PIC16C65B

PIC16C65B Rev. A Silicon Errata Sheet

The PIC16C65B (Rev. A) parts you have received conform functionally to the Device Data Sheet (DS30605**A**), except for the anomalies described below.

All the problems listed here will be addressed in future revisions of the PIC16C65B silicon.

1. Module: RESET

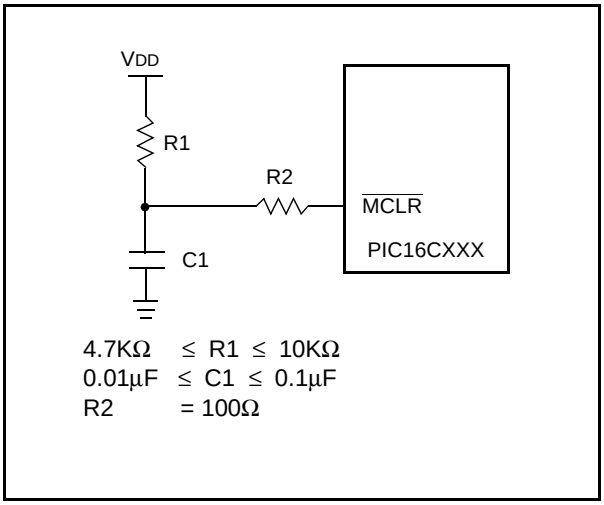
   The minimum specification for the $\overline{\text{MCLR}}$ must be met in order to RESET the PIC16CXXX. If a $\overline{\text{MCLR}}$ pulse occurs that is less that the minimum specification (parameter #30), improper device operation can occur.

   If the minimum specification cannot be met, then an external circuit must be used to insure that any pulse width less than the specification will be filtered before it reaches the $\overline{\text{MCLR}}$ pin.

   Work Around

   A possible circuit is shown in Figure 1. Proper design validation needs to be done to ensure desire operation over the applications operating conditions

FIGURE 1: $\overline{\text{MCLR}}$ EXTERNAL CIRCUIT



Note: As with any windowed EPROM device, please cover the window at all times, except when erasing.

2. Module: OSCILLATOR

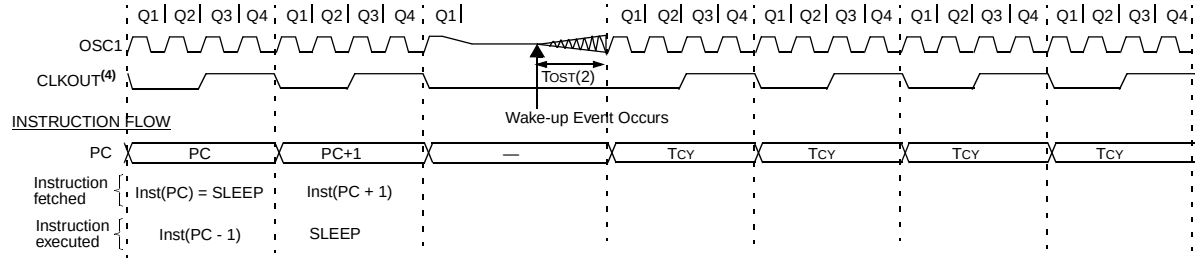
The Oscillator Start-up Timer (TOST) delay may not occur when the device wakes-up from sleep.

Figure 2 shows the start-up of the crystal after the event that causes the device to wake up from sleep mode (as specified in device data sheet). The start-up time (TOST) may not occur.

The events that wake-up the device from sleep are:

- An interrupt
- A WDT overflow (wake-up)
- A Brown-out Reset
- A $\overline{\text{MCLR}}$ reset

Figure 2: Wake-up from Sleep



Note 1: For TOST delay to be enabled, the XT, HS or LP oscillator mode must be selected.
2: TOST = 1024TOSC, This delay may not occur, and every valid clock edge will generate internal device clocks.
3: CLKOUT is not available in these osc modes, but shown here for timing reference.

