



EVB-USB2514Q36-BAS, USB2513 and USB2512 36-Pin QFN Evaluation Board User Manual



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1 Overview

The SMSC USB2514 MultiTRAK™ is a Low-Power Full-Featured High-Speed USB2.0 compliant hub with four down-stream ports. The EVB-USB2514Q36-BAS 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. Two other versions of the evaluation board are available using the same printed circuit board populated with either the USB2512, 2-port hub or the USB2513, 3-port hub with part numbers EVB-USB2512Q36-BAS and EVB-USB2513Q36-BAS.

1.1 Features

- USB2514 36 - pin QFN package low pin count. USB2512 for 2-port version and USB2513 for 3-port version.
- High-Speed (480Mbps/s), 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.
- Multi-TT enabled (USB2513/14 only).
- 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-USB2514Q36-BAS is a demonstration and low-cost evaluation platform featuring the USB2514 MultiTRAK™ 4-port, Low-Power High-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. The EVB-USB2514 is designed for low cost, power efficient implementation of a High speed USB Hub with minimal bill of materials. Schematics, Layout, and Bill of Materials are included minimizing the customers new product development time.

Revision B of the EVB-USB2514Q36-BAS 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-USB2514Q36-BAS 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 USB2514 generates its own on chip 1.8V supply. The USB2514 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-USB2514Q36-BAS 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-USB2514Q36-BAS 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

2.1.7 Layout Considerations

The EVB-USB2514Q36-BAS is a Low-Power High-Speed USB2.0 compliant hub on four PCB layers see [Table 2.2](#) for PCB stackup. All signals are routed on the top layer demonstrating the simplicity of implementation. Differential signals from the USB2514 match the upstream and downstream port placement, simplifying routing of critical signals.

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

Table 2.2 PCB stackup

Component Side	
Soldermask	
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	1.0oz., nominal
pre-preg	4.0 - 4.5 mil FR-4
Layer 4	1.3 - 2.3 oz., finished
Soldermask	
Solder Side	

