

TUSB217EVM User's Guide

This is the user guide for the evaluation module (EVM) of the TUSB217. The purpose of this user guide is to facilitate an easy evaluation process of our TUSB217 USB High-Speed signal conditioner

This user's guide provides an overview of the TUSB217, which includes highlighting its key features, operating conditions, and how to setup this EVM for use in a system level evaluation.

The construction of the TUSB217 EVM also serves as a reference design that is easily modified for any intended application. Target applications include Cell Phones, Desktop or Notebook Computers, Docking Stations, TVs, and active Cables. Schematic and layout information are available on TI.com.

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1 TUSB217EVM

The TUSB217 is a USB High-Speed signal conditioner, designed to compensate for ISI signal loss in a transmission channel.

The TUSB217 design is agnostic to USB Low and Full-Speed signals and does not affect FS and LS signaling. High-Speed signals are compensated along with programmable DC gain to fine-tune device performance to optimize the High-Speed signals at the connector.

This EVM was designed to be used as a medium connection between a USB host and a USB device. The interface to the EVM consists of a USB 3.1 Type A Receptacle and a USB 3.1 Type B Receptacle. Therefore, in order to connect the EVM to your system set up, the user most likely needs 2 USB 3.1 or USB 2.0 Standard Type A→B cables. Your test setup should look similar to [Figure 1](#).

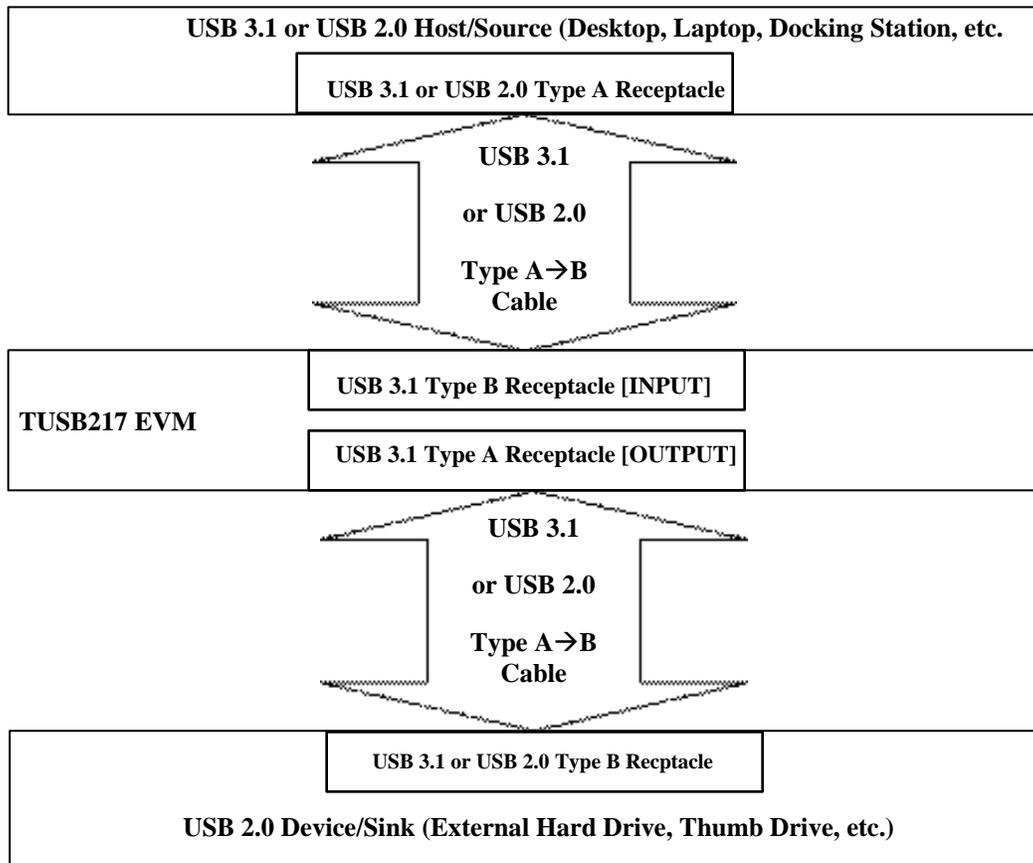


Figure 1. TUSB217 Functional System Level Block Diagram

2 TUSB217 EVM Kit Contents

This EVM kit should contain the following items:

- TUSB217 EVM board
- This user's manual

3 Description of EVM Board

The TUSB217 EVM is designed to provide easy evaluation of the TUSB217 device. It is also meant to serve as a reference design to show a practical example of how to use the device in a mass-production system. [Figure 2](#) highlights the jumpers and switch installed on this EVM and [Table 1](#) highlights their functionality and configuration.