In applications where time based measurements are started immediately after wake-up from sleep, the suggested work around should be implemented.

Work Around

After the SLEEP instruction, do a software delay of 256 TCY (same as 1024 TOSC). At the Reset and Interrupt vector addresses, test to see if the device woke from sleep (the $\overline{\text{TO}}$ and $\overline{\text{PD}}$ bits), and if the device did wake from sleep, ensure that the total cycle delay is 256 TCY.

3. Module: TMR1

When operating in external clock mode (TMR1CS is set), reading either of the timer 1 registers (TMR1H or TMR1L) may cause the timer not to increment as expected. This occurs for both synchronous and asynchronous inputs.

The scenarios which display this are:

- When a read operation of the TMR1H register occurs, the TMR1L register may not increment.
- When a read operation of the TMR1L register occurs, the TMR1H register may not increment. This improper operation is only an issue when the TMR1L register increments from FFh to 00h (FFh $\rightarrow$ 00H) during the read of the TMR1L register.

Work Around

Do not read either the TMR1H or the TMR1L registers when operating in external clock mode (TMR1CS is set). If the application needs to read the 16-bit counter, evaluate if this function can be moved to the TMR0 or one of the other timer resources on the device.

Clarifications/Corrections to the Data Sheet:
In the Device Data Sheet (DS30605A), the following clarifications and corrections should be noted:

1. Figure 3 and Figure 4 are additions to the data sheet to show the area of operation. These figures replace the Cross Reference of Device Specs for Oscillator Modes Table in the Electrical Specification section.

   Figure 3 shows the voltage vs. frequency operation for the PIC16**C**XXX devices. Devices marked with a "-04" operate up to 4 MHz, while devices marked with a "-20" operate up to 20 MHz. The entire shaded region is the valid operating region.

   Figure 4 shows the voltage vs. frequency operation for the PIC16**LC**XXX devices. The devices marked with a "-04" operate up to 4 MHz at the minimum supplied voltage. The devices also operate at a higher frequency (10 MHz) and at a higher voltage (3V). The entire shaded region is the valid operating region.

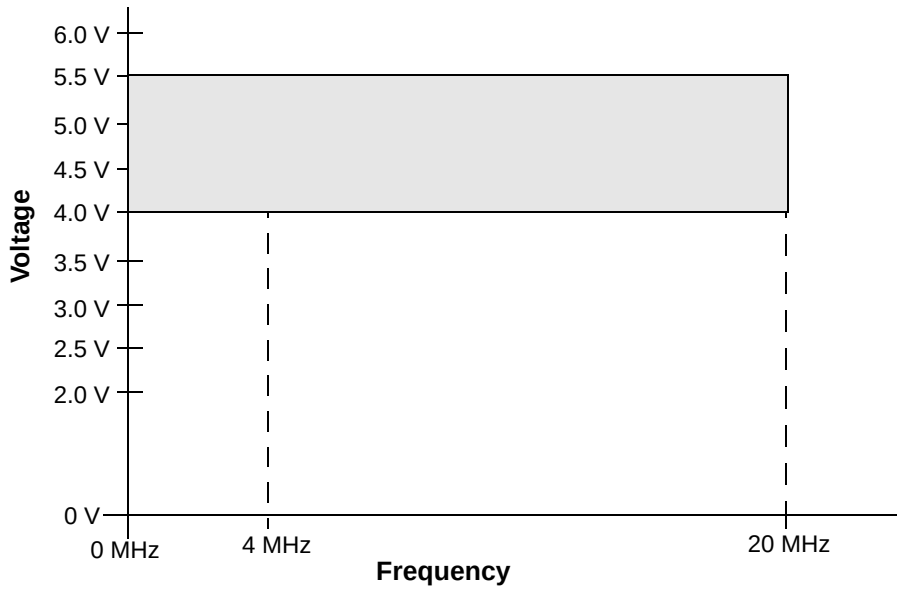
2. The supply voltages and power-down currents have been improved to the values shown in Table 1.

