USB82642 Evaluation Board Revision B User Manual

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SMSC EVB-USB82642 Revision 1.1 (01-08-13)
Chapter 1 Preview

This document provides a description of the USB82642 Evaluation Board, the implementation of the USB82642's USB to I²C bridge and the graphical user interface used to evaluate the features of an UCS81001 that is embedded on the USB82642 Evaluation Board.

Chapter 2 Overview

The SMSC USB82642 Evaluation Board Revision B contains an Ultra Fast USB 2.0 Multi-Format Flash Media Controller, a USB Hub Combo, and a USB Port Power Controller with Charger Emulation. The USB82642 Evaluation Board (EVB-USB82642) demonstrates a standalone application platform for developers of Breakout box designs that extend the I²C or SDIO ports of the micro controller into the Breakout box over the upstream USB connection.

The USB82642 is compatible with the following operating systems:

- Microsoft Vista®
- Windows® XP
- Windows ME
- Windows 2000 SP4
- Mac® OS X
- Linux® Mass Storage Class Drivers
2.1 Features

- 48-pin QFN (RoHS compliant) package
- Supports these Media Types:
  - Secure Digital (SD™)
  - MultiMediaCard™ (MMC) 4-bit/8-bit interfaces
- Two USB 2.0 downstream hub ports one with an individual port power and the other with a USB Port Power Controller with Charger Emulation, an UCS81001
- Supports external configuration
  - External SPI flash for USB downloadable firmware
  - External certification chip
  - SMBus header for additional firmware download
  - External I²C EEPROM for configuration options
- Operates from a single voltage (+5.0 VDC, regulated) 'wall wart' external power supply
- Internal FET power switch for all media types
- Multiple LED indicators
  - Card power LED indicator
  - Optional +3.3 VDC power LED indicator
  - Port power LED
  - Alert LED (Port 3)
  - Device Detect LED (Port 3)
- Single crystal clock source
- Single on-board +3.3 VDC regulator
- USB-IF BC1.2, YD/T-1591 (2009), and RIM® charging profiles (Port 3)
- Charging profiles (Port 3) suitable for iPhone®, iPad®, and iPod®
- 2.5 A max current (Port 3)
- Active Current limiting and monitoring (Port 3)

2.2 General Description

The EVB-USB82642 is a demonstration and evaluation platform featuring the USB82642 Ultra Fast USB 2.0 Multi-Format Flash Media Controller, an UCS81001 Port Power Controller with Charger Emulation, and the USB Hub Combo on a 4-layer RoHS compliant printed circuit board. It is designed to support internal default settings, an external certification chip, an SMBus header interface to monitor I²C traffic from the USB to I²C bridge and either an external I²C EEPROM for customized functionality or SPI flash for external firmware download.

An EEPROM device can be populated on the evaluation board to provide firmware updates via USB by using the SMSC provided USBDM utility.

Default configuration can be changed by adding an EEPROM or SPI flash device into the provided footprint.
2.3 USB82642 Evaluation System

The evaluation system has several components, as shown in Figure 2.1:

- Customer-provided Windows PC
- SMSC UCS81002 graphical user interface (GUI) software and SMSC USB Bridge Driver
- SMSC USB82642 Evaluation Board
- USB Cable for GUI communications (Standard-A plug to Standard-B plug)
- 5 V power source (VS)
- Customer-provided portable device and OEM USB charging cable (with Standard-A plug at EVB end)

![Figure 2.1 USB82642 Evaluation System](image_url)
2.4 **Functional Block Diagram**

The USB82642 consists of the blocks shown in the diagram below and described in the following sections.

![Functional Block Diagram](image)

Figure 2.2 Functional Block Diagram
Chapter 3 Hardware Description

Figure 3.1, "Top Level Silk Screen and Copper Layers" and Figure 3.2, "Bottom Level Silk Screen and Copper Layers" show the top and bottom level silk screen and copper layer.
Figure 3.2 Bottom Level Silk Screen and Copper Layers
3.1 Connectors on the EVB

Figure 3.3 shows the top of an EVB and highlights the connectors.

