

## UDP SiM3C1xx MCU CARD USER'S GUIDE

### 1. Introduction

The Unified Development Platform (UDP) provides a development and demonstration platform for Silicon Laboratories microcontrollers, short-range wireless devices, and software tools, including the Silicon Laboratories Integrated Development Environment (IDE).

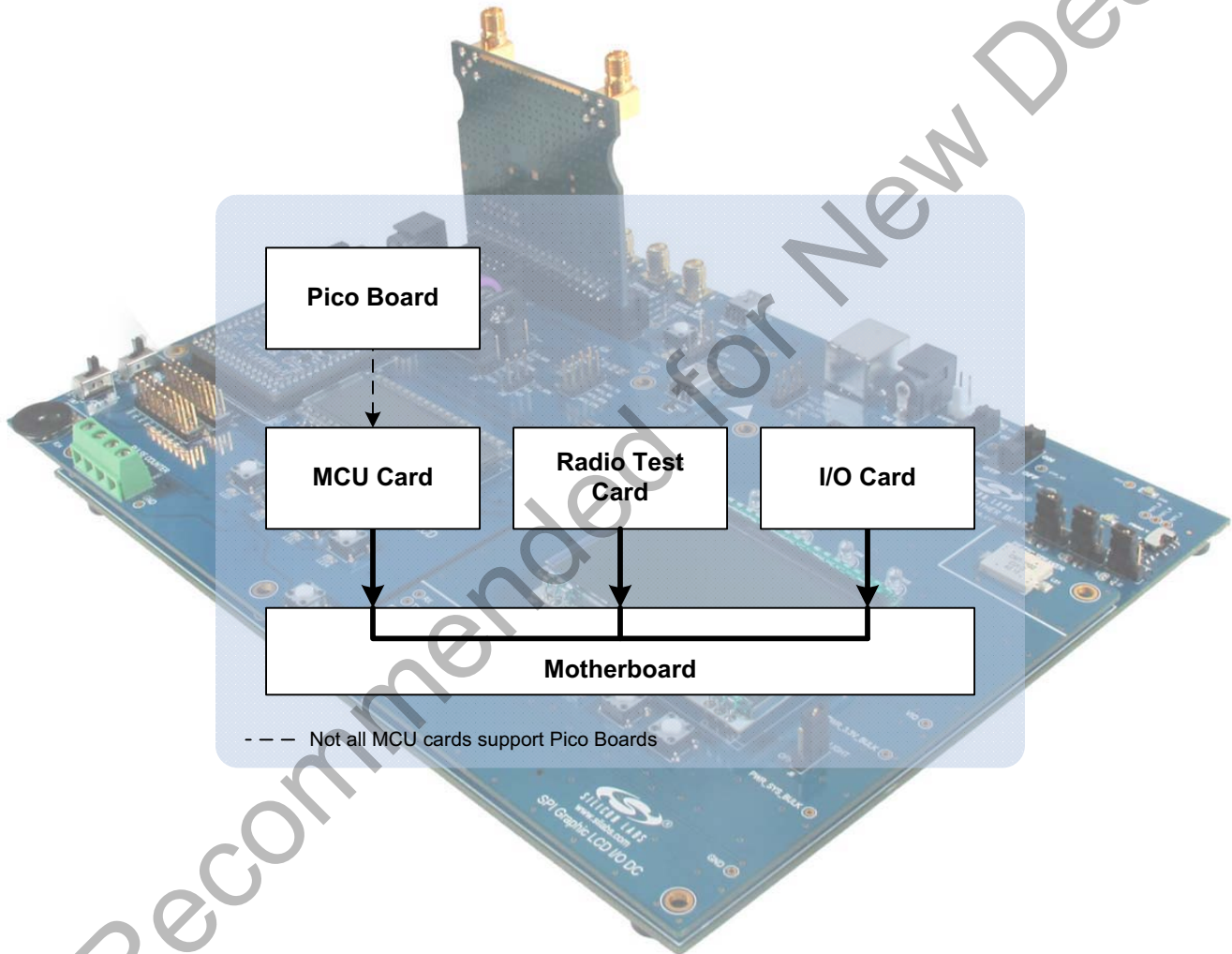


Figure 1. Unified Development Platform Block Diagram

# UDP SiM3C1xx

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## 2. Relevant Documents

This document provides a hardware overview for the Unified Development Platform (UDP) system SiM3C1xx MCU card. Additional information on the UDP system can be found in the documents listed in this section.

### 2.1. Motherboard User's Guide

The UDP Motherboard User's Guide contains information on the motherboard features and can be found at [www.silabs.com/udp](http://www.silabs.com/udp).

### 2.2. Card User's Guides

The UDP MCU, I/O, and radio test card user's guides can be found at [www.silabs.com/udp](http://www.silabs.com/udp).

Not Recommended for New Designs

## 3. Hardware Setup

### 3.1. Using the MCU Card Alone

Refer to Figure 2 for a diagram of the hardware configuration when using the MCU card without a UDP motherboard.

1. Connect the USB Debug Adapter to the 10-pin debug connector (J31) on the MCU card with the 10-pin ribbon cable.
2. Connect one end of the USB cable to the USB connector on the USB Debug Adapter.
3. Connect the other end of the USB cable to a USB Port on the PC.
4. Move the SW5 System Power Select switch to the upper WALL position.
5. Verify that the 5V WALL (J14), VDD (J15), and VIO (J17) Imeasure jumpers are all populated.
6. Verify that the VIOHD Selection jumper (J18) is in the upper position between VIO and VIOHD.
7. Connect the ac/dc power adapter to the wall outlet and to the power jack on the board labeled Power (P1).

#### Notes:

- Use the Reset button in the IDE to reset the target when connected using a USB Debug Adapter.
- Remove power from the MCU card and the USB Debug Adapter before connecting or disconnecting the ribbon cable from the MCU card. Connecting or disconnecting the cable when the devices have power can damage the device and/or the USB Debug Adapter.

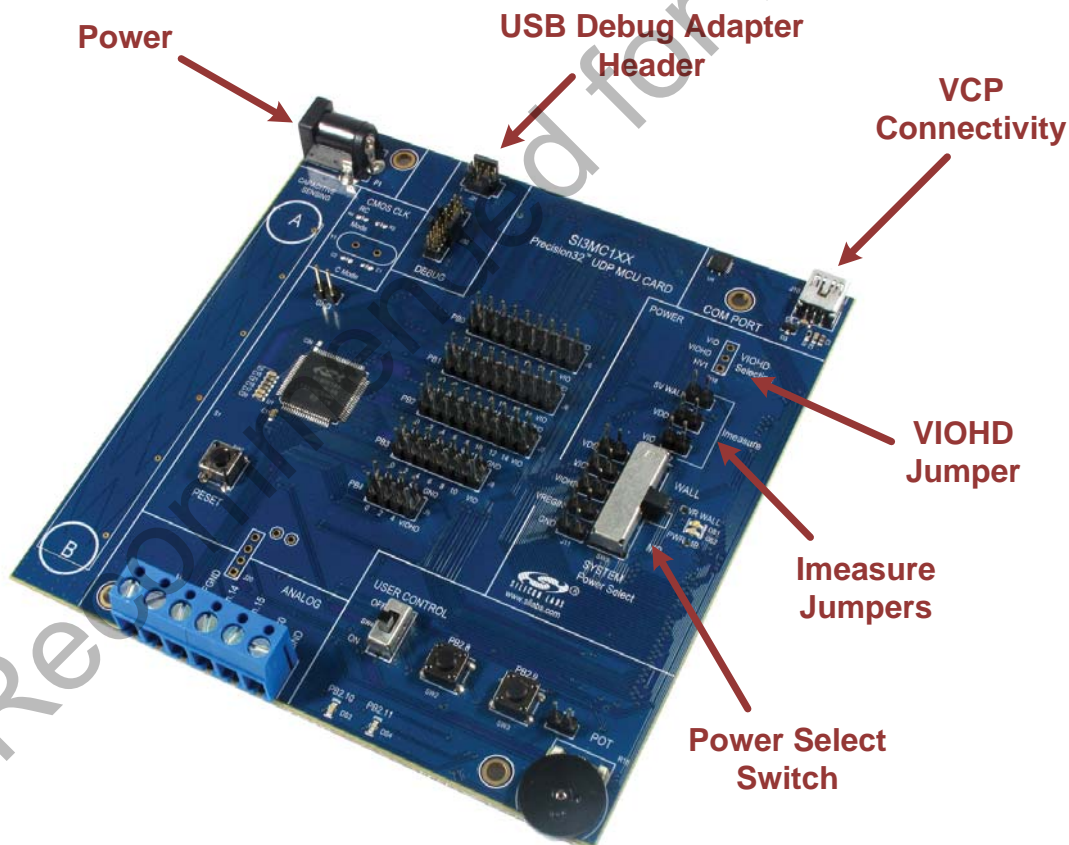


Figure 2. Hardware Setup using the MCU Card Alone

# UDP SiM3C1xx

## 3.2. Using the MCU Card with the UDP Motherboard

Refer to Figure 3 for a diagram of the hardware configuration when using the MCU card with a UDP motherboard.

1. Connect the MCU card to the UDP motherboard slot.
2. (Optional) Connect an I/O card to the UDP motherboard slot.
3. (Optional) Connect a radio test card to the radio test card slot in the UDP motherboard.
4. (Optional) Connect an EZLink card to the EZLink card slot in the UDP motherboard.
5. Connect the USB Debug Adapter to the 10-pin debug connector (J31) on the MCU card with the 10-pin ribbon cable.
6. Connect one end of the USB cable to the USB connector on the USB Debug Adapter.
7. Connect the other end of the USB cable to a USB Port on the PC.
8. Move the SW5 System Power Select switch to the lower MB position.
9. Verify that the 5V WALL (J14), VDD (J15), and VIO (J17) Imeasure jumpers are all populated.
10. Verify that the VIOHD Selection jumper (J18) is in the upper position between VIO and VIOHD.
11. Connect the ac/dc power adapter to power jack J20 on the UDP motherboard. The board can also be powered from the J16 USB, J1 mini USB connectors, or J11 battery connector socket.
12. Move the S3 power switch on the UDP motherboard to the ON position.
13. Update the motherboard firmware as described in Section 3.4.

### Notes:

- Use the Reset button in the IDE to reset the target when connected using a USB Debug Adapter.
- Remove power from the target board and the USB Debug Adapter before connecting or disconnecting the ribbon cable from the target board. Connecting or disconnecting the cable when the devices have power can damage the device and/or the USB Debug Adapter.
- The MCU card can be used alone without the motherboard. However, the motherboard must be powered if an MCU card is connected.

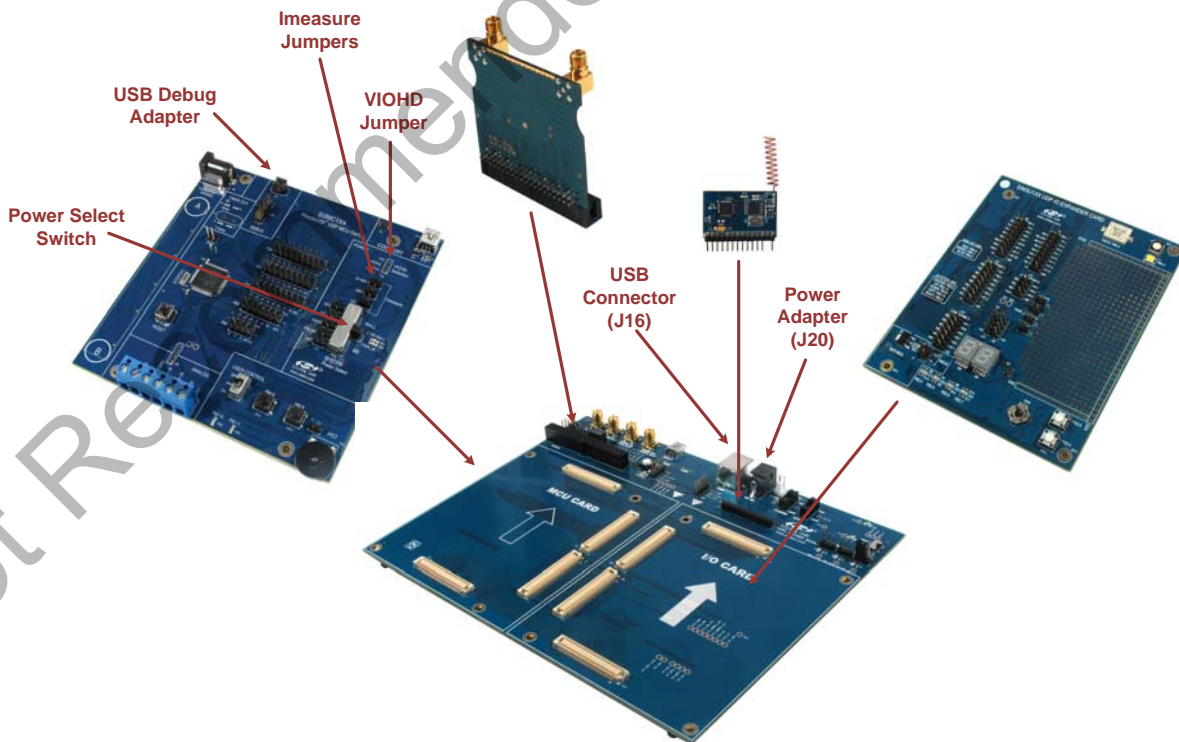


Figure 3. Hardware Setup using the Unified Development Platform

## 3.3. CP210x USB to UART VCP Driver Installation

The MCU Card includes a Silicon Labs CP210x USB-to-Dual-UART Bridge Controller. Device drivers for the CP210x need to be installed before the PC software can communicate with the MCU through the UART interface. If the "Install CP210x Drivers" option is selected during installation, a driver "unpacker" utility will launch.

