LMK03318EVM CodeLoader Software

User's Guide

Literature Number: SNAU187
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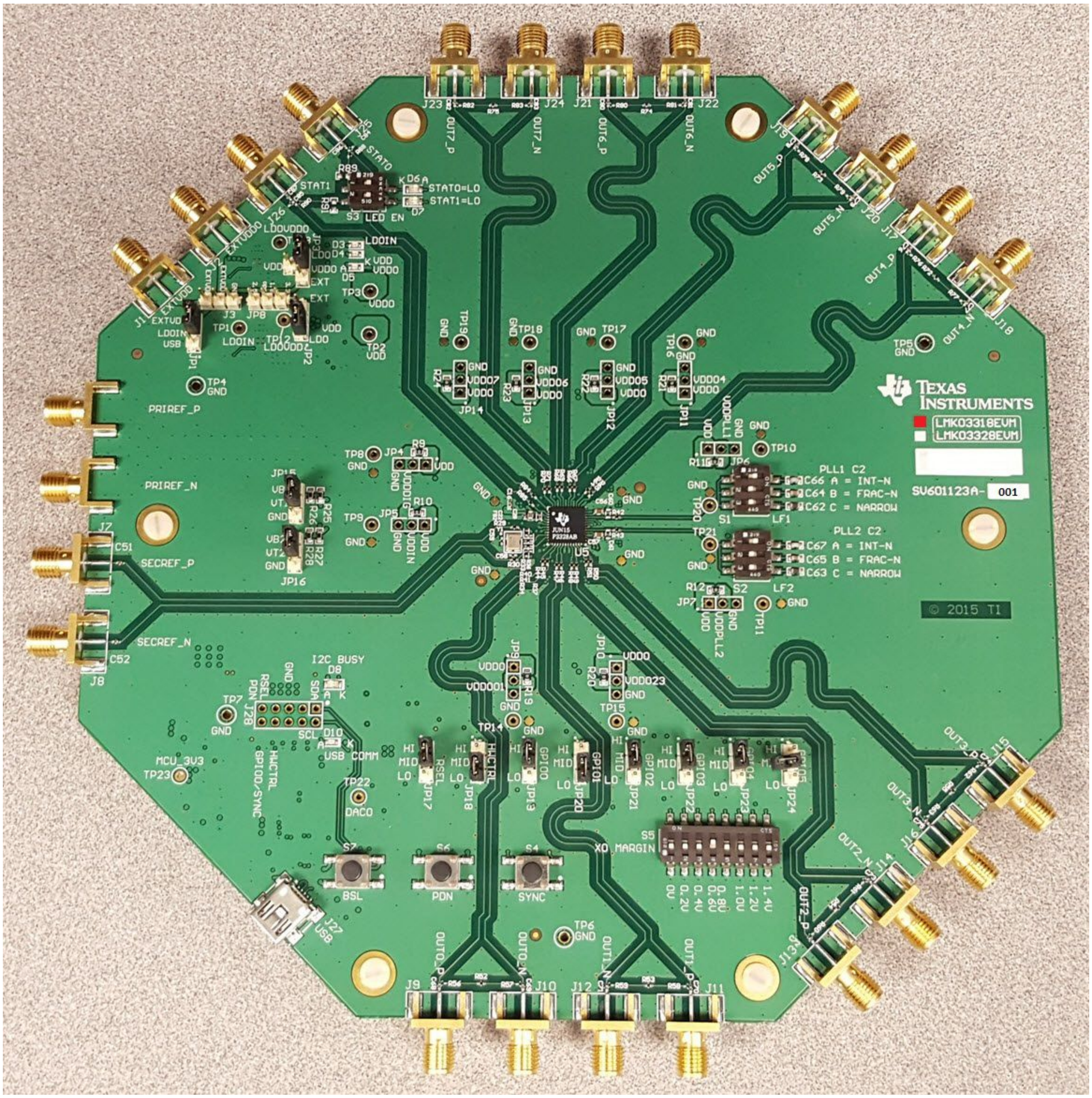

Figure 1. LMK03318EVM Photo

Table 1. Ordering Information

EVM ID	DEVICE ID	DEVICE PACKAGE
LMK03318EVM	LMK03318RHS	QFN-48

1 USB Interface Connection

The LMK03318 device registers can be initialized upon power-on/reset (POR) from one of the Soft Pin Modes (6 pre-programmed EEPROM page settings), Hard Pin Modes (64 predefined ROM page settings), or the Register Default settings. The start-up mode is selected by strapping the external control pins as described in the LMK03318 datasheet or LMK03318EVM User's Guide. After start-up, the device's I2C interface will be available to allow optional programming of the register (volatile), SRAM (volatile), and EEPROM (non-volatile) memories.

The on-board MSP430F5529 USB microcontroller (**U8**) provides an I2C host interface to the LMK03318 slave device. The device registers can be controlled via USB using TI's CodeLoader software GUI on a Host PC. The USB driver is included with the installation of the software GUI.

2 TI CodeLoader Software GUI Usage

To program the LMK03318EVM using TI's CodeLoader Software GUI:

1. Install the CodeLoader 4 software on a Windows-based Host PC.
2. Launch "CodeLoader 4" from the Start menu.
3. In the menu bar, click: Select Device > Clock Conditioners > LMK03318, then wait for the GUI to load.
4. Apply power to the LMK03318EVM .
5. Connect a USB cable (Figure 2) between the Host PC and the EVM mini-USB port (**J27**).

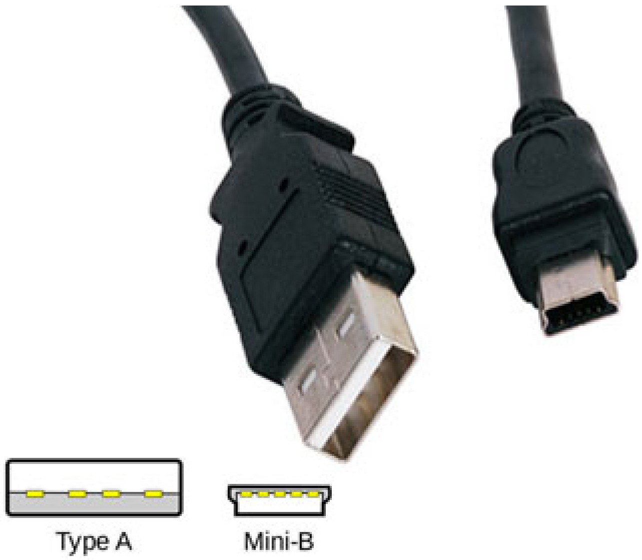

Figure 2. USB Cable (Type-A to Mini-B)

6. Establish USB / I2C communication. See **Port Setup Tab** (Section 3).
7. Configure the device register settings.
   (a) To restore a device setup (register settings) from a saved .mac file, see **Saving and Restoring a Device Setup File** (Section 5).
   (b) To restore a device setup from one of the predefined GUI default mode, click Mode menu and select the desired mode.
   (c) To update / sync the GUI controls from the device's current register settings, press <CTRL+R> to Read all registers.
   (d) Once device communication is established, the register controls / settings may be configured on the following tabs:
      (i) **Bits/Pins** Tab (Section 6)
      (ii) **Inputs/PLL** Tab (Section 7)
      (iii) **PLL** Tab (Section 8)
      (iv) **Outputs** Tab (Section 9)
      (v) **Status** Tab (Section 10)
8. Once the device register settings are confirmed, the settings may be committed for EEPROM programming on the **EEPROM Tab** (Section 11).

It is possible to use the CodeLoader GUI even without an EVM connected to generate the register settings and EEPROM settings; however, it is recommended to confirm the device operates and performs as intended on the EVM before committing the register settings for EEPROM programming.

3 Port Setup Tab

The **Port Setup** tab should be used to establish communication with the USB controller and the LMK03318.

1. Select “USB” for Communication Mode (“LPT” is not supported for this device).
   (a) Clicking “Identify” should cause LED D10 on the EVM to blink 5 times to confirm USB communication is functioning.
2. Set the I2C slave address for the target device (2 options):
   (a) Click “Scan I2C Bus” to auto-detect the device slave address.
      (i) The routine scans serially starting from 0x0 to 0x7F, and sets the address to the first slave address that acknowledges (ACK). It may take 2 scan attempts to find the device after device power-up.
      (ii) A pop-up window will display the detected I2C slave address and auto-set the address.
   (b) Alternatively, enter the target I2C slave address (7-bit hex value, excluding W/R bit) in the text box and click “Set I2C Address”.
      (i) This option may be needed to communicate with a target device (at a known slave address) on a system application board that has multiple slave devices sharing the I2C bus.

NOTE: Do NOT change any settings in the Pin Configuration group.

