TS3USB3200 EVM User's Guide

This document is the EVM user guide for TS3USB3200. The TS3USB3200 is a double-pole, double throw (DPDT) USB, Mobile High-Definition Link (MHL), Mobility Display Port(MyDP) high-performance 2:1 Multiplexer/De-Multiplexer with an integrated ID switch.

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1 About this Manual

This user's guide describes the TS3USB3200 Evaluation Module (EVM) and its intended use. This guide contains the jumper configurations, EVM schematics, bill of materials (BOM), and board layer information.

1.1 Information about Cautions and Warnings

The information in a caution or a warning is provided for your protection. Read each caution and warning carefully.

CAUTION

This EVM contains components that can potentially be damaged by electrostatic discharge. Always transport and store the EVM in its supplied ESD bag when not in use. Handle using an antistatic wristband. Operate on an antistatic work surface. For more information on proper handling, see the *Electrostatic Discharge (ESD)* application note (SSYA008).

2 Introduction

The TS3USB3200EVM is an evaluation module for TI's 1:2 multiplexer/de-multiplexer high-performance USB/MHL/MyDP switch. It is specifically designed for high-speed signal switching that supports bi-directional operation and offers a high bandwidth (5.5 GHz typical). When interfacing other USB/MHL/MyDP devices with this EVM, the switch allows signals to pass with minimum edge and phase distortion as well as little or no signal attenuation.

The evaluation module is designed to demonstrate the small printed-circuit board (PCB) areas that can be achieved when designing with the TS3USB3200 switch. The TS3USB3200 offers the flexibility of powering from either a VCC rail (2.7 V to 4.3 V) or the VBUS power rail from the USB connector (4.75 V to 5.25 V) with the capability of switching between power rails using the PSEL pin. See Figure 1 for the EVM block diagram.

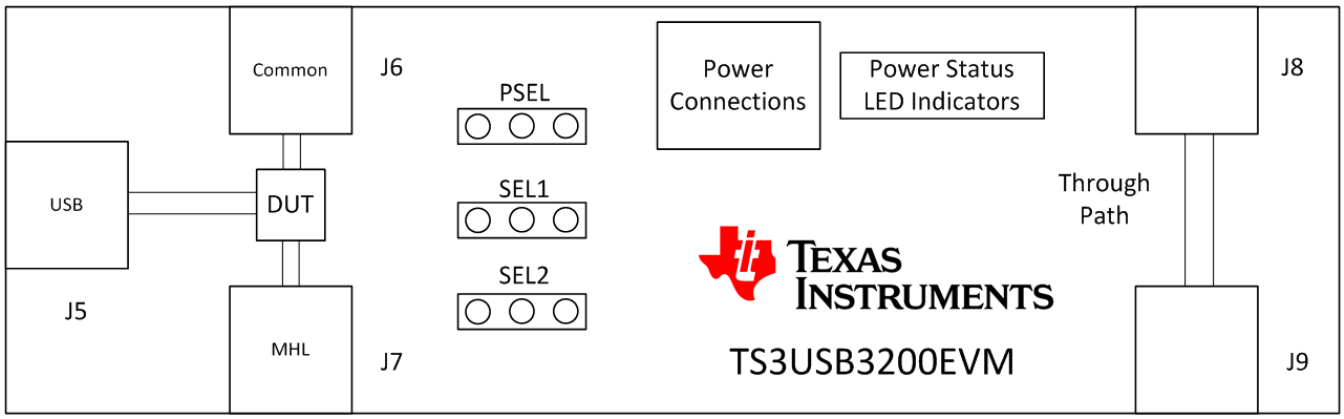

Figure 1. TS3USB3200 EVM Block Diagram

2.1 Hardware Items for Operation

The following items are required for EVM evaluation:

- TS3USB3200 EVM
- USB cables with connector type depending on the surrounding system

The following items are optional for EVM evaluation:

- MHL/MyDP source capable of interfacing through a female-to-male micro-B connection
- MHL-to-HDMI adapter
- Display capable of displaying MHL/MyDP/HDMI at appropriate frame rate

3 Quick Start Evaluation

3.1 Evaluation Overview

Figure 2 provides a diagram of the setup, for evaluation.