1. Follow the steps to copy the driver files to the desired location. The default directory is `C:\SiLabsMCU\CP210x`.
2. The final window will give an option to install the driver on the target system. Select the "Launch the CP210x VCP Driver Installer" option if you are ready to install the driver.
3. If selected, the driver installer will now launch, providing an option to specify the driver installation location. After pressing the "Install" button, the installer will search your system for copies of previously installed CP210x Virtual COM Port drivers. It will let you know when your system is up to date. The driver files included in this installation have been certified by Microsoft.
4. If the "Launch the CP210x VCP Driver Installer" option was not selected in step 3, the installer can be found in the location specified in step 2, by default `C:\SiLabsMCU\CP210x\Windows_2K_XP_S2K3_Vista`. At this location, run `CP210xVCPInstaller.exe`.
5. To complete the installation process, connect the included USB cable between the host computer and the COM PORT USB connector (J10) on the MCU Card. Windows will automatically finish the driver installation. Information windows will pop up from the taskbar to show the installation progress.
6. If needed, the driver files can be uninstalled by selecting "Silicon Labs CP210x USB to UART Bridge Driver Removal" option in the "Add or Remove Programs" window.

## 3.4. Updating the UDP Motherboard Firmware

To ensure the UDP Motherboard supports the SiM3C1xx MCU card, run the UDP Motherboard Firmware Update Utility shown in Figure 4. This utility can be downloaded from [www.silabs.com/udp](http://www.silabs.com/udp).

1. Connect the UDP motherboard to a PC using a regular USB cable connected to the UDS connector (J16).
2. Run the utility.
3. Select the desired motherboard if more than one is connected to the PC.
4. Press the **Update Selected Device** button.

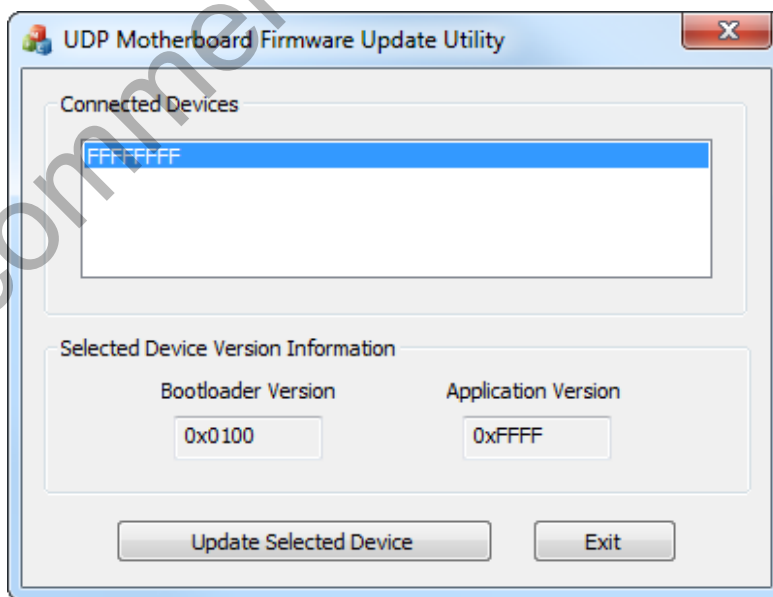


Figure 4. UDP Motherboard Firmware Update Utility

# UDP SiM3C1xx

## 4. UDP SiM3C1xx MCU Card Overview

The SiM3C1xx MCU card enables application development on the SiM3C1xx MCU. The card connects to the MCU Card expansion slot on the UDP motherboard and provides complete access to the MCU resources. Each expansion board has a unique ID that can be read out of an EEPROM or MCU on the board, which enables software tools to recognize the connected hardware and automatically select the appropriate firmware image. The target MCU card can also be detached from the UDP and used alone as a development or demonstration tool.

Figure 5 shows the SiM3C1xx MCU card.

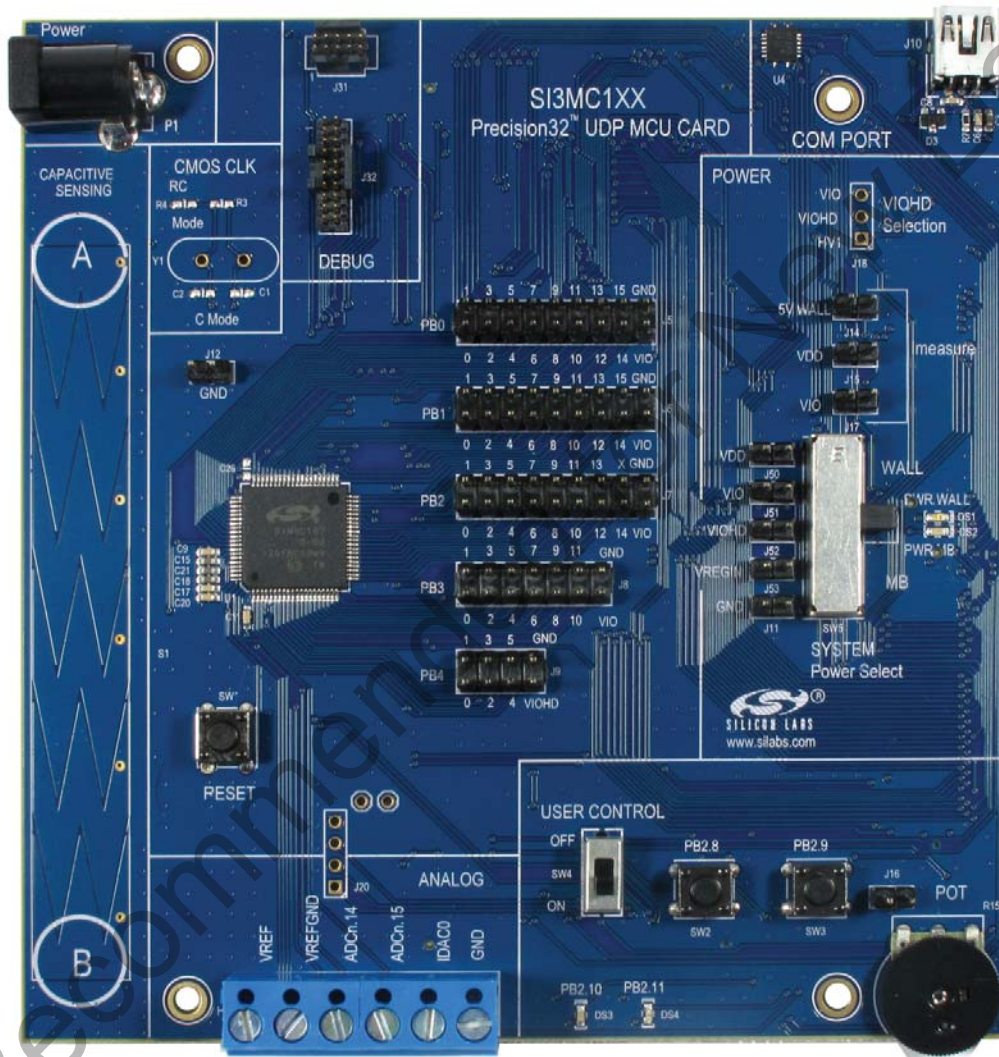


Figure 5. UDP SiM3C1xx MCU Card

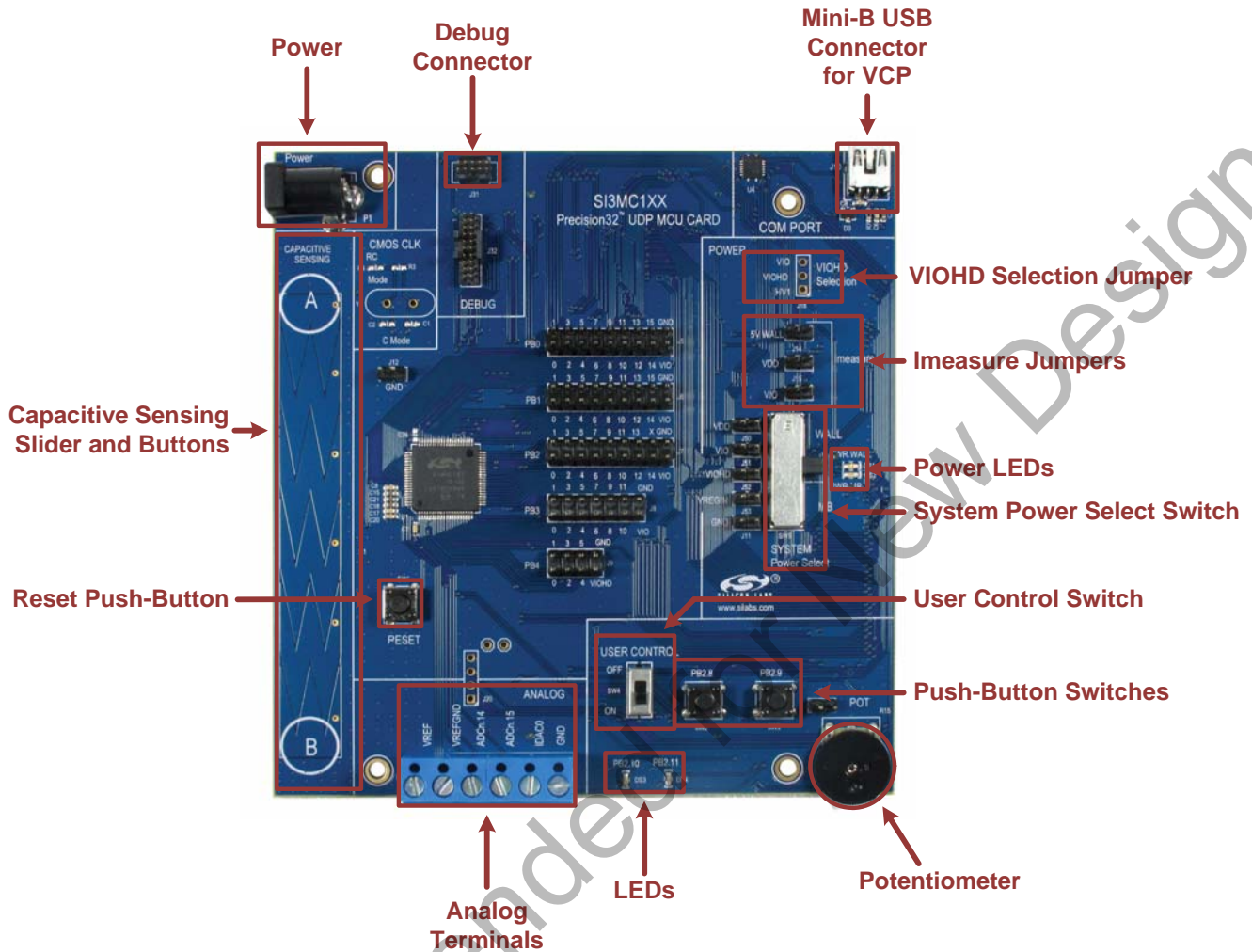


Figure 6. UDP SiM3C1xx MCU Card Features

## 4.1. Push-Button Switches and LEDs (SW2, SW3, DS3, DS4)

The UDP SiM3C1xx MCU Card has two push-button switches and two LEDs. The two switches connect to PB2.8 and PB2.9. The switches are normally open and pull the pin voltage to ground when pressed.

Port pins PB2.10 and PB2.11 also connect to two LEDs: DS3 and DS4. The LEDs connect to VIO through a current limiting resistor.

When using PB2.8 and PB2.9 as switches and PB2.10 and PB2.11 as LEDs, the User Control switch (SW4) must be in the ON position.

## 4.2. Analog Terminals (H1)

Several of the SiM3C1xx port pins used for analog functions are connected to the H1 terminal block. Refer to Table 1 for the H1 terminal block connections.

**Table 1. Terminal Block Pin Descriptions (H1)**

| Pin | I/O              |
|-----|------------------|
| 1   | PB0.12 / VREF    |
| 2   | PB0.11 / VREFGND |
| 3   | PB1.5 / ADCn.14  |
| 4   | PB1.6 / ADCn.15  |
| 5   | PB0.13 / IDAC0   |
| 6   | GND              |

## 4.3. User Control Switch (SW4)

The User Control Switch enables and disables the User Control portion of the board. When in the ON position, various GPIO pins are connected to the push-button switches, LEDs, and potentiometer. When in the OFF position, the GPIO pins are disconnected from the hardware in the User Control portion of the board. The OFF selection should be used if another I/O board is connected to the MCU Card via a UDP motherboard or if the GPIO pins are needed for different functions. Table 2 shows a list of the GPIO pins that are controlled by the User Control Switch.

**Table 2. User Controlled GPIO Pins**

| GPIO Pin | User Control Function    |
|----------|--------------------------|
| PB1.5    | Potentiometer            |
| PB2.8    | Push-Button Switch (SW2) |
| PB2.9    | Push-Button Switch (SW3) |
| PB2.10   | Red LED (DS3)            |
| PB2.11   | Yellow LED (DS4)         |
| PB2.12   | Potentiometer Bias       |

## 4.4. Potentiometer (R15)

The potentiometer is available on PB1.5. To use the potentiometer, install a shorting block on J16 to connect PB1.5 to POT. To facilitate a low-power potentiometer, PB2.12 connects to bottom of the potentiometer as a potentiometer enable. Drive PB2.12 low to enable the potentiometer. The User Control switch must be in the ON position to use the potentiometer.

## 4.5. System Power Select Switch (SW5)

The MCU card has two power supply options: WALL power or UDP motherboard power. The System Power Select Switch is used to select between the two. If the MCU card is used without the UDP Motherboard, this switch should be placed in the WALL position. While in the WALL position, the part can be powered from the power connector (P1) labeled "Power".



## 4.6. Power LEDs (DS1, DS2)

The two power LEDs provide visual feedback when the board is powered. When the System Power Select Switch is in the WALL position, the PWR WALL LED (DS1) will turn on when the device is powered through the P1 connector or by connecting a power supply to any power header on the board. When the System Power Select Switch is in the MB position, the PWR MB LED (DS2) will turn on when the device is powered by a UDP Motherboard.

