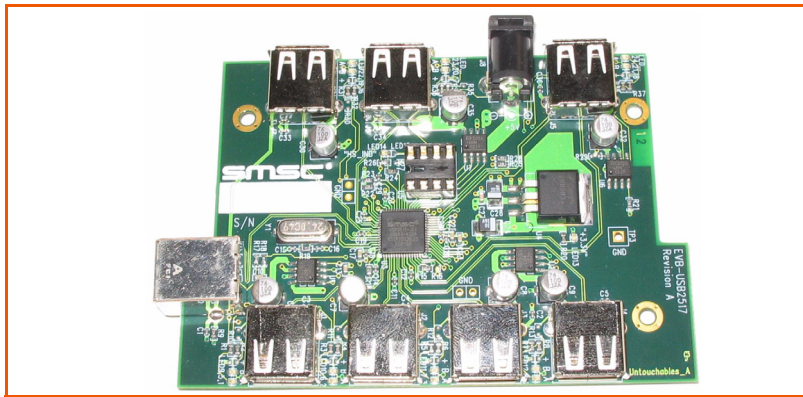


EVB-USB2517

Evaluation Board User Manual

(Revision A)



Copyright © 2009 SMSC or its subsidiaries. All rights reserved.

Circuit diagrams and other information relating to SMSC products are included as a means of illustrating typical applications. Consequently, complete information sufficient for construction purposes is not necessarily given. Although the information has been checked and is believed to be accurate, no responsibility is assumed for inaccuracies. SMSC reserves the right to make changes to specifications and product descriptions at any time without notice. Contact your local SMSC sales office to obtain the latest specifications before placing your product order. The provision of this information does not convey to the purchaser of the described semiconductor devices any licenses under any patent rights or other intellectual property rights of SMSC or others. All sales are expressly conditional on your agreement to the terms and conditions of the most recently dated version of SMSC's standard Terms of Sale Agreement dated before the date of your order (the "Terms of Sale Agreement"). The product may contain design defects or errors known as anomalies which may cause the product's functions to deviate from published specifications. Anomaly sheets are available upon request. SMSC products are not designed, intended, authorized or warranted for use in any life support or other application where product failure could cause or contribute to personal injury or severe property damage. Any and all such uses without prior written approval of an Officer of SMSC and further testing and/or modification will be fully at the risk of the customer. Copies of this document or other SMSC literature, as well as the Terms of Sale Agreement, may be obtained by visiting SMSC's website at <http://www.smSC.com>. SMSC is a registered trademark of Standard Microsystems Corporation ("SMSC"). Product names and company names are the trademarks of their respective holders.

SMSC DISCLAIMS AND EXCLUDES ANY AND ALL WARRANTIES, INCLUDING WITHOUT LIMITATION ANY AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, TITLE, AND AGAINST INFRINGEMENT AND THE LIKE, AND ANY AND ALL WARRANTIES ARISING FROM ANY COURSE OF DEALING OR USAGE OF TRADE. IN NO EVENT SHALL SMSC BE LIABLE FOR ANY DIRECT, INCIDENTAL, INDIRECT, SPECIAL, PUNITIVE, OR CONSEQUENTIAL DAMAGES; OR FOR LOST DATA, PROFITS, SAVINGS OR REVENUES OF ANY KIND; REGARDLESS OF THE FORM OF ACTION, WHETHER BASED ON CONTRACT; TORT; NEGLIGENCE OF SMSC OR OTHERS; STRICT LIABILITY; BREACH OF WARRANTY; OR OTHERWISE; WHETHER OR NOT ANY REMEDY OF BUYER IS HELD TO HAVE FAILED OF ITS ESSENTIAL PURPOSE, AND WHETHER OR NOT SMSC HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

1 Overview

The SMSC USB2517 is a low-power, OEM configurable, hub controller IC with 7 downstream ports for embedded USB solutions. The USB2517 is a USB 2.0-compliant MultiTRAK™ hub that supports low-speed, full-speed, and hi-speed downstream devices. The EVB-USB2517 evaluation board demonstrates a stand alone application for the hub with all of the features listed below. The SMSC evaluation board demonstrates advanced power saving options and configurable port assignments.