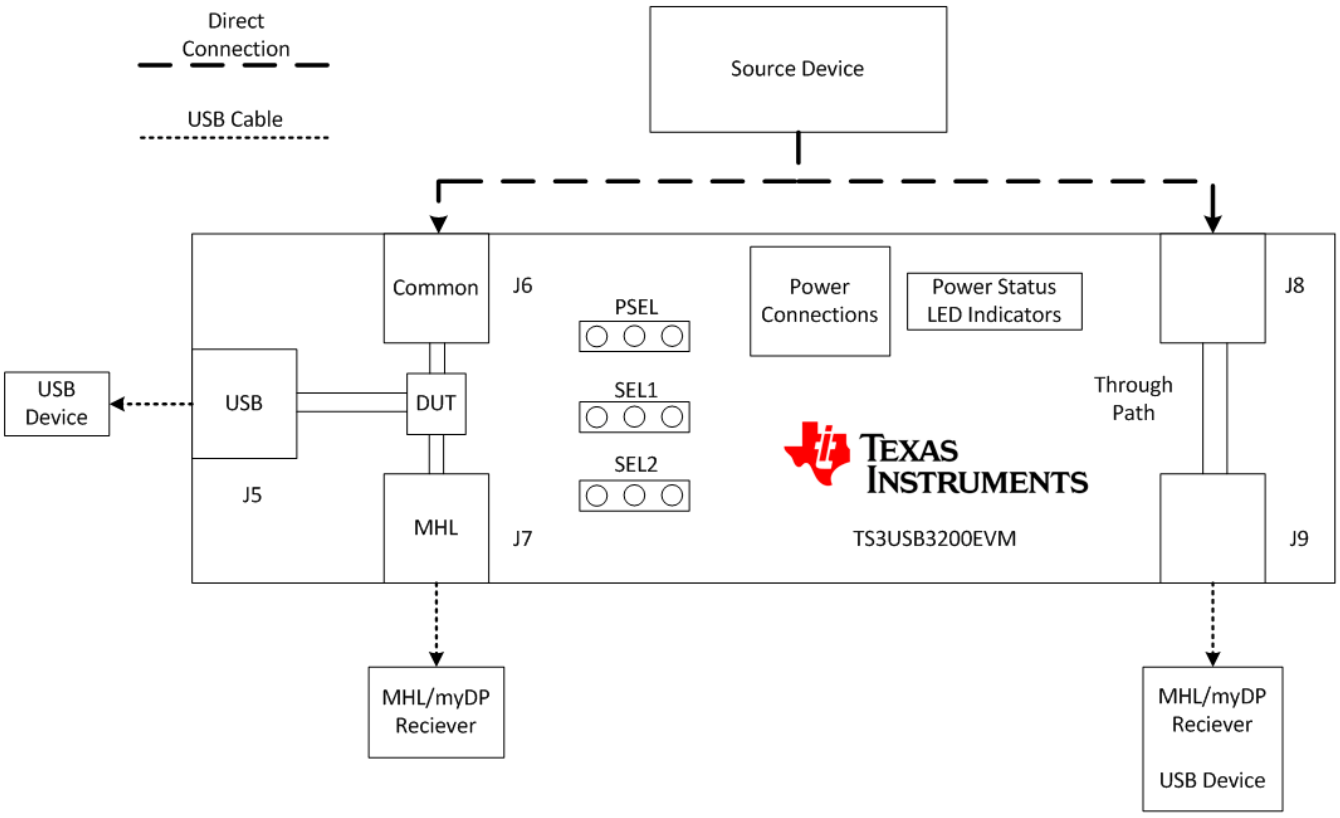

Figure 2. Quick Start Diagram

3.2 Jumper Configuration Tables

Table 1 displays the jumper configuration for VCC, VBUS, and PSEL.

Table 1. PSEL Jumper Configuration

VCC	VBUS	PSEL[1]	Power Source
L	L	X	No Power
L	H	X	VBUS
H	L	X	VCC
H	H	L	VCC
H	H	H	VBUS

(1) The PSEL pin has a 6-MΩ weak pull-down resistor to GND to make its default value LOW

Table 2 displays the jumper configuration for SEL1 and SEL2.