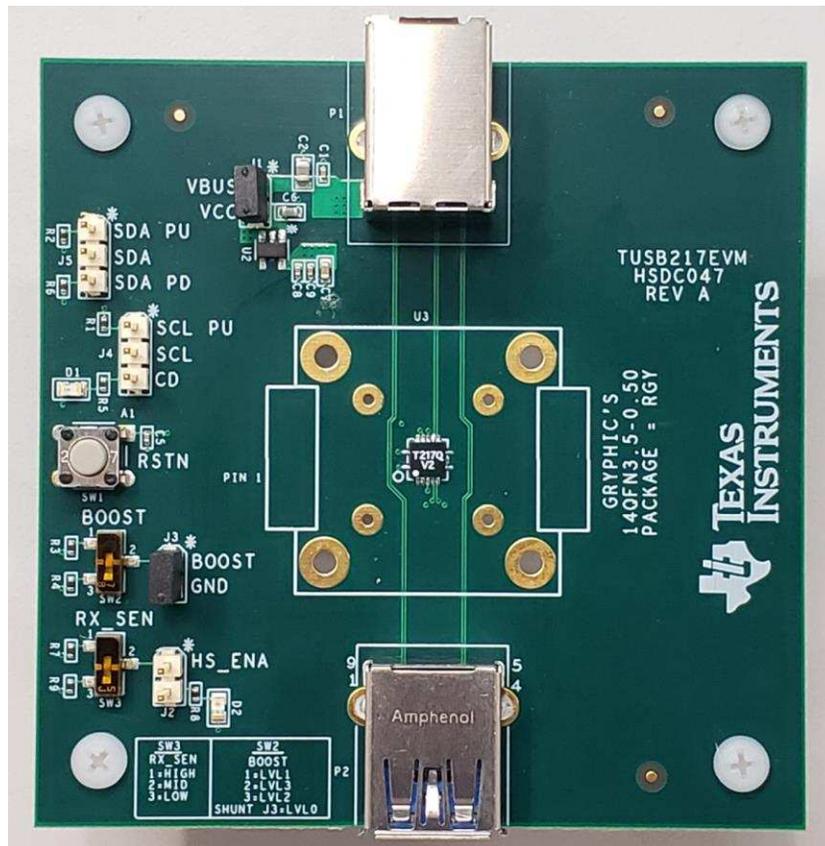


Figure 2. TUSB217EVM

4 Configuration Switches

The TUSB217 has three switches to facilitate configuration changes. Changing these switch settings without a complete understanding of the result is not recommended. Configuration inputs are only read by the TUSB217 during power on reset or after de-asserting the RSTN pin, changing these switch settings while the EVM is powered on has no effect. Refer to the device datasheet for detailed pin descriptions and functionality along with EVM schematic for additional information.

The switch definitions are as follows:

SW1 RSTN Pushbutton Switch:

- Pushbutton to place TUSB217 device in RESET
- Release to de-assert RESET

SW2 BOOST:

1. Sets TUSB217 to BOOST Level 1
 2. Sets TUSB217 to BOOST Level 3
 3. Sets TUSB217 to BOOST Level 2
- Shunt across J3 Sets TUSB217 to BOOST Level 0

SW3 RX SEN:

1. Pull Up (High Boost)
2. NC (Mid Boost)
3. Pull Low (Low Boost)

Table 1. TUSB217 EVM Jumper Descriptions

Jumper	Functionality and Configuration
J1	<ul style="list-style-type: none"> • Populated – EVM powered from VBUS • Not Populated – EVM can be powered from external supply (3.3V to 6.5V) injected on pin 2. <hr/> <p>NOTE: The TUSB217EVM will not operate below 3.3V due to the use of an on-board 3.3V regulator to power the device.</p> <hr/>
J3	<ul style="list-style-type: none"> • Populated – BOOST Level = 0 • Not Populated – BOOST set by SW2
J4	<ul style="list-style-type: none"> • Populated [1-2] – SCL pullup • Populated [2-3] – Connect Detect LED enabled • Not Populated – default mode
J5	<ul style="list-style-type: none"> • Populated [1-2] – SDA pullup • Populated [2-3] – SDA pulldown • Not Populated – default mode
J2	<ul style="list-style-type: none"> • Populated – Enable HS LED enabled • Not Populated – RX_SEN set by SW3

5 Selecting Equalization / Boost Level for TUSB217

The primary purpose of the TUSB217 is to restore the signal integrity of a USB High-Speed channel up to the USB connector. The platform goal is to pass the USB Near-End or Far-End Eye Mask with the TUSB217 in the best location.