1.1 Features

- Low pin count: 64-pin QFN package
- Hi-Speed (480 Mbits/s), Full-Speed (12 Mbits/s), and Low-Speed (1.5 Mbits/s) compatible
- Operates from a single voltage (+5.0 V, regulated) 'wall wart' external power supply
- Low cost 4-layer design: two outer signal layers, power and ground inner layers
- Self-powered operation
- Multi-TT enabled
- Supports internal default hub configuration (optional support configuration from external EEPROM)
- Single onboard +3.3 V regulator
- Single crystal clock source
- Individual port over-current sensing
- Individual port power control
- Port OCS/port power control interface with LEDs for optional port power indication
- Red LED indicator for Hi-Speed hub state
- Standard USB amber/green LED indicators for operational state indication
- EMI suppression provided by selection of capacitors and inner power/ground PCB layers

1.2 General Description

The EVB-USB2517 is a low-cost evaluation platform featuring the USB2517 7-port, low-power, hi-speed USB 2.0 hub with MultiTRAK™ technology. The platform is designed to robustly demonstrate the unique features of this device using a low-cost PCB implementation with individual port power control. The EVB-USB2517 is designed with efficient power usage for the implementation of a hi-speed USB hub with minimal bill-of-materials. Schematics, layout, and bill-of-materials are included to minimize new product development time.

Revision A of the EVB-USB2517 features a four-layer printed circuit board to improve coupling between power and ground layers to reduce EMI.

2 Hardware Configuration

2.1 Hardware Description

The EVB-USB2517 has one onboard regulator, which generates 3.3 volts from an external 5 volt power supply. The USB2517 generates its own on-chip 1.8 volt supply. The internal 1.8 volt regulator to the oscillator and the PLL is turned off during suspend to minimize suspend current. The USB2517 hub consumes power from the 3.3 volt supply. Downstream port power is distributed by four power switches (U1, U2, U6 and U7) that consume power from the 5 volt supply.

2.1.1 Port Assignment

Downstream ports are numbered one through seven 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 Hub Configuration

Default: The EVB-USB2517 has been set up to support internal default configuration with no strapping options enabled as determined by the state of CFG_SEL2, CFG_SEL1 and CFG_SEL0 pins immediately after reset.

EEPROM Option: The EVB-USB2517 can load configuration from an external two-wire, I²C EEPROM U5. To enable this option, change the states of CFG_SEL2 and CFG_SEL1. Program and install an EEPROM at U5. This option allows access to all of the configuration registers and ID strings for the USB2517 device for detailed and desired functional analysis and exercise. The EVB-USB2517 is compatible with I²C EEPROMs from several manufacturers. The minimum memory requirement is 256 bytes.

2.1.3 Port Power LEDs

LEDs 9,10,11,12,16,17, and 18 can be arranged to indicate when port power is available. This feature is optional and consumes power in suspend mode. The recommendation is to leave this feature unpopulated for low-cost and low-power implementations.

2.1.4 Hi-Speed Indicator LED

A red LED, LED14 or LED15 (depending on the strapping of HS_IND/CFG_SEL1), indicates when the hub's upstream port is connected at Hi-Speed.

2.1.5 Powered State LED

An optional LED, LED13, indicates when power is present.

2.1.6 Connector Description

The EVB-USB2517 has a set of standard USB style connectors:

- One type B connector for the upstream port
- Seven type A connectors for downstream ports

Power is supplied via a 2.0 mm power jack. Please refer to [Table 2.1](#) for a list of the connectors. For more details on the pinout of the connectors please refer to the schematics in [Figure 2.1](#) and [Figure 2.2](#).

Table 2.1 Connector Descriptions

CONNECTOR	TYPE	DESCRIPTION
J0	USB B	Upstream Port
J1	USB A	Downstream Port 1
J2	USB A	Downstream Port 2
J3	USB A	Downstream Port 3
J4	USB A	Downstream Port 4
J5	USB A	Downstream Port 5
J6	USB A	Downstream Port 6
J7	USB A	Downstream Port 7
J8	Power Jack 2.0 mm	+5 V Power Supply

2.1.7 Layout Considerations

The EVB-USB2517 is a low-power, hi-speed USB 2.0 compliant hub on four PCB layers. Please refer to [Table 2.2](#) for a list of the PCB layer stackup. Differential signals from the USB2517 match the upstream and downstream port placement to simplify the routing of critical signals.

