MICROCHIP PIC18F6390/6490/8390/8490

PIC18F6390/6490/8390/8490 Data Sheet Errata

Clarifications/Corrections to the Data Sheet:

In the Device Data Sheet (DS39629**B**), the following clarifications and corrections should be noted. Any silicon issues related to the PIC18F6390/6490/8390/8490 devices will be reported in a separate silicon errata. Please check the Microchip web site for any existing issues.

1. Module: LCD Initialization Conditions

The initialization conditions for the LCDDATAx and LCDSEx registers have been revised from those shown in Table 4-4 of the Device Data Sheet.

The LCDDATAx registers are cleared upon all types of Resets, instead of unchanged for $\overline{\text{MCLR}}$ Reset, WDT Reset, the `RESET` instruction and Stack Overflow Resets.

The LCDSEx registers are cleared only on a POR and remain unchanged for a BOR. Note 6 was added to Table 4-4 in the Device Data Sheet to clarify this exception.

The revised conditions are shown in Table 1.

TABLE 1: INITIALIZATION CONDITIONS FOR ALL REGISTERS

Register	Applicable Devices		Power-on Reset, Brown-out Reset	$\overline{\text{MCLR}}$ Resets WDT Reset `RESET` Instruction Stack Resets	Wake-up via WDT or Interrupt
LCDDATA23	6X90	8X90	0000 0000	0000 0000	uuuu uuuu
LCDDATA22	6X90	8X90	0000 0000	0000 0000	uuuu uuuu
LCDDATA21	6X90	8X90	0000 0000	0000 0000	uuuu uuuu
LCDDATA20	6X90	8X90	0000 0000	0000 0000	uuuu uuuu
LCDDATA19	6X90	8X90	0000 0000	0000 0000	uuuu uuuu
LCDDATA18	6X90	8X90	0000 0000	0000 0000	uuuu uuuu
LCDDATA17	6X90	8X90	0000 0000	0000 0000	uuuu uuuu
LCDDATA16	6X90	8X90	0000 0000	0000 0000	uuuu uuuu
LCDDATA15	6X90	8X90	0000 0000	0000 0000	uuuu uuuu
LCDDATA14	6X90	8X90	0000 0000	0000 0000	uuuu uuuu
LCDDATA13	6X90	8X90	0000 0000	0000 0000	uuuu uuuu
LCDDATA12	6X90	8X90	0000 0000	0000 0000	uuuu uuuu
LCDDATA11	6X90	8X90	0000 0000	0000 0000	uuuu uuuu
LCDDATA10	6X90	8X90	0000 0000	0000 0000	uuuu uuuu
LCDDATA9	6X90	8X90	0000 0000	0000 0000	uuuu uuuu
LCDDATA8	6X90	8X90	0000 0000	0000 0000	uuuu uuuu
LCDDATA7	6X90	8X90	0000 0000	0000 0000	uuuu uuuu
LCDDATA6	6X90	8X90	0000 0000	0000 0000	uuuu uuuu
LCDDATA5	6X90	8X90	0000 0000	0000 0000	uuuu uuuu
LCDDATA4	6X90	8X90	0000 0000	0000 0000	uuuu uuuu
LCDDATA3	6X90	8X90	0000 0000	0000 0000	uuuu uuuu
LCDDATA2	6X90	8X90	0000 0000	0000 0000	uuuu uuuu
LCDDATA1	6X90	8X90	0000 0000	0000 0000	uuuu uuuu

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.

6: These registers are cleared on POR and unchanged on BOR.