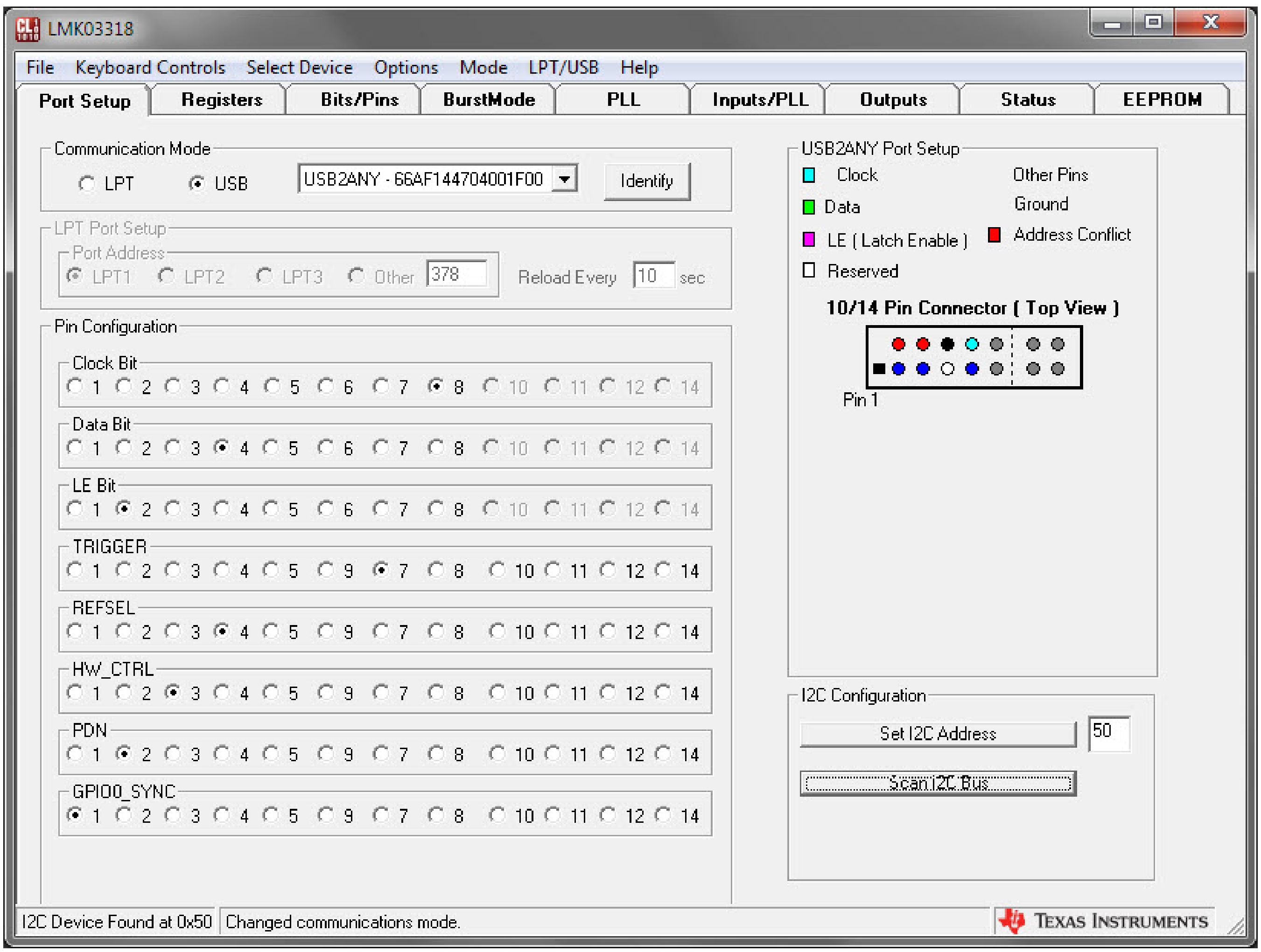

Figure 3. Port Setup Tab

4 CodeLoader Hints

4.1 Shortcut Keys

- Press <CTRL+R> to Read all registers and update GUI controls with the device register settings.
- Press <CTRL+L> to Load all registers and update device register settings with the GUI settings.
- Press <CTRL+W> to toggle Auto-Reloading of device registers when a GUI control is changed.

4.2 Register Help

To display a Register Help pop-up window with short register description:

- On the **Bits/Pins** tab, right-click on any register control name.
- On the **PLL**, **Inputs/PLL**, **Outputs**, **Status**, and **EEPROM** tabs, click on any register control (to focus) and press ~ (tilde character) on the keyboard.

For detailed register descriptions, refer to the LMK03318 Datasheet.

5 Saving and Restoring a Device Setup File

To **save** the current device setup to a .mac file, click File > Save and Save the file. This will save the complete register settings, user-specified input frequencies, and calculated frequencies from the GUI.

NOTE: The device setup file (.mac) does NOT store any EEPROM data. To save EEPROM data to a separate EEPROM file (.epr), see Export EEPROM File (Section 11.3).

To **restore** a device setup from a saved .mac file, click File > Restore and Open the file. This will load the register settings, input frequencies, and update the GUI controls and calculated frequencies. If device communication is established, the register settings will also be programmed to the device.

After restoring a device setup from a .mac file, it is possible to use the loaded register settings to populate the GUI Map. Restoring a device setup **will not** overwrite the GUI Memory Map data array until the register data is committed by the user (see Commit Registers to SRAM Page / GUI Map Section 11.2). Furthermore, restoring a device setup will not write/program the device SRAM or EEPROM until these scripts are executed explicitly by the user (see EEPROM Programming Flow Section 11.1).

6 Bits/Pins Tab

The **Bits/Pins** tab contains several register fields for device ID and configuration mode (read-only) and other general controls that may not be available on the other GUI tabs. Read-only registers can be updated by pressing <CTRL+R> (read all registers). Some register fields in Figure 4 are mapped to the EEPROM BASE partition in the GUI Memory Map. The GUI Map is described in Section 11.

NOTE: The checkbox controls in the Program Pins group should be ignored. By default on the EVM, the LMK03318 input pins (REFSEL, HW_SW_CTRL, PDN, GPIO0 pins) are controlled by hardware jumper settings. The software-control of these device pins through the USB2ANY GPIO interface are disconnected through resistor stuffing options (DNP) on the EVM, so the checkbox controls have no control of the device by default.

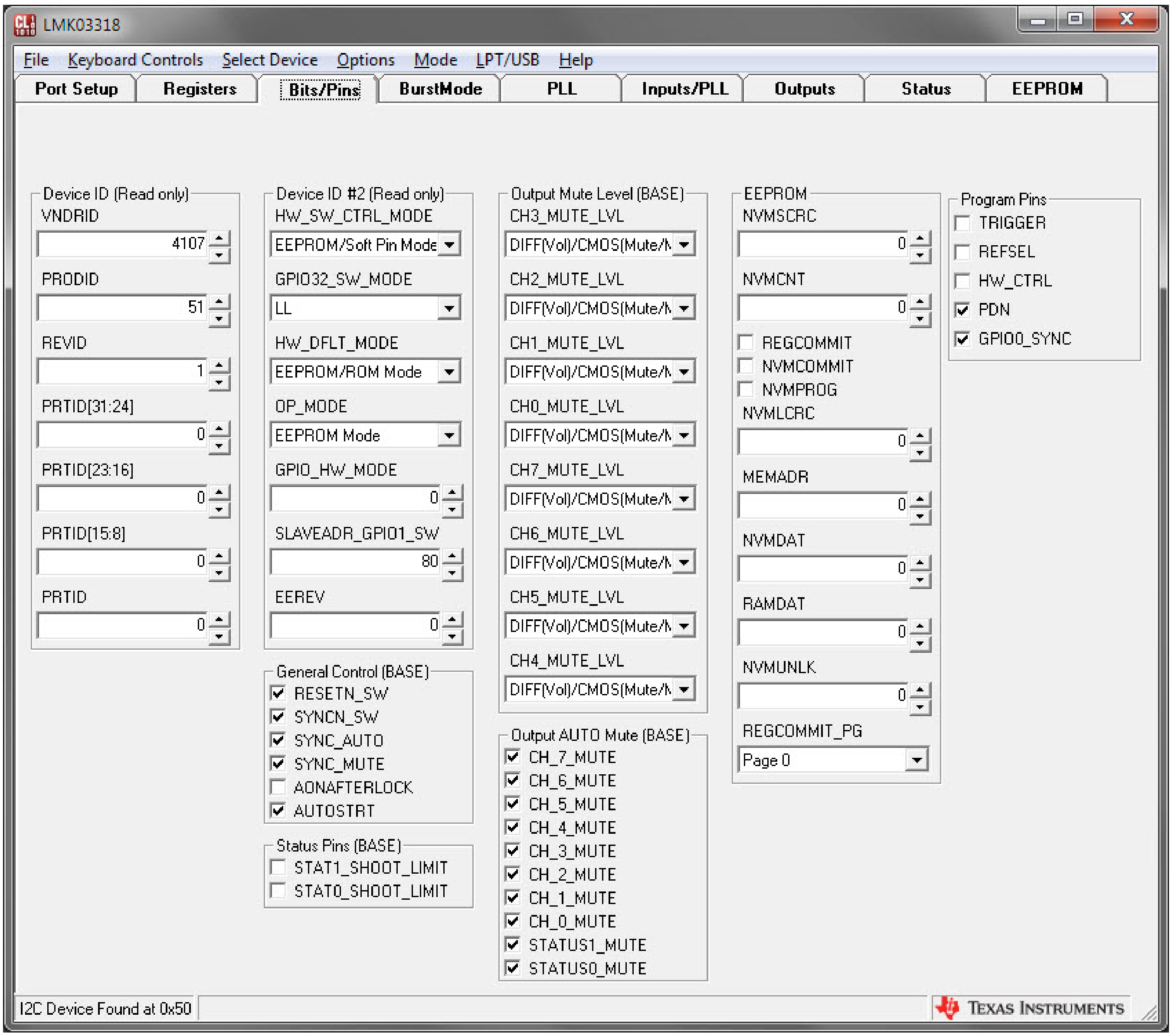

Figure 4. Bits/Pins Tab

7 Inputs/PLL Tab

The **Inputs/PLL** tab contains the PRIREF and SECREF frequency input fields, VCO/PLL frequency input fields , and the following register control groups:

1. PRIREF and SECREF Input Buffer Type, Input Termination, and Input AC Coupling Mode
2. Crystal Oscillator (XO) Frequency Margining
3. PRIREF and SECREF Frequency Doublers
4. PLL R Divider and Input Mux
5. PLL Powerdown, Sync Enable, Internal Loop Filter, and Fractional PLL Settings
6. Reference Input Detection
7. XO and PLL Timers

If the VCO frequency is changed in the **PLL tab**, the new frequency will be displayed accordingly in the **Inputs/PLL tab**.