![Figure 3.3 EVB Top View - Connectors](image)

<table>
<thead>
<tr>
<th>CONNECTOR</th>
<th>FUNCTION</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>J2</td>
<td>5 VDC 4 A</td>
<td>Right-angle power supply: This connects to a linear voltage regulator which outputs 3.3 V across the evaluation board. In addition it ties into the VS pins of the UCS81001 (5 V).</td>
</tr>
<tr>
<td>J3</td>
<td>Upstream Host USB Connector</td>
<td>Right-Angle USB Standard-B Receptacle: This connects the EVB to the PC with the GUI software. The upstream host USB connector ties the EVB to a host and therefore activates communication with the downstream ports.</td>
</tr>
<tr>
<td>J4</td>
<td>Down Stream Port 2</td>
<td>Right-Angle USB Standard-A Receptacle: This connects the EVB to the portable device.</td>
</tr>
<tr>
<td>J5</td>
<td>MMC4.0 / SD</td>
<td>Standard SD/MMC socket: This connector allows to plug in normal SD / MMC4.0 cards.</td>
</tr>
<tr>
<td>J6</td>
<td>Down Stream Port 3</td>
<td>Right-Angle USB Standard-A Receptacle: This connects the EVB to the portable device. In addition this connector is able to provide auxiliary power.</td>
</tr>
</tbody>
</table>
### 3.2 LEDs on the EVB

Figure 3.4 shows the top of an EVB and highlights the LEDs.

![Figure 3.4 EVB Top View - LEDs](image)

#### Table 3.2 EVB Top View - LEDs

<table>
<thead>
<tr>
<th>CONNECTOR</th>
<th>FUNCTION</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1</td>
<td>Down Stream Port 2</td>
<td>When lit, this green LED indicates that power is being supplied to the down stream port 2.</td>
</tr>
<tr>
<td>D3</td>
<td>Card Power</td>
<td>When lit, this bright green LED indicates card power when a normal SD / MMC4.0 card is plugged in.</td>
</tr>
<tr>
<td>D4</td>
<td>3.3 V Power</td>
<td>When lit, this orange LED indicates that 3.3 V is being supplied to the evaluation board from the onboard regulator.</td>
</tr>
<tr>
<td>D5</td>
<td>Down Stream Port 3</td>
<td>When lit, this green LED indicates that power is being supplied to the down stream port 3.</td>
</tr>
<tr>
<td>D6</td>
<td>Device Detect</td>
<td>When lit, this bright green LED indicates a device is attached that can be controlled by an UCS81001.</td>
</tr>
<tr>
<td>D7</td>
<td>Alert</td>
<td>When lit, this red LED indicates an alert signal is active that is being generated from the UCS81001.</td>
</tr>
</tbody>
</table>
3.3 Jumpers on the EVB

Figure 3.5 shows the top of an EVB and highlights the jumpers.

![Figure 3.5 EVB Top View - Jumpers](image.png)

Table 3.3 EVB Top View - Jumpers

<table>
<thead>
<tr>
<th>CONNECTOR</th>
<th>FUNCTION</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>J1</td>
<td>Ext</td>
<td>Not installed by default, when installed, this external jumper allows injecting 5 V to the evaluation board instead of using the 5 V power jack.</td>
</tr>
<tr>
<td>J7</td>
<td>S0</td>
<td>When installed this jumper allows grounding the S0 pin of the UCS81001.</td>
</tr>
<tr>
<td>J8</td>
<td>SMBus</td>
<td>When installed, this jumper allows monitoring I²C traffic from the USB to I²C bridge.</td>
</tr>
<tr>
<td>J9</td>
<td>EM_EN</td>
<td>When installed, this jumper will force a low at the EM_EN pin.</td>
</tr>
<tr>
<td>J10</td>
<td>M1</td>
<td>When installed, this jumper will force a low at the M1 pin.</td>
</tr>
<tr>
<td>J11</td>
<td>M2</td>
<td>When installed, this jumper will force a low at the M2 pin.</td>
</tr>
</tbody>
</table>
3.4 Test Points on the EVB

Figure 3.6 shows the top of an EVB and highlights the test points.