Table 2. SEL1 and SEL2 Jumper

SEL1[1]	SEL2[1]	Data Connection	ID Connection
L	L	J6 to J5 (USB)	J6 to J5 (USB)
L	H	J6 to J5 (USB)	J6 to J5 (MHL)
H	L	J6 to J5 (MHL)	J6 to J5 (USB)
H	H	J6 to J5 (MHL)	J6 to J5 (MHL)

(1) The SEL1 and SEL2 pins have 6-MΩ weak pull-down resistors to GND to make their default value LOW

3.3 Device Charging

Charging through the EVM is not supported and may cause damage to the board. Low current (< 100 mA) charging is allowed through the EVM.

3.4 USB Communication

Set up the USB communication for the EVM by following steps 1 through 5.

1. Configure the SEL1 and SEL2 jumpers so both are in the high position (shorting pins 1 and 2 of the headers).
2. If VCC is powered, place the PSEL jumper to choose which power source is desired for evaluation.
3. Connect the TS3USB3200 J6 male connector to a USB device with a female micro-B receptacle.
4. Connect a USB-A to micro-B cable from a powered PC to the J5 micro-B receptacle on the EVM.
   - The VBUS led indicator should turn on when the powered cable from the PC connects to the EVM.
5. If the device is capable (not on low battery), USB communication should occur between the peripheral connector to J6 and the PC connected to J5 through the TS3USB3200. The device may also begin charging.

3.5 MHL/MyDP Communication

Set up MHL/MyDP communication for the EVM by following steps 1 through 4.

1. Configure the SEL1 and SEL2 jumpers so both are in the “GND” position (shorting pins 2 and 3 of the headers).
2. If VCC is powered, place the PSEL jumper to choose which power source is desired for evaluation.
3. Connect the TS3USB3200 J6 Male Connector to a MHL/MyDP source with a female micro-B receptacle.
4. Connect a USB-A to micro-B cable from an appropriate MHL/MyDP-compatible display to the J7 micro-B receptacle on the EVM.
   - An alternative is using an MHL/MyDP-to-HDMI Dongle to connect to an HDMI-compatible display.

4 Board Documentation

This section contains the schematic, bill of materials, PCB layout, and board stackup for the TS3USB3200 EVM.

4.1 TS3USB3200 EVM Schematic

The schematic for this EVM is illustrated in Figure 3.