In Figure 5, register fields in red text are mapped to the EEPROM BASE partition in the GUI Map, while other register fields are mapped to one of the six EEPROM PAGE partitions (pages 0 to 5).

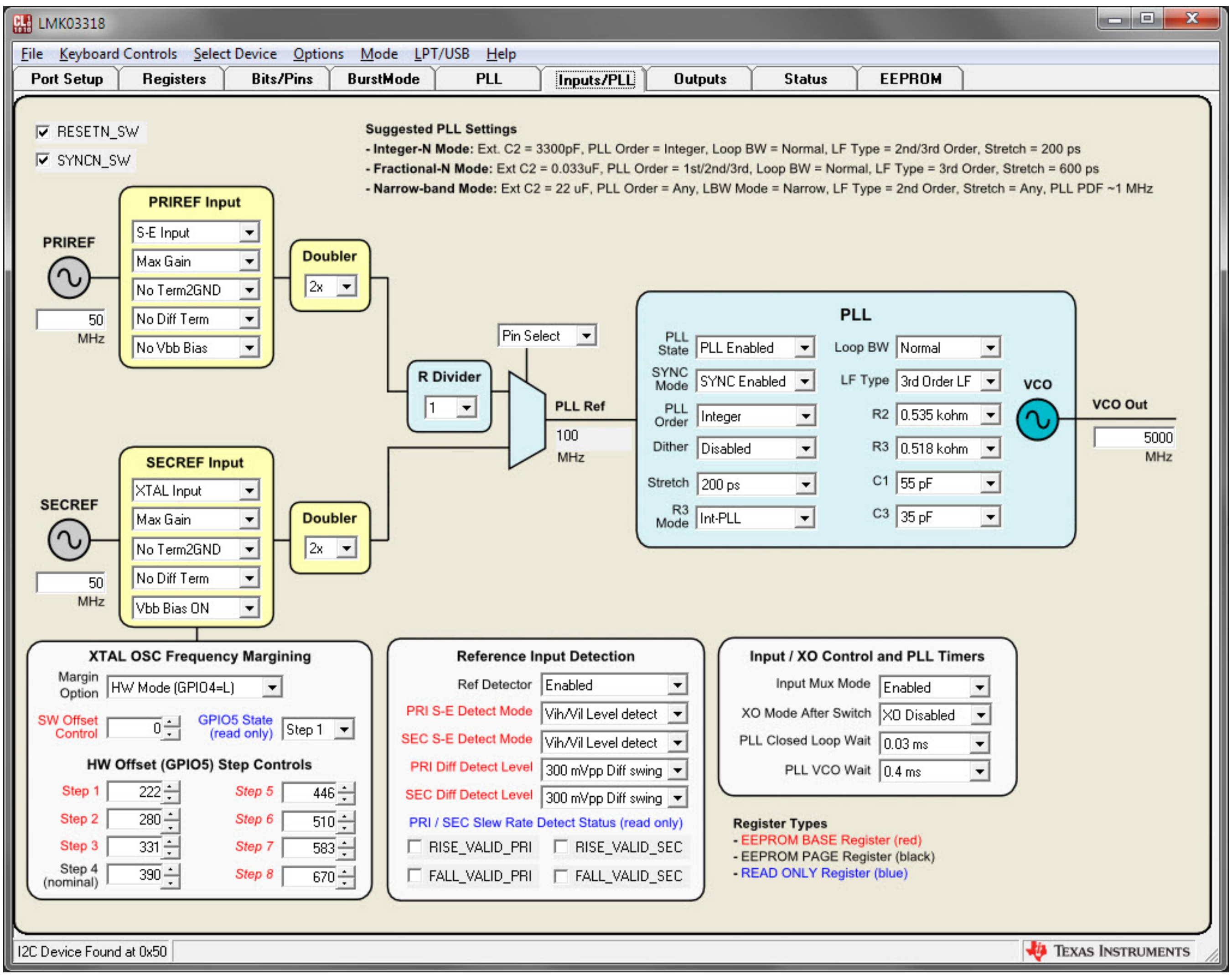

Figure 5. Inputs/PLL Tab

After changing the PRIREF / SECREF input frequencies, the GUI calculates the PLL, VCO, and Output clock frequencies.

NOTE: When the PLL Input Mux Selection is set to "Auto" or "Pin Select", the GUI calculates the frequencies based on PRIREF's input frequency.

8 PLL Tab

The **PLL** tab contains the PLL Reference frequency, M divider, N divider, and fractional divider numerator/denominator, charge pump gain, VCO frequency, VCO post-divider, and VCO post-divider output frequency controls.

The PLL register settings in Figure 6 are mapped to one of the six EEPROM PAGE partitions (pages 0 to 5) in the GUI Map.

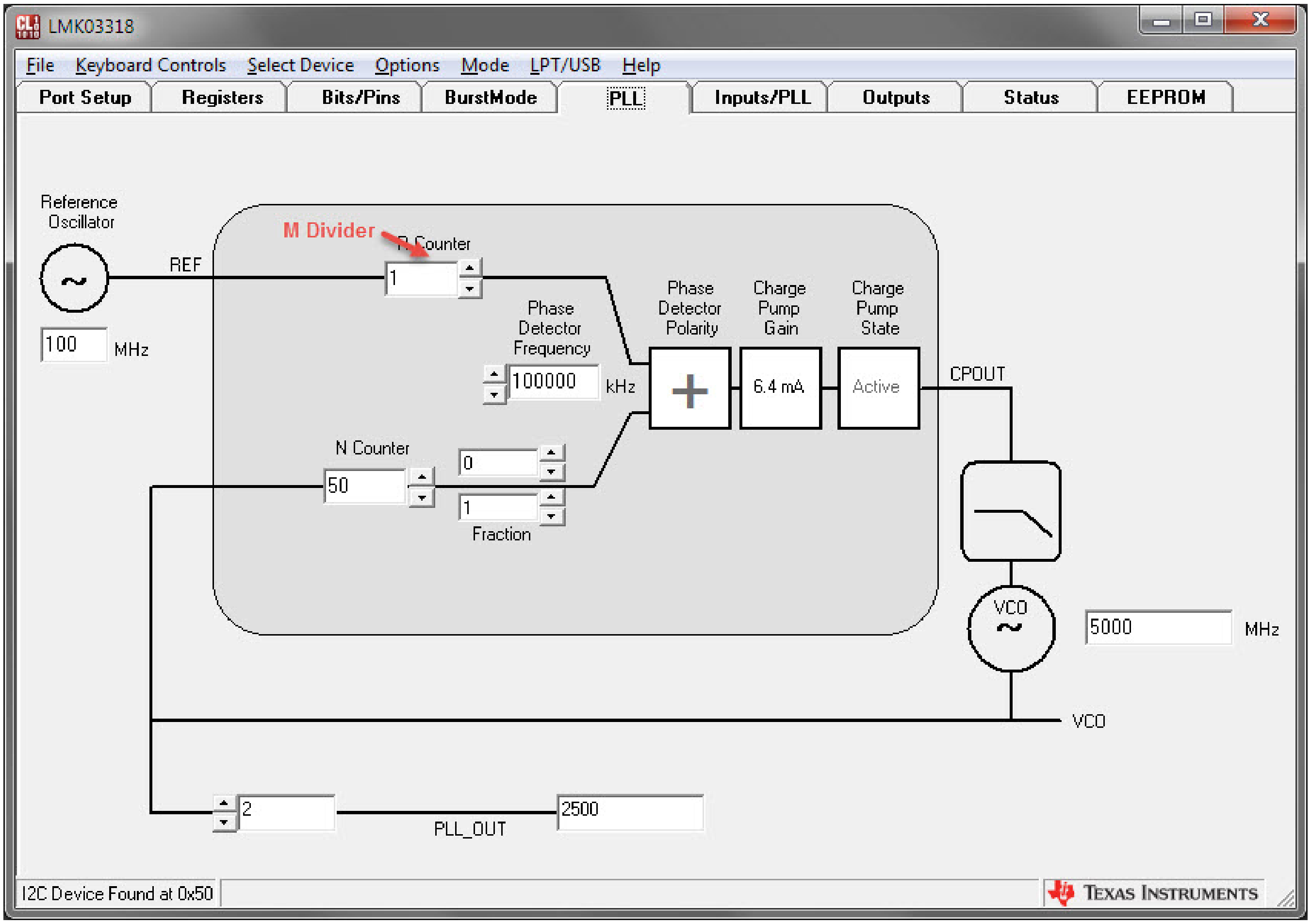

Figure 6. PLL Tab

NOTE: The PLL Reference frequency **cannot** be altered in this tab. This frequency text box is for display only and will be automatically set equal to the selected PLL Input Mux source frequency on the **Inputs/PLL** tab.