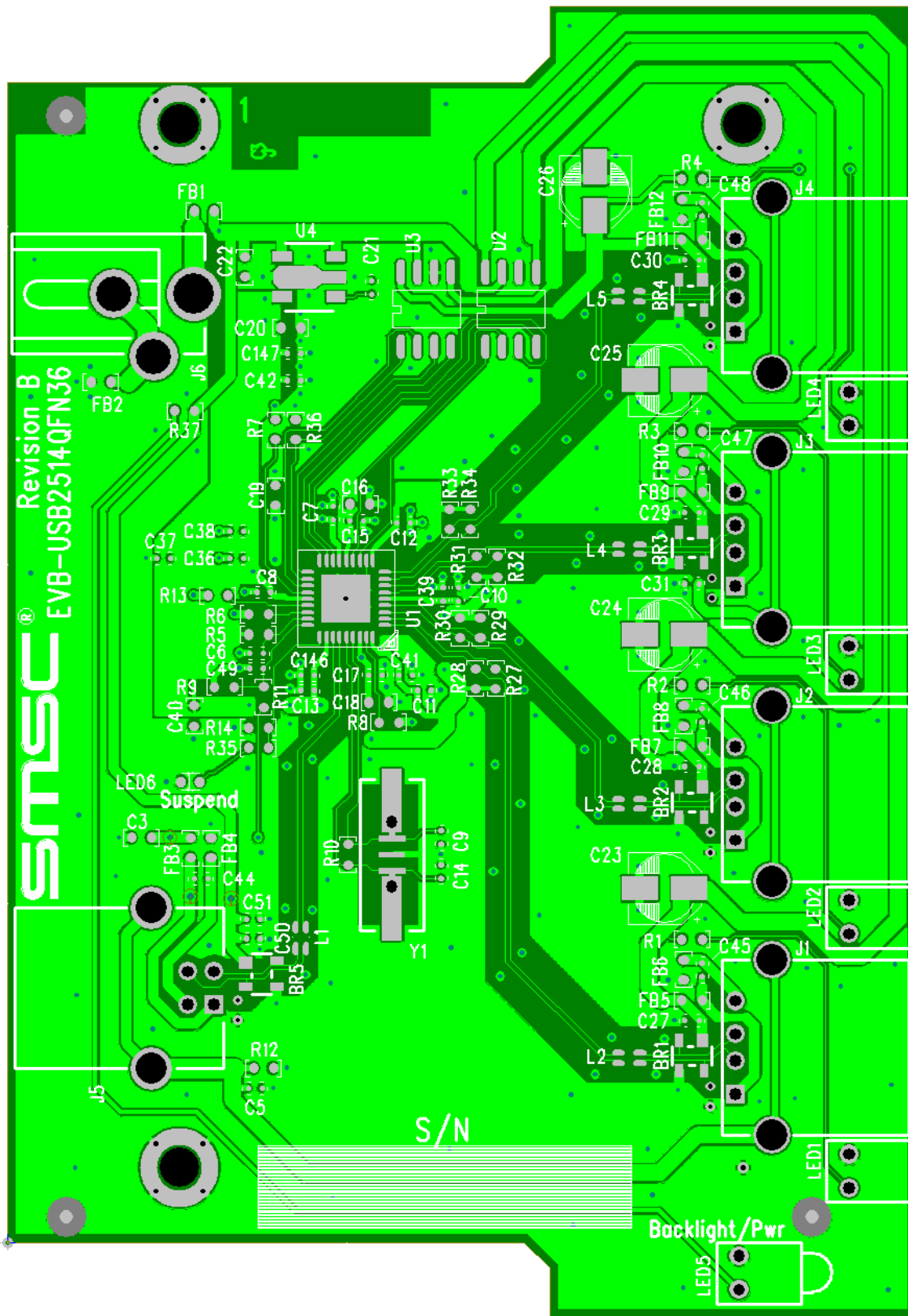


Figure 2.1 EVB_USB2514-36 Pin Component Side Top Layer

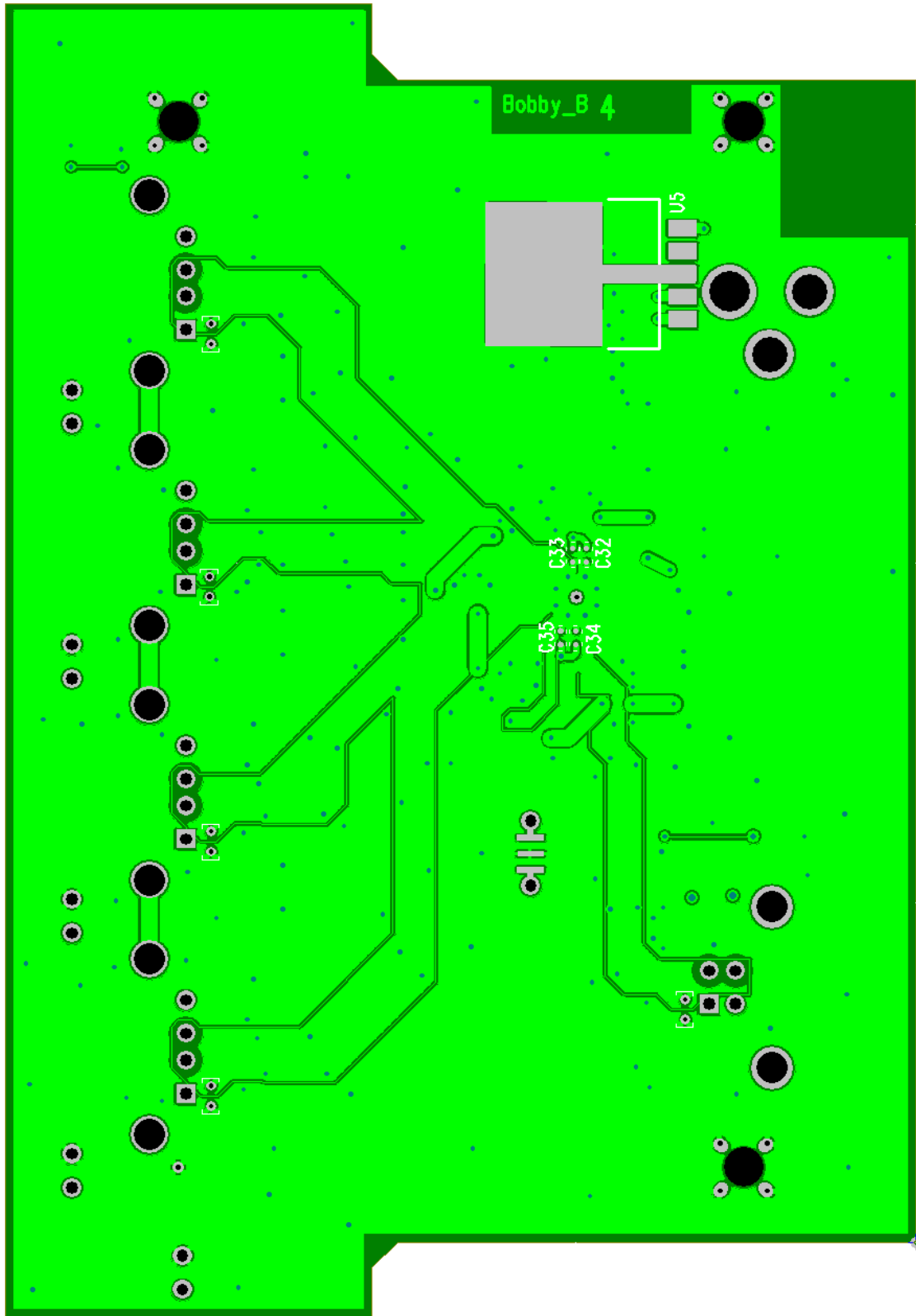


Figure 2.2 EVB_USB2514-36 Pin Solder Side Bottom Layer