Table 3.4  EVB Top View - Test Points

<table>
<thead>
<tr>
<th>TEST POINT</th>
<th>FUNCTION</th>
<th>TEST POINT</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP1</td>
<td>GND</td>
<td>TP8</td>
<td>GND</td>
</tr>
<tr>
<td>TP2</td>
<td>3.3 V</td>
<td>TP9</td>
<td>GPIO12</td>
</tr>
<tr>
<td>TP3</td>
<td>GND</td>
<td>TP10</td>
<td>GND</td>
</tr>
<tr>
<td>TP4</td>
<td>Reset</td>
<td>TP11</td>
<td>GND</td>
</tr>
<tr>
<td>TP5</td>
<td>1.8 VDDPLL</td>
<td>TP12</td>
<td>1.8 VDD</td>
</tr>
<tr>
<td>TP6</td>
<td>GND</td>
<td>TP13</td>
<td>GND</td>
</tr>
<tr>
<td>TP7</td>
<td>3.3 VDD</td>
<td>TP14</td>
<td>GPIO1</td>
</tr>
</tbody>
</table>
Chapter 4 Software Installation

To begin using the USB82642 Evaluation Board, software must be installed on a Windows-based computer with a USB port.

**Note:** The software’s installer itself is part of the USB82642 Evaluation Board and therefore shows USB82642 during the installation, however the installed software controls an USB port power controller with charger emulation and thus shows UCS81002 in its title.

### 4.1 GUI Software Installation

Begin by inserting the CD provided with the EVB into the computer. Run the Setup.exe program located in the root directory of the CD. This steps through the graphical user interface installation, which takes less than a minute. Figure 4.1 shows the initial installation screen, which displays briefly as the setup program loads.

![Figure 4.1 Software Installation Step 1](image-url)
Click Next in the Destination Directory window, shown in Figure 4.2. For proper operation, the files must be installed in the default locations. The default location for the software files is C:\Program Files\SMSC\USB82642 and for the LabVIEW software is C:\Program Files\National Instruments.

In order to use this SMSC software, the license agreement must be accepted (see Figure 4.3).
In order to use the LabVIEW software, the license agreement must be accepted (see Figure 4.4).

Figure 4.4 Software Installation Step 4

Follow the on-screen instructions to complete the installation. During installation, shortcuts will be created on the Windows Start Menu under Programs>SMSC>USB82642 and on the desktop. When installation is complete, the program will automatically run. The UCS81002 GUI will have SMBus communications.

Note: Screen captures in this document were taken on a PC with Windows XP using the default desktop colors. The colors on your screen may vary, especially if a Windows theme has been applied on the PC.
Chapter 5 GUI Overview

5.1 Starting the GUI and EVB

The UCS81002 GUI, shown in Figure 5.1, consists of 4 tabs (Main, Configuration & General Status, Custom Charging, and Register Set) as well as the right side sections that are always visible (Panel Controls, Pin State & Attach Status, and Charger Emulation Selection).

5.2 Tips for Using the EVB GUI

- For many controls on the GUI panel, hovering the mouse cursor over a control will pop up context help that indicates the register address or gives a description. In addition, a context help window can be displayed by clicking the Help menu and then selecting Show Context Help. Display speed varies by system.
- After a power up of the EVB, the default settings are loaded. Users can save setting configurations to user-named files which can be reloaded at any time for quick re-configuration (see Section 10.3, "Configuration Save and Load").
- The GUI cannot be used to demonstrate UCS81001 behavior in Stand-alone mode since SMBus communication is required.

![Figure 5.1 UCS81002 EVB GUI](image-url)
5.2.1 GUI Abbreviations

BC = battery charging
CDP = charging downstream port
DBP = dead battery provision
DC = dedicated charger
DCE = dedicated charger emulation
DCP = dedicated charging port
EM = emulation
EM_EN = emulation enable
M1 = mode control pin number one
M2 = mode control pin number two

5.2.2 Keyboard Shortcuts

Some GUI controls have keyboard shortcuts, as shown in Table 5.1.