In closed-loop PLL operation, the VCO frequency can be an integer or fractional multiple of the PLL reference frequency by programming the PLL dividers with valid values while NOT violating any PLL/VCO frequency ranges. The PLL/VCO frequency relationships are given by the following equalities:

Fref / MDIV = Fpd = Fvco / (NDIV + NUM / DEN)

where:

- Fref = PLL reference input mux frequency (factoring Doubler and R Divider settings on **Inputs/PLL** tab)
- Fpd = PLL phase detector frequency (range: 1 to 150 MHz), maximize Fpd for normal loop bandwidth settings
- Fvco = VCO frequency (range: 4800 to 5400 MHz)
- MDIV = PLL reference input divider (5 bits, range: 1 to 32)
- NDIV = PLL feedback divider integer value (12 bits, range: 1 to 4095)
- NUM = PLL feedback divider fractional numerator value (22 bits, range: 0 to 4194303)
- DEN = PLL feedback divider fractional denominator value (22 bits, range: 1 to 4194303) (1)

To achieve 0-ppm frequency synthesis error, compute the feedback divider term (NDIV + NUM/DEN) as a precise decimal from the nominal PLL reference and VCO frequencies with as many significant decimal digits (avoid rounding errors). Convert the decimal as a rational number to express as a lowest term or larger equivalent fraction.

Example: Precise Computation of Fractional NUM / DEN Values

- If Fref = 19.44 MHz, Fvco = 5000 MHz, and MDIV=1, then the term (NDIV + NUM/DEN) = 257.20164609053497942386831275720165. Using an online calculator tool that supports quad-precision floating point decimal, the decimal term can be converted to a lowest term fraction, NUM/DEN = 49/243. A larger equivalent fraction could be 490000/2430000. Either fraction can give 0-ppm frequency synthesis error.
- Fast Decimal to Fraction Online Tool: http://www.mindspring.com/~alanh/fracs.html

The user may set the VCO frequency in one of two ways:

1. Program the N divider and fractional numerator/denominator values to compute the VCO frequency.
   (a) For integer mode, set the numerator to 0 and set PLL Order to “Integer Mode” in the **Inputs/PLL** tab.
   (b) If fractional feedback is desired (numerator ≠ 0), set PLL Order to “1st Order”, “2nd Order”, or “3rd Order” (i.e. not “Integer”) in the **Inputs/PLL** tab.
2. Enter the VCO frequency directly in the **PLL** tab, **Inputs/PLL** tab, or **Outputs** tab. When the VCO frequency is entered, the GUI will only change the N divider and fractional numerator values. The fractional denominator will NOT be changed.
   (a) If the targeted VCO frequency can be achieved with the current fractional denominator value, then the exact VCO frequency will be updated and match the entered frequency.
   (b) Otherwise, if a different fractional denominator value is required to achieve the targeted VCO frequency, the VCO frequency will be updated but will not match the entered frequency. In this case, the user should manually enter the fractional values to achieve the exact VCO frequency.

9 Outputs Tab

The Outputs tab displays the calculated frequencies for the VCO and VCO post-divider, PRIREF and SECREF, clock outputs, and contains the following register controls:

1. VCO Post-Divider
2. Output Channel Muxes and Channel Mux/Divider Powerdown
3. Output Dividers and Dynamic Delays
4. Output Driver Modes / Powerdown

The output register settings in Figure 7 are mapped to one of the six EEPROM PAGE partitions (pages 0 to 5).

The output frequencies will be calculated based on the selected output mux source frequency. When the PRIREF or SECREF input is selected by the output mux, the PLL and output divider blocks will be bypassed and the output frequency will be the same as the selected reference input.

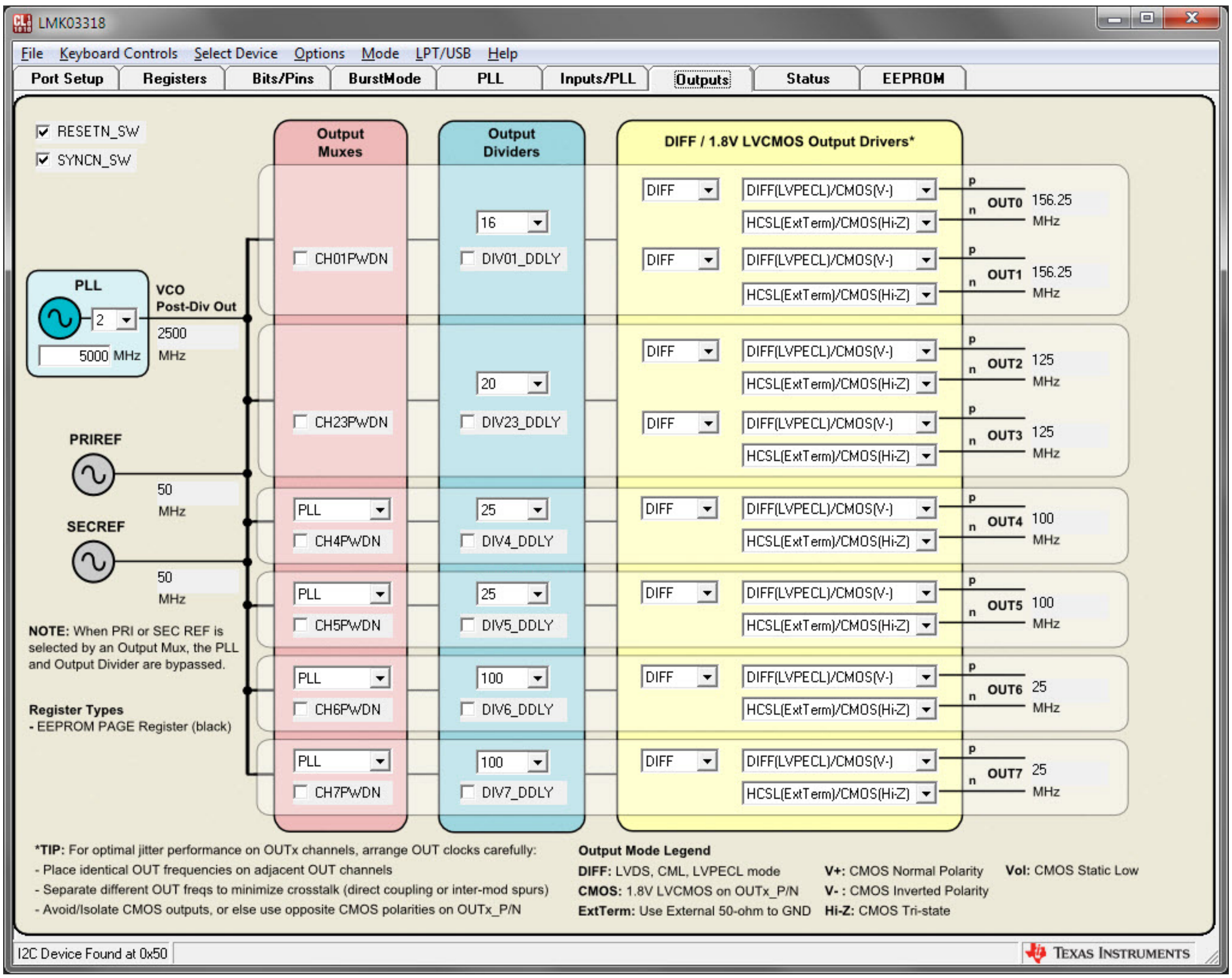

Figure 7. Outputs Tab

NOTE: When Channel Mux/Divider is powered-down (CHxPWDN=1), its associated output driver(s) need to be powered-down separately (OUT_x_SEL=0) to fully power-down the channel. However, when its associated output driver(s) is/are powered-down, the channel mux/divider will be automatically powered-down regardless of its CHxPWDN setting.

10 Status Tab

The **Status** tab contains displays the calculated frequencies for the VCO and Status outputs (when configured as a PLL CMOS clock output), Device Core & Output Supply Current measurement values, and the following register controls:

1. PLL CMOS Channel Divider and CMOS Channel Powerdown
2. Status Muxes for Clock / Status Selection
3. Output Driver Settings
4. Interrupt Configuration

In Figure 8, register settings in red text are mapped to the EEPROM BASE partition in the GUI Map, while other register fields are mapped to one of the six EEPROM PAGE partitions (pages 0 to 5).