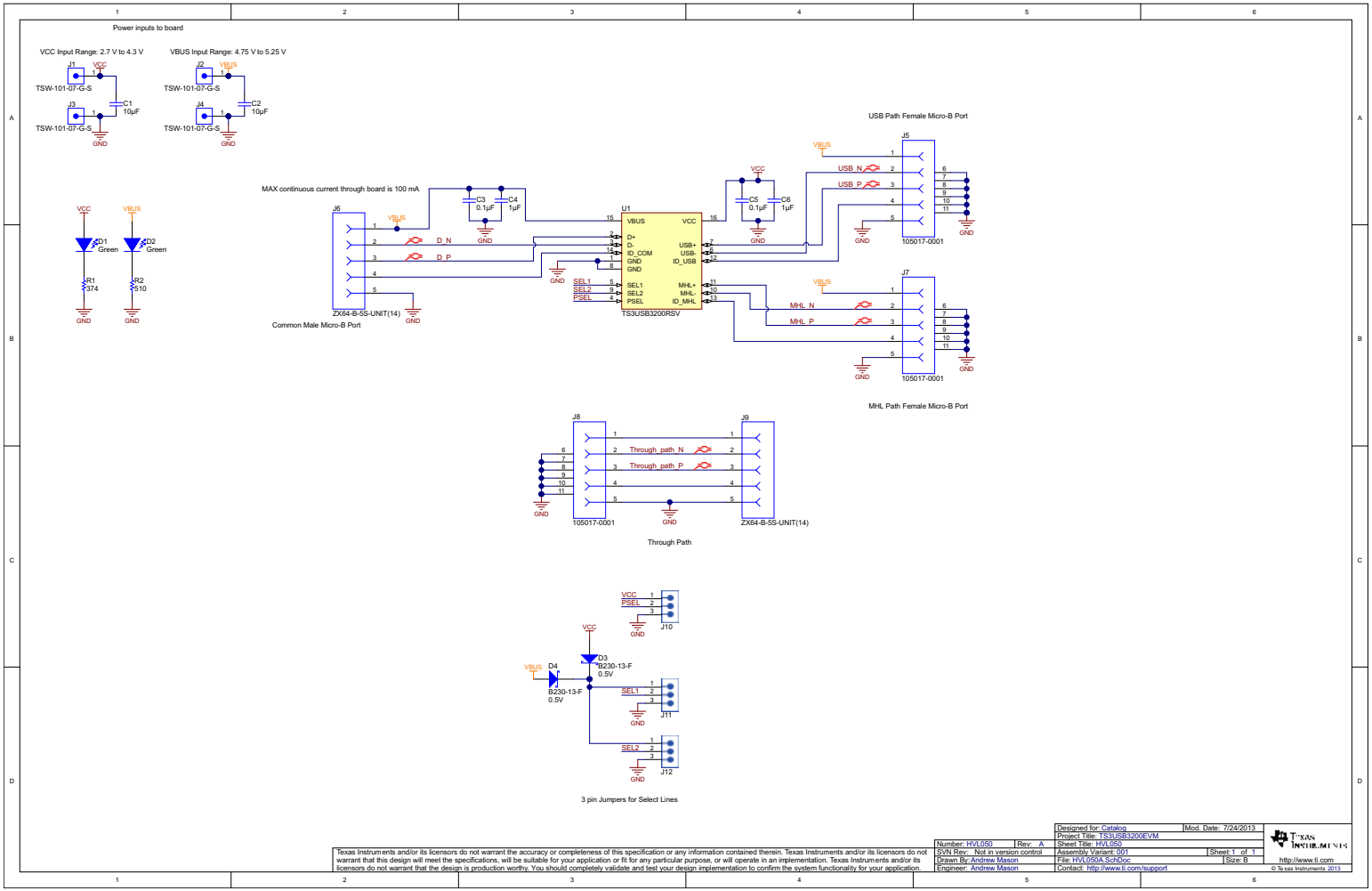

Figure 3. TS3USB3200 Schematic

4.2 Bill of Materials

The BOM for this EVM is listed in Table 3.

Table 3. Bill of Materials

Designator	Qty	Value	Description	Package Reference	Part Number
C1, C2	2	10uF	CAP, CERM, 10uF, 10V, ±10%, C0G/NP0, 0603	0603	C1608X5R1A106M
C3, C5	2	0.1uF	CAP, CERM, 0.1uF, 6.3V, ±10%, X5R, 0402	0402	C1005X5R0J104K
C4, C6	2	1uF	CAP, CERM, 1uF, 10V, ±20%, X5R, 0201	0201	CL03A105MP3NSNC
D1, D2	2	Green	LED, Green, SMD	1.6x0.8x0.8mm	LTST-C190GKT
D3, D4	2	0.5V	Diode, Schottky, 30V, 2A, SMB	SMB	B230-13-F
FID1, FID2, FID3, FID4, FID5, FID6	0		Fiducial mark. There is nothing to buy or mount.	Fiducial	N/A
J1, J2, J3, J4	4		Header, TH, 100mil, 1pos, Gold plated, 230 mil above insulator	Testpoint	TSW-101-07-G-S
J5, J7, J8	3		Receptacle, Micro-USB-B, Right Angle, SMD	Micro USB receptacle	105017-0001
J6, J9	2		Connector, micro USB Type B, Receptacle, R/A, SMD	Micro USB-B receptacle	ZX64-B-5S-UNIT(14)
J10, J11, J12	3		Header, TH, 100mil, 3x1, Gold plated, 230 mil above insulator	TSW-103-07-G-S	TSW-103-07-G-S
R1	1	374	RES, 374 ohm, 1%, 0.063W, 0402	0402	CRCW0402374RFKED
R2	1	510	RES, 510 ohm, 5%, 0.063W, 0402	0402	CRCW0402510RJNED
SH-J1, SH-J2, SH-J3	3	1x2	Shunt, 100mil, Gold plated, Black	Shunt	969102-0000-DA
	2		Micro USB-B Receptacle Housing	Receptacle housing	ZX64-B-SLDC
U1	1		DPDT USB 2.0 High-Speed (480Mbps) and Mobile High-Definition Link (MHL) Switch with ID Select and Flexible Power Control, RSV0016A	RSV0016A	TS3USB3200RSV

4.3 PCB Layout

The PCB layouts for this EVM are displayed in Figure 4 through Figure 7.