TABLE 1: INITIALIZATION CONDITIONS FOR ALL REGISTERS (CONTINUED)

Register	Applicable Devices		Power-on Reset, Brown-out Reset	$\overline{\text{MCLR}}$ Resets WDT Reset RESET Instruction Stack Resets	Wake-up via WDT or Interrupt
LCDDATA0	6X90	8X90	0000 0000	0000 0000	uuuu uuuu
LCDSE5	6X90	8X90	0000 0000(6)	0000 0000	uuuu uuuu
LCDSE4	6X90	8X90	0000 0000(6)	0000 0000	uuuu uuuu
LCDSE3	6X90	8X90	0000 0000(6)	0000 0000	uuuu uuuu
LCDSE2	6X90	8X90	0000 0000(6)	0000 0000	uuuu uuuu
LCDSE1	6X90	8X90	0000 0000(6)	0000 0000	uuuu uuuu
LCDSE0	6X90	8X90	0000 0000(6)	0000 0000	uuuu uuuu

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.

6: These registers are cleared on POR and unchanged on BOR.

2. Module: OSCTUNE Register

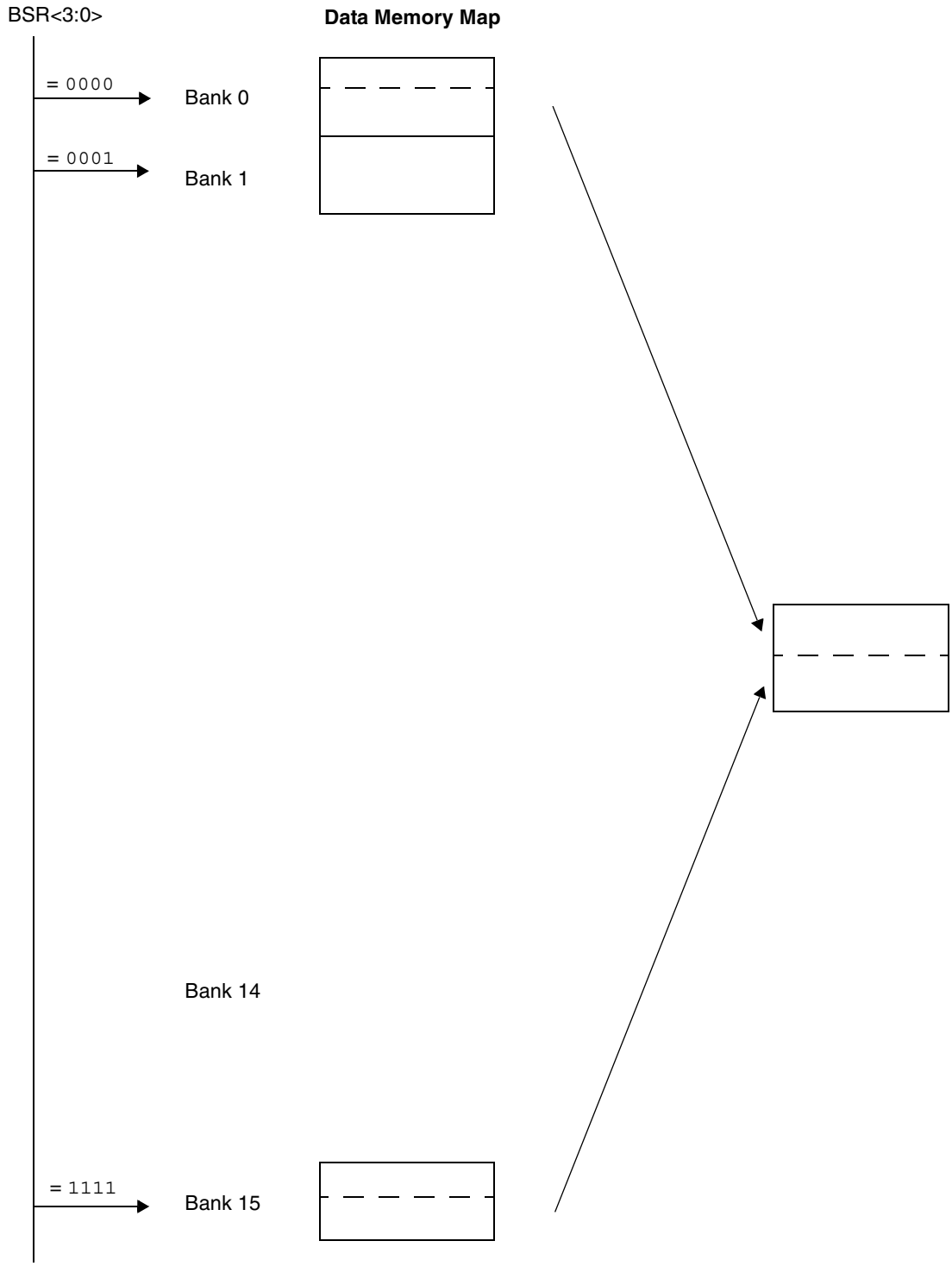
In **Section 2.6.3 "OSCTUNE Register"**, references to INTRC have been removed from the second paragraph, which now reads as follows:

When the OSCTUNE register is modified, the INTOSC frequency will begin shifting to the new frequency. The INTOSC clock will stabilize within 1 ms. Code execution continues during this shift. There is no indication that the shift has occurred.

3. Module: Data Memory Map

In Figure 5-5 of the Device Data Sheet, the address range, F00h to F58h, has been corrected to **"Unimplemented"** rather than "GPR".

FIGURE 5-5: DATA MEMORY MAP FOR PIC18F6390/6490/8390/8490 DEVICES



7. Module: Electrical Characteristics

In **Section 26.2 "DC Characteristics: Power-Down and Supply Current"**, the Units value for Supply Current (I_{DD}) in RC_RUN mode (F_{OSC} = 4 MHz and V_{DD} = 2.0V), have been updated to **"mA"** rather than "μA".

The following relevant portion of the table indicates the corrections. (For clarity, the corrected items appear in **bold** text – all other text appears in plain text for purposes of this errata.)

26.2 DC Characteristics: Power-Down and Supply Current PIC18F6390/6490/8390/8490 (Industrial) PIC18LF6390/6490/8390/8490 (Industrial)

PIC18LF6390/6490/8390/8490 (Industrial)		**Standard Operating Conditions (unless otherwise stated)** Operating temperature -40°C ≤ T_A ≤ +85°C for industrial					
PIC18F6390/6490/8390/8490 (Industrial)		**Standard Operating Conditions (unless otherwise stated)** Operating temperature -40°C ≤ T_A ≤ +85°C for industrial					
Param No.	**Device**	**Typ**	**Max**	**Units**	**Conditions**		
	Supply Current (I_{DD})(1)						
	PIC18LFX390/X490	0.6	1.7	**mA**	-40°C	V_{DD} = 2.0V	F_{OSC} = 4 MHz (**RC_RUN** mode, INTOSC source)
		0.6	1.6	**mA**	+25°C		
		0.6	1.5	**mA**	+85°C		
	PIC18LFX390/X490	1.0	2.4	mA	-40°C	V_{DD} = 3.0V	
		1.0	2.4	mA	+25°C		
		1.0	2.4	mA	+85°C		
	All devices	2.0	4.2	mA	-40°C	V_{DD} = 5.0V	
		2.0	4	mA	+25°C		
		2.0	3.8	mA	+85°C		

Note 1: The supply current is mainly a function of operating voltage, frequency and mode. Other factors, such as I/O pin loading and switching rate, oscillator type and circuit, internal code execution pattern and temperature, also have an impact on the current consumption.
The test conditions for all I_{DD} measurements in active operation mode are:
$\overline{OSC1}$ = external square wave, from rail-to-rail; all I/O pins tri-stated, pulled to V_{DD} or V_{SS};
$\overline{MCLR}$ = V_{DD}; WDT enabled/disabled as specified.

8. Module: Electrical Characteristics

In **Section 26.2 "DC Characteristics: Power-Down and Supply Current"**, certain Max values and operating temperatures for Supply Current (I_{DD}) in SEC_RUN and SEC_IDLE modes have been updated.

The following relevant portion of the table indicates the corrections. (For clarity, the corrected items appear in **bold** text – all other text appears in plain text for purposes of this errata.)