Table 5.1 USB82642 EVB GUI Keyboard Shortcuts

<table>
<thead>
<tr>
<th>GUI CONTROL</th>
<th>SHORTCUT</th>
<th>CONTROL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run</td>
<td>CTRL + R</td>
<td>Section 6.1.1, &quot;Stop and Run Buttons&quot;</td>
</tr>
<tr>
<td>Stop</td>
<td>F12</td>
<td>Section 6.1.1, &quot;Stop and Run Buttons&quot;</td>
</tr>
</tbody>
</table>
Chapter 6 Fixed Right Side of Panel

6.1 Panel Controls

The Panel Controls section on the right side of the GUI, shown in Figure 6.1, affects GUI operation. This section is always displayed.

6.1.1 Stop and Run Buttons

The Stop button, shown in Figure 6.1, halts GUI software communication with the EVB. When this button is clicked, the Run button, which has an arrow on it, displays below the menu bar, as shown in Figure 6.2.
To restart communications between the software and the EVB, click the Run button. The arrow button disappears when communications resume.

**Note:** Stopping and restarting the GUI do not affect register settings. To restore default register settings, disconnect power from the EVB, then reconnect power.

To close the program, use the red X in the upper right corner of the window.

### 6.1.2 COM Status Indicator

The COM Status indicator, on the right side of the panel shown in Figure 6.1, indicates the status of communications over the SMBus. During normal operation, COM Status is green. If SMBus communications fail, COM Status turns red (or alternates red and green).

### 6.1.3 Register Read Delay

The Register Read Delay, shown in Figure 6.1, sets the GUI control panel update speed. It affects the speed that the software reads the registers but will not affect the device’s sampling time. The default is 50 ms. This number can range from 0 to 5000 ms in increments of 25 ms.
6.2 Pin State & Attach Status

The Pin State & Attach Status section on the right side of the GUI, shown in Figure 6.3, provides a quick graphical status reference and allows physical control pin override. This section is always displayed.

6.2.1 ALERT_PIN, A_DET_PIN, CHG_ACT, and EM_ACT Indicators

When the ALERT_PIN and A_DET_PIN indicators are green they reflect the states of the corresponding pins that means the ALERT# pin and the A_DET# pin are asserted low. The CHG_ACT indicator is green if the current value delivered to the port device exceeds the charging current threshold. The EM_ACT indicator is green if the UCS81001 is in the Active state and is emulating.

6.2.2 ALERT#, A_DET#, and LOW_CUR Indicators

When the ALERT#, A_DET#, and LOW_CUR indicators are green, the signals at the devices respective pin are low and the corresponding condition has occurred (alert, device attached or the portable device is pulling less current and may finish charging, respectively). When the indicators are dark, the pin states are high.

6.2.3 Pin Indicators

The pin indicators (SEL, PWR_EN, M1, M2, and EM_EN) shown in Figure 6.3 are green if the signal on the corresponding pin on the UCS81001 device is high and dark if the signal is low. If the Pin Ignore
box is checked (see Section 6.2.4, "Pin Override"), these indicators reflect the GUI overrides for these pins.

### 6.2.4 Pin Override

For evaluation convenience, the GUI can override the setting of the following pins on the UCS81001 device: PWR_EN, M1, M2, and EM_EN. Place a checkmark in Pin Ignore box (see Figure 6.3) to enable pin override. Then, place a checkmark in the corresponding pin box to set the value high.

**Note 6.1** Pin override does not affect the actual signal on the pin. It only affects the register values.

**Note 6.2** The SEL pin is only read once by the UCS81001 at power up, so there is no pin override for it. To close the port power switch, the PWR_EN state must match the SEL state (e.g., SEL = high and PWR_EN = high).

### 6.3 Charger Emulation Selection

The Charger Emulation Selection section on the right side of the GUI, shown in Figure 6.4, provides a quick reference regarding operating state based on the values of M1, M2, and EM_EN. This section is always displayed.

![Figure 6.4 Charger Emulation Selection](image)

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Chapter 7 Main Tab

The Main Tab, shown in Figure 7.1, shows key parameters related to the port power switch, including the maximum current limit, the present current limit (always equal to or less than maximum current limit), and power state (e.g., Detect, Active, Error, etc.). When a portable device has been successfully attached, the screen shows the power state change from Detect to Active and shows the various handshakes applied. Once it is determined that the device is charging, the screen shows which emulation profile was successful, and the graph shows the charging current. Optionally, the user may monitor the charge delivered or ration the charge delivered to the attached device.