## 4.7. Imeasure Jumpers (J14, J15, J17)

The 5V WALL (J14), VDD (J15), and VIO (J17) Imeasure jumpers allow for easy access to measure the supply current of the MCU. The shorting blocks for these headers are populated by default. To measure the supply current, remove the corresponding shorting block and connect a current measurement device across the unpopulated header.

## 4.8. VIOHD Selection Jumper (J18)

The VIOHD jumper allows for the VIOHD pin on the MCU to be connected to the VIO power supply, the HV1 signal from the UDP Motherboard, or to an external power supply. The HV1 option is only available if the MCU is connected to a UDP Motherboard. To power from an external supply, remove the shorting block and connect the supply to pin 2 of the header.

## 4.9. UART VCP Connection Options (J10)

The MCU card features a USB virtual COM port (VCP) UART connection via the mini-B USB connector (J10) labeled "COM PORT". The VCP connection uses the CP210x USB-to-UART bridge chip. The GPIO pins connected to the CP210x device can be enable or disabled when connected to a UDP Motherboard as necessary. When the MCU card is not connected to the UDP Motherboard, the TX, RX, CTS, and RTS signals are all connected to the CP210x device. Table 3 shows the GPIO pins that are routed to the CP210x or UDP Motherboard.

**Table 3. CP210x Controlled GPIO Pins**

| GPIO Pin | User Control Function |
|----------|-----------------------|
| PB1.12   | RX                    |
| PB1.13   | TX                    |
| PB1.14   | CTS                   |
| PB1.15   | RTS                   |

## 4.10. Debug Header (J31)

The mini 10-pin debug header supports the Silicon Labs USB Debug Adapter. This connector provides a Serial Wire (SW) debug connection to the SiM3C1xx on the MCU card.

## 4.11. Capacitive Sensing Button and Slider (S1)

Two capacitive sensing buttons and one slider are included on the MCU card. Six GPIO pins are connected to the slider and can be used to implement up to two buttons or a slider. Table 4 shows the J13 pin definitions. The GPIO pins are connected to the slider in ascending order from the location labeled “A” to the location labeled “B” on the MCU card.

**Table 4. Capacitive Sensing GPIO Connections**

| Location | Pin   |
|----------|-------|
| A        | PB1.7 |
| —        | PB1.8 |
| —        | PB0.4 |
| —        | PB0.3 |
| —        | PB0.2 |
| B        | PB0.1 |

## 4.12. Reset Button (SW1)

The reset push-button switch is in the lower-left corner. Pushing this button will always reset the MCU. Note that pushing this button while the IDE is connected to the MCU will result in IDE disconnecting from the target.

## 4.13. Port Pin Headers (J5-J9)

All of the MCU port pins are available on the 0.100-inch headers on MCU card. Some of these port pins are shared with other functions on the board. For example, PB0.9 and PB0.10 are both used by the external RTC. Several GPIO pins are connected to circuits in the User Control portion of the board as well. To disconnect these GPIO pins from the additional circuits, place the User Control switch in the OFF position. PB1.12, PB1.13, PB1.14, and PB1.15 are either routed to the CP210x device or to the UDP Motherboard. For more information on the GPIO pins used by the CP210x or UART interface, see Section 4.9.

## 4.14. MCU Card Default and Optional Connections

The MCU card has many default and optional connections for use with different I/O cards and the UDP motherboard. The default connections are via shorting jumpers. The shorting jumpers are a 603 resistor footprint with a cut trace between pads. To disconnect, cut the trace with a sharp utility knife. To reconnect, install a 0 Ω 603 resistor or connect the two pads with solder. The optional connections are non-populated (no-pop) resistor footprints. To connect, install a 0 Ω 603 resistor or connect the two pads with solder. The User Control ON connections are only enabled when the User Control switch is moved to the ON position.

Table 5 shows a summary of the default and optional connections for each pin.

**Table 5. MCU Pin Functions**

| MCU Pin | MCU Card Function |          |                 | UDP Motherboard Signal                  |                          |
|---------|-------------------|----------|-----------------|---|--------------------------|
|         | Default           | Optional | User Control ON | Default                                 | Optional                 |
| P0.0    |                   |          |                 | USART_TX_A                              |                          |
| P0.1    | CAPSENSE          |          |                 | USART_RX_A                              |                          |
| P0.2    | CAPSENSE          |          |                 | USART_RTS_A<br>C2D_TX00_A               |                          |
| P0.3    | CAPSENSE          |          |                 | USART_CTS_A<br>C2D_TX01_A               |                          |
| P0.4    | CAPSENSE          |          |                 | USART_UCLK_A<br>C2D_TX02_A              |                          |
| P0.5    |                   |          |                 | SPI_SCK_EZR<br>C2D_TX03_A               |                          |
| P0.6    |                   |          |                 | SPI_MISO_EZR<br>C2D_TX04_A              |                          |
| P0.7    |                   |          |                 | SPI_MOSI_EZR<br>C2D_TX05_A<br>I2V_INP_A |                          |
| P0.8    |                   |          |                 | SPI_NSS0_EZR<br>C2D_TX06_A<br>I2V_INN_A |                          |
| P0.9    | RTC1              |          |                 |   | GPIO14                   |
| P0.10   | RTC2              |          |                 |   | GPIO15                   |
| P0.11   |                   | VREFGND  |                 | GPIO11<br>ADC_VREFGND                   |                          |
| P0.12   |                   | VREF     |                 | GPIO12<br>ADC_VREF                      |                          |
| P0.13   |                   | IDAC     |                 | PCA_CH0_A<br>GPIO13<br>IDAC_B           |                          |
| P0.14   |                   |          |                 | PCA_CH1_A<br>I2SOUT_DFS_A<br>IDAC_A     |                          |
| P0.15   | XTAL1             |          |                 |   | I2SOUT_CLK_A<br>CP_OUT_A |

# UDP SiM3C1xx

Table 5. MCU Pin Functions (Continued)

| MCU Pin | MCU Card Function |          |                 | UDP Motherboard Signal                     |                            |
|---------|-------------------|----------|-----------------|--|----------------------------|
|         | Default           | Optional | User Control ON | Default                                    | Optional                   |
| P1.0    | XTAL2             |          |                 |  | I2SOUT_DOUT_A<br>CP_OUTA_A |
| P1.1    |                   |          |                 | I2C_SDA_EZR                                |                            |
| P1.2    |                   |          |                 | I2C_SCL_EZR                                |                            |
| P1.3    |                   |          |                 | JTAG_TDO_A                                 |                            |
| P1.4    |                   |          |                 | JTAG_TDI_A                                 |                            |
| P1.5    |                   |          | POT             |  | ADC_IN0                    |
| P1.6    |                   |          |                 |  | ADC_IN1                    |
| P1.7    | CAPSENSE          |          |                 |  | GPIO08                     |
| P1.8    | CAPSENSE          |          |                 |  | GPIO09                     |
| P1.9    |                   |          |                 |  | GPIO10                     |
| P1.10   |                   |          |                 | ADC_IN2                                    |                            |
| P1.11   |                   |          |                 | TIMER_EX_A<br>ADC_IN3                      |                            |
| P1.12   |                   | VCP_RX   |                 | EMIF_A21                                   | UART_RX_SYS                |
| P1.13   |                   | VCP_TX   |                 | EMIF_A20                                   | UART_TX_SYS                |
| P1.14   |                   | VCP_CTS  |                 | EMIF_A19<br>EZRP_CLK_IN                    | UART_CTS_SYS               |
| P1.15   |                   | VCP_RTS  |                 | WAKEUP0<br>EMIF_A18<br>EZRP_TX_DATA_IN     | UART_RTS_SYS               |
| P2.0    |                   |          |                 | EMIC_A17<br>EZRP_RX_CLK_OUT                |                            |
| P2.1    |                   |          |                 | USART_TX_B<br>EMIF_A16<br>EZRP_RX_DATA_OUT |                            |
| P2.2    |                   |          |                 | USART_RX_B<br>EMIF_A15<br>EZRP_SDN         |                            |
| P2.3    |                   |          |                 | EMIF_A14<br>EZRP_NIRQ                      |                            |
| P2.4    |                   |          |                 | EXT_INT0<br>EMIF_A13                       |                            |
| P2.5    |                   |          |                 | GPIO00<br>EMIF_A12                         |                            |
| P2.6    |                   |          |                 | GPIO01<br>EMIF_A11                         |                            |
| P2.7    |                   |          |                 | GPIO02<br>EMIF_A10                         |                            |

Table 5. MCU Pin Functions (Continued)

| MCU Pin | MCU Card Function |          |                 | UDP Motherboard Signal                  |          |
|---------|-------------------|----------|-----------------|---|----------|
|         | Default           | Optional | User Control ON | Default                                 | Optional |
| P2.8    |                   |          | SW2             | SPI_NSS3_A<br>GPIO03<br>EMIF_A9         |          |
| P2.9    |                   |          | SW3             | SPI_NSS2_A<br>GPIO04<br>EMIF_A8         |          |
| P2.10   |                   |          | LED (DS3)       | SPI_NSS1_A<br>GPIO05<br>EMIF_A7         |          |
| P2.11   |                   |          | LED (DS4)       | SPI_NSS0_A<br>GPIO06<br>EMIF_A6         |          |
| P2.12   |                   |          | POT_EN          | SPI_SCK_A<br>GPIO07<br>EMIF_A5          |          |
| P2.13   |                   |          |                 | SPI_MISO_A<br>EMIF_A4<br>CP_POS_A       |          |
| P2.14   |                   |          |                 | SPI_MOSI_A<br>EMIF_A3<br>CP_NEG_A       |          |
| P3.0    |                   |          |                 | EMIF_A2                                 |          |
| P3.1    |                   |          |                 | SPI_NSS2_EZR<br>EMIF_A1                 |          |
| P3.2    |                   |          |                 | SPI_NSS3_EZR<br>EMIF_A0                 |          |
| P3.3    |                   |          |                 | LPTIMER_IN_A<br>I2SIN_DFS_A<br>EMIF_WRB |          |
| P3.4    |                   |          |                 | I2SIN_CLK_A<br>EMIF_OEB<br>CP_POS_B     |          |
| P3.5    |                   |          |                 | I2SIN_DOUT_A<br>EMIF_ALE<br>CP_NEG_B    |          |
| P3.6    |                   |          |                 | EMIF_CS0B<br>EXTREG_SP_A                |          |
| P3.7    |                   |          |                 | EMIF_BE1B<br>EXTREG_SN_A                |          |
| P3.8    |                   |          |                 | EMIF_CS1B<br>EXTREG_OUT_A               |          |

Table 5. MCU Pin Functions (Continued)

| MCU Pin | MCU Card Function |          |                 | UDP Motherboard Signal                                   |          |
|---------|-------------------|----------|-----------------|--|----------|
|         | Default           | Optional | User Control ON | Default  | Optional |
| P3.9    |                   |          |                 | EMIF_BE0B<br>EXTREG_BD_A                                 |          |
| P3.10   | EBID_SCK          |          |                 | PORT_MATCH0<br>UDPBUS_SDA_A                              |          |
| P3.11   | EBID_SDA          |          |                 | PORT_MATCH1<br>UDPBUS_SCL_A                              |          |
| P4.0    |                   |          |                 | EPCA_CH0_MOTOR<br>HVGPI00                                |          |
| P4.1    |                   |          |                 | EPCA_CH1_MOTOR<br>HVGPI01                                |          |
| P4.2    |                   |          |                 | UART_TX_A<br>EPCA_CH2_MOTOR<br>HVGPI02                   |          |
| P4.3    |                   |          |                 | UART_RX_A<br>EPCA_CH3_MOTOR<br>HVGPI03                   |          |
| P4.4    |                   |          |                 | UART_RTS_A<br>EPCA_CH4_MOTOR<br>HVGPI04                  |          |
| P4.5    |                   |          |                 | LPTIMER_OUT_A<br>UART_CTS_A<br>EPCA_CH5_MOTOR<br>HVGPI05 |          |

#### 4.14.1. P0.1, P0.2, P0.3, P0.4, P1.8, P1.7

Pins P0.1, P0.2, P0.3, P0.4, P1.7, P1.8 all connect to the capacitive sensing slider by default. To disconnect any of these pins from the capacitive sensing slider, remove the 0 Ω resistor that is connected to the port pin (R16 - R21).

#### 4.14.2. P0.9, P0.10

Pin P0.9 and P0.10 both connect to the 32.768 kHz RTC by default. To disconnect this pin from the RTC, remove the crystal Y2 on the board. Alternatively, the 0 Ω resistors R5 and R6 can be removed to disconnect the RTC circuit from the headers on J5.

#### 4.14.3. P0.11

Pin P0.11 connects to the VREFGND terminal on H1 by default. By default, P0.11 is not used as VREFGND and is instead a GPIO pin.

#### 4.14.4. P0.12

Pin P0.12 connects to the RX pin of the CP210x by default. Alternatively, P0.12 can be enabled for use with the VREF.

#### 4.14.5. P0.13

Pin P0.13 connects to the TX pin of the CP210x by default. Alternatively, P0.13 can be enabled for use with the IDAC.

#### 4.14.6. P0.14

Pin P0.14 connects to the CTS pin of the CP210x by default.

#### 4.14.7. P0.15

Pin P0.15 connects to the RTS pin of the CP210x by default. Alternatively, P0.15 can be enabled for use as the XTAL1 input.

#### 4.14.8. P1.0

Pin P1.0 is a GPIO pin by default. Alternatively, P1.0 can be enabled for use as the XTAL2 input. P1.0 is connected to the external crystal circuit, but the external crystal circuit is not populated by default. See the MCU card schematic in 6. "Schematics," on page 18 for more information on the external crystal circuit.

#### 4.14.9. P1.5

Pin P1.5 is a GPIO pin by default. Alternatively, P1.5 can be used at the potentiometer input pin if the User Control switch is in the ON position.

#### 4.14.10. P2.8, P2.9

Pins P2.8 and P2.9 are both GPIO pins by default. Alternatively, P2.8 and P2.9 can be used as switches (SW2 and SW3) if the User Control switch is in the ON position.