26.2 DC Characteristics: Power-Down and Supply Current PIC18F6390/6490/8390/8490 (Industrial) PIC18LF6390/6490/8390/8490 (Industrial)

PIC18LF6390/6490/8390/8490 (Industrial)		**Standard Operating Conditions (unless otherwise stated)** Operating temperature -40°C ≤ T_A ≤ +85°C for industrial					
PIC18F6390/6490/8390/8490 (Industrial)		**Standard Operating Conditions (unless otherwise stated)** Operating temperature -40°C ≤ T_A ≤ +85°C for industrial					
Param No.	**Device**	**Typ**	**Max**	**Units**	**Conditions**		
	Supply Current (I_{DD})(1)						
	PIC18LFX390/X490	13	**40**	µA	**-40°C**	V_{DD} = 2.0V	F_{OSC} = 32 kHz(2) (**SEC_RUN** mode, Timer1 as clock)
		14	**40**	µA	+25°C		
		16	**40**	µA	**+85°C**		
	PIC18LFX390/X490	34	**74**	µA	**-40°C**	V_{DD} = 3.0V	
		31	**70**	µA	+25°C		
		28	**67**	µA	**+85°C**		
	All devices	72	**150**	µA	**-40°C**	V_{DD} = 5.0V	
		65	**150**	µA	+25°C		
		59	**150**	µA	**+85°C**		
	PIC18LFX390/X490	5.5	15	µA	**-40°C**	V_{DD} = 2.0V	F_{OSC} = 32 kHz(2) (**SEC_IDLE** mode, Timer1 as clock)
		5.8	15	µA	+25°C		
		6.1	18	µA	**+85°C**		
	PIC18LFX390/X490	8.2	30	µA	**-40°C**	V_{DD} = 3.0V	
		8.6	30	µA	+25°C		
		8.8	35	µA	**+85°C**		
	All devices	13	80	µA	**-40°C**	V_{DD} = 5.0V	
		13	80	µA	+25°C		
		13	85	µA	**+85°C**		

Note 1: The supply current is mainly a function of operating voltage, frequency and mode. Other factors, such as I/O pin loading and switching rate, oscillator type and circuit, internal code execution pattern and temperature, also have an impact on the current consumption.
The test conditions for all I_{DD} measurements in active operation mode are:
OSC1 = external square wave, from rail-to-rail; all I/O pins tri-stated, pulled to V_{DD} or V_{SS};
$\overline{MCLR}$ = V_{DD}; WDT enabled/disabled as specified.

2: BOR and HLVD enable internal band gap reference. With both modules enabled, current consumption will be less than the sum of both specifications.

9. Module: Electrical Characteristics

In **Section 26.2 "DC Characteristics: Power-Down and Supply Current"**, the Max values of parameters D022A (Brown-out Reset) and D022B (High/Low-Voltage Detect) have been updated.

The following relevant portion of the table indicates the corrections. (For clarity, the corrected items appear in **bold** text – all other text appears in plain text for purposes of this errata.)

26.2 DC Characteristics: Power-Down and Supply Current PIC18F6390/6490/8390/8490 (Industrial) PIC18LF6390/6490/8390/8490 (Industrial)

PIC18LF6390/6490/8390/8490 (Industrial)		**Standard Operating Conditions (unless otherwise stated)** Operating temperature -40°C ≤ TA ≤ +85°C for industrial					
PIC18F6390/6490/8390/8490 (Industrial)		**Standard Operating Conditions (unless otherwise stated)** Operating temperature -40°C ≤ TA ≤ +85°C for industrial					
Param No.	**Device**	**Typ**	**Max**	**Units**	**Conditions**		
	Module Differential Currents (ΔIWDT, ΔIBOR, ΔILVD, ΔILCD, ΔIOSCB, ΔIAD)						
D022A (ΔIBOR)	**Brown-out Reset**	17	**50.0**	µA	-40°C to +85°C	VDD = 3.0V	
		47	**60.0**	µA	-40°C to +85°C	VDD = 5.0V	
D022B (ΔILVD)	**High/Low-Voltage Detect**	14	**38.0**	µA	-40°C to +85°C	VDD = 2.0V	
		18	**40.0**	µA	-40°C to +85°C	VDD = 3.0V	
		21	**45.0**	µA	-40°C to +85°C	VDD = 5.0V	

10. Module: Electrical Characteristics

In Table 26-1 of the Device Data Sheet, the Min values of parameters D132 and D132A have been updated.