Figure 7.1 Main Tab
7.1 Dedicated Charger Emulation (DCE) Cycle

As shipped, the UCS81001 is ready to function as a dedicated charger, which will be applied when there is an attach detection. To view this behavior, perform the following:

1. Connect VS to the EVB (see Section 3.3, "Jumpers on the EVB"). The VS Low indicator on the Main Tab must be dark. If the VS Low indicator is red, the voltage is not high enough to charge a portable device.

2. Connect a portable device to the EVB. Use the OEM USB charging cable that came with the portable device.

3. The UCS81001 should detect an attachment, switch to the Active power state, apply an emulation profile, and deliver a charge. Figure 7.2 shows the GUI after charging has started.

![Figure 7.2 Main Tab - Charging]
4. Disconnect the portable device from the EVB.

5. The UCS81001 should detect a removal, switch to the Detect power state, and stop delivering a charge. Figure 7.3 shows the GUI after a removal was detected.

![Figure 7.3 Main Tab - Removal](image)

7.2 Charging Downstream Port (CDP)

The CDP charging profile is based on the Battery Charging standard 1.x. When a BC1.x compliant portable device attachment is detected, the UCS81001 and the portable device do handshaking based on the standard. If handshaking is successful, charging occurs up to the set current limit.

To select the CDP port power profile, M1, M2, and EM_EN must all be high. This can be done by removing the jumpers for these pins (J10, J11, and J9 respectively) or by using the pin override in the GUI (see Section 6.2.4, "Pin Override").
7.3 Pass-Through

Data Pass-Through does not apply any type of charger emulation. When selected, it closes the USB high speed data switch and supplies current up to the current limit.

To select Data Pass-Through, M1, M2, and EM_EN can be set to any one of the two data pass-thru combinations (010 and 110), as shown in Figure 7.4. This can be done by setting the jumpers for these pins (J10, J11, and J9 respectively - Section 3.3, “Jumpers on the EVB”) or by using the pin override in the GUI (see Section 6.2.4, “Pin Override”).

![Figure 7.4 Data Pass-Through Selection Options](image-url)
7.4 Current Monitoring and Charge Rationing

To view current monitoring and current rationing, perform the following on the Main Tab:

1. Set a Ration Limit. The ration limit is in units of mA-h (electric charge).

2. Set Rationing Behavior. The Ration Completion Behavior defaults to "Report and Disconnect". Once the Ration Limit is reached, portable device charging will cease, the ALERT# pin will assert, and the Ration Complete bit will be set. If you do not want the system to behave in this fashion, select one of the other three options: Report, Report & Sleep, and Take No Action.

3. Connect VS to the EVB (see Section 3.3, "Jumpers on the EVB"). The VS Low indicator on the Main Tab must be dark. If the VS Low indicator is red, the voltage is not high enough to charge a portable device.

4. Connect a portable device to the EVB. Use the OEM USB charging cable that came with the portable device.

5. Enable Rationing. Place a checkmark in the Ration Enable box on the Main Tab.

6. Watch the GUI as the device starts charging. Figure 7.5 shows the GUI after the ration limit was reached (in the case of "Report & Disconnect").

Note: As shown in Figure 7.5, the green trace is the instantaneous current and the red diagonal line is the charge being delivered in mA-h. Both are also presented in numeric format in the bottom left boxes. Trace color and characteristics can be change by clicking on the waveform boxes to the left of these numerical values.

![Figure 7.5 Main Tab - Ration Limit Reached](image)
Chapter 8 Configuration & General Status Tab

The Configuration & General Status Tab, shown in Figure 8.1, includes various status indicators and configuration controls. Items are grouped by function.

8.1 Interrupt Status

Indicators in the Interrupt Status section turn green when the corresponding bit is high and are dark when the bit is low.

8.2 General Status

Indicators in the General Status section turn green when the corresponding bit is high and are dark when the bit is low.

8.3 Emulation Behavior

Place a checkmark in a box to enable the corresponding emulation behavior.