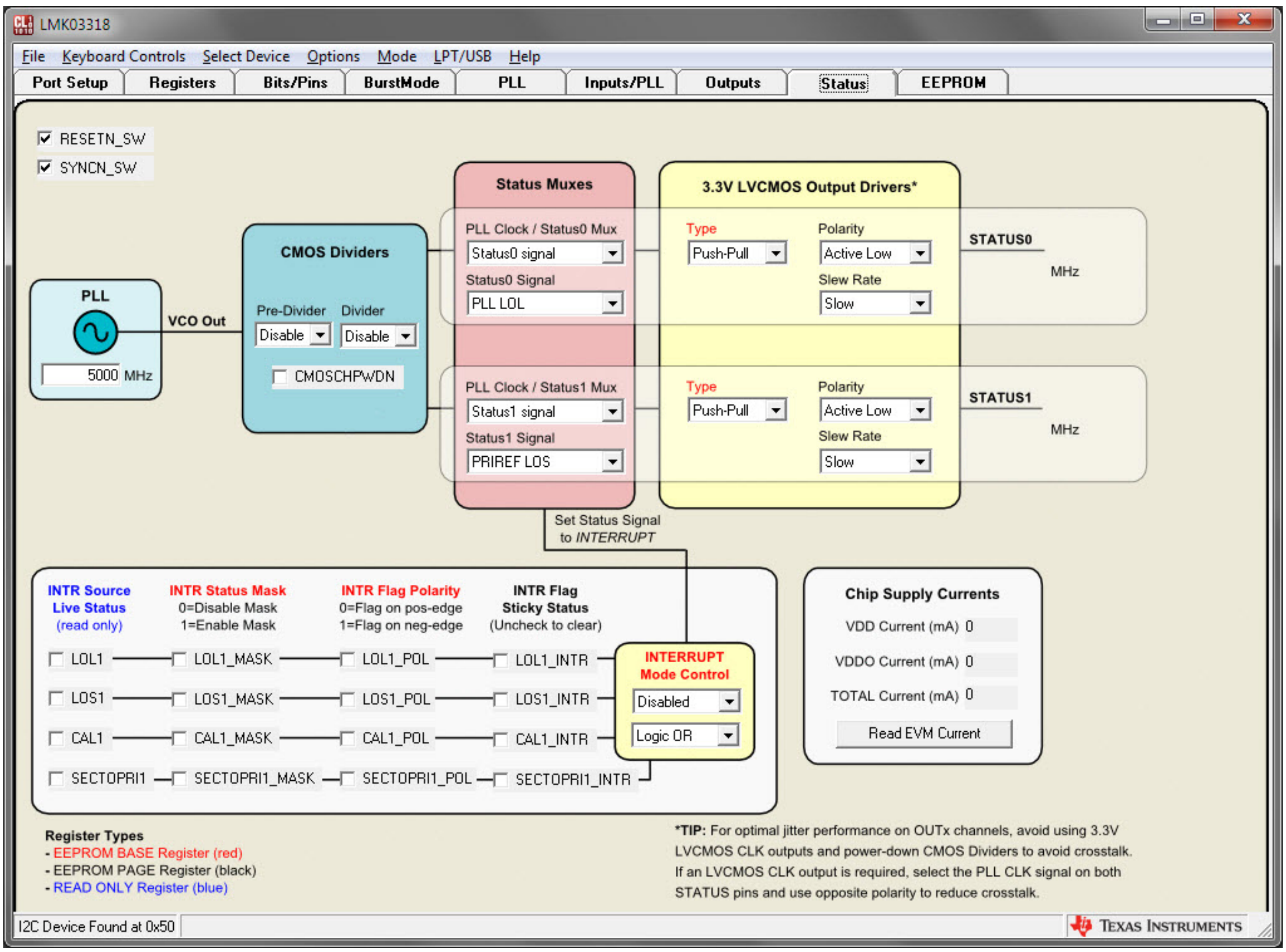

Figure 8. Status Tab

11 EEPROM Tab

The **EEPROM** tab contains the following group boxes:

1. EEPROM Status Registers
2. SRAM / EEPROM Programming and Read-back Scripts
   (a) Button-driven scripts to initiate transfer of register data between the GUI Memory Map and device SRAM / EEPROM memories.
3. EEPROM File Export / Import Scripts
   (a) Button-driven scripts to Export (save) GUI Memory Map data to an EEPROM file, and Import (load) data from an EEPROM file to the GUI Memory Map.
4. GUI Memory Map (GUI Map)
   (a) The GUI Map is a data array for mapping the GUI Register data into EEPROM map format which is necessary to program the device EEPROM.
   (b) The data array contents are displayed in the large textbox for convenience to the user.

The GUI Map array makes it possible to display and store the EEPROM map data before and after committing (writing) to the SRAM, which is a prerequisite step to program the device EEPROM. The GUI Map array can also display and store the data imported from a saved EEPROM file, as well as display and store the data read-back from the SRAM or EEPROM when a device EVM is connected.

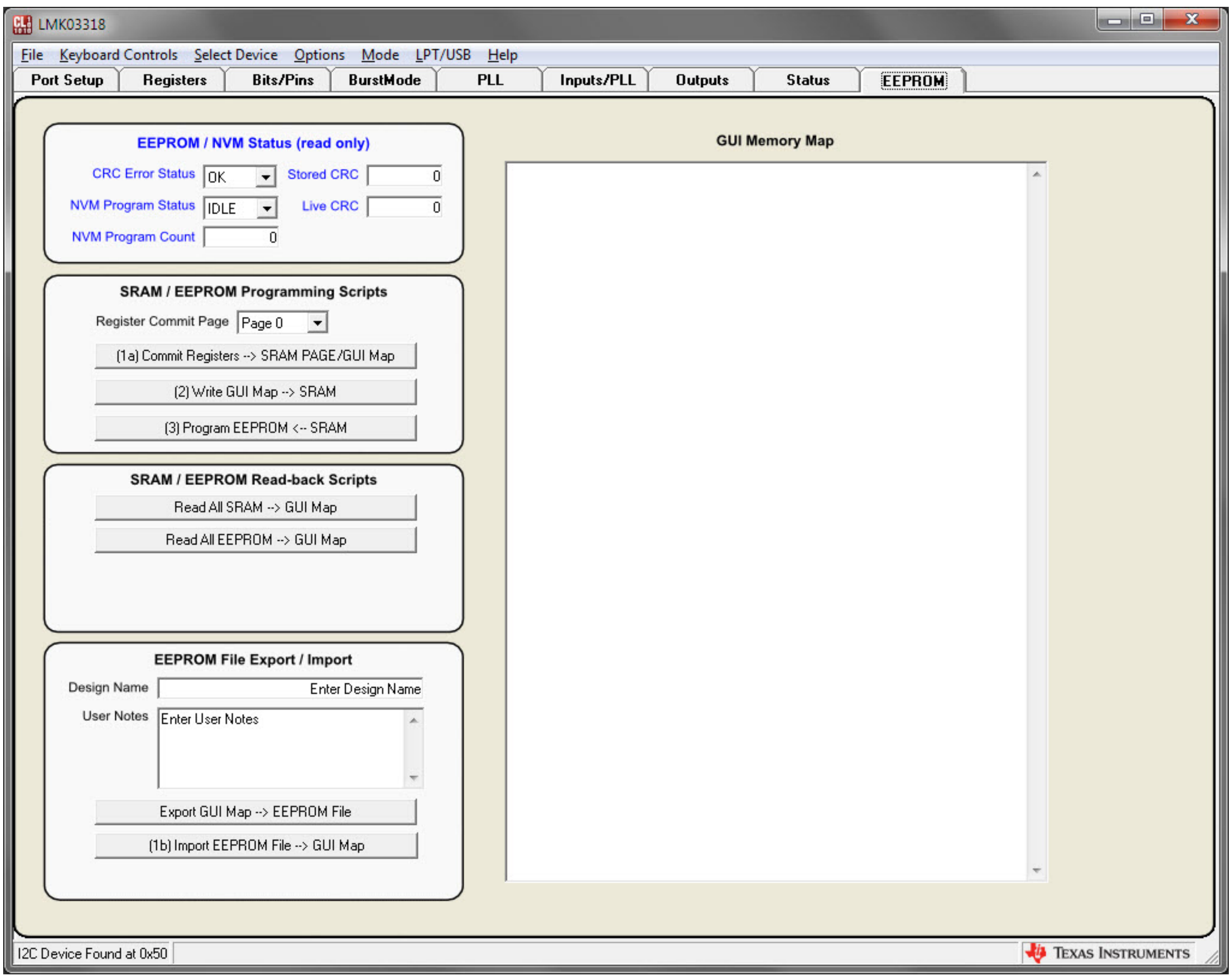

Figure 9. EEPROM Tab

The GUI Map has the same data format / partitioning as the device EEPROM map. The EEPROM map contains one BASE partition and six PAGE partitions. The PAGE partitions allow up to 6 start-up modes (6 page settings) to be stored in a single EEPROM image, while the BASE partition contains common settings shared between all 6 pages. Refer to the LMK03318 datasheet for the EEPROM map details.

As shown in Figure 9, the GUI Map textbox displays several lines of header information (preceded by #) with a timestamp and description of the button-script last used to update the GUI Map display. Below the header info are 4 column headers and numeric values that contain the GUI Map array indices and data values:

- Columns 1 & 2 (**HADR** & **LADR**) are the 2 higher & lower bytes forming the SRAM / EEPROM memory address index in hex (ADR range: 0000h to 0158h with HADR & LADR bytes concatenated).
- Column 3 (**DATA**) is the SRAM / EEPROM data value indexed by ADR (DATA range: 00h to FFh).
- Column 4 (**BYTE**) is the memory address byte index in decimal (BYTE range: 0 to 344).

