1 Overview

EVB-USB2502 Revision C Evaluation Board for the SMSC USB2502 USB2.0 Compatible 2-port Hub.

1.1 Features

- USB 2.0 high-speed support with two downstream ports
- Operates from a single voltage (+5.0V, regulated) ‘wall wart’ external power supply
- Low Cost 2-Layer Design
- Self or bus-powered operation
- Overcurrent protection and port power switching (ganged mode)
- Green LED port indicators
- Single Onboard +3.3V Regulator
- Optional ESD and EMI footprints are provided
- Optional port power LED indicators
- Optional serial EEPROM for configuration in a socket for easy programming

1.2 General Description

The EVB-USB2502 is a demonstration and evaluation platform featuring the USB2502 2-port USB2.0 Hub. It is configured with strapping options without using an EEPROM. The EVB-USB2502 can operate in self-powered mode when the external power supply is attached or in bus-powered mode when the external supply is detached or not connected to the wall. Strapping options and configuration can be changed by moving strapping resistors to different locations on the PCB. Footprints are available for optional features such as ESD protection, EMI filtering and LED indicators. A socket is provided for an external EEPROM. Figure 1 shows the top level silk screen and copper layer.
Figure 1 Top level silk screen and copper layer
2 Getting Started

The EVB-USB2502 is configured by internal default and external strapping resistors. In this configuration it can operate as a generic self or bus-powered USB 2.0 hub with SMSC standard VID/PID/DID settings.

2.1 Configuration

The SMSC USB2502 is configured at the rising edge of RESET_N by sampling the state of pins CFG_SEL1 and CFG_SEL0. Selective populating resistor locations R1A, R1B, R2A and R2B determines the configuration source: internal default with strapping choice, SMBus or external EEPROM. Table 2.1 shows how to select the configuration source.

### Table 2.1 Configuration Source Selection - resistor values in Ohms

<table>
<thead>
<tr>
<th>Configuration Source</th>
<th>R1A</th>
<th>R1B</th>
<th>R2A</th>
<th>R2B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strapping with internal defaults</td>
<td>10k</td>
<td>None</td>
<td>10k</td>
<td>None</td>
</tr>
<tr>
<td>EEPROM</td>
<td>None</td>
<td>10k</td>
<td>10k</td>
<td>None</td>
</tr>
<tr>
<td>SMBus</td>
<td>10k</td>
<td>None</td>
<td>None</td>
<td>10k</td>
</tr>
</tbody>
</table>

2.1.1 Configuration source - Internal default with strapping choice

The internal default sets Vendor ID, Product ID and Device ID and a few other choices. External strapping choices can be selected if the hub is part of a compound device to declare one or more down-stream port(s) as non-removable. A generic hub has both down-stream ports declared removable. The straps are selected via resistors connected to pins NON_REM1 and NON_REM0. Table 2.2 describes the choices.

### Table 2.2 Non-removable port Selection - resistor values in Ohms

<table>
<thead>
<tr>
<th>Removable down-stream ports</th>
<th>R4A</th>
<th>R4B</th>
<th>R5A</th>
<th>R5B</th>
<th>R6A</th>
<th>R6B</th>
<th>R7A</th>
<th>R7B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both down-stream ports are removable</td>
<td>0</td>
<td>None</td>
<td>330</td>
<td>None</td>
<td>0</td>
<td>None</td>
<td>330</td>
<td>None</td>
</tr>
<tr>
<td>Down-stream port 1 is non-removable</td>
<td>None</td>
<td>0</td>
<td>None</td>
<td>330</td>
<td>0</td>
<td>None</td>
<td>330</td>
<td>None</td>
</tr>
<tr>
<td>(compound device)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Both down-stream ports are non-removable (compound device)</td>
<td>None</td>
<td>0</td>
<td>None</td>
<td>330</td>
<td>None</td>
<td>0</td>
<td>None</td>
<td>330</td>
</tr>
<tr>
<td>Determined by EEPROM or SMBus</td>
<td>None</td>
<td>0</td>
<td>None</td>
<td>330</td>
<td>None</td>
<td>0</td>
<td>None</td>
<td>330</td>
</tr>
</tbody>
</table>
2.1.2 Configuration source - External EEPROM

The EVB-USB2502 provides an 8-pin DIP socket IC U3 for an external EEPROM of type 24C00/01/02 to customize the hub settings. The EEPROM contains 16 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 data sheet for the SMSC USB2502. Note that strapping options do not have any effect when using EEPROM. Setting down-stream ports to be removable or non-removable is also done in a field in the EEPROM.

2.1.3 Configuration source - SMBus

The EVB-USB2502 can be configured via a cable connected to the socket U3 by an external SMBus host. The SMBus cable connects to socket pins 5 (SDA), 6 (SCLK) and 7 (GND). All the customizable settings are accessible through the SMBus. For details on the fields please see the data sheet for the SMSC USB2502.
3 Optional Features

The EVB-USB2502 printed circuit board has three non-populated options: Indicators, ESD protection and EMI filtering. These options can be populated for further evaluation. The EMI filtering options requires cuts in PCB traces to break bypass connections on the PCB.

3.1 Option - Indicators

There are two LED indicators for port power on status. These indicators are single color LEDs that require external 330 Ohm series resistors.

3.2 Option - ESD protection

The EVB-USB2502 has locations for three diode bridge devices to protect the USB signal lines from ESD events. Each bridge also needs a 100nF capacitor populated on a location nearby.

3.3 Option - EMI filter

There are two levels of EMI filtering. Each level requires cuts on the PCB to remove the bypass connection. The first level are ferrite beads in the VBUS path for each down-stream port and the up-stream port. The second level of filtering is a common mode choke placed in series of the three pairs of USB signals.