Figure 8.1 Configuration & General Status Tab
8.4 Detect State Enable
Click the S0_SET box to remove the checkmark and disable the function.

8.5 Emulation Profile Disable
Profiles corresponding to boxes with a checkmark are disabled. They will not be used during emulation. Selecting the Disable ALL will toggle ALL profile check boxes.

8.6 Communications
Controls related to SMBus and USB communications.

8.7 Fault Handler
Controls related to fault handling.

8.8 General Control
Controls for general parameters.

8.9 Thermal Regulation
Controls for thermal and detection delay parameters.

8.10 Port Power Keep-out
Displays values for the port power parameters.

8.11 General Emulation / Charging Settings
Controls for emulation and charging.

8.12 Emulation Timeouts
Sets the emulation timeout period for each profile. These timeout periods are not used if the EM Timeout Disable control in the Emulation Behavior section is checked.

8.13 Charging Threshold Current
Controls charging threshold current setting.

8.14 High Speed Switch Configuration
Controls the high speed switch parameters.
Chapter 9 Custom Charging Tab

The Custom Charging Tab, shown in Figure 9.1, provides the means for users to create custom charger emulator configurations. Custom charger configurations include signaling on the USB data lines, as well as what method of current limiting to employ (constant current or trip). For more information, please refer to the UCS81001 Datasheet and Custom Emulation application note.

9.1 Custom Emulation Configuration

Creating a custom emulation profile is a two part process of entering the appropriate stimulus-response pairs in the fields provided as well as the desired current limiting behavior (after emulation is applied, and the portable device starts to draw current).

9.1.1 Example

The settings shown in Figure 9.1 will apply the Legacy 1 stimulus pair. This includes a voltage divider on DP and on DM with the values shown under STEP 5.

If the portable device draws bus current greater than the charging threshold being used, it will always operate in “trip” mode current limiting (with trip point based on the current limit setting).
9.2 Custom Current Limiting Behavior

The second part of creating custom profiles is to specify the behavior of current limiting and minimum voltage output. This is accomplished using the Ibus_r2min and Vbus_Min entry boxes shown in Figure 9.2.

![Figure 9.2 Voltage-Current Behavior](image)

9.3 Custom Emulation Quick Load

The Custom Emulation Quick Load pull down menu allows single click loading of the Custom Emulation Configuration registers. Simply select the profile to load from the pull down menu and registers 41h-4Ch will be loaded with that profile. Emulation Timeout will also be loaded based on the settings of the corresponding Emulation Timeout on the Configuration & General Status tab.
Chapter 10 Register Set Tab

The Register Set Tab, shown in Figure 10.1, allows viewing and updating of the UCS81001 registers, identifies the device on the EVB, and manages configuration files.

10.1 Register Content

Register Content, shown in Figure 10.1, is a scrollable list of the UCS81001 registers and the current value. It is important to note that not all addresses are physical memory locations on the device; these registers will read “0”. Likewise, some registers shown that are undocumented in the datasheet may have data. Editing these registers can cause unexpected results.

To update a register value, locate the register address in the left column, type the new value in the corresponding cell in the right column, and press the Enter key on the keyboard or click on another part of the GUI.

10.1.1 Numbering Systems Views

The Register Content section allows values to be displayed using different numbering systems: Decimal, Hex, Octal, Binary or SI Notation.

To view a value using a different numbering system, click the indicator to the left of the value in the cell, shown circled in Figure 10.2.
10.2 Panel Controls: Single / Continuous Read

The panel defaults to continuous register reads (toggle switch in down position, as shown in Figure 6.1). To stop continuous register reads, click the Single Read Enable box to place an 'X' in it. In order to capture the register values at a given time, click the switch, which will briefly flip to Single Read.

10.3 Configuration Save and Load

The Register Set Tab contains controls, shown in Figure 10.3, which save the settings currently configured in the UCS81001 to allow quick re-configuration at any time.

To save configuration settings, configure the UCS81001 as desired, then display the Register Set Tab. In the File Stored Path box, type in a path, or select the folder icon to use a Windows-based navigation aid to select the folder where the configuration file will be saved. The file should be named with the extension ".txt" or similar text file format. Once a file name and location has been chosen, click the "Save All Register Values" switch, and the file is saved.