The GUI Map data array and display can be updated from any of the following SRAM Programming button scripts or SRAM / EEPROM Read-back button scripts:

- (1a) **Commit Registers → SRAM PAGE/GUI Map**: Writes the current register settings to the selected PAGE partition (selected by Register Commit Page control) and BASE partition in the GUI Map, and commits to the device SRAM when the EVM is connected.
- (2) **Write GUI Map → SRAM**: Writes the current contents of the entire GUI Map to the device SRAM. This script does not modify the GUI Map data contents, but only updates the displayed header info to indicate the GUI Map data was committed to the SRAM. The device SRAM must be written prior to initiating the EEPROM program cycle (see Section 11.1).
- (1b) **Import EEPROM File → GUI Map**: Prompts user to open a saved EEPROM file, and loads it into the GUI Map array (see Section 11.4).
- **Read All SRAM → GUI Map**: Reads the entire device SRAM (via RAMDAT Register R142) and copies it to the GUI Map (overwriting the existing data), then refreshes the textbox display with updated header and read-back SRAM data.
- **Read All EEPROM → GUI Map**: Reads the entire device EEPROM (via NVMDAT Register R141) and copies it to the GUI Map (overwriting the existing data), then refreshes the textbox display with updated header and read-back EEPROM data.

NOTE: The actual GUI Map data array content is stored in and accessed through the LMK03318.ini file, located in the CodeLoader program folder. Within the GUI, only the button scripts above can be used to update the GUI Map data array values. The GUI Map textbox is for display only, so attempting to directly edit any value in the textbox display will not change the actual data in the GUI Map array.

11.1 EEPROM Programming Flow

The following procedure may be used to program the device EEPROM from the GUI.

1. Populate the GUI Map to commit settings to any / all of the 6 pages. The GUI Map can be populated by one of the following button scripts:
   (a) Commit Registers to SRAM Page / GUI Map (Section 11.2)
   (b) Import EEPROM File (Section 11.4)
2. Click the button (2) **Write GUI Map → SRAM** using this script.
   (a) Writes the entire GUI map data to the device SRAM.
   (b) Uses single-byte I2C write transactions to increment the memory address index bytes (MEMADR Registers R139 & R140) and write the corresponding SRAM data value (RAMDAT Register R142).
3. Click the button (3) **Program EEPROM ← SRAM** using this script.
   (a) Unlocks the EEPROM (writes EAh to NVMUNLK Register R146).
   (b) Executes the EEPROM Program cycle (writes 13h, then 10h to NVMCTL Register R137).
   (c) Locks the EEPROM (writes 00h to NVMUNLK Register R144) to prevent accidental programming.
4. After a successful programming cycle, the chip can be restarted by strapping the external control pins to select one of the new EEPROM page settings in Soft Pin Mode:
   (a) Set the **HW_SW_CTRL** pin = 0 (Soft Pin Mode) and **GPIO[3:2]** pins per Table 2.
   (b) Toggle the **PDN** pin (or power-cycle) to restart the chip in the selected Soft Pin Mode.

Table 2. EEPROM Page Select Control Pins for Soft Pin Mode

GPIO3 PIN STATE	GPIO2 PIN STATE	DEVICE MODE / PAGE SELECT
LO	LO	Soft Pin Mode, EEPROM Page 0
LO	MID	Soft Pin Mode, EEPROM Page 1
LO	HI	Soft Pin Mode, EEPROM Page 2
HI	LO	Soft Pin Mode, EEPROM Page 3
HI	MID	Soft Pin Mode, EEPROM Page 4
HI	HI	Soft Pin Mode, EEPROM Page 5

11.2 Commit Registers to SRAM Page / GUI Map

The procedure below allows the user to commit the current GUI register settings (one page at a time) to the selected PAGE and BASE partitions in the GUI Map. The process can be repeated to commit up to 6 pages (separately) with different register settings to populate the GUI Map. While it is possible to populate the GUI Map without an EVM connected, it is recommended to confirm the device operates as intended on the EVM before committing the register settings to the GUI Map.

1. Configure the GUI register settings in the **Bits/Pins**, **Inputs/PLL**, **PLL**, **Outputs**, and **Status** tabs.
   (a) It is also possible to restore register settings from a saved .mac file (File > Restore > Open file). See Saving and Restoring a Device Setup File (Section 5).
2. Select the **Register Commit Page** target (REGCOMMIT_PAGE Register R145) for writing the current settings.
3. Click the button (1b) **Commit Registers → SRAM PAGE/GUI Map** using this script.
   (a) Copies the current register data to the selected PAGE and BASE partitions in the GUI Map, without overwriting the existing GUI Map data on the other non-selected pages.
   (b) If a device is connected: Commits the current device register data to the selected PAGE and BASE partitions in SRAM by toggling the REGCOMMIT bit (in NVMCTRL Register R137), so the device SRAM page settings should mirror the register settings copied to the GUI Map.
   (c) Refreshes the GUI Map display data & header with new timestamp and committed data.
4. Steps 1-3 may be repeated to commit additional register settings to other pages in the GUI Map.
5. Once the GUI Map is populated (either partially or fully), the user can either:
   (a) Program the device EEPROM (continue to Step 2 in the EEPROM Programming Flow Section 11.1).
   (b) Export the GUI Map data to an EEPROM file for future use (see Export EEPROM File Section 11.3).

11.3 Export EEPROM File

To save the current GUI Map data array to a specially-formatted EEPROM text file (.epr file), click the button **Export GUI Map → EEPROM File** and enter the filename/path to save the .epr file. Before exporting, the user may choose to enter comments to the Design Name and User Notes text fields. These comment fields are included in the EEPROM file and may be helpful for file identification.

An exported EEPROM file can be imported (loaded) for future use in the GUI as described in Import EEPROM File Section 11.4. It can also be sent to Texas Instruments as part of the process to request custom programmed devices.

Figure 10 shows the EEPROM file format with example data. The one-dimensional array contains 345 8-bit data values. The data elements are specified in each row by EEPROM_IMG_IDX[i]=[x], where [i] is the memory address index (range: 0 to 344, decimal) and [x] is the corresponding data value (range: 0 to 255, decimal). Some index ranges with (...) have been omitted in Figure 10 for brevity. The comments in magenta are annotations added to highlight specific EEPROM bytes and address ranges for BASE/PAGE partitions. The comments do not actually appear in the EEPROM text file.

```
[EEPROM_IMAGE]
COUNT=345
DATE_TIME=MM/DD/YYYY, hh:mm:ss
DESIGN_NAME=Enter Design Name
USER_NOTES=Enter User Notes
EEPROM_IMG_IDX00=0          ' Byte 0: START of BASE partition
EEPROM_IMG_IDX01=0          ' Bytes 0-10 are Protected bytes (Read-only)
EEPROM_IMG_IDX02=0
EEPROM_IMG_IDX03=0
EEPROM_IMG_IDX04=0
EEPROM_IMG_IDX05=0
EEPROM_IMG_IDX06=2
EEPROM_IMG_IDX07=31
EEPROM_IMG_IDX08=240
EEPROM_IMG_IDX09=33
EEPROM_IMG_IDX10=255
EEPROM_IMG_IDX11=168        ' Byte 11: I2C Slave Addr MSB bits[7:3] (user field)
EEPROM_IMG_IDX12=0          ' Byte 12: EEPROM rev (user field)
...
EEPROM_IMG_IDX38=0          ' Byte 38: END of BASE partition
EEPROM_IMG_IDX39=0          ' Byte 39: START of PAGE 0 partition
...                         ' Byte 40-88: Not shown for brevity
EEPROM_IMG_IDX89=56         ' Byte 89: END of PAGE 0 partition
EEPROM_IMG_IDX90=176        ' Byte 90: START of PAGE 1 partition
...
EEPROM_IMG_IDX140=56        ' Byte 140: END of PAGE 1 partition
EEPROM_IMG_IDX141=168       ' Byte 141: START of PAGE 2 partition
...
EEPROM_IMG_IDX191=56        ' Byte 191: END of PAGE 2 partition
EEPROM_IMG_IDX192=48        ' Byte 192: START of PAGE 3 partition
...
EEPROM_IMG_IDX242=56        ' Byte 242: END of PAGE 3 partition
EEPROM_IMG_IDX243=48        ' Byte 243: START of PAGE 4 partition
...
EEPROM_IMG_IDX287=129       ' Byte 287: END of PAGE 4 partition
EEPROM_IMG_IDX288=32        ' Byte 288: START of PAGE 5 partition
...
EEPROM_IMG_IDX344=12        ' Byte 344: END of PAGE 5 partition
```

Figure 10. EEPROM File Format

11.4 Import EEPROM File

To load a previously saved EEPROM file, click the button (1b) **Import EEPROM File → GUI Map** and select/open the .epr file. The imported data will overwrite the entire contents of the GUI Map array and update the GUI Map display.

If a device EVM is connected, the imported data can be used to program the device EEPROM (continue to Step 2 of the EEPROM Programming Flow Section 11.1).

12 Registers Tab

The **Registers** tab contains the Register map, which is a low-level representation of the register settings controlled by the high-level GUI controls on the other tabs. In the register map matrix, Bits 15 to 8 form the 8-bit register address (cannot be modified), and Bits 7 to 0 form the 8-bit data value for the corresponding register address. When a register data bit is modified directly, it will cause the corresponding register controls/displays in the other tabs to be updated accordingly.