#### 4.14.11. P2.10, P2.11

Pins P2.10 and P2.11 are both GPIO pins by default. Alternatively, P2.10 and P2.11 can be used as LEDs (DS3 and DS4) if the User Control switch is in the ON position.

#### 4.14.12. P2.12

Pin P2.12 is a GPIO pin by default. Alternatively, P2.12 can be used at the potentiometer bias pin if the User Control switch is in the ON position.

#### 4.14.13. P3.10, P3.11

Pins P3.10 and P3.11 normally connects to the EBID UDP bus. To disconnect these pins from the UDP bus circuit, remove the 0  $\Omega$  resistors R34 and R35.

## 5. Using the UDP SiM3C1xx MCU Card with the UDP Motherboard

### 5.1. Current Measurement

The power measurement circuitry on the UDP motherboard consists of a Silicon Labs C8051F351 8051 MCU that measures both input voltage and current consumption of the MCU card, I/O expander, and radio test card. Install a shorting block on the UDP Motherboard J13 and J15 connect the two left pins together when using the motherboard with the SiM3C1xx MCU card.

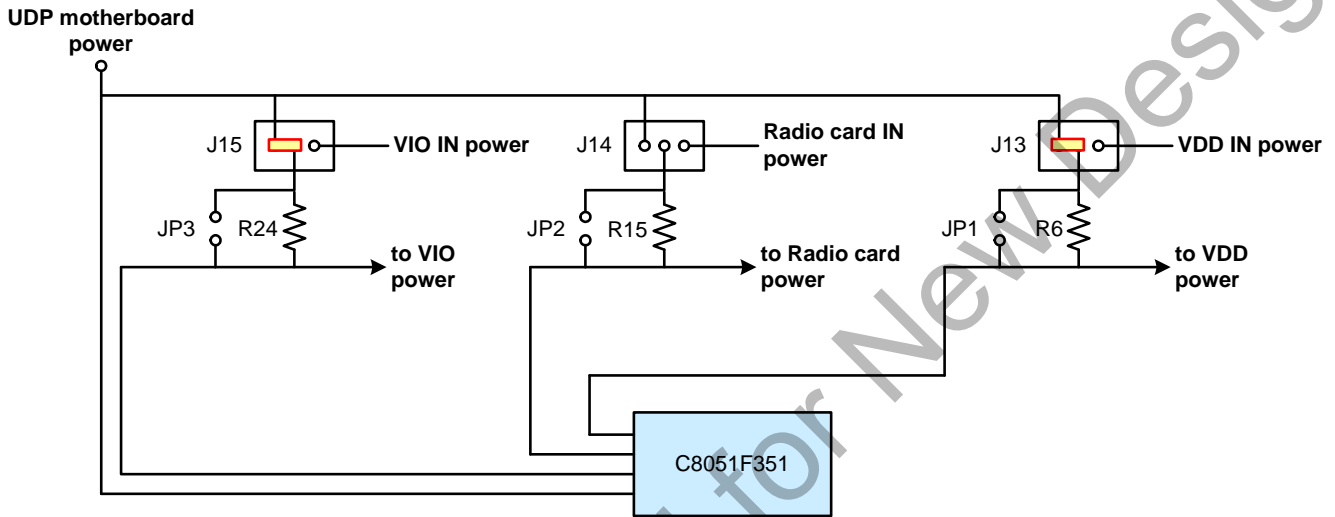


Figure 7. Power Measurement Diagram with Shorting Blocks

### 5.2. MCU Card Header Connections

The MCU card has four connectors with 100 pins each. These 400 pins are directly tied to the UDP motherboard and I/O cards. These signals are named and designed to support a wide variety of features and applications, and the UDP SiM3C1xx card implements a subset of these connections.

The MCU cards and I/O cards are designed so that a maximum number of functions are shared between each card. This allows a particular type of I/O card to be shared amongst all MCU cards that connect to the same signals.

The MCU card slot includes the following components:

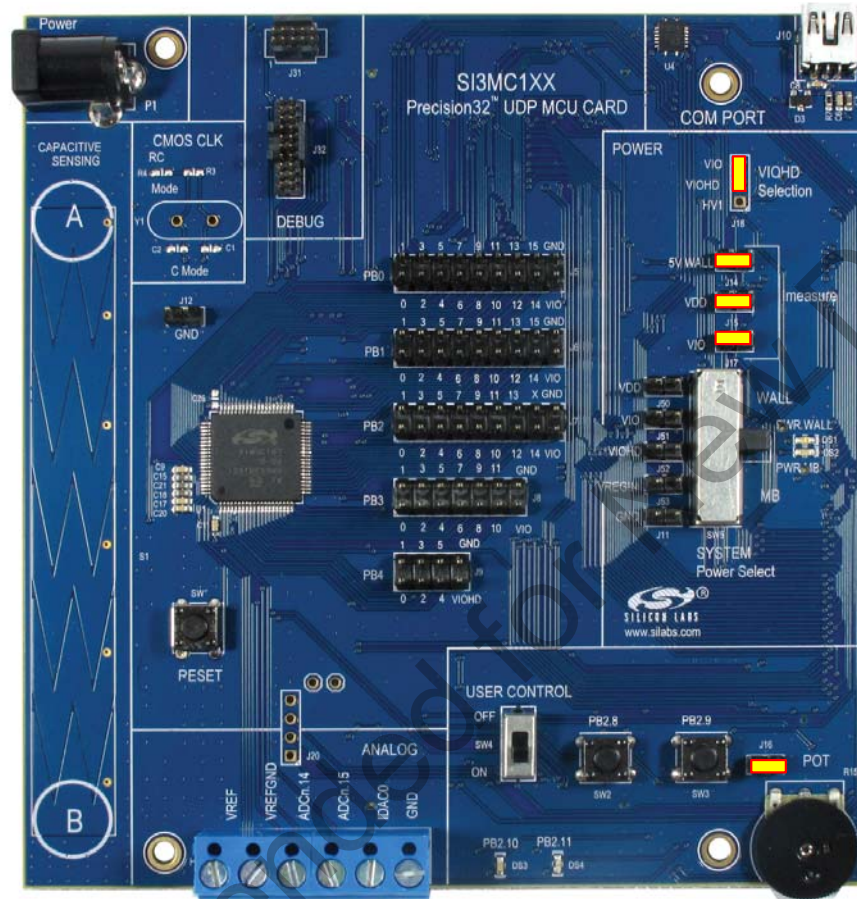
- |    |                       |
|----|-----------------------|
| J1 | MCU card connector H1 |
| J2 | MCU card connector H2 |
| J3 | MCU card connector H3 |
| J4 | MCU card connector H4 |

The UDP SiM3C1xx card implements the signals described in Table 7, Table 8, Table 9, and Table 10 in the Appendix.



## 5.3. Shorting Blocks: Factory Defaults

The UDP SiM3C1xx MCU card comes from the factory with pre-installed shorting blocks on several headers. Figure 8 shows the positions of the factory default shorting blocks.



**Figure 8. Shorting Blocks: Factory Defaults**

Shorting blocks are installed across the 5V WALL (J14), VDD (J15), VIO (J17) Imeasure jumpers. A shorting block is installed on J16 to connect the potentiometer to the User Control portion of the board. A shorting block is also installed on J18 to connect the VIOHD pin of the MCU to the VIO pin of the MCU.

## 6. Schematics

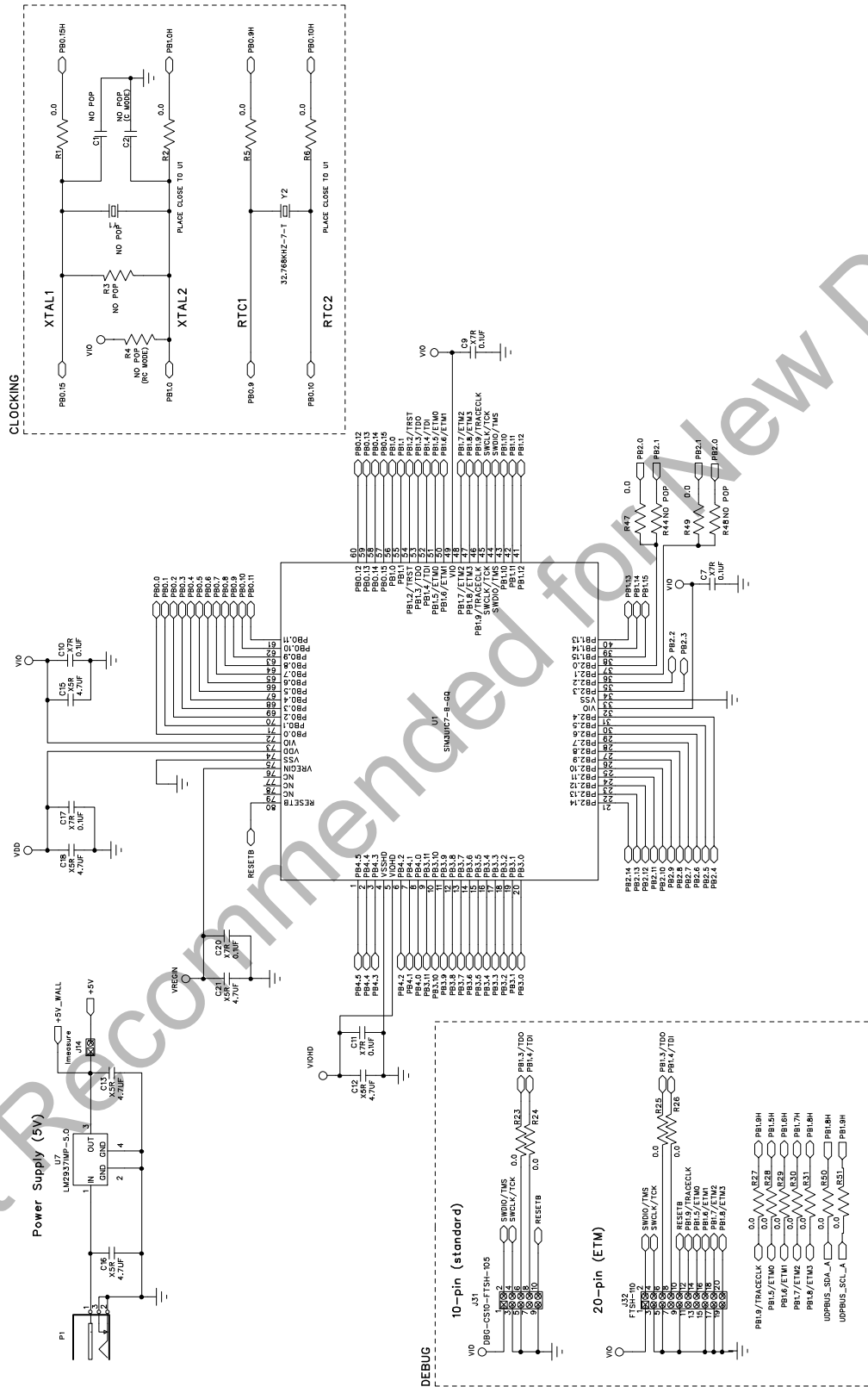


Figure 9. SiM3C1xx UDP MCU Card Schematic (1 of 6)

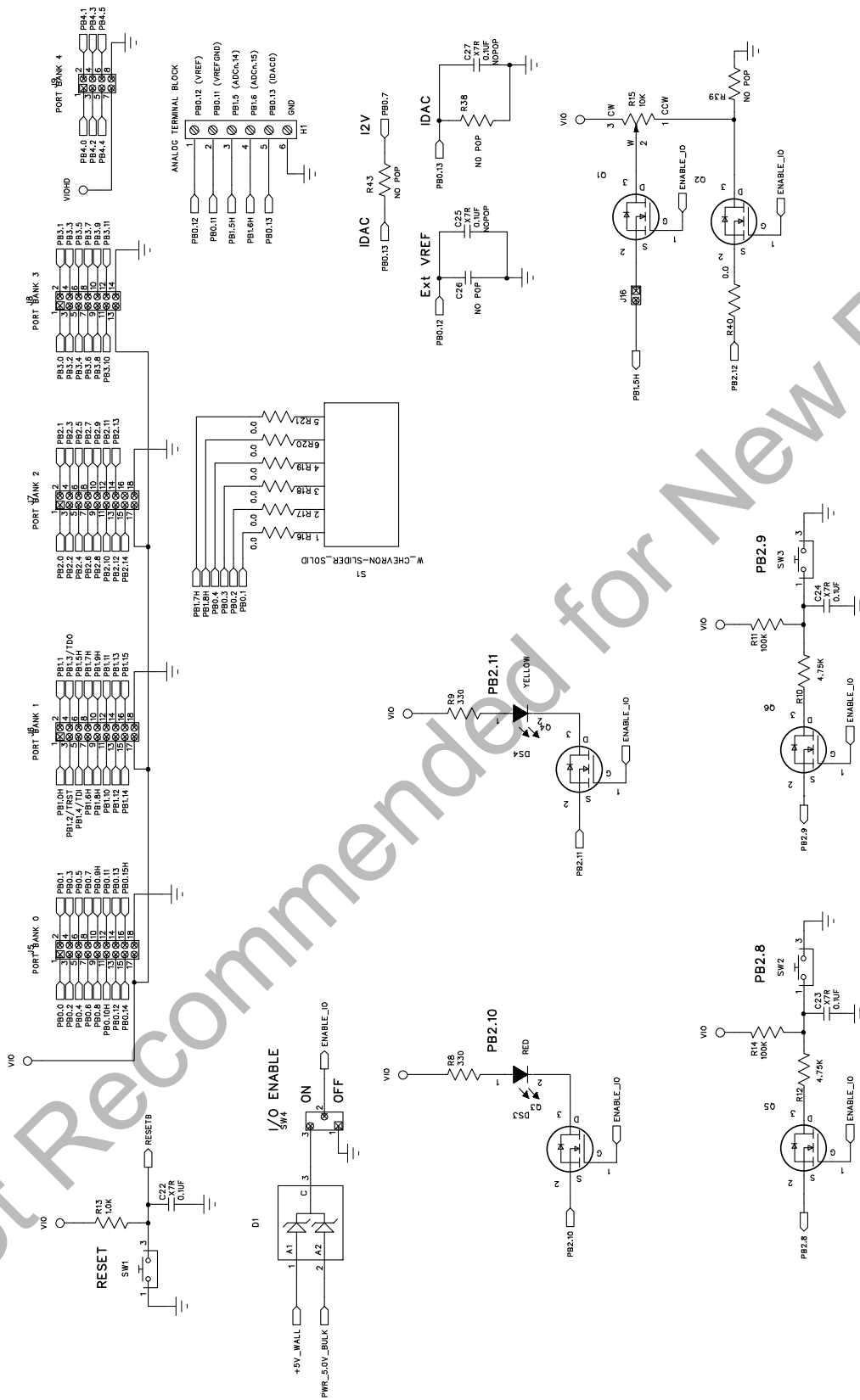


Figure 10. SiM3C1xx UDP MCU Card Schematic (2 of 6)

