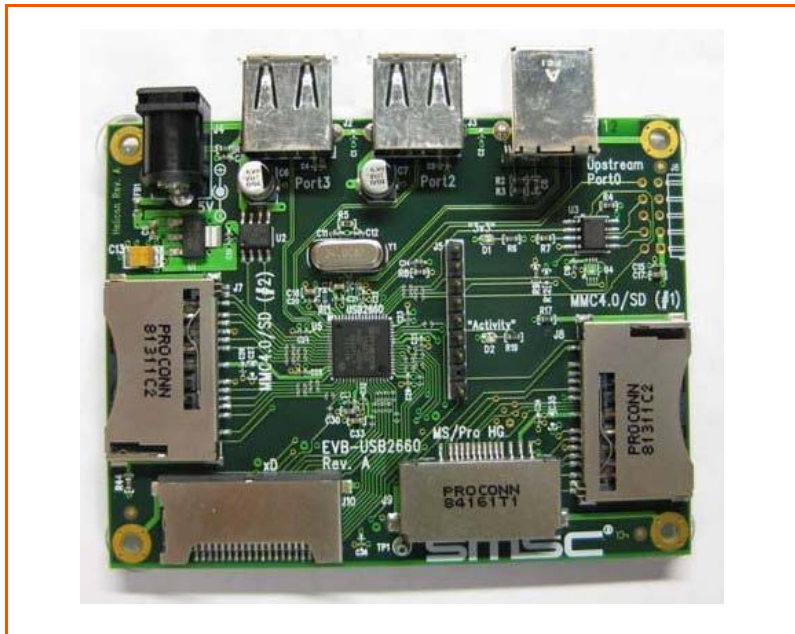


## EVB-USB2660/USB2660i Evaluation Board Revision A User Manual



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## 1 Overview

The SMSC USB2660 contains an Ultra Fast USB 2.0 Hub, Flash Media Controller, and Protocol Bridge Combo. The EVB-USB2660/60i Evaluation Board demonstrates a standalone application for developers of the following applications: Flash Media Card Reader/Writer, printers, desktop and mobile PCs, consumer A/V, and flat panel displays, among others.

### 1.1 General Description

The EVB-USB2660/60i is an evaluation and demonstration platform featuring the USB2660/60i Ultra Fast USB 2.0 Hub, Flash Media Controller, and Protocol Bridge Combo on a 4-layer RoHS compliant printed circuit board.

The EVB-USB2660/60i is designed to demonstrate the unique features of this device using a low-cost PCB implementation with individual port power control for the downstream USB 2.0 ports. It is designed to support internal default configuration settings and either an external I<sup>2</sup>C EEPROM (optional) for customized configured functionality or SPI flash for customized configured functionality or for external firmware. A SPI flash device is populated on the evaluation board to provide firmware updates via USB by using the SMSC provided USBDM utility, as required.

Default configuration can be changed by adding an EEPROM into the provided footprint. However, the SPI flash device has to first be removed to avoid signaling conflicts. [Figure 2.1](#) and [Figure 2.2](#) show the top and bottom level silk screen and copper layers.

The EVB-USB2660/60i is compatible with the following:

- Microsoft<sup>®</sup> Vista
- Windows<sup>®</sup> XP
- Windows<sup>®</sup> ME
- Windows<sup>®</sup> 2k SP4
- Apple<sup>®</sup> OSx
- Linux<sup>®</sup> Mass Storage Class Drivers.

Schematics, Layout, and Bill of Materials are included minimizing new product development time.

### 1.2 Features

- 64-Pin QFN (RoHS compliant) package.
- Supports these Media Types on Media I/F1:
  - Secure Digital (SD2.0, HS-SD, HC-SD)
  - MultiMediaCard<sup>™</sup> 4.2
  - xD-Picture Card<sup>™</sup>
  - Memory Stick<sup>®</sup> 1.43
  - High Speed Memory Stick<sup>™</sup>
  - Memory Stick Pro-HG<sup>™</sup>
  - Memory Stick Duo Memory Stick Pro<sup>™</sup>
- Supports these Media Types on Media I/F2:
  - Secure Digital (SD2.0, HS-SD, HC-SD)
  - MultiMediaCard<sup>™</sup> 4.2
- Simultaneous access to any one device on Media I/F1 and any one device on Media I/F2.
- Internal FET power switches for all media types; no external power FETs needed.
- Two USB 2.0 downstream hub ports with individual port power and over-current sense.
- Hi-Speed (480 Mbits/s), Full-Speed (12 Mbits/s), and Low-Speed (1.5 Mbits/s) compatible.
- Individual port over-current sensing.
- Individual port power control.



