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Applications of "<u>Embedded -</u> <u>Microcontrollers</u>"

Details

E·XF

Product Status	Active
Core Processor	PIC
Core Size	8-Bit
Speed	40MHz
Connectivity	I ² C, SPI, UART/USART
Peripherals	Brown-out Detect/Reset, HLVD, POR, PWM, WDT
Number of I/O	25
Program Memory Size	16KB (8K x 16)
Program Memory Type	FLASH
EEPROM Size	-
RAM Size	768 x 8
Voltage - Supply (Vcc/Vdd)	2V ~ 5.5V
Data Converters	A/D 10x10b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 85°C (TA)
Mounting Type	Surface Mount
Package / Case	28-VQFN Exposed Pad
Supplier Device Package	28-QFN (6x6)
Purchase URL	https://www.e-xfl.com/product-detail/microchip-technology/pic18lf2410t-i-ml

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PIC18F2X1X/4X1X

PIC18F2X1X/4X1X Data Sheet Errata

Clarifications/Corrections to the Data Sheet:

In the Device Data Sheet (DS39636**A**), the following clarifications and corrections should be noted. Any silicon issues related to the PIC18F2X1X/4X1X devices will be reported in a separate silicon errata. Please check the Microchip web site for any existing issues.

1. Module: I/O Ports

The TRIS setting for the TX pin on PORTC in Table 9-5 of the Device Data Sheet was incorrectly stated as '1'.

The correct TRIS setting for the TX pin on PORTC is '0'.

2. Module: Resets

The PR2 initialization condition shown in Table 4-4 for MCLR Resets, WDT Reset, RESET Instruction, Stack Resets and Wake-up via WDT or Interrupt should read "uuuu uuuu" as shown in the following table (changes are shown in **bold** text):

TABLE 4-4: INITIALIZATION CONDITIONS FOR ALL REGISTERS

Register			Applicable Devices			Power-on Reset, Brown-out Reset	MCLR Resets, WDT Reset, RESET Instruction, Stack Resets	Wake-up via WDT or Interrupt			
PR2	2410	2510	2515	2610	4410	4510	4515	4610	1111 1111	uuuu uuuu	uuuu uuuu

 $\label{eq:legend: u = unchanged, x = unknown, - = unimplemented bit, read as `0`, q = value depends on condition. Shaded cells indicate conditions do not apply for the designated device.$

3. Module: DC Characteristics

In Section 25.3 "DC Characteristics" (page 326), the specifications for VIL parameters D033B and D034 have been clarified and now read as follows:

25.3 DC Characteristics: PIC18F2X1X/4X1X (Industrial, Extended) PIC18LF2X1X/4X1X (Industrial)

DC CHARACTERISTICS			Standard Operating Conditions (unless otherwise stated) Operating temperature $-40^{\circ}C \le TA \le +85^{\circ}C$ for industrial					
Param No.	Symbol	Characteristic	Min	Мах	Units	Conditions		
	Vi∟	Input Low Voltage						
D033B		OSC1	Vss	0.3	V	XT, LP modes		
D034		T13CKI	Vss	0.3	V			

4. Module: A/D Converter Characteristics

In Table 25-24: A/D Converter Characteristics (page 349), specification A40 has been added:

TABLE 25-24: A/D CONVERTER CHARACTERISTICS: PIC18F2X1X/4X1X (INDUSTRIAL, EXTENDED) PIC18LF2X1X/4X1X (INDUSTRIAL)

Param No.	Symbol	Character	Min	Тур	Max	Units	Conditions	
A40	IAD	A/D Current from VDD	PIC18FXXXX	_	180		μA	Average current during
			PIC18LFXXXX		90	—	μA	conversion

5. Module: Instruction Set

In Table 23-2: PIC18FXXXX Instruction Set (page 261), the BTG instruction has been modified. The changes are shown in **bold** text:

TABLE 23-2: PIC18FXXXX INSTRUCTION SET

Mnemonic, Operands		Description	Cycles	16-Bit Instruction Word				Status	Notoo
		Description	Cycles	MSb			LSb	Affected	Notes
BIT-ORIENTED OPERATIONS									
BTG	f, b , a	Bit Toggle f	1	0111	bbba	ffff	ffff	None	1, 2

Note 1: When a Port register is modified as a function of itself (e.g., MOVF PORTB, 1, 0), the value used will be that value present on the pins themselves. For example, if the data latch is '1' for a pin configured as input and is driven low by an external device, the data will be written back with a '0'.

2: If this instruction is executed on the TMR0 register (and where applicable, 'd' = 1), the prescaler will be cleared if assigned.

6. Module: Timing Diagrams and Specifications

Table 25-6: External Clock Timing Requirements (page 333), has been revised (changes and additions are shown in **bold** text).