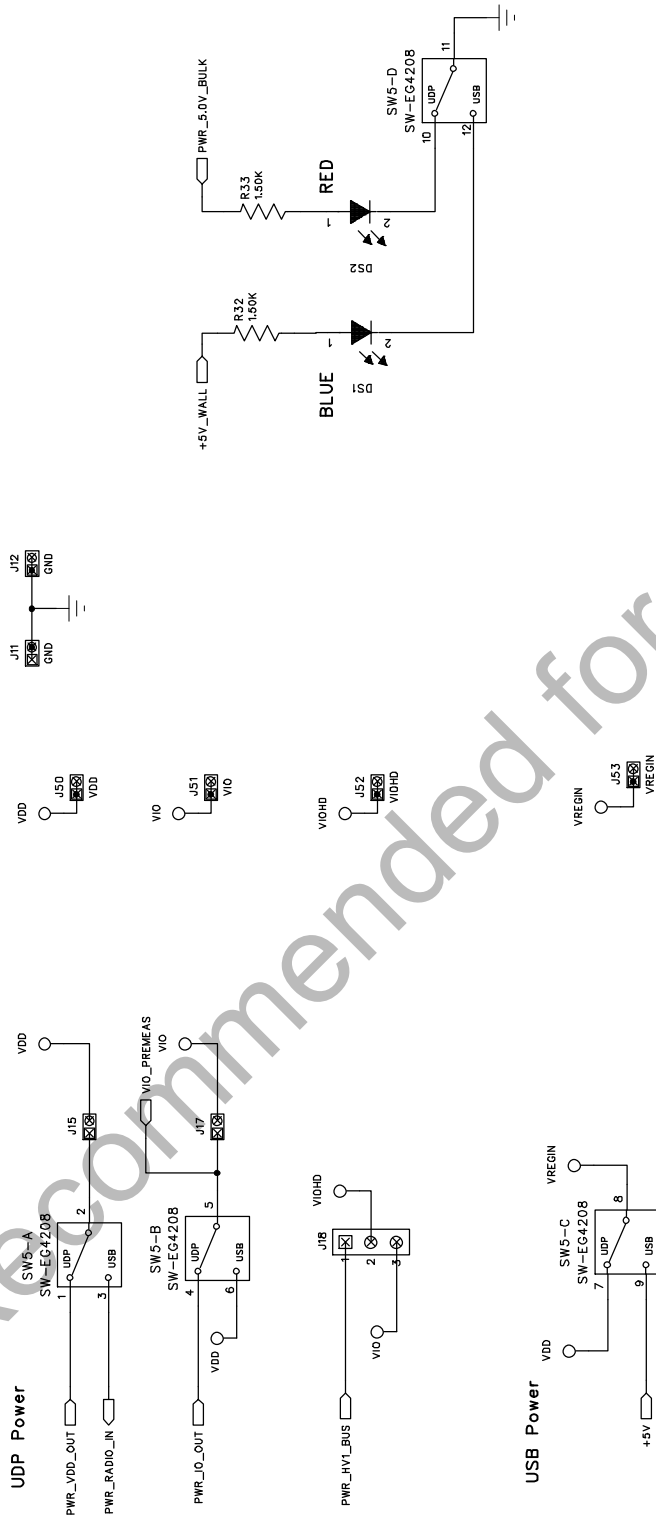


Figure 11. SiM3C1xx UDP MCU Card Schematic (3 of 6)

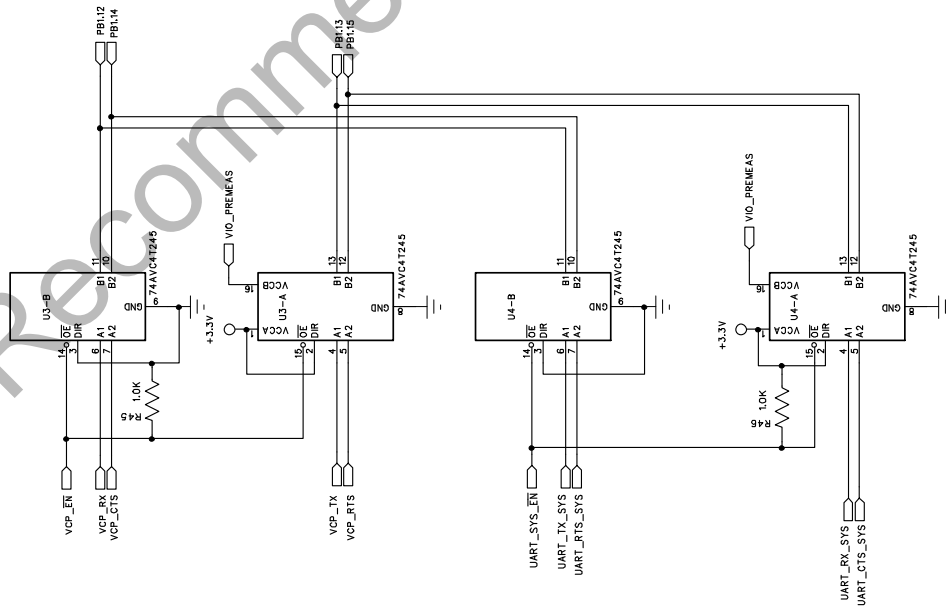
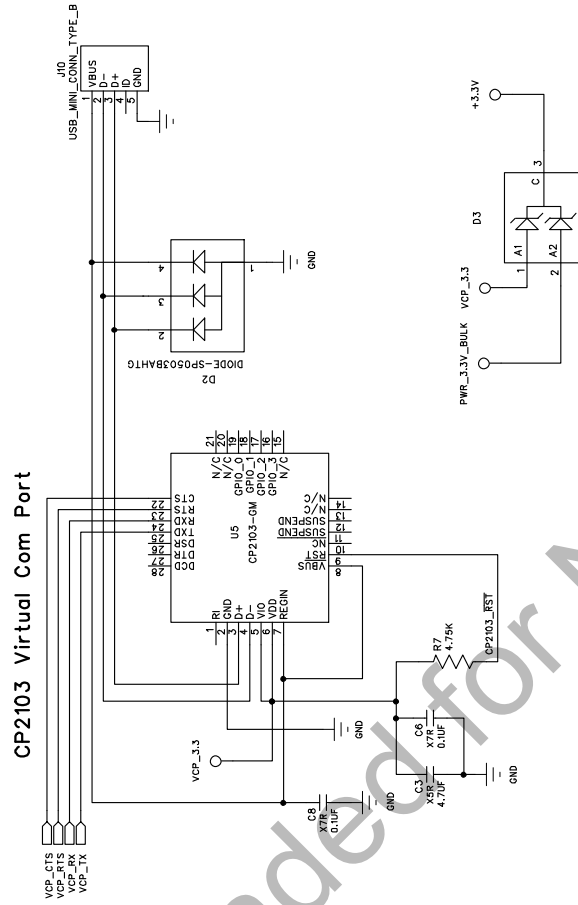
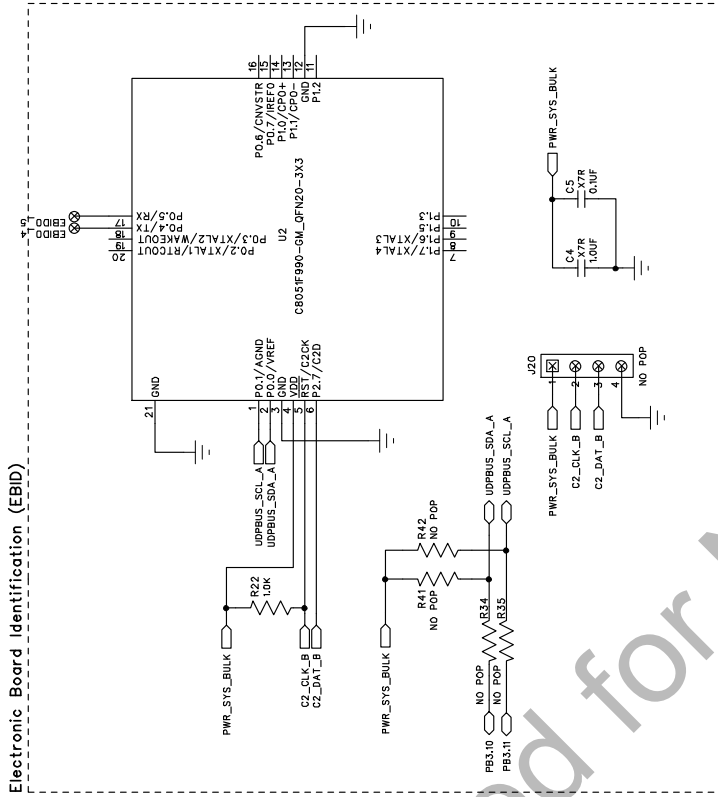
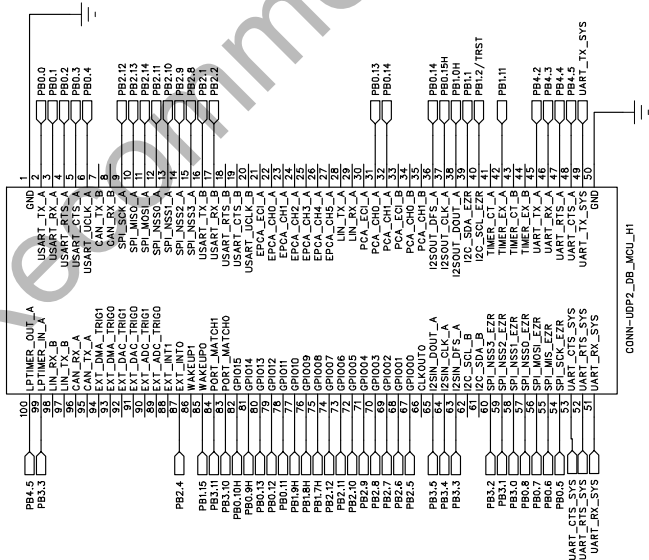


Figure 12. SIM3C1xx UDP MCU Card Schematic (4 of 6)

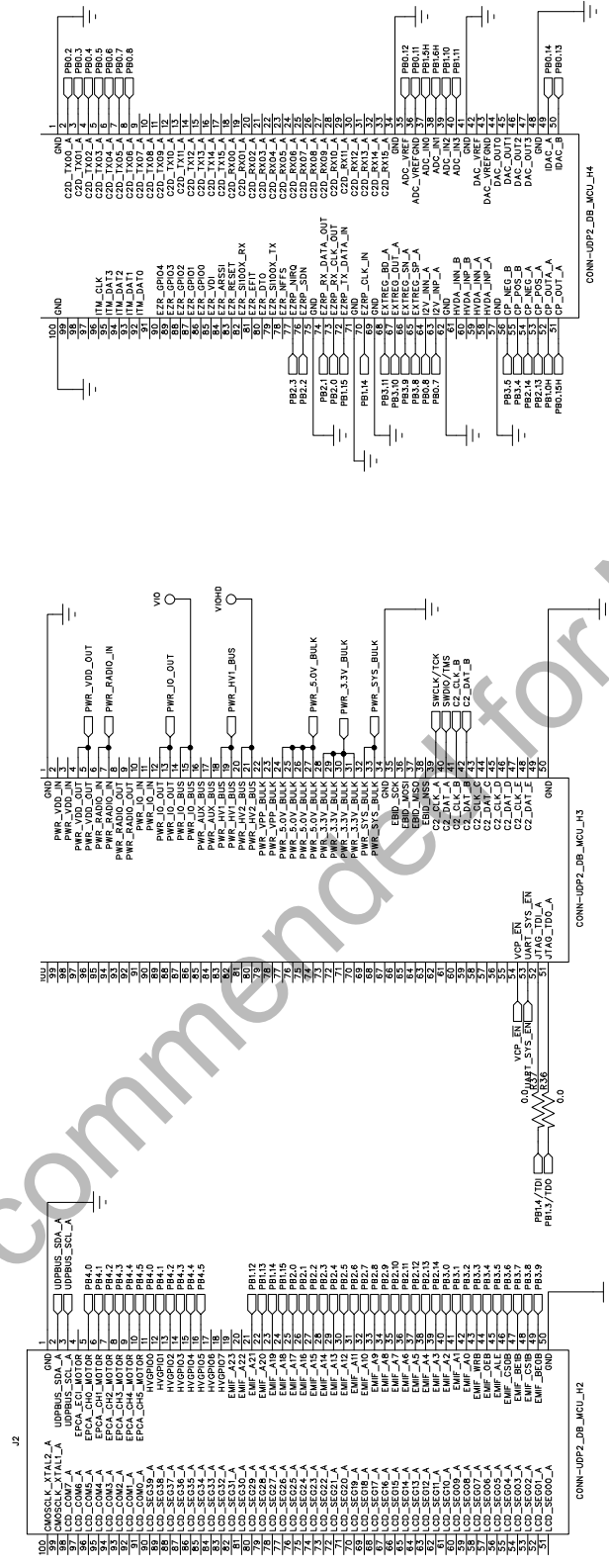


Electronic Board Identification (EBID)