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

Table 2.2 PCB Layer Stackup

COMPONENT SIDE	
Solder mask	
Layer 1	1.3 - 2.3 oz., finished
Pre-preg	4.0 - 4.5 mil FR-4
Layer 2	1.0 oz., nominal
Core	28 mil FR-4
Layer 3	1.0 oz., nominal
Pre-preg	4.0 - 4.5 mil FR-4
Layer 4	1.3 - 2.3 oz., finished
Solder mask	
Solder Side	

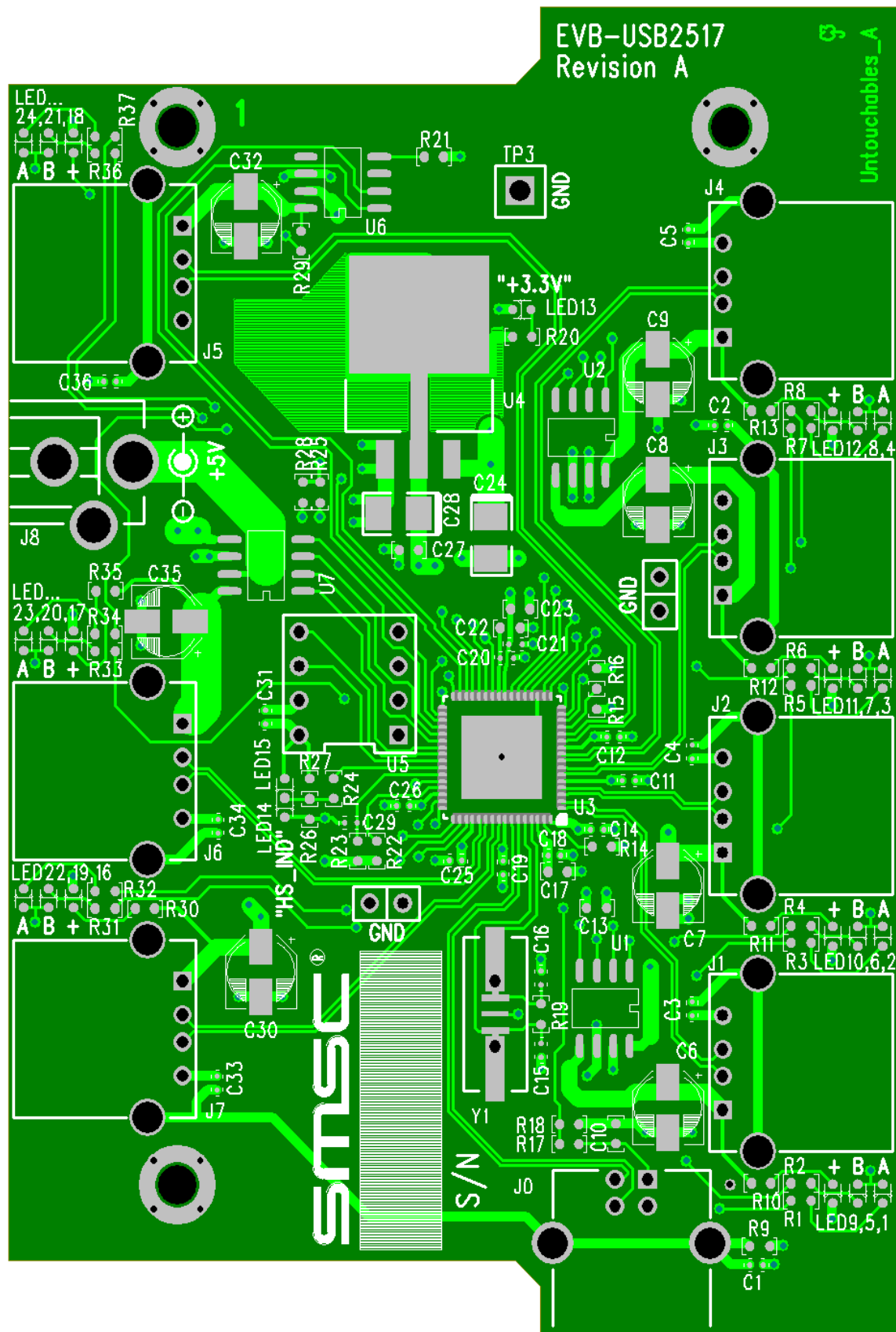


Figure 2.1 EVB-USB2517 64-Pin Component Side Top Layer

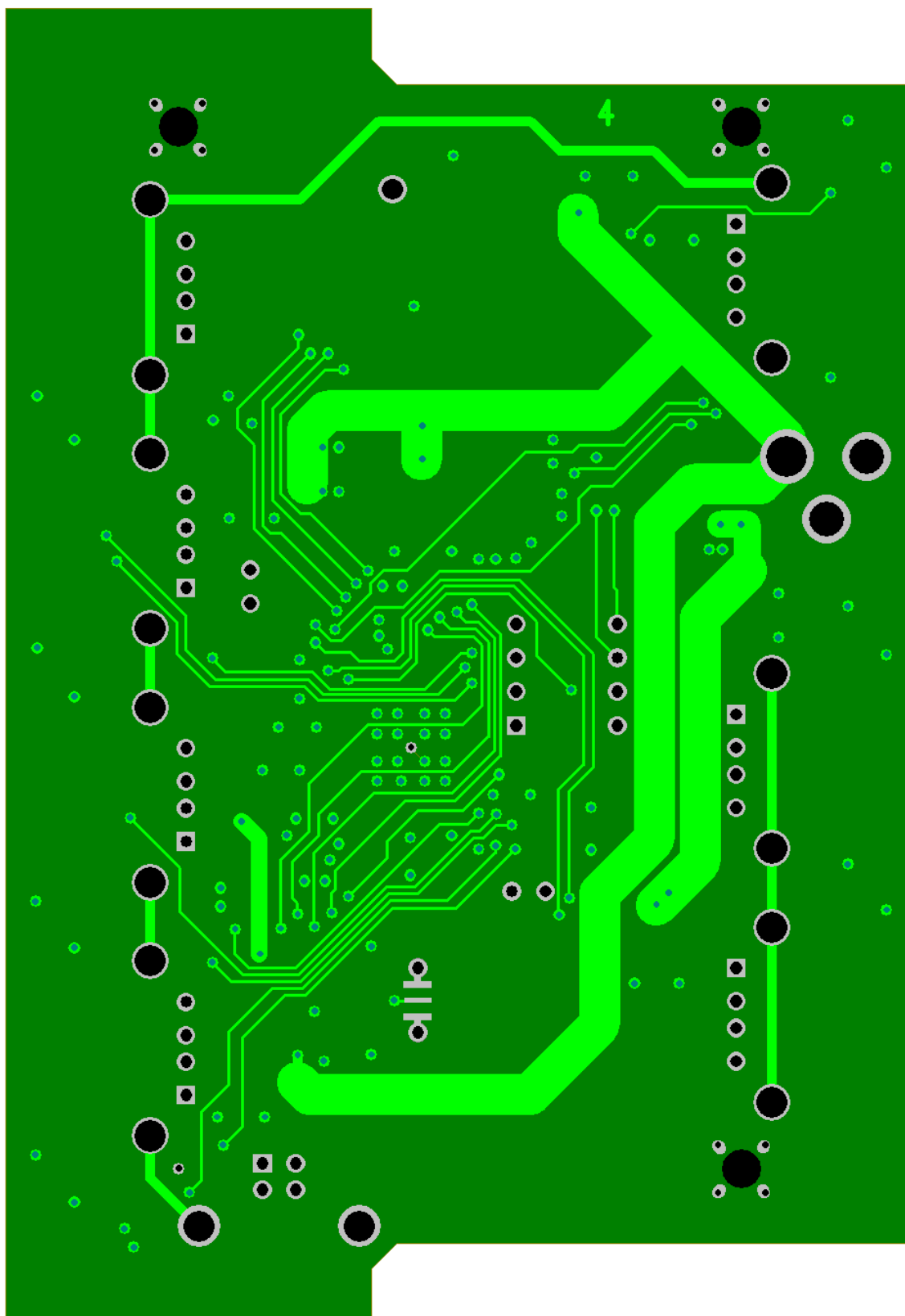


Figure 2.2 EVB-USB2517 64-Pin Solder Side Bottom Layer