Note: If a file with the same name already exists, the file will be overwritten and old data will be lost.

The data is saved in 2 columns separated by tabs. The first column is the register address and the second column is the register data.

Once a file is saved, it can be recalled at any time by selecting the file in the File Load Path box and clicking the "Load All Register Values" switch.

10.4 Product Information

Product Information, shown in Figure 10.1, shows the values of three registers (FDh, FEh, and FFh) which identify the device on the EVB.
10.5 GUI Information

Check for GUI Update requires an internet connection. When pressed it will check with SMSC if the current version is up to date and will automatically download a zip file if out of date.

The Documentation button will launch a Windows file viewer opening the local folder containing the current EVB documentation.
Chapter 11 Troubleshooting

11.1 GUI Controls Unresponsive After Installation

Restart the computer. In some cases, a restart is required after installation.

11.2 GUI Freezes

If the GUI freezes for unknown reasons, communications cannot be stopped, and the program cannot be closed, disconnect the USB cable from the EVB, then close the program. Reconnect the EVB, then restart the GUI.

11.3 Random Panel Display

When an EVB is not connected to the PC running the GUI, the panel will be in an all zero register displayed state. This also occurs when SMBus communications are disconnected. The panel display is not meaningful. Connect the EVB and establish SMBus communications. If this still doesn’t work, there’s a problem with the connection. The cable or the USB port could be bad.

11.4 Device Is Not Charging or Not Charging Optimally

- Check current limit jumper is set appropriately.
- The current source may not have high enough capacity from VS.
- Run the Demo routine to determine highest current profile.

11.5 COM Error

A COM error is detected if either the LabView panel does not respond or if a Windows device driver error is shown.

- Check whether the SMSC USB Bridge driver is installed. If it is not installed, refer to the WIN7 document on the CD. Many times Windows 7 systems do not read the bridge chip correctly. In these cases the SMSC USB Bridge driver has to be installed manually.
Chapter 12 Getting Started

The EVB-USB82642 is configured by internal default registers. In this configuration it operates as a USB 2.0 combo device with a three port USB Hub (two external ports) and a Flash Media Controller with SMSC standard VID/PID/DID settings and USB to I²C bridge-ability.

The UCS81001 on port 3 is configured in Data Pass-through mode by default.

12.1 Configuration

The EVB-USB82642 is designed for flexible configuration solutions. It demonstrates functionality with default internal register settings, USB host downloadable configuration EEPROM, or USB host downloadable external firmware to a SPI flash.

The UCS81001 can be configured using the J9, J10, J11 jumpers at startup or by the UCS81002 GUI. In the default mode M1, M2 and EM_EN are set to ‘110’.

Table 12.1 Active Mode Selection

<table>
<thead>
<tr>
<th>#</th>
<th>M1</th>
<th>M2</th>
<th>EM_EN</th>
<th>ACTIVE MODE</th>
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<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>Dedicated Charger Emulation Cycle</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>Data Pass-through</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>BC1.2 DCP</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>BC1.2 SDP - See Note 12.1</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>Dedicated Charger Emulation Cycle</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>Data Pass-through</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>BC1.2 CDP</td>
</tr>
</tbody>
</table>

Note 12.1 BC1.2 SDP behaves the same as the Data Pass-through mode with the exception that it is preceded by a VBUS discharge when the mode is entered per the BC1.2 specification.

12.1.1 Configuration Source - Internal default

When the EVB-USB82642 does not detect an EEPROM or a valid SPI flash image upon power-up, the EVB-USB82642 uses internal default register settings; it sets the Vendor ID, Product ID, Language ID, and Device ID, and a few other choices from internal ROM code.