UDP Header 1 (Top View)

Figure 13. SIM3C1xx UDP MCU Card Schematic (5 of 6)



UDP Header 2 (Top View)

UDP Header 3 (Top View)

UDP Header 4 (Top View)

Figure 14. SiM3C1xx UDP MCU Card Schematic (6 of 6)

# UDP SiM3C1xx

## 7. Bill of Materials

Table 6. UDP SiM3C1xx Card Bill of Materials

| Reference                     | Part Number        | Source                      | Description   |
|-------------------------------|--------------------|-----------------------------|---|
| U1                            | SiM3C167-A-GQ      | Silicon Labs                | MCU, TQFP80-14X14, RoHS   |
| U2                            | C8051F990-GM       | Silicon Labs                | MIXED SIGNAL, MCU, QFN20-3X3, RoHS                                  |
| U3-4                          | SN74AVC4T245RGR    | Texas Instruments           | IC, BUS TRANSCVR, 4BIT, 16QFN, RoHS                                 |
| U7                            | LM2937IMP-5.0/NOPB | National Semiconductor      | VOLTAGE REG-LDO, 5.0V, 500mA, SOT223, RoHS                          |
| C5-11, C17, C20, C22-25, C27  | C0603C104J3RACTU   | Kemet                       | CAP, 0.1 $\mu$ F, X7R, CERAMIC, 0603, 25V, $\pm$ 5%, OR EQ, RoHS    |
| C4                            | C1608X7R1C105K     | TDK Corporation             | CAP CERAMIC, 1.0UF, X7R, 0603, 16V, $\pm$ 10%, OR EQ, RoHS          |
| C3, C12, C15, C18, C21        | ECJ-1VB0J475M      | Panasonic - ECG             | CAP, 4.7 $\mu$ F, X5R, CERAMIC, 0603, 6.3V, $\pm$ 20%, OR EQ, RoHS  |
| C13, C16                      | EMK212BJ475KG-T    | Taiyo Yuden                 | CAP, 4.7 $\mu$ F, X5R, CERAMIC, 0805, 16V, $\pm$ 10%, OR EQ, RoHS   |
| C1-2, C26                     |                    |                             | CAP, NO POP, 0603, OR EQ, RoHS                                      |
| J1-4                          | FX8-100P-SV1(91)   | Hirose Electric Co Ltd      | CONN, HDR, 100POS, .6 mm, GOLD, SMD, RoHS                           |
| U5                            | CP2103             | Silicon Labs                | SINGLE-CHIP USB TO UART BRIDGE, QFN28, RoHS                         |
| J31                           | FTSH-105-01-F-D-K  | Samtec Inc                  | CoreSight 10 Debug Header   |
| J32                           | FTSH-110-L-D-K     | Samtec Inc                  | CONN, HDR, SHRD, 0.050"(1.27 mm) PITCH, 20 PINS [2X10], OR EQ, RoHS |
| D1, D3                        | BAT54C-G           | Comchip Technology          | DIODE, Schottkey DUAL CC, 200 mA, 30 V, SOT23, RoHS                 |
| D2, D6                        | SP0503BAHTG        | Littlefuse                  | TVS AVAL DIODE ARRAY, 3 CH, SOT143, RoHS                            |
| Q1-6                          | DMN2075U-7         | Diodes Inc                  | MOSFET, PWR N-CHAN, 20 V, 4.2A, SOT-23, OR EQ, RoHS                 |
| J15, J11-12, J14, J17, J50-53 | PBC02SAAN          | Sullins Connector Solutions | STAKE HEADER, 1X2, 0.1"CTR, GOLD, OR EQ, RoHS                       |
| J14, J16                      | PBC02DAAN          | Sullins Connector Solutions | STAKE HEADER, 1X2, 0.1"CTR, GOLD, OR EQ, RoHS                       |
| J18                           | PBC03SAAN          | Sullins Connector Solutions | STAKE HEADER, 1X3, 0.1" CTRS, OR EQ, RoHS                           |
| J20                           | PBC04SAAN          | Sullins Connector Solutions | STAKE HEADER, 1X4, 0.1" CTRS, OR EQ, RoHS, NO POP                   |
| J9                            | PBC04DAAN          | Sullins Connector Solutions | STAKE HEADER, 2X4, 0.1"CTR, OR EQ, RoHS                             |
| J8                            | PBC07DAAN          | Sullins Connector Solutions | STAKE HEADER, 2X7, 0.1" CTR, GOLD, OR EQ, RoHS                      |
| J5-7                          | PBC09DAAN          | Sullins Connector Solutions | STAKE HEADER, 2X9, 0.1" CTR, GOLD, OR EQ, RoHS                      |



**Table 6. UDP SiM3C1xx Card Bill of Materials (Continued)**

| Reference   | Part Number              | Source                        | Description  |
|---|--------------------------|-------------------------------|--|
| DS1   | LTST-C190TBKT            | Lite-On Inc                   | LED 468NM, BLUE, SMT0603, OR EQ, RoHS                  |
| DS2-3   | SML-LX0603IW-TR          | Lumex Opto / Components Inc   | LED, RED DIFF, 635NM, SMT0603, OR EQ, RoHS             |
| DS4   | LY L29K-H1K2-26-Z        | OSRAM Opto Semiconductors Inc | LED, YELLOW, 591NM, SMD0603, 1.8 V, OR EQ, RoHS        |
| R15   | RV100F-30-4K1B-B10K-B301 | Alpha (Taiwan)                | POT, 10K, THUMBWHEEL LINEAR, 0.03W, ±20%, OR EQ, RoHS  |
| R1-2, R5-6, R16-21, R23-31, R34-37, R40, R44, R48 | RC0603JR-070RL           | Yageo                         | RES, 0.0, SMT, 0603, 1/10W, ±5%, OR EQ, RoHS           |
| R32-33  | ERJ-3EKF1501V            | Panasonic - ECG               | RES 1.50 kΩ, SMT, 0603, 1/10W, ±1%, OR EQ, RoHS        |
| R11, R14  | ERJ-6ENF1003V            | Panasonic - ECG               | RES, 100 k, SMT, 0805, 1/8W, ±1%, OR EQ, RoHS          |
| R13, R22, R41-42, R45-46                          | RC0603JR-071KL           | Yageo                         | RES, 1.0 kΩ, SMT, 0603, 1/10W, ±5%, RoHS               |
| R8-9  | RC0805JR-07330RL         | Yageo                         | RES, 330 Ω, SMT, 0805, 1/8W, ±5%, OR EQ, RoHS          |
| R7  | ERJ-3EKF4751V            | Panasonic - ECG               | RES, 4.75 kΩ, SMT, 0603, 1/10W, ±1%, OR EQ, RoHS       |
| R10, R12  | ERJ-6ENF4751V            | Panasonic - ECG               | RES, 4.75 kΩ, SMT, 0805, 1/8W, ±1%, OR EQ, RoHS        |
| R3-4, R38-39, R43, R47, R49                       |                          |                               | RES, NO POP, SMT, 0603, OR EQ, RoHS                    |
| SW4   | OS102011MS2QN1           | C&K Components                | SWITCH SLIDE MINI, SPDT, PCB MNT, OR EQ, RoHS          |
| SW5   | EG6201                   | E-Switch                      | SWITCH, SLIDE 6PDT, RT ANG, L=4MM, OR EQ, RoHS         |
| SW1-3   | EVQ-PAD04M               | Panasonic - ECG               | SWITCH, LIGHT TOUCH, 130GF, 6 mm SQ, RoHS              |
| H1  | 1729160                  | Phoenix Contact               | TERM. BLOCK, 5.08 mm CTRS, 6 POS, RoHS                 |
| J10   | 54819-0519               | Molex Inc                     | CONN, USB MINI RECEPT, 5POS RT ANG, TYPE B OR EQ, RoHS |
| S1  |                          |                               | PCB W_CHEVRON SLIDER SOLID, RoHS                       |
| Y2  | ABS07-32.768KHZ-7-T      | Abracon Corporation           | CRYSTAL, 32.76 kHz, 7PF, SMT, RoHS                     |
| Y1  |                          | ECS Inc                       | HC46/9 CRYSTAL, NO POP, OR EQ, RoHS                    |
| P1  | RAPC722X                 | Switchcraft Inc               | CONN, POWERJACK MINI.08" RA PC MNT, RoHS               |

# UDP SiM3C1xx

## APPENDIX—MCU CARD HEADER PIN DESCRIPTIONS

Table 7. UDP SiM3C1xx MCU Card H1 Pin Descriptions (J1)

| MCU Card Pin | Signal Name  | Description                  | SiM3C167 Pin / Signal |
|--------------|--------------|------------------------------|-----------------------|
| 1            | GND          |                              |                       |
| 2            | USART_TX_A   | USART A transmit             | PB0.0                 |
| 3            | USART_RX_A   | USART A receive              | PB0.1                 |
| 4            | USART_RTS_A  | USART A hardware handshaking | PB0.2                 |
| 5            | USART_CTS_A  | USART A hardware handshaking | PB0.3                 |
| 6            | USART_UCLK_A | USART A clock                | PB0.4                 |
| 7            | CAN_TX_B     |                              |                       |
| 8            | CAN_RX_B     |                              |                       |
| 9            | SPI_SCK_A    | SPI A clock                  | PB2.12                |
| 10           | SPI_MISO_A   | SPI A master-in, slave-out   | PB2.13                |
| 11           | SPI_MOSI_A   | SPI A master-out, slave-in   | PB2.14                |
| 12           | SPI_NSS0_A   | SPI A slave select 0         | PB2.11                |
| 13           | SPI_NSS1_A   | SPI A slave select 1         | PB2.10                |
| 14           | SPI_NSS2_A   | SPI A slave select 2         | PB2.9                 |
| 15           | SPI_NSS3_A   | SPI A slave select 3         | PB2.8                 |
| 16           | USART_TX_B   | USART B transmit             | PB2.1                 |
| 17           | USART_RX_B   | USART B receive              | PB2.2                 |
| 18           | USART_RTS_B  | USART B hardware handshaking |                       |
| 19           | USART_CTS_B  | USART B hardware handshaking |                       |
| 20           | USART_UCLK_B | USART B clock                |                       |
| 21           | EPCA_ECI_A   | EPCA A external clock input  |                       |
| 22           | EPCA_CH0_A   |                              |                       |
| 23           | EPCA_CH1_A   |                              |                       |
| 24           | EPCA_CH2_A   |                              |                       |
| 25           | EPCA_CH3_A   |                              |                       |
| 26           | EPCA_CH4_A   |                              |                       |
| 27           | EPCA_CH5_A   |                              |                       |
| 28           | LIN_TX_A     |                              |                       |
| 29           | LIN_RX_A     |                              |                       |
| 30           | PCA_ECI_A    | PCA A external clock input   |                       |
| 31           | PCA_CH0_A    |                              | PB0.13                |
| 32           | PCA_CH1_A    |                              | PB0.14                |
| 33           | PCA_ECI_B    | PCA B external clock input   |                       |
| 34           | PCA_CH0_B    |                              |                       |

**Table 7. UDP SiM3C1xx MCU Card H1 Pin Descriptions (J1) (Continued)**

| MCU Card Pin | Signal Name   | Description                                   | SiM3C167 Pin / Signal |
|--------------|---------------|---|-----------------------|
| 35           | PCA_CH1_B     |   |                       |
| 36           | I2SOUT_DFS_A  | I <sup>2</sup> S A transmitter word sync (WS) | PB0.14                |
| 37           | I2SOUT_CLK_A  | I <sup>2</sup> S A transmitter clock (SCK)    | PB0.15H               |
| 38           | I2SOUT_DOUT_A | I <sup>2</sup> S A transmitter data (SD)      | PB1.0H                |
| 39           | I2C_SDA_EZR   | EZRadio I <sup>2</sup> C data                 | PB1.1                 |
| 40           | I2C_SCL_EZR   | EZRadio I <sup>2</sup> C clock                | PB1.2 / TRST          |
| 41           | TIMER_CT_A    |   |                       |
| 42           | TIMER_EX_A    |   | PB1.11                |
| 43           | TIMER_CT_B    |   |                       |
| 44           | TIMER_EX_B    |   |                       |
| 45           | UART_TX_A     | UART A transmit                               | PB4.2                 |
| 46           | UART_RX_A     | UART A receive                                | PB4.3                 |
| 47           | UART_RTS_A    | UART A hardware handshaking                   | PB4.4                 |
| 48           | UART_CTS_A    | UART A hardware handshaking                   | PB4.5                 |
| 49           | UART_TX_SYS   | System UART transmit                          | UART_TX_SYS           |
| 50           | GND           |   |                       |
| 51           | UART_RX_SYS   | System UART receive                           | UART_RX_SYS           |
| 52           | UART_RTS_SYS  | System UART hardware handshaking              | UART_RTS_SYS          |
| 53           | UART_CTS_SYS  | System UART hardware handshaking              | UART_CTS_SYS          |
| 54           | SPI_SCK_EZR   | EZRadio SPI clock                             | PB0.5                 |
| 55           | SPI_MISO_EZR  | EZRadio SPI master-in, slave-out              | PB0.6                 |
| 56           | SPI_MOSI_EZR  | EZRadio SPI master-out, slave-in              | PB0.7                 |
| 57           | SPI_NSS0_EZR  | EZRadio SPI slave select 0                    | PB0.8                 |
| 58           | SPI_NSS1_EZR  | EZRadio SPI slave select 1                    | PB3.0                 |
| 59           | SPI_NSS2_EZR  | EZRadio SPI slave select 2                    | PB3.1                 |
| 60           | SPI_NSS3_EZR  | EZRadio SPI slave select 3                    | PB3.2                 |
| 61           | I2C_SDA_B     | I <sup>2</sup> C B data                       |                       |
| 62           | I2C_SCL_B     | I <sup>2</sup> C B clock                      |                       |
| 63           | I2SIN_DFS_A   | I <sup>2</sup> S A receiver word sync (WS)    | PB3.3                 |
| 64           | I2SIN_CLK_A   | I <sup>2</sup> S A receiver clock (SCK)       | PB3.4                 |
| 65           | I2SIN_DOUT_A  | I <sup>2</sup> S A receiver data (SD)         | PB3.5                 |
| 66           | CLKOUT0       | clock   |                       |
| 67           | GPIO00        | General purpose I/O 0                         | PB2.5                 |
| 68           | GPIO01        | General purpose I/O 1                         | PB2.6                 |