The register address byte & data byte (hex values) are concatenated and displayed on the right side. It is possible to save the current register address/data to a register programming file by pressing "Export register values in hex to text file".

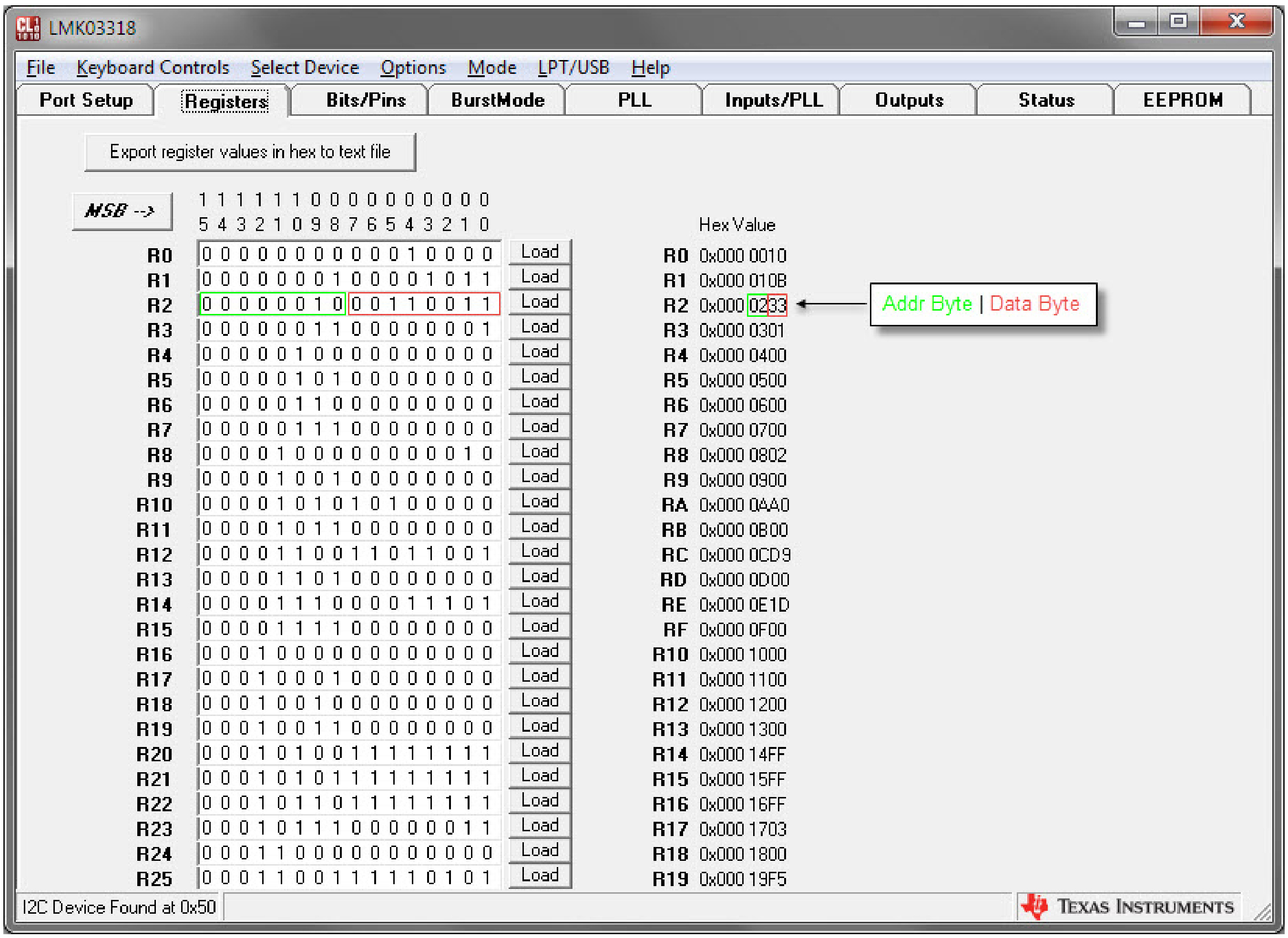

Figure 11. Registers Tab

13 Using TI's USB2ANY Module for In-System Programming of LMK03318

When designing in the LMK03318 into a system application board, it is a recommended to provision a **dedicated** header to access the I2C lines of the device to support external programming from Texas Instruments' USB2ANY module (see Figure 12). The USB2ANY module can be very useful to support in-system programming of the initial clock configuration (e.g. before the system software/firmware is enabled) and rapid clock prototyping, optimization, and debugging.

Figure 12. USB2ANY Module

Because the USB2ANY module implements the same MSP430-based USB-to-I2C interface/firmware as the one integrated on the LMK03318EVM , the same EVM GUI platform can be used to easily program the device in-system.

Once the customer's system software/firmware is enabled and can provide reliable configuration of the LMK03318, then the provisional I2C header may be removed or superseded in the next iteration of the hardware design.

13.1 USB2ANY Board Connections

The USB2ANY has four interface connectors: one USB 2.0 connector (J2) and three I/O connectors (J3, J4, and J5). The USB connector is a standard 'A' type mini USB receptacle. The I/O connectors are standard dual-row, 0.1" center, pin headers.

I/O connectors J3 and J5 are 8-pin type and J4 is a 10-pin type. They are configured such that they will accept either individual cable connections or a single 30-pin connection.

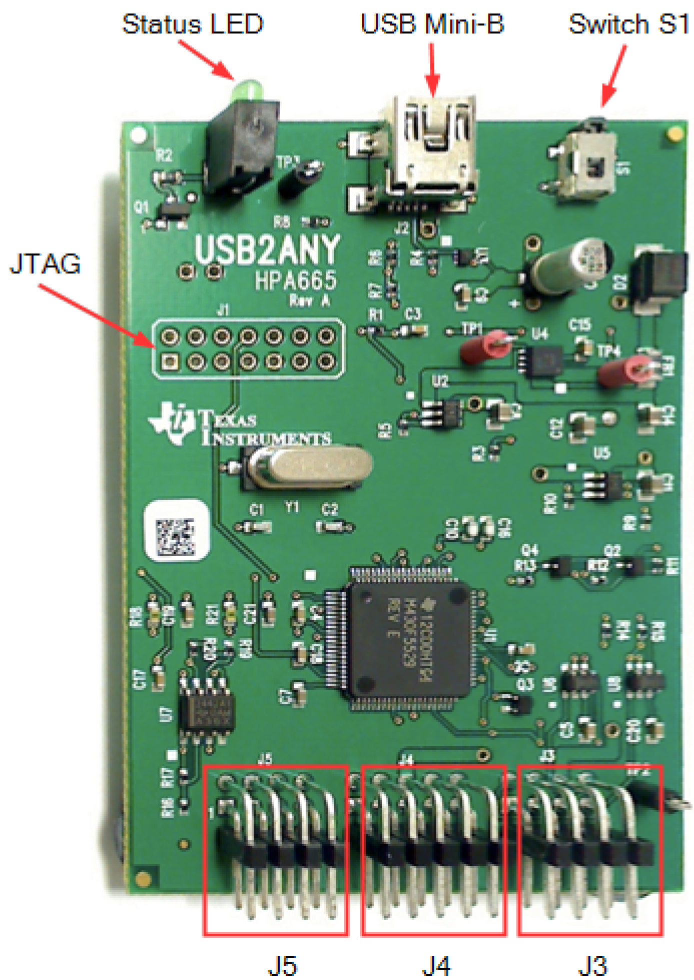

Figure 13. USB2ANY Board Connections

The standard USB2ANY Kit (HPA665-001) includes both a 10-pin cable and a 30-pin cable. The 10-pin cable is intended to be connected to J4. J4 provides the SDA, SCL, and GND connections of interest.

NOTE: J5 and J6 supply other connections that are NOT required and therefore, outside the scope of this document.

When the USB2ANY board is in the enclosure, there is a key notch above J4 that will prevent the cable connector from being plugged in upside-down. With the notch at the top, pin 1 of the 10-pin cable connector is located at the upper-right corner.

The 10-pin cable is about 6 inches in length and has a keyed female 10-pin IDC connector on each end. The cable should be connected to the USB2ANY board as shown in Figure 14 (note that the key must be facing up, away from the board). The opposite end of the cable should be connected to the target board. The red stripe on the cable indicates pin 1 as shown in Figure 15.