Param. No.	Symbol	Characteristic	Min	Max	Units	Conditions
1A	Fosc	External CLKI Frequency ⁽¹⁾	DC	1	MHz	XT, RC Oscillator mode
			DC	25	MHz	HS Oscillator mode
			DC	31.25	kHz	LP Oscillator mode
			DC	40	MHz	EC Oscillator mode
		Oscillator Frequency ⁽¹⁾	DC	4	MHz	RC Oscillator mode
			0.1	4	MHz	XT Oscillator mode
			4	25	MHz	HS Oscillator mode
			4	10	MHz	HS + PLL Oscillator mode
			5	200	kHz	LP Oscillator mode
1	Tosc	External CLKI Period ⁽¹⁾	1000		ns	XT, RC Oscillator mode
			40	—	ns	HS Oscillator mode
			32	—	μs	LP Oscillator mode
			25	—	ns	EC Oscillator mode
		Oscillator Period ⁽¹⁾	250	—	ns	RC Oscillator mode
			250	1	μs	XT Oscillator mode
			40	250	ns	HS Oscillator mode
			100	250	ns	HS + PLL Oscillator mode
			5	200	μs	LP Oscillator mode

TABLE 25-6: EXTERNAL CLOCK TIMING REQUIREMENTS

Note 1: Instruction cycle period (TCY) equals four times the input oscillator time base period for all configurations except PLL. All specified values are based on characterization data for that particular oscillator type under standard operating conditions with the device executing code. Exceeding these specified limits may result in an unstable oscillator operation and/or higher than expected current consumption. All devices are tested to operate at "min." values with an external clock applied to the OSC1/CLKI pin. When an external clock input is used, the "max." cycle time limit is "DC" (no clock) for all devices.

7. Module: EUSART

The RX pin sampling information in **Section 17.1.2** "**Sampling**" has changed. This section now reads as follows:

17.1.2 SAMPLING

The data on the RX pin is sampled three times by a majority detect circuit to determine if a high or a low level is present at the RX pin when SYNC is clear or when BRG16 and BRGH are both not set.

The data on the RX pin is sampled once when SYNC is set or when BRGH16 and BRGH are both set.

8. Module: MSSP

In **Section 16.3.2 "Operation**", the following note has been added:

Note: The SSPBUF register cannot be used with read-modify-write instructions, such as BCF, BTFSC, COMF, etc.

9. Module: QFN

In the QFN pin diagrams on pages 3 and 4, and in Table 1-3: PIC18F2410/2510/2515/2610 Pinout I/O Descriptions, the following note has been added:

Note: It is recommended to connect the bottom pad of QFN package parts to Vss.

10. Module: Electrical Characteristics

Parameters D031A and D041A have been added to **Section 25-3** "**DC Characteristics**", as shown below:

25.3 DC Characteristics: PIC18F2X1X/4X1X (Industrial) PIC18LF2X1X/4X1X (Industrial)

DC CHA	ARACTE	RISTICS	Standard Operating Conditions (unless otherwise stated) Operating temperature $-40^{\circ}C \le TA \le +85^{\circ}C$ for industrial					
Param No.	Symbol	Characteristic	Min	Мах	Units	Conditions		
-	Vi∟	Input Low Voltage						
		I/O ports:						
D031A		with SMBus buffer	Vss	0.8	V			
	Viн	Input High Voltage						
		I/O ports:						
D041A		with SMBus buffer	2.1	Vdd	V			

11. Module: Electrical Characteristics

In Table 25-1: Memory Programming Requirements, parameters D132, D132A, D133 and D133A have been changed. The changes are shown in **bold** in the following table:

TABLE 25-7: MEMORY PROGRAMMING REQUIREMENTS

DC CHARACTERISTICS				Standard Operating Conditions (unless otherwise stated) Operating temperature $-40^{\circ}C \le TA \le +85^{\circ}C$ for industrial						
Param No.	Sym	Characteristic	Min	Тур†	Max	Units	Conditions			
		Program Flash Memory								
D132	VIE	VDD for Block Erase	3.0	—	5.5	V	Using ICSP™ port, 25°C			
D132A	Viw	VDD for Externally Timed Erase or Write	4.5	—	5.5	V	Using ICSP port, 25°C			
D133	TIE	ICSP Block Erase Cycle Time	_	4	_	ms	$VDD \ge 4.5V$			
D133A	Tiw	ICSP Erase or Write Cycle Time (externally timed)	1	_	_	ms	$VDD \ge 4.5V, 25^{\circ}C$			
D133A	Tıw	Self-Timed Write Cycle Time	—	2	—	ms				

REVISION HISTORY

Rev A Document (01/2005) First revision of this document.

Data Sheet Clarification issues 1 (I/O Ports), 2 (Resets), 3 (DC Characteristics), 4 (A/D Converter Characteristics), 5 (Instruction Set) and 6 (Timing Diagrams and Specifications).

Rev B Document (09/2005)

Added Data Sheet Clarification issues 7 (EUSART), 8 (MSSP), 9 (QFN) and 10-11 (Electrical Characteristics).

PIC18F2X1X/4X1X

NOTES:

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