- Supports internal default configuration
- Optionally supports external configuration.
  - External I<sup>2</sup>C EEPROM for configuration options (optional).
  - External SPI flash for configuration options (optional).
  - External SPI flash for USB downloadable firmware (optional).
- Low cost 4-Layer space saving design.
- Self-powered operation.
- Operates from a single voltage (+5.0 VDC, regulated) external power supply.
- Single onboard +3.3 VDC regulator.
- +3.3 VDC power LED indicator.
- Activity LED indicator.
- Single crystal clock source.
- Test header locations for firmware development and debug.

## 2 Hardware Configuration

### 2.1 Hardware Description

The EVB-USB2660/60i has one onboard regulator, which generates +3.3 VDC from an external +5 VDC regulated power supply. The USB2660/60i generates its own 1.8 VDC for internal use using on-chip +1.8 VDC regulators. The internal 1.8 Volt regulator to the oscillator and PLL is turned off during suspend to minimize suspend current. The USB2660/60i consumes power from the 3.3 Volt supply. Downstream port power is distributed by a power switch, U2, that consumes power from the 5 Volt supply.

#### 2.1.1 Port Assignment

Downstream ports are numbered 2 and 3 with individual port power controllers. The port power controllers provide 5 volts of power with over-current protection to the downstream devices. Upstream and downstream port connectors have USB 2.0 compliant decoupling and a separate shield ground.

#### 2.1.2 USB2660/60i Configuration

**Default:** The EVB-USB2660/60i has been set up to support internal default configuration as determined by the empty state (no valid signature ID) of the SPI flash or of the EEPROM immediately after reset. When no valid EEPROM or SPI image is detected, the Vendor ID, Product ID, Language ID, and Device ID, and a few other choices are set using ROM code defaults.

**EEPROM Option:** The EVB-USB2660/60i can load configuration from an external two-wire, I<sup>2</sup>C EEPROM U4. The EEPROM must be installed at U4, and the SPI device at U3 should be removed to enable this option. The EEPROM may be pre-programmed before installation, or it can be programmed with the USB host using the provided SMSC USBDM application.

This option allows access to all of the configuration registers and ID strings for the USB2660/60i device for detailed functional analysis and exercise as desired. The EVB-USB2660/60i is compatible with I<sup>2</sup>C EEPROMs from several manufacturers. The memory capacity must be at least 512 bytes.

**SPI Option:** The EVB-USB2660/60i can load configuration from an external SPI flash memory device at U3 only when the SPI flash is supplying external ROM code and the external code specifies this mode. The memory must be programmed with the USB host using the interface and programming utility supplied by SMSC, or by programming the SPI device in-situ, or by programming the SPI externally and then installing it at U3 to enable the SPI option.

This option allows access to all of the configuration registers and ID strings for the USB2660/60i device for detailed functional analysis and exercise as desired. The EVB-USB2660/60i is compatible with SPI flash memory devices from several manufacturers. The SPI flash capacity must be at least 128 kilobytes.

#### 2.1.3 Powered State LED

An optional LED, D1, indicates when +5 VDC and +3.3 VDC power are present.

#### 2.1.4 Activity LED

An optional LED, D2, indicates when the USB2660/60i is active, as defined by firmware.



## 2.1.5 Media Interface 1

The USB2660/60i supports a wide array of devices. Media Interface 1 accommodates all of the media types supported through the use of three media socket connectors. Adapters may be needed for some form factors.

- J8 supports SD media up to the specification limit of 4 bits wide. It also supports MMC media up to the specification 2.0 of 8 bits wide.
- J9 supports MS, MS Pro, MS Duo, and MS Pro-HG media at up to the specification limit of 8 bits wide.
- J10 supports xD-Picture Card media.

Since these connectors are all on the same media bus, only one device is allowed to be inserted into any of these media socket connectors at one time for the Media Interface 1.

A device may be inserted into the media interface 2 connector (J7) and simultaneously accessed while a single device is inserted and being accessed in Media Interface 1.

## 2.1.6 Media Interface 2

Media Interface 2 accommodates all of the SD and MMC media types supported through the use of the media socket connectors at J7. Adapters may be needed for some form factors.

## 2.1.7 Connector Description

The EVB-USB2660/60i has a set of standard USB style connectors, one of type B for the upstream port and two of type A for downstream ports. It also has a standard set of media storage style connectors, which supports popular flash media formats from the xD-Picture Card (xD), Memory Stick (MS), Secure Digital (SD), and MultiMediaCard (MMC) families. Power is supplied via a 2.0 mm power jack. [Table 2.1](#) lists all of the connectors. For more details on the pinout of the connectors please see the schematic.