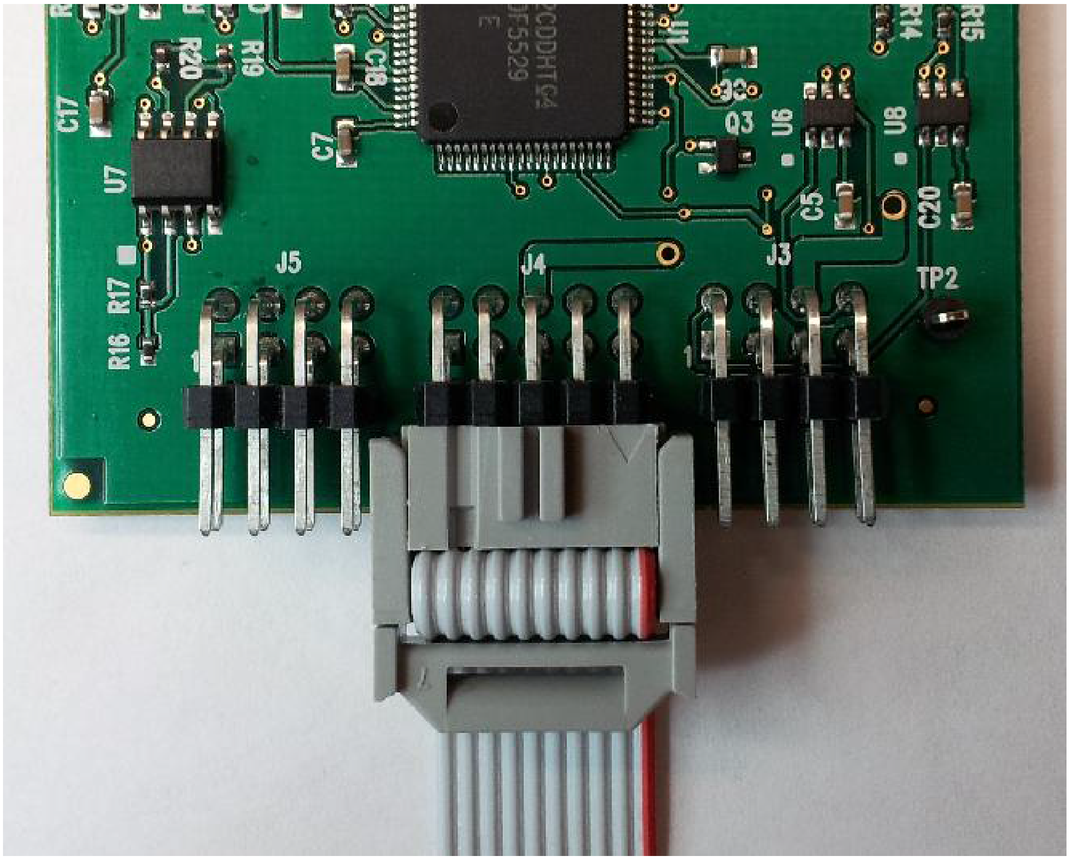

Figure 14. 10-pin Cable Connection to J4

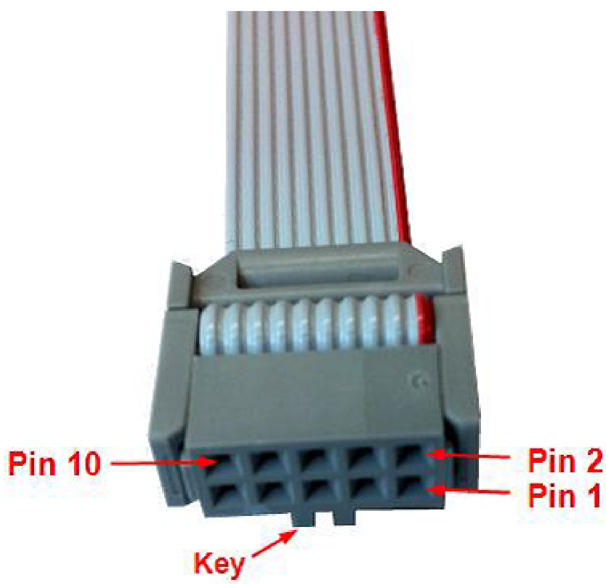

Figure 15. 10-pin Cable Pinout

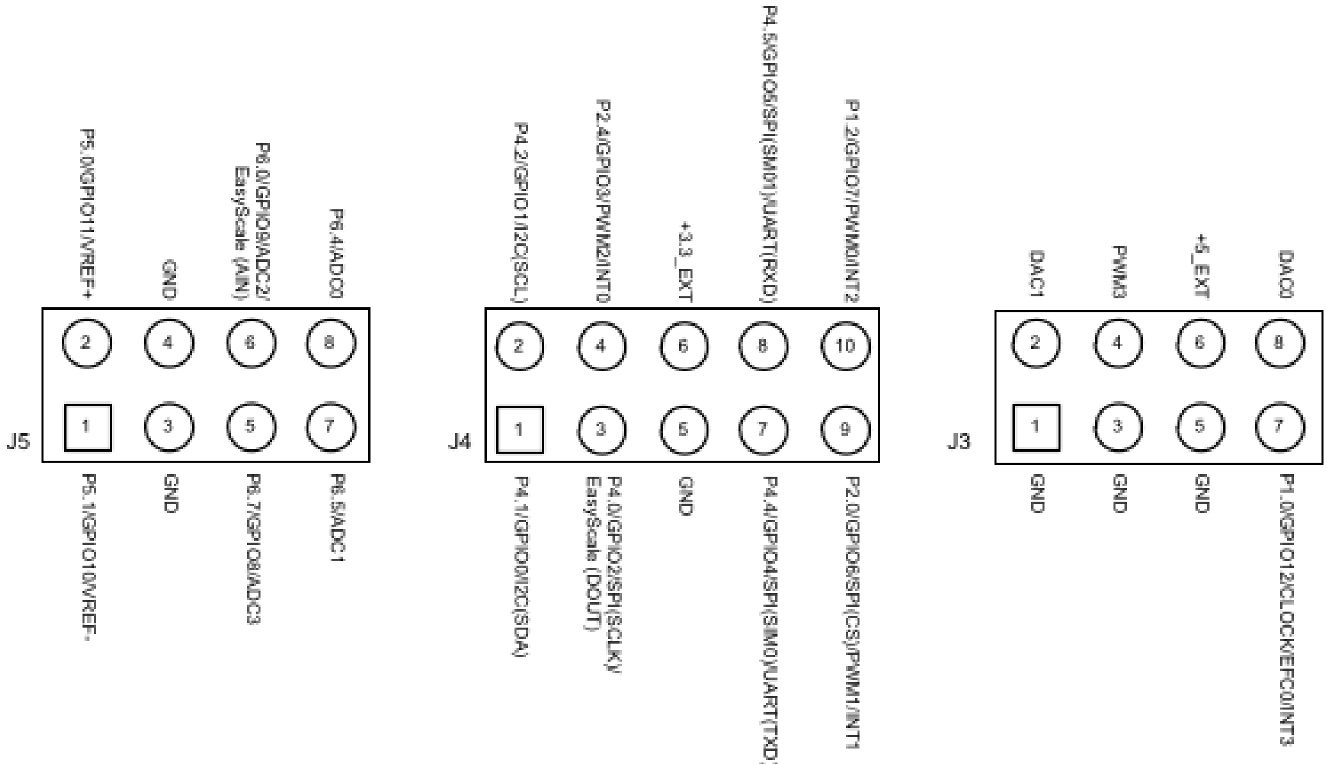

Figure 16. USB2ANY Board Connector Pinout Diagram

Table 3. USB2ANY Board Connector J4 and 10-pin Cable Pinouts

Pin Name	J4 Pin #	Cable Pin #	Description
P4.1/GPIO0/I2C(SDA)	1	10	I2C Data
P4.2/GPIO1/I2C(SCL)	2	9	I2C Clock
P4.0/GPIO2/SPI(SCLK)	3	8	General-purpose digital I/O (not required)
P2.4/GPIO3	4	7	General-purpose digital I/O (not required)
GND	5	6	Common Ground
+3.3_EXT	6	5	+3.3V output power supply (100 mA limit)
P4.4/GPIO4/SPI(SIM0)	7	4	General-purpose digital I/O (not required)
P4.5/GPIO5/SPI(SM01)	8	3	General-purpose digital I/O (not required)
P2.0/GPIO6/SPI(CS)	9	2	General-purpose digital I/O (not required)
P1.2/GPIO7	10	1	General-purpose digital I/O (not required)

Instead of using the 10-pin header and supplied cable, a board designer may alternatively choose to use a 3-pin "I2C header" on the application board and 3 jumper wires to connect the SDA, SCL, and GND signals from J4 of USB2ANY to the I2C header.

13.2 Ordering a USB2ANY Module

To order a USB2ANY module, submit a request to clock_support@list.ti.com with the following information:

1. Request/Reason: 1 pc. USB2ANY module for LMK03318 in-system programming/prototyping
2. Company Name:
3. Application/End-Equipment:
4. LMK03318 Est. Annual Volume/Year:
5. Ship-To Address:

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3 *Regulatory Notices:*

   3.1 *United States*

   3.1.1 *Notice applicable to EVMs not FCC-Approved:*

   This kit is designed to allow product developers to evaluate electronic components, circuitry, or software associated with the kit to determine whether to incorporate such items in a finished product and software developers to write software applications for use with the end product. This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required FCC equipment authorizations are first obtained. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of this chapter, the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under part 5 of this chapter.

   3.1.2 *For EVMs annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant:*

   CAUTION

   This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

   Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

   FCC Interference Statement for Class A EVM devices

   NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Interference Statement for Class B EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- *Reorient or relocate the receiving antenna.*
- *Increase the separation between the equipment and receiver.*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
- *Consult the dealer or an experienced radio/TV technician for help.*

3.2 *Canada*

3.2.1 *For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210*

Concerning EVMs Including Radio Transmitters:

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Concernant les EVMs avec appareils radio:

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Concerning EVMs Including Detachable Antennas:

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication. This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante. Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur

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2. Use EVMs only after User obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
3. Use of EVMs only after User obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless User gives the same notice above to the transferee. Please note that if User does not follow the instructions above, User will be subject to penalties of Radio Law of Japan.

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