# UDP SiM3C1xx

Table 7. UDP SiM3C1xx MCU Card H1 Pin Descriptions (J1) (Continued)

| MCU Card Pin | Signal Name   | Description                         | SiM3C167 Pin / Signal |
|--------------|---------------|-------------------------------------|-----------------------|
| 69           | GPIO02        | General purpose I/O 2               | PB2.7                 |
| 70           | GPIO03        | General purpose I/O 3               | PB2.8                 |
| 71           | GPIO04        | General purpose I/O 4               | PB2.9                 |
| 72           | GPIO05        | General purpose I/O 5               | PB2.10                |
| 73           | GPIO06        | General purpose I/O 6               | PB2.11                |
| 74           | GPIO07        | General purpose I/O 7               | PB2.12                |
| 75           | GPIO08        | General purpose I/O 8               | PB1.7H                |
| 76           | GPIO09        | General purpose I/O 9               | PB1.8H                |
| 77           | GPIO10        | General purpose I/O 10              | PB1.9H                |
| 78           | GPIO11        | General purpose I/O 11              | PB0.11                |
| 79           | GPIO12        | General purpose I/O 12              | PB0.12                |
| 80           | GPIO13        | General purpose I/O 13              | PB0.13                |
| 81           | GPIO14        | General purpose I/O 14              | PB0.9H                |
| 82           | GPIO15        | General purpose I/O 15              | PB0.10H               |
| 83           | PORT_MATCH0   |                                     | PB3.10                |
| 84           | PORT_MATCH1   |                                     | PB3.11                |
| 85           | WAKEUP0       | MCU low-power wakeup input signal 0 | PB1.15                |
| 86           | WAKEUP1       | MCU low-power wakeup input signal 1 |                       |
| 87           | EXT_INT0      | External interrupt 0                | PB2.4                 |
| 88           | EXT_INT1      | External interrupt 1                |                       |
| 89           | EXT_ADC_TRIG0 | External ADC trigger 0              |                       |
| 90           | EXT_ADC_TRIG1 | External ADC trigger 1              |                       |
| 91           | EXT_DAC_TRIG0 | External DAC trigger 0              |                       |
| 92           | EXT_DAC_TRIG1 | External DAC trigger 1              |                       |
| 93           | EXT_DMA_TRIG0 | External DMA trigger 0              |                       |
| 94           | EXT_DMA_TRIG1 | External DMA trigger 1              |                       |
| 95           | CAN_TX_A      |                                     |                       |
| 96           | CAN_RX_A      |                                     |                       |
| 97           | LIN_TX_B      |                                     |                       |
| 98           | LIN_RX_B      |                                     |                       |
| 99           | LPTIMER_IN_A  |                                     | PB3.3                 |
| 100          | LPTIMER_OUT_A |                                     | PB4.5                 |

**Table 8. UDP SiM3C1xx Card H2 Pin Descriptions (J2)**

| MCU Card Pin | Signal Name    | Description                              | SiM3C167 Pin / Signal |
|--------------|----------------|--|-----------------------|
| 1            | GND            |  |                       |
| 2            | UDPBUS_SDA_A   | UDP motherboard I <sup>2</sup> C A data  | UDPBUS_SDA_A          |
| 3            | UDPBUS_SCL_A   | UDP motherboard I <sup>2</sup> C A clock | UDPBUS_SCL_A          |
| 4            | EPCA_ECI_MOTOR | Motor EPCA external clock input          |                       |
| 5            | EPCA_CH0_MOTOR |  | PB4.0                 |
| 6            | EPCA_CH1_MOTOR |  | PB4.1                 |
| 7            | EPCA_CH2_MOTOR |  | PB4.2                 |
| 8            | EPCA_CH3_MOTOR |  | PB4.3                 |
| 9            | EPCA_CH4_MOTOR |  | PB4.4                 |
| 10           | EPCA_CH5_MOTOR |  | PB4.5                 |
| 11           | HVGPIO0        | High Drive I/O 0                         | PB4.0                 |
| 12           | HVGPIO1        | High Drive I/O 1                         | PB4.1                 |
| 13           | HVGPIO2        | High Drive I/O 2                         | PB4.2                 |
| 14           | HVGPIO3        | High Drive I/O 3                         | PB4.3                 |
| 15           | HVGPIO4        | High Drive I/O 4                         | PB4.4                 |
| 16           | HVGPIO5        | High Drive I/O 5                         | PB4.5                 |
| 17           | HVGPIO6        | High Drive I/O 6                         |                       |
| 18           | HVGPIO7        | High Drive I/O 7                         |                       |
| 19           | EMIF_A23       | EMIF muxed AD23m pin (non-muxed A15)     |                       |
| 20           | EMIF_A22       | EMIF muxed AD22m pin (non-muxed A14)     |                       |
| 21           | EMIF_A21       | EMIF muxed AD21m pin (non-muxed A13)     | PB1.12                |
| 22           | EMIF_A20       | EMIF muxed AD20m pin (non-muxed A12)     | PB1.13                |
| 23           | EMIF_A19       | EMIF muxed AD19m pin (non-muxed A11)     | PB1.14                |
| 24           | EMIF_A18       | EMIF muxed AD18m pin (non-muxed A10)     | PB1.15                |
| 25           | EMIF_A17       | EMIF muxed AD17m pin (non-muxed A9)      | PB2.0                 |
| 26           | EMIF_A16       | EMIF muxed AD16m pin (non-muxed A8)      | PB2.1                 |
| 27           | EMIF_A15       | EMIF muxed AD15m pin (non-muxed A7)      | PB2.2                 |
| 28           | EMIF_A14       | EMIF muxed AD14m pin (non-muxed A6)      | PB2.3                 |
| 29           | EMIF_A13       | EMIF muxed AD13m pin (non-muxed A5)      | PB2.4                 |
| 30           | EMIF_A12       | EMIF muxed AD12m pin (non-muxed A4)      | PB2.5                 |
| 31           | EMIF_A11       | EMIF muxed AD11m pin (non-muxed A3)      | PB2.6                 |
| 32           | EMIF_A10       | EMIF muxed AD10m pin (non-muxed A2)      | PB2.7                 |
| 33           | EMIF_A9        | EMIF muxed AD9m pin (non-muxed A1)       | PB2.8                 |
| 34           | EMIF_A8        | EMIF muxed AD8m pin (non-muxed A0)       | PB2.9                 |
| 35           | EMIF_A7        | EMIF muxed AD7m pin (non-muxed D7)       | PB2.10                |

# UDP SiM3C1xx

Table 8. UDP SiM3C1xx Card H2 Pin Descriptions (J2) (Continued)

| MCU Card Pin | Signal Name | Description                        | SiM3C167 Pin / Signal |
|--------------|-------------|------------------------------------|-----------------------|
| 36           | EMIF_A6     | EMIF muxed AD6m pin (non-muxed D6) | PB2.11                |
| 37           | EMIF_A5     | EMIF muxed AD5m pin (non-muxed D5) | PB2.12                |
| 38           | EMIF_A4     | EMIF muxed AD4m pin (non-muxed D4) | PB2.13                |
| 39           | EMIF_A3     | EMIF muxed AD3m pin (non-muxed D3) | PB2.14                |
| 40           | EMIF_A2     | EMIF muxed AD2m pin (non-muxed D2) | PB3.0                 |
| 41           | EMIF_A1     | EMIF muxed AD1m pin (non-muxed D1) | PB3.1                 |
| 42           | EMIF_A0     | EMIF muxed AD0m pin (non-muxed D0) | PB3.2                 |
| 43           | EMIF_WRB    | EMIF write signal                  | PB3.3                 |
| 44           | EMIF_OEB    | EMIF output enable                 | PB3.4                 |
| 45           | EMIF_ALE    | EMIF address latch enable          | PB3.5                 |
| 46           | EMIF_CS0B   | EMIF chip select 0                 | PB3.6                 |
| 47           | EMIF_BE1B   | EMIF output byte enable 1          | PB3.7                 |
| 48           | EMIF_CS1B   | EMIF chip select 1                 | PB3.8                 |
| 49           | EMIF_BE0B   | EMIF output byte enable 0          | PB3.9                 |
| 50           | GND         |                                    |                       |
| 51           | LCD_SEG00_A |                                    |                       |
| 52           | LCD_SEG01_A |                                    |                       |
| 53           | LCD_SEG02_A |                                    |                       |
| 54           | LCD_SEG03_A |                                    |                       |
| 55           | LCD_SEG04_A |                                    |                       |
| 56           | LCD_SEG05_A |                                    |                       |
| 57           | LCD_SEG06_A |                                    |                       |
| 58           | LCD_SEG07_A |                                    |                       |
| 59           | LCD_SEG08_A |                                    |                       |
| 60           | LCD_SEG09_A |                                    |                       |
| 61           | LCD_SEG10_A |                                    |                       |
| 62           | LCD_SEG11_A |                                    |                       |
| 63           | LCD_SEG12_A |                                    |                       |
| 64           | LCD_SEG13_A |                                    |                       |
| 65           | LCD_SEG14_A |                                    |                       |
| 66           | LCD_SEG15_A |                                    |                       |
| 67           | LCD_SEG16_A |                                    |                       |
| 68           | LCD_SEG17_A |                                    |                       |
| 69           | LCD_SEG18_A |                                    |                       |
| 70           | LCD_SEG19_A |                                    |                       |
| 71           | LCD_SEG20_A |                                    |                       |
| 72           | LCD_SEG21_A |                                    |                       |

**Table 8. UDP SiM3C1xx Card H2 Pin Descriptions (J2) (Continued)**

| MCU Card Pin | Signal Name     | Description                            | SiM3C167 Pin / Signal |
|--------------|-----------------|--|-----------------------|
| 73           | LCD_SEG22_A     |  |                       |
| 74           | LCD_SEG23_A     |  |                       |
| 75           | LCD_SEG24_A     |  |                       |
| 76           | LCD_SEG25_A     |  |                       |
| 77           | LCD_SEG26_A     |  |                       |
| 78           | LCD_SEG27_A     |  |                       |
| 79           | LCD_SEG28_A     |  |                       |
| 80           | LCD_SEG29_A     |  |                       |
| 81           | LCD_SEG30_A     |  |                       |
| 82           | LCD_SEG31_A     |  |                       |
| 83           | LCD_SEG32_A     |  |                       |
| 84           | LCD_SEG33_A     |  |                       |
| 85           | LCD_SEG34_A     |  |                       |
| 86           | LCD_SEG35_A     |  |                       |
| 87           | LCD_SEG36_A     |  |                       |
| 88           | LCD_SEG37_A     |  |                       |
| 89           | LCD_SEG38_A     |  |                       |
| 90           | LCD_SEG39_A     |  |                       |
| 91           | LCD_COM0_A      |  |                       |
| 92           | LCD_COM1_A      |  |                       |
| 93           | LCD_COM2_A      |  |                       |
| 94           | LCD_COM3_A      |  |                       |
| 95           | LCD_COM4_A      |  |                       |
| 96           | LCD_COM5_A      |  |                       |
| 97           | LCD_COM6_A      |  |                       |
| 98           | LCD_COM7_A      |  |                       |
| 99           | CMOSCLK_XTAL1_A | MCU XTAL1 pin for external oscillators |                       |
| 100          | CMOSCLK_XTAL2_A | MCU XTAL2 pin for external oscillators |                       |

Not Recommended for New Designs

# UDP SiM3C1xx

Table 9. UDP SiM3C1xx Card H3 Pin Descriptions (J3)

| MCU Card Pin | Description   | Description   | SiM3C167 Pin / Signal |
|--------------|---------------|---|-----------------------|
| 1            | GND           |   |                       |
| 2            | PWR_VDD_IN    | Power input for powering the MCU card from a power source other than the UDP motherboard        |                       |
| 3            | PWR_VDD_IN    | Power input for powering the MCU card from a power source other than the UDP motherboard        |                       |
| 4            | PWR_VDD_OUT   | Power input for the MCU card  | PWR_VDD_OUT           |
| 5            | PWR_VDD_OUT   |   |                       |
| 6            | PWR_RADIO_IN  | Power input for powering the radio test card from a power source other than the UDP motherboard | PWR_RADIO_IN          |
| 7            | PWR_RADIO_IN  |   |                       |
| 8            | PWR_RADIO_OUT | Power input for the radio test card   |                       |
| 9            | PWR_RADIO_OUT | Power input for the radio test card   |                       |
| 10           | PWR_IO_IN     | Power input for powering the I/O card from a power source other than the UDP motherboard        |                       |
| 11           | PWR_IO_IN     | Power input for powering the I/O card from a power source other than the UDP motherboard        |                       |
| 12           | PWR_IO_OUT    | Power input for the I/O card  | PWR_IO_OUT            |
| 13           | PWR_IO_OUT    |   |                       |
| 14           | PWR_IO_BUS    | Connects power from the MCU card to the radio and I/O cards                                     | VIO                   |
| 15           | PWR_IO_BUS    |   |                       |
| 16           | PWR_AUX_BUS   | Connects power from the MCU card to the radio and I/O cards                                     |                       |
| 17           | PWR_AUX_BUS   | Connects power from the MCU card to the radio and I/O cards                                     |                       |
| 18           | PWR_HV1_BUS   | High Drive I/O power 1  | PWR_HV1_BUS           |
| 19           | PWR_HV1_BUS   |   |                       |
| 20           | PWR_HV2_BUS   | High Drive I/O power 2  | VIOHD                 |
| 21           | PWR_HV2_BUS   |   |                       |
| 22           | PWR_VPP_BULK  | VPP programming voltage   |                       |
| 23           | PWR_VPP_BULK  | VPP programming voltage   |                       |
| 24           | PWR_5.0_BULK  | 5.0 V power from the UDP motherboard  | PWR_5.0V_BULK         |
| 25           | PWR_5.0_BULK  |   |                       |
| 26           | PWR_5.0_BULK  |   |                       |
| 27           | PWR_5.0_BULK  |   |                       |
| 28           | VCC_3.3V      | 3.3 V power from the UDP motherboard  | PWR_3.3V_BULK         |
| 29           | VCC_3.3V      |   |                       |
| 30           | VCC_3.3V      |   |                       |
| 31           | VCC_3.3V      |   |                       |