12.1.2 Configuration Source - External EEPROM

Upon power-up the EVB-USB82642 looks for an attached EEPROM on its I²C interface. The EVB-USB82642 provides a footprint (U10) where an external EEPROM (embedded in a DFN8 package of type 24C04) can be soldered to customize the Media Controller’s settings. The EEPROM contains 512 bytes of user customizable settings. Among the settings are Vendor ID, Product ID, and Device ID numbers. For details on the fields please see the USB82642 Software Release notes. To use the EEPROM the SPI flash chip U4 must first be removed.
12.1.3 Configuration Source - External Certification Chip

When an iPhone, iPad, or iPod is connected to the USB82642-EVB's USB interface, the external certification chip can be communicated with from the upstream microprocessor over the USB to I²C bridge to certify the system. If other devices are attached, the external certification chip is not involved in the data communication between control application and attached device.

Note: If the certification chip is installed, the 10.0 kΩ pulldown resistor R26 must also be installed.

12.1.4 Configuration Source - External SPI Flash

The installed SPI flash is initially blank. In this scenario the internal firmware will execute. External firmware updates can be downloaded via USB using the SMSC utility USBDM to the SPI flash. After downloading the EVB-USB82642 will execute out of the SPI flash.

Note: If the SPI flash is installed, the 10.0 kΩ pullup resistor R13 must also be installed.
# Chapter 13 Revision History

<table>
<thead>
<tr>
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<th>SECTION/FIGURE/ENTRY</th>
<th>CORRECTION</th>
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<tr>
<td>Rev. 1.1 (01-08-13)</td>
<td>All</td>
<td>Document updated according to Microchip rules</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>Totally revised:</td>
</tr>
<tr>
<td></td>
<td>Section Chapter 1, &quot;Preview&quot;</td>
<td>New chapter</td>
</tr>
<tr>
<td></td>
<td>Section 2.1, &quot;Features&quot;</td>
<td>Feature list adapted: EEPROM added. Activity LES removed.</td>
</tr>
<tr>
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<td>Section 2.2, &quot;General Description&quot;</td>
<td>Description of SMBus header corrected: -&gt; “an SMBus header interface to monitor I²C traffic from the the USB to I²C bridge”</td>
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<td>USBDM utility is used with EEPROM: An 8Mbit SPI Flash device&quot; -&gt; &quot;An EEPROM device&quot;</td>
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<tr>
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<td></td>
<td>Improved description how default configuration can be changed: “Default configuration can be changed by adding an EEPROM or SPI flash device into the provided footprint.”</td>
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<td>Section 2.3, &quot;USB82642 Evaluation System&quot;</td>
<td>New section</td>
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<td>Section 2.4, &quot;Functional Block Diagram&quot;</td>
<td>Function block diagram adapted (EEPROM added).</td>
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<td></td>
<td>Figure 2.2 updated, I2C / IF -&gt; SMBus / I2C / IF</td>
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<td>Chapter Chapter 3, &quot;Hardware Description&quot;</td>
<td>New chapter, including new figures of the top and bottom level silk screen and copper layers (moved from section General Description)</td>
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<td>Chapter Chapter 4, &quot;Software Installation&quot;</td>
<td>New chapter</td>
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<td>Chapter Chapter 5, &quot;GUI Overview&quot;</td>
<td>New chapter</td>
</tr>
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<td>Chapter Chapter 6, &quot;Fixed Right Side of Panel&quot;</td>
<td>New chapter</td>
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<td>Chapter Chapter 7, &quot;Main Tab&quot;</td>
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Table 13.1 Customer Revision History (continued)

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<th>CORRECTION</th>
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<tr>
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<td>Chapter Chapter 8, &quot;Configuration &amp; General Status Tab&quot;</td>
<td>New chapter</td>
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<td>Chapter Chapter 9, &quot;Custom Charging Tab&quot;</td>
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<tr>
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<td>Chapter Chapter 10, &quot;Register Set Tab&quot;</td>
<td>New chapter</td>
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<td></td>
<td>Chapter Chapter 11, &quot;Troubleshooting&quot;</td>
<td>New chapter</td>
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|                       | Chapter Chapter 12, "Getting Started" | Correspons old chapter 2  
First paragraph of section Configuration: Description improved  
Section Configuration Source - Internal default: Description improved  
Section Configuration Source - External EEPROM: added  
Section Configuration Source - External SPI Flash: Description improved |
|                       | Chapter Chapter 13, "Revision History" | Own Chapter added. |
| Rev. 1.0 (12-15-11)   | Initial version of document |