then the part may become stuck in Reset.

Work around

Ensure that the application is capable of supplying at least 30 mA of transient current during power-up.

Affected Silicon Revisions

A2	A3	A4	A5				
X	X	X					

9.2 Min V_{DD} for PIC18F2X/4XK22 parts is limited to 2.3V. Min V_{DD} for PIC18LF2X/4XK22 parts is 1.8V.

Work around

None.

Affected Silicon Revisions

A2	A3	A4	A5				
X	X	X	X				

10. Module: Timer1/3/5 Gate

The Timer gate times cannot be resolved to the two Least Significant timer bits when the source frequency is FOSC (TMRxCS[1:0]=01). This is because the gate edges are synchronized with the FOSC/4 clock.

Work around

None.

Affected Silicon Revisions

A2	A3	A4	A5				
X	X	X	X				

11. Module: EUSART

The EUSART asynchronous operation has a probability of 1 in 256 of missing the Start bit edge for all combinations of BRGH and BRG16 values, other than BRGH = 1, BRG16 = 1.

Work around

Set BRGH = 1, and BRG16 = 1 and use this baud rate formula:

$$Baud\_Rate = Fosc/[4([SPBRGH:SPBRGL]+1)]$$

Affected Silicon Revisions

A2	A3	A4	A5				
X	X	X					

Data Sheet Clarifications

The following typographic corrections and clarifications are to be noted for the latest version of the device data sheet (DS41412**D**):

Note:	Corrections are shown in **bold**. Where possible, the original bold text formatting has been removed for clarity.

1. Module: I/O Ports

In Table 10-5, the Buffer Type column listed ST (Schmitt Trigger) for functions RB1-RB7, when the Pin Type was I (Input), should be TTL. The Table below reflects the correction.

TABLE 10-5: PORTB I/O SUMMARY

Pin	Function	TRIS Setting	ANSEL Setting	Pin Type	Buffer Type	Description
RB0/INT0/CCP4/ FLT0/SRI/$\overline{SS2}$/ AN12	RB0	0	1	O	DIG	LATB<0> data output; not affected by analog input.
		1	0	I	TTL	PORTB<0> data input; disabled when analog input enabled.
	INT0	1	0	I	ST	External interrupt 0.
	CCP4(3)	0	1	O	DIG	Compare 4 output/PWM 4 output.
		1	0	I	ST	Capture 4 input.
	FLT0	1	0	I	ST	PWM Fault input for ECCP auto-shutdown.
	SRI	1	0	I	ST	SR Latch input.
	$\overline{SS2}$(3)	1	0	I	TTL	SPI slave select input (MSSP2).
	AN12	1	1	I	AN	Analog input 12.
RB1/INT1/P1C/ SCK2/SCL2/ C12IN3-/AN10	RB1	0	1	O	DIG	LATB<1> data output; not affected by analog input.
		1	0	I	**TTL**	PORTB<1> data input; disabled when analog input enabled.
	INT1	1	0	I	ST	External Interrupt 1.
	P1C(3)	0	1	O	DIG	Enhanced CCP1 PWM output 3.
	SCK2(3)	0	1	O	DIG	MSSP2 SPI Clock output.
		1	0	I	ST	MSSP2 SPI Clock input.
	SCL2(3)	0	1	O	DIG	MSSP2 I^2C^{TM} Clock output.
		1	0	I	I^2C	MSSP2 I^2C^{TM} Clock input.
	C12IN3-	1	1	I	AN	Comparators C1 and C2 inverting input.
	AN10	1	1	I	AN	Analog input 10.

Legend: AN = Analog input or output; TTL = TTL compatible input; HV = High Voltage; OD = Open Drain; XTAL = Crystal; CMOS = CMOS compatible input or output; ST = Schmitt Trigger input with CMOS levels; I^2C^{TM} = Schmitt Trigger input with I^2C.

Note 1: Default pin assignment for P2B, T3CKI, CCP3 and CCP2 when Configuration bits PB2MX, T3CMX, CCP3MX and CCP2MX are set.

2: Alternate pin assignment for P2B, T3CKI, CCP3 and CCP2 when Configuration bits PB2MX, T3CMX, CCP3MX and CCP2MX are clear.

3: Function on PORTD and PORTE for PIC18(L)F4XK22 devices.

TABLE 10-5: PORTB I/O SUMMARY (CONTINUED)