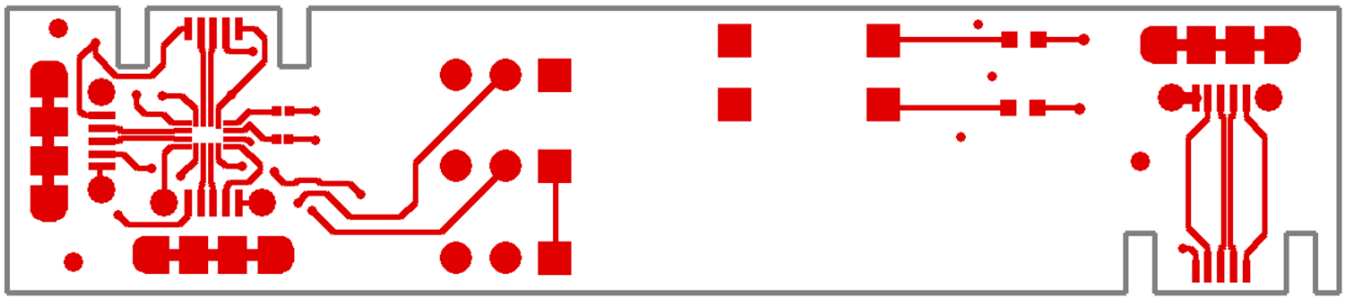

Figure 4. Top Layer

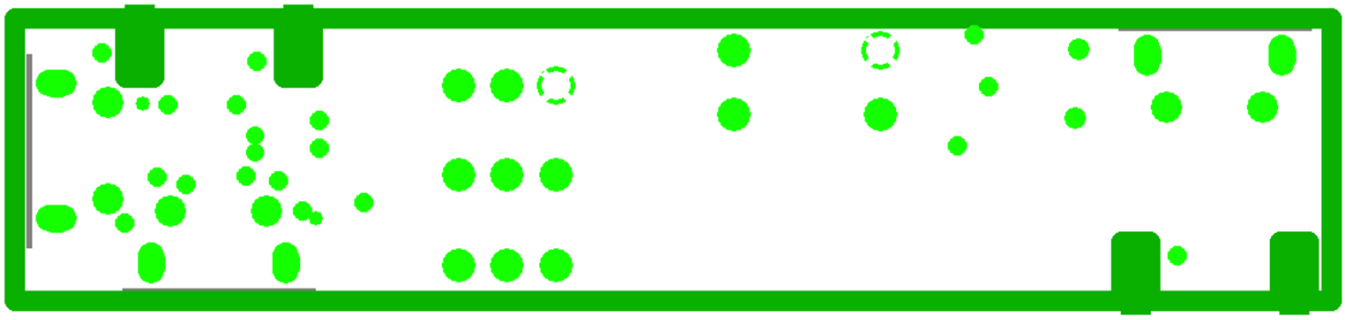

Figure 5. Ground Plane

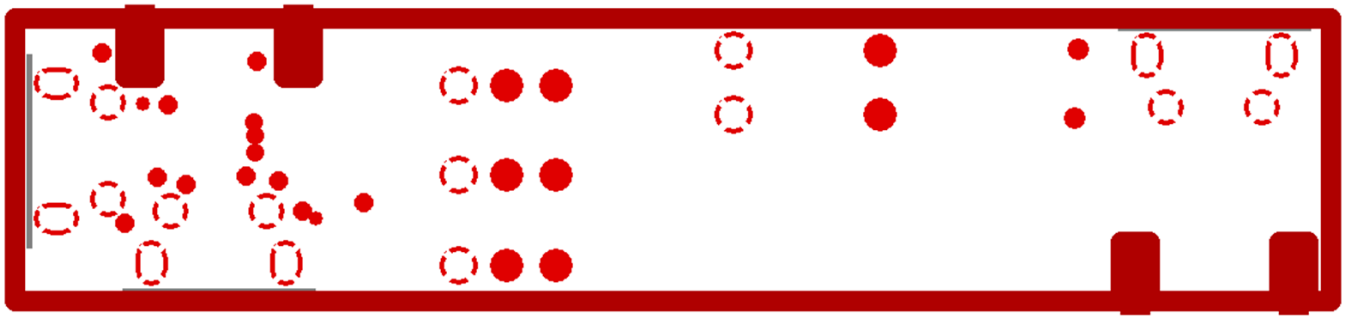

Figure 6. Power Plane

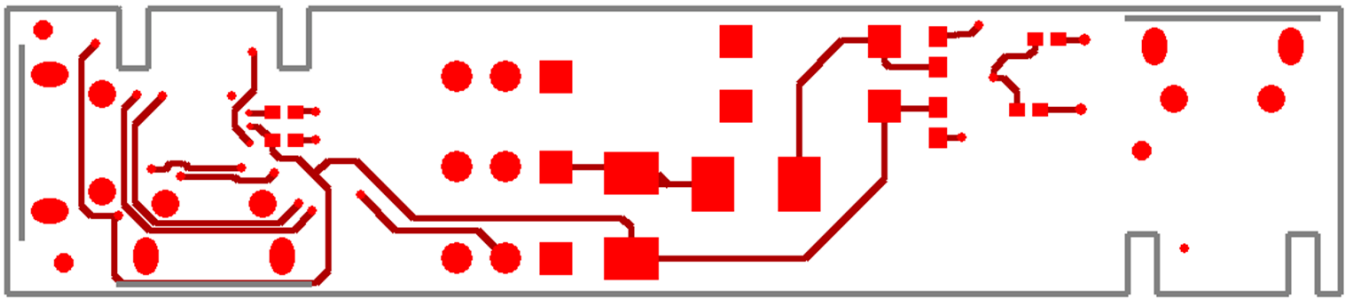

Figure 7. Bottom Layer

4.4 Board Stackup

Figure 8 depicts the board stackup.

- Core: ROGERS4350B
- Prepreg: FR-4

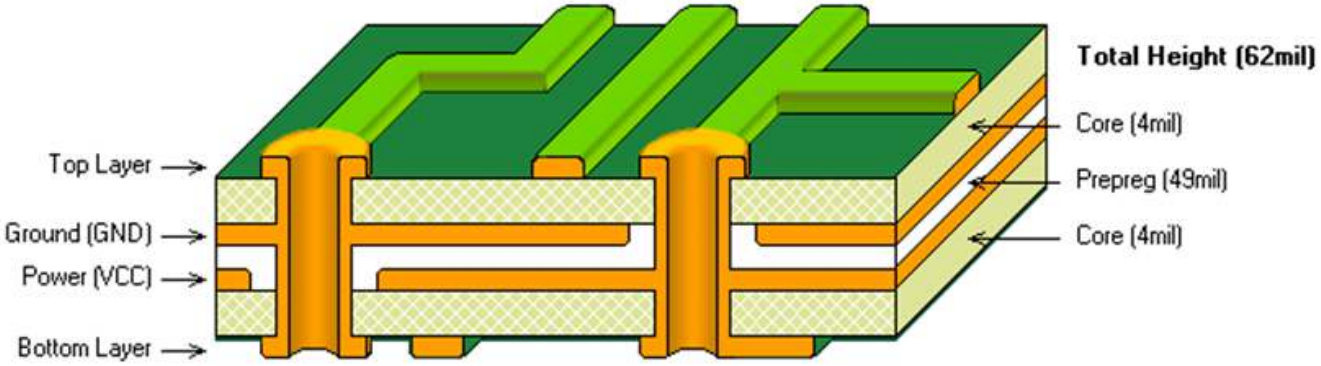

Figure 8. Board Stackup

Table 4 lists the stackup along with the dielectric material.

Table 4. Board Stackup and Dielectric Material

	Layer	Type	Thickness (mils)	Copper Weight	Dielectric Constant	Loss Tangent	Coupling Type	Width (mils)	Spacing (mils)	Diff Z_O (Ω)
1		Surface	0.4							
2	Top	Conductor	0.7	0.5 oz			Coupled MS	7	7	98.6
3		Dielectric	4		3.66	0.0037				
4	Ground	Plane	1.4	1 oz						
5		Dielectric	49		4.5	0.035				
6	Power	Plane	1.4	1 oz						
7		Dielectric	4		3.66	0.007				
8	Bottom	Conductor	0.7	0.5 oz						
9		Surface	0.4							

5 Related Documentation

TS3USB3200 data sheet: DPDT USB 2.0 High-Speed (480Mbps) and Mobile High-Definition Link (MHL) or Mobility Display Port (MyDP) Switch with ID Select and Flexible Power Control (SCDS333)

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