**Table 2.1 Connector Description**

CONNECTOR	TYPE	DESCRIPTION
J1	USB B	Upstream Port
J2	USB A	Downstream Port 3
J3	USB A	Downstream Port 2
J4	Power Jack 2.0mm	+5 VDC Power Supply
J5	Header	GPIO Test - DNP
J6	Header	SPI Test - DNP
J7	SD/MMC4.0	SD/MMC I/F #2
J8	SD/MMC4.0	SD/MMC I/F #1
J9	MS/MS Duo/MS Pro-HG	MS I/F
J10	xD	xD I/F

## 2.1.8 Layout Considerations

The EVB-USB2660/60i is designed on four PCB layers: two signal layers and two supply layers. The PCB layer stack is shown in [Table 2.2](#). All signals are routed on top and bottom layers. Internal layers are ground and power. Note that the differential signals from the USB2660/60i match the upstream and downstream port placement, and that the media I/F signals flow easily to their destination connectors simplifying routing of critical signals.

**Table 2.2 PCB layer stack**

Component Side	
Solder mask	

**Table 2.2 PCB layer stack**

Layer 1	1.9 - 2.8 mil, finished
Pre-preg	4.25 mil, +/- 0.25 mil FR-4
Layer 2	1.3 mil (nominal)
Core	~45 mil FR-4
Layer 3	1.3 mil (nominal)
Pre-preg	4.25 mil, +/- 0.25 mil FR-4
Layer 4	1.9 - 2.8 mil, finished
Solder mask	
<b>Solder Side</b>	

The component side top layer is shown in [Figure 2.1](#) with silk screen information to identify component locations.