Pin	Function	TRIS Setting	ANSEL Setting	Pin Type	Buffer Type	Description
RB2/INT2/CTED1/ P1B/SDI2/SDA2/ AN8	RB2	0	1	O	DIG	LATB<2> data output; not affected by analog input.
		1	0	I	**TTL**	PORTB<2> data input; disabled when analog input enabled.
	INT2	1	0	I	ST	External interrupt 2.
	CTED1	1	0	I	ST	CTMU Edge 1 input.
	P1B(3)	0	1	O	DIG	Enhanced CCP1 PWM output 2.
	SDI2(3)	1	0	I	ST	MSSP2 SPI data input.
	SDA2(3)	0	0	O	DIG	MSSP2 I^2C^{TM} data output.
		1	0	I	I^2C	MSSP2 I^2C^{TM} data input.
	AN8	1	1	I	AN	Analog input 8.
RB3/CTED2/P2A/ CCP2/SDO2/ C12IN2-/AN9	RB3	0	1	O	DIG	LATB<3> data output; not affected by analog input.
		1	0	I	**TTL**	PORTB<3> data input; disabled when analog input enabled.
	CTED2	1	0	I	ST	CTMU Edge 2 input.
	P2A	0	1	O	DIG	Enhanced CCP1 PWM output 1.
	CCP2(2)	0	1	O	DIG	Compare 2 output/PWM 2 output.
		1	0	I	ST	Capture 2 input.
	SDO2(2)	0	1	O	DIG	MSSP2 SPI data output.
	C12IN2-	1	1	I	AN	Comparators C1 and C2 inverting input.
	AN9	1	1	I	AN	Analog input 9.
RB4/IOC0/P1D/ T5G/AN11	RB4	0	1	O	DIG	LATB<4> data output; not affected by analog input.
		1	0	I	**TTL**	PORTB<4> data input; disabled when analog input enabled.
	IOC0	1	0	I	TTL	Interrupt-on-change pin.
	P1D	0	1	O	DIG	Enhanced CCP1 PWM output 4.
	T5G	1	0	I	ST	Timer5 external clock gate input.
	AN11	1	1	I	AN	Analog input 11.
RB5/IOC1/P2B/ P3A/CCP3/T3CKI/ T1G/AN13	RB5	0	1	O	DIG	LATB<5> data output; not affected by analog input.
		1	0	I	**TTL**	PORTB<5> data input; disabled when analog input enabled.
	IOC1	1	0	I	TTL	Interrupt-on-change pin 1.
	P2B(1)(3)	0	1	O	DIG	Enhanced CCP2 PWM output 2.
	P3A(1)	0	1	O	DIG	Enhanced CCP3 PWM output 1.
	CCP3(1)	0	1	O	DIG	Compare 3 output/PWM 3 output.
		1	0	I	ST	Capture 3 input.
	T3CKI(2)	1	0	I	ST	Timer3 clock input.
	T1G	1	0	I	ST	Timer1 external clock gate input.
	AN13	1	1	I	AN	Analog input 13.

Legend: AN = Analog input or output; TTL = TTL compatible input; HV = High Voltage; OD = Open Drain; XTAL = Crystal; CMOS = CMOS compatible input or output; ST = Schmitt Trigger input with CMOS levels; I^2C^{TM} = Schmitt Trigger input with I^2C.

Note 1: Default pin assignment for P2B, T3CKI, CCP3 and CCP2 when Configuration bits PB2MX, T3CMX, CCP3MX and CCP2MX are set.

2: Alternate pin assignment for P2B, T3CKI, CCP3 and CCP2 when Configuration bits PB2MX, T3CMX, CCP3MX and CCP2MX are clear.

3: Function on PORTD and PORTE for PIC18(L)F4XK22 devices.

TABLE 10-5: PORTB I/O SUMMARY (CONTINUED)

Pin	Function	TRIS Setting	ANSEL Setting	Pin Type	Buffer Type	Description
RB6/KBI2/PGC	RB6	0	1	O	DIG	LATB<6> data output; not affected by analog input.
		1	0	I	TTL	PORTB<6> data input; disabled when analog input enabled.
	IOC2	1	0	I	TTL	Interrupt-on-change pin.
	TX2(3)	0	1	O	DIG	EUSART 2 asynchronous transmit data output.
	CK2(3)	0	1	O	DIG	EUSART 2 synchronous serial clock output.
		1	0	I	ST	EUSART 2 synchronous serial clock input.
	PGC	x	x	I	ST	In-Circuit Debugger and ICSP™ programming clock input.
RB7/KBI3/PGD	RB7	0	1	O	DIG	LATB<7> data output; not affected by analog input.
		1	0	I	TTL	PORTB<7> data input; disabled when analog input enabled.
	IOC3	1	0	I	TTL	Interrupt-on-change pin.
	RX2(2), (3)	1	0	I	ST	EUSART 2 asynchronous receive data input.
	DT2(2), (3)	0	1	O	DIG	EUSART 2 synchronous serial data output.
		1	0	I	ST	EUSART 2 synchronous serial data input.
	PGD	x	x	O	DIG	In-Circuit Debugger and ICSP™ programming data output.
		x	x	I	ST	In-Circuit Debugger and ICSP™ programming data input.

Legend: AN = Analog input or output; TTL = TTL compatible input; HV = High Voltage; OD = Open Drain; XTAL = Crystal; CMOS = CMOS compatible input or output; ST = Schmitt Trigger input with CMOS levels; I^2C™ = Schmitt Trigger input with I^2C.

Note 1: Default pin assignment for P2B, T3CKI, CCP3 and CCP2 when Configuration bits PB2MX, T3CMX, CCP3MX and CCP2MX are set.

2: Alternate pin assignment for P2B, T3CKI, CCP3 and CCP2 when Configuration bits PB2MX, T3CMX, CCP3MX and CCP2MX are clear.

3: Function on PORTD and PORTE for PIC18(L)F4XK22 devices.

APPENDIX A: DOCUMENT REVISION HISTORY

Rev A Document (5/2010)

Initial release of this document.

Rev B Document (8/2010)

Updated errata to the new format; Updated for Revision A4 silicon release; Added Modules 5.2, 9.1, 9.2 and 10.

Data Sheet Clarifications: Added Module 1.

Rev C Document (7/2011)

Updated for Revision A5 silicon release; Module 9.1 errata fixed.

Data Sheet Clarifications: No changes.

Rev D Document (8/2011)

Added Module 11, EUSART; Module 11 errata fixed on Silicon revision A5.

Data Sheet Clarifications: No changes.

NOTES:

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