The following relevant portion of Table 26-1 indicates the corrections. (For clarity, the corrected items appear in **bold** text – all other text appears in plain text for purposes of this errata.)

TABLE 26-1: MEMORY PROGRAMMING REQUIREMENTS

DC Characteristics			**Standard Operating Conditions (unless otherwise stated)** Operating temperature -40°C ≤ TA ≤ +85°C for industrial				
Param No.	**Sym**	**Characteristic**	**Min**	**Typ†**	**Max**	**Units**	**Conditions**
		Program Flash Memory					
D132	VIE	VDD for Block Erase	**2.75**	—	5.5	V	Using ICSP™ port
D132A	VIW	VDD for Externally Timed Erase or Write	**2.75**	—	5.5	V	Using ICSP port

† Data in "Typ" column is at 5.0V, 25°C unless otherwise stated. These parameters are for design guidance only and are not tested.

11. Module: Electrical Characteristics

In Table 26-4 of the Device Data Sheet, the parameter D423 has been added.

The following relevant portion of Table 26-4 indicates the addition. (For clarity, the new item appears in **bold** text – all other text appears in plain text for purposes of this errata.)

TABLE 26-4: LOW-VOLTAGE DETECT CHARACTERISTICS

				Standard Operating Conditions (unless otherwise stated) Operating temperature -40°C ≤ TA ≤ +85°C for industrial				
Param No.	**Symbol**	**Characteristic**		**Min**	**Typ†**	**Max**	**Units**	**Conditions**
D423	**VBG**	**Band Gap Reference Voltage Value**	**LVV = 1111**	**—**	**1.20**	**—**	**V**	**HLVDIN input external**

† Production tested at TAMB = 25°C. Specifications over temperature limits ensured by characterization.

12. Module: Electrical Characteristics

In Table 26-10 of the Device Data Sheet, the Max value for parameter 33 has been updated.

The following relevant portion of Table 26-10 indicates the correction. (For clarity, the corrected item appears in **bold** text – all other text appears in plain text for purposes of this errata.)

TABLE 26-10: RESET, WATCHDOG TIMER, OSCILLATOR START-UP TIMER, POWER-UP TIMER AND BROWN-OUT RESET REQUIREMENTS

Param. No.	Symbol	Characteristic	Min	Typ	Max	Units	Conditions
33	TPWRT	Power-up Timer Period	55.5	65.5	**75**	ms	

13. Module: Electrical Characteristics

In Table 26-23 of the Device Data Sheet, the part numbers listed in the heading incorrectly reference the PIC18F4520 and PIC18LF4520 families of devices and have been corrected.

The following relevant portion of Table 26-23 indicates the correction.

TABLE 26-23: A/D CONVERTER CHARACTERISTICS: PIC18F6390/6490/8390/8490 (INDUSTRIAL) PIC18LF6390/6490/8390/8490 (INDUSTRIAL)

REVISION HISTORY

Rev A Document (3/2005)

First revision of this document. Includes issues 1 (HLVD Internal Reference Voltage Parameter) and 2 (LCD Initialization Conditions).

Rev B Document (11/2006)

Removed issue 1, renumbered issue 2 (LCD Initialization Conditions) to issue 1. Added new issues 2 (OSCTUNE Register), 3 (Data Memory Map), 4 (PORTA, TRISA and LATA Registers), 5 (LCD Bias Types) and 6 through 13 (Electrical Characteristics).

NOTES:

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