



## EVB-USB2514B-FS USB Full Speed Evaluation Board User Manual



Copyright © 2008 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 USB2514B MultiTRAK™ is a Low-Power Full-Featured Full-Speed USB2.0 compliant hub with four down-stream ports. The EVB-USB2514B-FS Evaluation Board demonstrates a stand alone application for the hub with all the features listed below and demonstrates the advanced power saving options and configurable port assignments.

### 1.1 Features

- USB2514B 36 - pin QFN package low pin count.
- Full-Speed (12Mbps/s), and Low-Speed (1.5Mbps/s) compatible.
- Operates from a single voltage (+5.0V, regulated) 'wall wart' external power supply.
- Low Cost 4-Layer Design: two outer signal layers, power and ground inner layers.
- Optional pull-up resistors for disabling individual downstream ports.
- Self-powered operation.
- Supports internal default hub configuration.
- Single Onboard +3.3V Regulator. A footprint is provided for alternate regulator for industrial temperature operation.
- Single Crystal Clock Source.
- Individual port over-current sensing.
- Individual port power control.
- Port OCS/Port Power Control interface with LEDs for port power indication.
- Red LED indicator for active hub state (not suspend).
- EMI suppression provided by ferrite beads, selection of capacitors and internal power/ground layers.
- ESD protection up to 25 kV direct contact to USB signals provided with diode bridges and common mode chokes.

### 1.2 General Description

The EVB-USB2514B-FS is a demonstration and low-cost evaluation platform featuring the USB2514B MultiTRAK™ 4-port, Low-Power Full-Speed USB2.0 Hub. It is designed to robustly demonstrate the unique features of this device using a low-cost PCB implementation with individual port power control. Schematics, Layout, and Bill of Materials are included minimizing the customers new product development time.

Revision B of the EVB-USB2514B-FS has a four-layer printed circuit board to improve coupling between power and ground to reduce EMI. Ferrite beads were added on all connector ground and power nets. Protective diode bridges and common mode chokes were added to all USB signals.

## 2 Hardware Configuration

### 2.1 Hardware Description

The EVB-USB2514B-FS has one on board regulator, which generates 3.3V from 5V power supply. An alternate footprint U5 was added to support industrial temperature range. The alternate footprint supports a larger package and has ties into the ground plane for better thermal dissipation. The USB2514B generates its own on chip 1.8V supply. The USB2514B Hub consumes power from the 3.3V supply while the MIC2026 Power distribution switch consumes power from the 5V supply. The MIC2026 Power distribution switch supplies downstream power to each attached device.

#### 2.1.1 Port Assignment

Down-stream ports are numbered 1 through 4 with individual port power controllers. The port power controllers provide 5 Volts power with over-current protection to the downstream devices. Upstream and downstream port connectors have USB 2.0 compliant decoupling, filtering for EMI on signal ground and power, and a separate shield ground. ESD protection for USB signals is provided by diode bridges and common mode chokes. This gives protection up to 25 kV direct contact to USB signals.

Optional pull-up resistors can be placed to disable a USB port, see schematic for implementation.

#### 2.1.2 HUB Configuration

The EVB-USB2514B-FS has been configured to support internal default configuration with strapping options enabled as determined by the state of CFG\_SEL1 and CFG\_SEL0 pins immediately after reset. The internal 1.8V regulator supplies voltage to the oscillator and PLL is turned off during suspend to minimize suspend current.

#### 2.1.3 Port Power LEDs

LEDs 1-4 can be placed to indicate when port power is available. This feature is optional and consumes power in suspend mode. The recommendation is to leave unpopulated for low cost and low power implementations.

#### 2.1.4 Active State LED

A red LED, LED6 indicates when the hub is not in suspend.

#### 2.1.5 Powered State/Backlight LED

An optional LED, LED5 indicates when 5V power is present.

#### 2.1.6 Connector Description

The EVB-USB2514B-FS has a standard set of USB style connectors, one of type B for upstream ports and four of type A for downstream ports. Power is supplied via a 2.0 mm power jack. [Table 2.1](#) lists all the connectors. For more details on the pinout of the connectors please see the schematic.

**Table 2.1 Connector Description**

CONNECTOR	TYPE	DESCRIPTION
J5	USB B	Upstream Port
J1	USB A	Downstream Port 1
J2	USB A	Downstream Port 2
J3	USB A	Downstream Port 3

**Table 2.1 Connector Description (continued)**

CONNECTOR	TYPE	DESCRIPTION
J4	USB A	Downstream Port 4
J6	Power Jack 2.0mm	+5V Power Supply