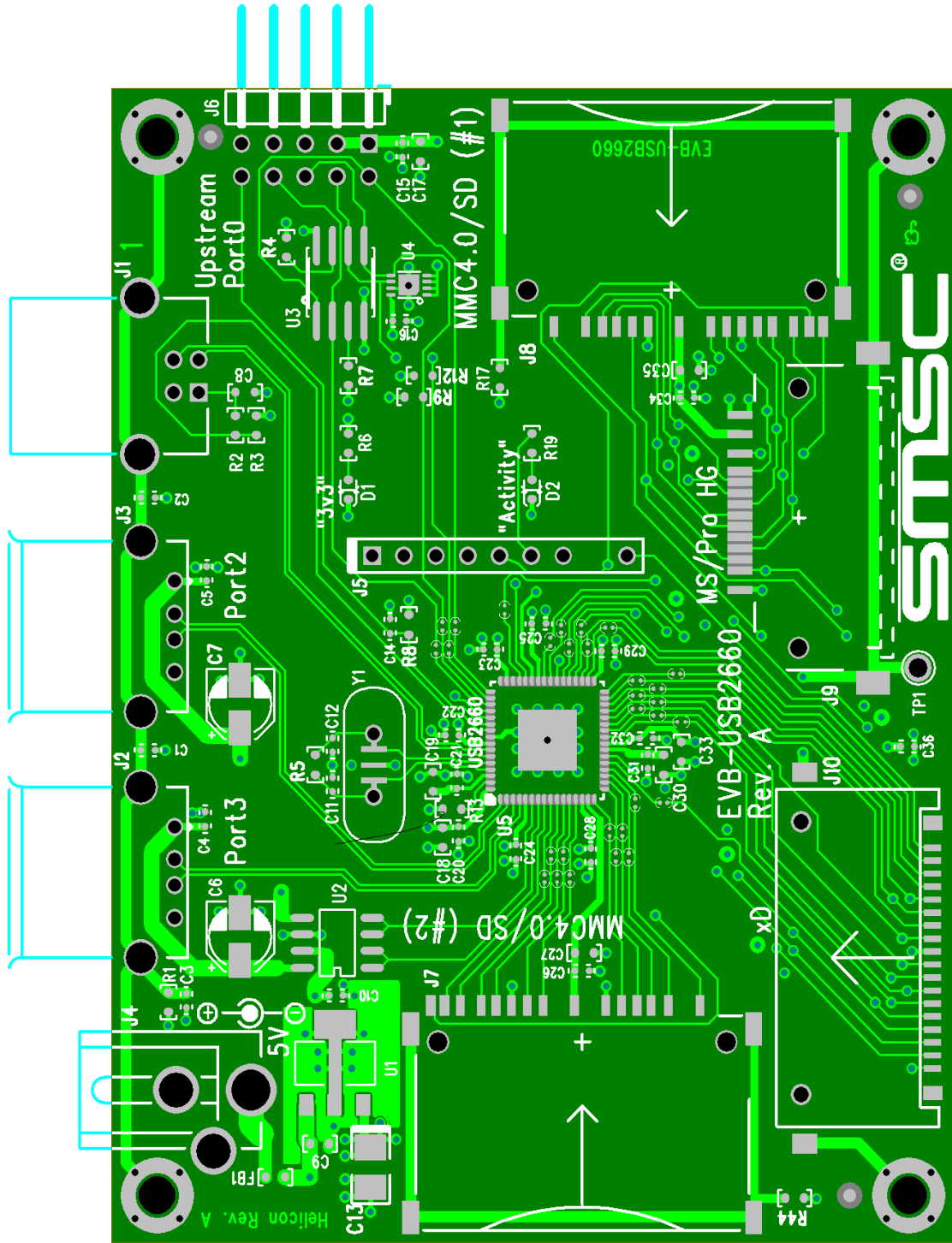


Figure 2.1 EVB\_USB2660/60i Top Layer - Component Side

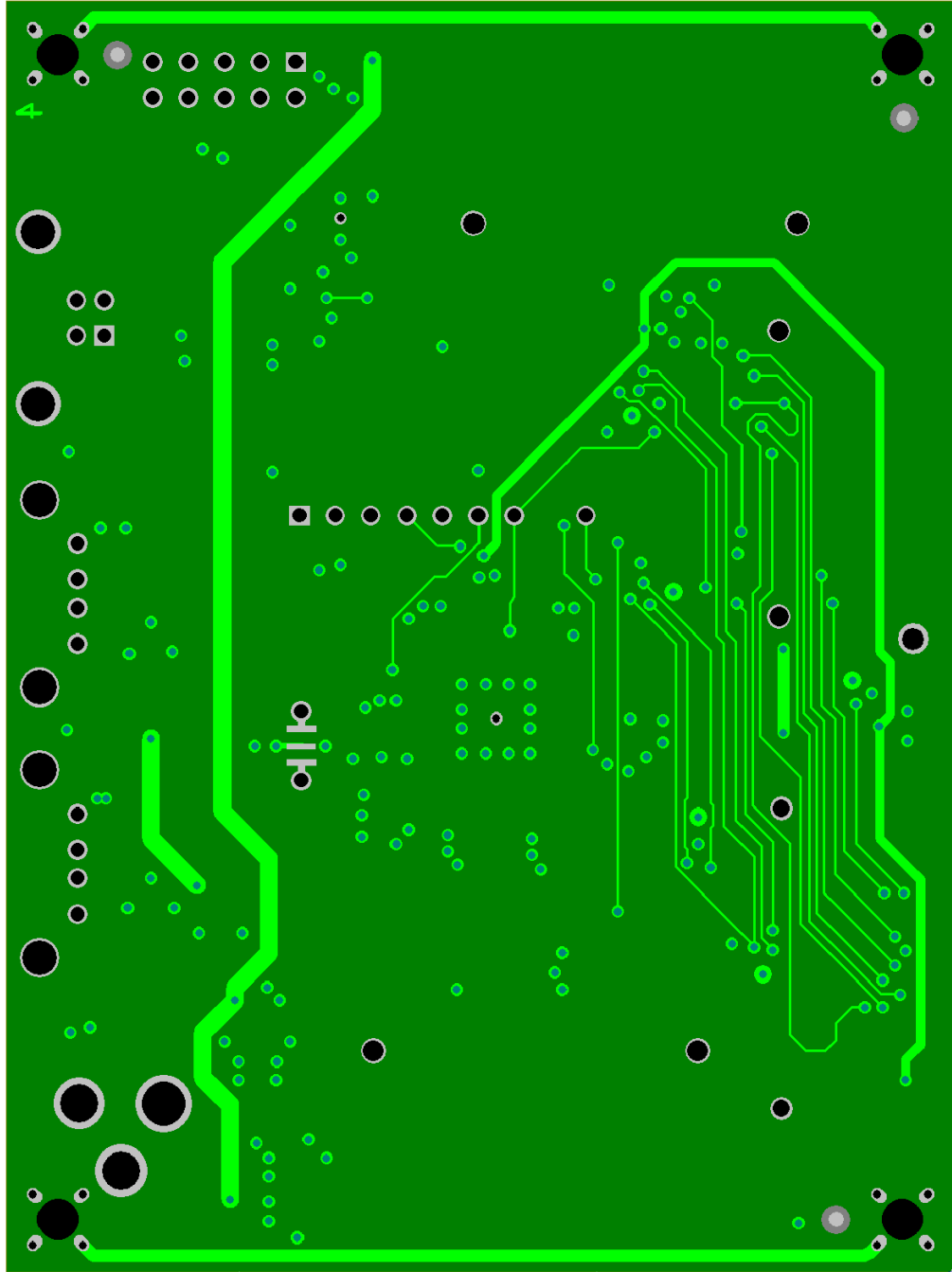


Figure 2.2 EVB\_USB2660/60i Bottom Layer - Solder Side