TABLE 1: DC SPECIFICATION CHANGES FROM DATA SHEET

Parm No.	Symbol	Characteristic	New Specification			Data Sheet Specification			Units
			Min	Typ	Max	Min	Typ	Max	
D001A	V_{DD}	Supply Voltage (1)	4.0	—	5.5	4.5	—	5.5	V
D001	V_{DD}	Supply Voltage (LC devices) (2, 3)	$V_{DDAPPMIN}$	—	5.5	N.A.	—	N.A.	V
D021	I_{PD}	Power-down Current (LC devices)	—	0.9	3.0	—	0.9	5.0	µA
D021A			—	0.9	3.0	—	0.9	5.0	µA

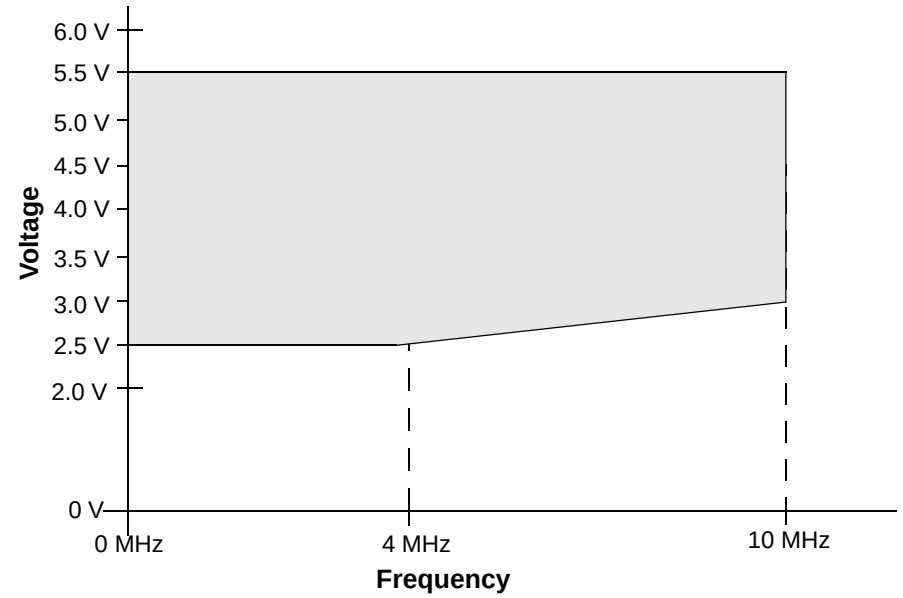
Note 1: HS oscillator mode
2: $V_{DDAPPMIN}$ is the minimum voltage of the PICmicro® in the application
$V_{DDAPPMIN} \geq 2.5$ V
3: $F_{MAX} = (12 \text{ MHz/V}) (V_{DDAPPMIN} - 2.5\text{V}) + 4 \text{ MHz}$
$F_{MAX} \leq 10$ MHz

Figure 3: PIC16CXXX Voltage-Frequency Graph



Note 1: The shaded region indicates the permissible combinations of voltage and frequency.

Figure 4: PIC16LCXXX Voltage-Frequency Graph



FMAX = 12 MHz/V (VDDAPPMIN - 2.5 V) + 4 MHz

Note 1: The shaded region indicates the permissible combinations of voltage and frequency.

Note 2: VDDAPPMIN is the minimum voltage of the PICmicro® device in the application.

Note 3: FMAX must be less than 10 MHz.

Note the following details of the code protection feature on PICmicro® MCUs.

- The PICmicro family meets the specifications contained in the Microchip Data Sheet.
- Microchip believes that its family of PICmicro microcontrollers is one of the most secure products 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 PICmicro microcontroller in a manner outside the operating specifications contained in the data sheet. The person doing so may be 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 product.

If you have any further questions about this matter, please contact the local sales office nearest to you.

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