**Table 9. UDP SiM3C1xx Card H3 Pin Descriptions (J3) (Continued)**

| MCU Card Pin | Description  | Description   | SiM3C167 Pin / Signal |
|--------------|--------------|---|-----------------------|
| 32           | PWR_SYS_BULK | 3.3 V power supply for EBID devices                           | PWR_SYS_BULK          |
| 33           | PWR_SYS_BULK |   |                       |
| 34           | GND          |   |                       |
| 35           | EBID_SCK     | EBID SPI clock  |                       |
| 36           | EBID_MOSI    | EBID SPI master-out, slave in                                 |                       |
| 37           | EBID_MISO    | EBID SPI master-in, slave-out                                 |                       |
| 38           | EBID_NSS     | EBID SPI slave select   |                       |
| 39           | C2_CLK_A     | C2 interface A clock, JTAG interface A TCK, Serial Wire SWCLK | SWCLK / TCK           |
| 40           | C2_DAT_A     | C2 interface A data, JTAG interface A TMS, Serial Wire SWDIO  | SWDIO / TMS           |
| 41           | C2_CLK_B     | C2 interface B clock  | C2_CLK_B              |
| 42           | C2_DAT_B     | C2 interface B data   | C2_DAT_B              |
| 43           | C2_CLK_C     | C2 interface C clock  |                       |
| 44           | C2_DAT_C     | C2 interface C data   |                       |
| 45           | C2_CLK_D     | C2 interface D clock  |                       |
| 46           | C2_DAT_D     | C2 interface D data   |                       |
| 47           | C2_CLK_E     | C2 interface E clock  |                       |
| 48           | C2_DAT_E     | C2 interface E data   |                       |
| 49           | nc           | no connect  |                       |
| 50           | GND          |   |                       |
| 51           | JTAG_TDO_A   | JTAG interface A data out (TDO), Serial Wire SWO              | PB1.3 / TDO           |
| 52           | JTAG_TDI_A   | JTAG interface A data in (TDI)                                | PB1.4 / TDI           |
| 53           | VCP_EN       | Selects the USB-to-USART motherboard path                     | UART_SYS_EN           |
| 54           | UART_SYS_EN  | Selects the USB-to-USART motherboard path                     | VCP_EN                |
| 55           | H3_55        | General purpose signal  |                       |
| 56           | H3_56        | General purpose signal  |                       |
| 57           | H3_57        | General purpose signal  |                       |
| 58           | H3_58        | General purpose signal  |                       |
| 59           | H3_59        | General purpose signal  |                       |
| 60           | H3_60        | General purpose signal  |                       |
| 61           | H3_61        | General purpose signal  |                       |
| 62           | H3_62        | General purpose signal  |                       |
| 63           | H3_63        | General purpose signal  |                       |
| 64           | H3_64        | General purpose signal  |                       |
| 65           | H3_65        | General purpose signal  |                       |
| 66           | H3_66        | General purpose signal  |                       |

# UDP SiM3C1xx

Table 9. UDP SiM3C1xx Card H3 Pin Descriptions (J3) (Continued)

| MCU Card Pin | Description | Description            | SiM3C167 Pin / Signal |
|--------------|-------------|------------------------|-----------------------|
| 67           | H3_67       | General purpose signal |                       |
| 68           | H3_68       | General purpose signal |                       |
| 69           | H3_69       | General purpose signal |                       |
| 70           | H3_70       | General purpose signal |                       |
| 71           | H3_71       | General purpose signal |                       |
| 72           | H3_72       | General purpose signal |                       |
| 73           | H3_73       | General purpose signal |                       |
| 74           | H3_74       | General purpose signal |                       |
| 75           | H3_75       | General purpose signal |                       |
| 76           | H3_76       | General purpose signal |                       |
| 77           | H3_77       | General purpose signal |                       |
| 78           | H3_78       | General purpose signal |                       |
| 79           | H3_79       | General purpose signal |                       |
| 80           | H3_80       | General purpose signal |                       |
| 81           | H3_81       | General purpose signal |                       |
| 82           | H3_82       | General purpose signal |                       |
| 83           | H3_83       | General purpose signal |                       |
| 84           | H3_84       | General purpose signal |                       |
| 85           | H3_85       | General purpose signal |                       |
| 86           | H3_86       | General purpose signal |                       |
| 87           | H3_87       | General purpose signal |                       |
| 88           | H3_88       | General purpose signal |                       |
| 89           | H3_89       | General purpose signal |                       |
| 90           | H3_90       | General purpose signal |                       |
| 91           | H3_91       | General purpose signal |                       |
| 92           | H3_92       | General purpose signal |                       |
| 93           | H3_93       | General purpose signal |                       |
| 94           | H3_94       | General purpose signal |                       |
| 95           | H3_95       | General purpose signal |                       |
| 96           | H3_96       | General purpose signal |                       |
| 97           | H3_97       | General purpose signal |                       |
| 98           | H3_98       | General purpose signal |                       |
| 99           | H3_99       | General purpose signal |                       |
| 100          | H3_100      | General purpose signal |                       |

**Table 10. UDP SiM3C1xx Card H4 Pin Descriptions (J4)**

| MCU Card Pin | Description | Description                  | SiM3C167 Pin / Signal |
|--------------|-------------|------------------------------|-----------------------|
| 1            | GND         |                              |                       |
| 2            | C2D_TX00_A  | Capacitive Sensing output 0  | PB0.2                 |
| 3            | C2D_TX01_A  | Capacitive Sensing output 1  | PB0.3                 |
| 4            | C2D_TX02_A  | Capacitive Sensing output 2  | PB0.4                 |
| 5            | C2D_TX03_A  | Capacitive Sensing output 3  | PB0.5                 |
| 6            | C2D_TX04_A  | Capacitive Sensing output 4  | PB0.6                 |
| 7            | C2D_TX05_A  | Capacitive Sensing output 5  | PB0.7                 |
| 8            | C2D_TX06_A  | Capacitive Sensing output 6  | PB0.8                 |
| 9            | C2D_TX07_A  | Capacitive Sensing output 7  |                       |
| 10           | C2D_TX08_A  | Capacitive Sensing output 8  |                       |
| 11           | C2D_TX09_A  | Capacitive Sensing output 9  |                       |
| 12           | C2D_TX10_A  | Capacitive Sensing output 10 |                       |
| 13           | C2D_TX11_A  | Capacitive Sensing output 11 |                       |
| 14           | C2D_TX12_A  | Capacitive Sensing output 12 |                       |
| 15           | C2D_TX13_A  | Capacitive Sensing output 13 |                       |
| 16           | C2D_TX14_A  | Capacitive Sensing output 14 |                       |
| 17           | C2D_TX15_A  | Capacitive Sensing output 15 |                       |
| 18           | C2D_RX00_A  | Capacitive Sensing input 0   |                       |
| 19           | C2D_RX01_A  | Capacitive Sensing input 1   |                       |
| 20           | C2D_RX02_A  | Capacitive Sensing input 2   |                       |
| 21           | C2D_RX03_A  | Capacitive Sensing input 3   |                       |
| 22           | C2D_RX04_A  | Capacitive Sensing input 4   |                       |
| 23           | C2D_RX05_A  | Capacitive Sensing input 5   |                       |
| 24           | C2D_RX06_A  | Capacitive Sensing input 6   |                       |
| 25           | C2D_RX07_A  | Capacitive Sensing input 7   |                       |
| 26           | C2D_RX08_A  | Capacitive Sensing input 8   |                       |
| 27           | C2D_RX09_A  | Capacitive Sensing input 9   |                       |
| 28           | C2D_RX10_A  | Capacitive Sensing input 10  |                       |
| 29           | C2D_RX11_A  | Capacitive Sensing input 11  |                       |
| 30           | C2D_RX12_A  | Capacitive Sensing input 12  |                       |
| 31           | C2D_RX13_A  | Capacitive Sensing input 13  |                       |
| 32           | C2D_RX14_A  | Capacitive Sensing input 14  |                       |
| 33           | C2D_RX15_A  | Capacitive Sensing input 15  |                       |
| 34           | GND         |                              |                       |
| 35           | ADC_VREF    | ADC voltage reference        | PB0.12                |
| 36           | ADC_VREFGND | ADC VREF ground              | PB0.11                |
| 37           | ADC_IN0     |                              | PB1.5H                |

Table 10. UDP SiM3C1xx Card H4 Pin Descriptions (J4) (Continued)

| MCU Card Pin | Description      | Description  | SiM3C167 Pin / Signal |
|--------------|------------------|--|-----------------------|
| 38           | ADC_IN1          |  | PB1.6H                |
| 39           | ADC_IN2          |  | PB1.10                |
| 40           | ADC_IN3          |  | PB1.11                |
| 41           | GND              |  |                       |
| 42           | DAC_VREF         | DAC voltage reference                                |                       |
| 43           | DAC_VREFGND      | DAC voltage reference ground                         |                       |
| 44           | DAC_OUT0         |  |                       |
| 45           | DAC_OUT1         |  |                       |
| 46           | DAC_OUT2         |  |                       |
| 47           | DAC_OUT3         |  |                       |
| 48           | GND              |  |                       |
| 49           | IDAC_A           | IDAC A output  | PB0.14                |
| 50           | IDAC_B           | IDAC B output  | PB0.13                |
| 51           | CP_OUT_A         | Comparator A synchronous output                      | PB0.15H               |
| 52           | CP_OUTA_A        | Comparator A asynchronous output                     | PB1.0H                |
| 53           | CP_POS_A         | Comparator A positive input                          | PB2.13                |
| 54           | CP_NEG_A         | Comparator A negative input                          | PB2.14                |
| 55           | CP_POS_B         | Comparator B positive input                          | PB3.4                 |
| 56           | CP_NEG_B         |  | PB3.5                 |
| 57           | GND              |  |                       |
| 58           | HVDA_INP_A       | High Voltage Differential Amplifier A positive input |                       |
| 59           | HVDA_INN_A       | High Voltage Differential Amplifier A negative input |                       |
| 60           | HVDA_INP_B       | High Voltage Differential Amplifier B positive input |                       |
| 61           | HVDA_INN_B       | High Voltage Differential Amplifier B negative input |                       |
| 62           | GND              |  |                       |
| 63           | I2V_INP_A        | Current-to-Voltage converter A input 0               | PB0.7                 |
| 64           | I2V_INN_A        | Current-to-Voltage converter A input 1               | PB0.8                 |
| 65           | EXTREG_SP_A      | External Voltage Regulator SP input                  | PB3.6                 |
| 66           | EXTREG_SN_A      | External Voltage Regulator SN input                  | PB3.7                 |
| 67           | EXTREG_OUT_A     | External Voltage Regulator OUT output                | PB3.8                 |
| 68           | EXTREG_BD_A      | External Voltage Regulator base drive output         | PB3.9                 |
| 69           | GND              |  |                       |
| 70           | EZRP_CLK_IN      | Radio test card clock input (SMA connector)          | PB1.14                |
| 71           | GND              |  |                       |
| 72           | EZRP_TX_DATA_IN  | Radio test card transmit data input (SMA connector)  | PB1.15                |
| 73           | EZRO_RX_CLK_OUT  | Radio test card receive clock output (SMA connector) | PB2.0                 |
| 74           | EZRP_RX_DATA_OUT | Radio test card receive data output (SMA connector)  | PB2.1                 |

**Table 10. UDP SiM3C1xx Card H4 Pin Descriptions (J4) (Continued)**

| MCU Card Pin | Description   | Description                                 | SiM3C167 Pin / Signal |
|--------------|---------------|---|-----------------------|
| 75           | GND           |   |                       |
| 76           | EZRP_SDN      | Radio test card peripheral shutdown         | PB2.2                 |
| 77           | EZRP_NIRQ     | Radio test card peripheral interrupt status | PB2.3                 |
| 78           | EZR_NFFS      |   |                       |
| 79           | EZR_SI100X_TX | Radio test card Si100x transmit             |                       |
| 80           | EZR.DTO       |   |                       |
| 81           | EZR_FFIT      |   |                       |
| 82           | EZR_SI100X_RX | Radio test card Si100x receive              |                       |
| 83           | EZR_RESET     | Radio test card reset                       |                       |
| 84           | EZR_ARSSI     |   |                       |
| 85           | EZR_VDI       |   |                       |
| 86           | EZR_GPIO0     | Radio test card general purpose I/O 0       |                       |
| 87           | EZR_GPIO1     | Radio test card general purpose I/O 1       |                       |
| 88           | EZR_GPIO2     | Radio test card general purpose I/O 2       |                       |
| 89           | EZR_GPIO3     | Radio test card general purpose I/O 3       |                       |
| 90           | EZR_GPIO4     | Radio test card general purpose I/O 4       |                       |
| 91           | H4_91         | General purpose signal                      |                       |
| 92           | ITM_DAT0      |   |                       |
| 93           | ITM_DAT1      |   |                       |
| 94           | ITM_DAT2      |   |                       |
| 95           | ITM_DAT3      |   |                       |
| 96           | ITM_CLK       |   |                       |
| 97           | H4_97         | General purpose signal                      |                       |
| 98           | H4_98         | General purpose signal                      |                       |
| 99           | H4_99         | General purpose signal                      |                       |
| 100          | GND           |   |                       |