A typical use case is to place the TUSB217 close to the USB connector on a Host platform in order to pass Near-End Eye Mask testing. This includes systems where the USB connector may be placed at the Far-End of a cable.

Typical EQ and Boost recommendations based on cable length (28 AWG USB Cable).

Table 2. EQ/Boost Setting Based on Cable Length

Cable Length	TUSB217 BOOST	TUSB217 RX SEN
0m - 1m	EQ1	MID
1m - 2m	EQ1	MID
2m - 3m	EQ1	HIGH
3m - 5m	EQ2	HIGH

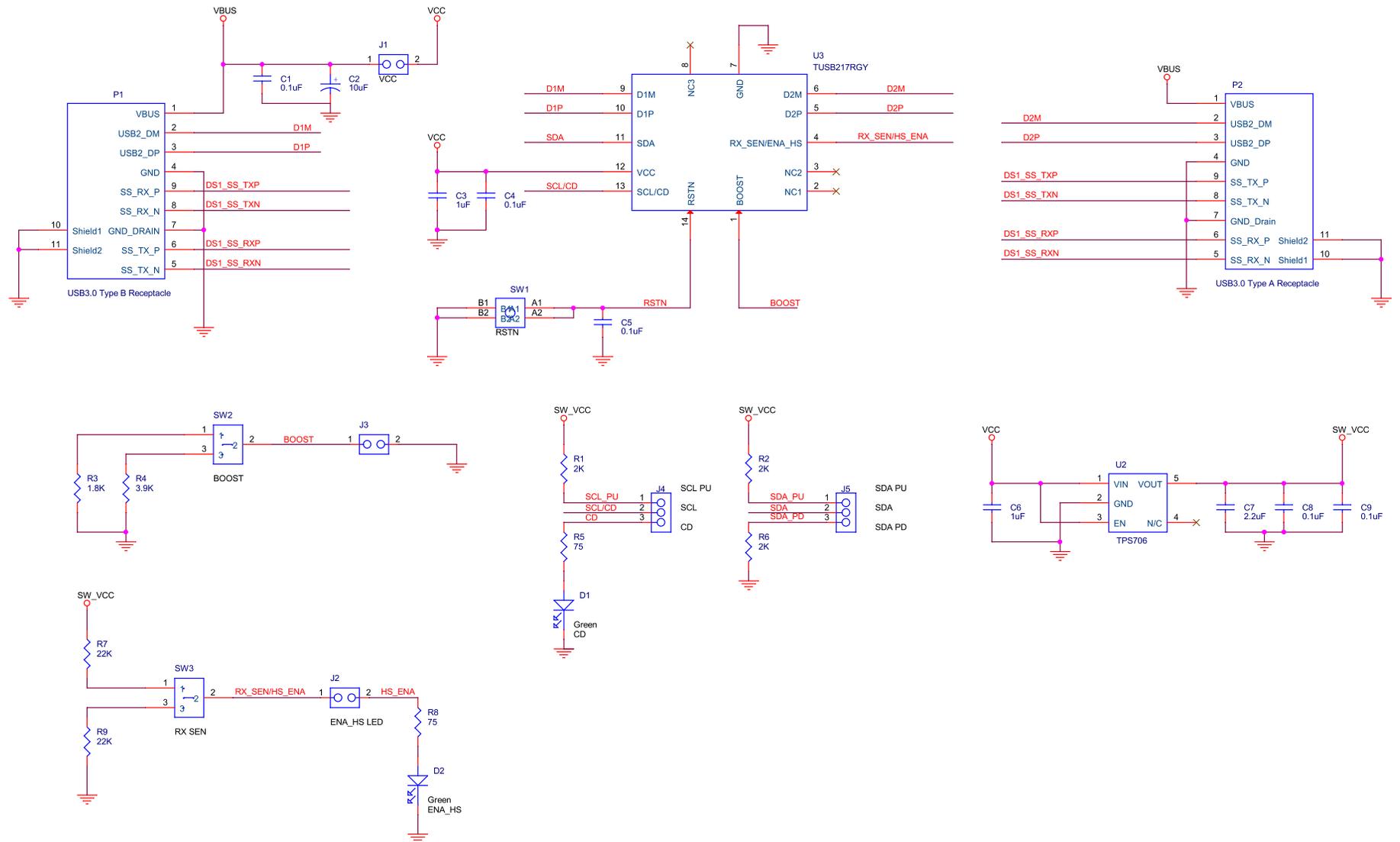
6 EVM Operation

To install the EVM, perform the following steps:

1. Attach a USB2 or USB3 cable from a Host PC Type A connector to the Type B connector (P1) of the TUSB217 EVM.
2. Attach a USB device either via cable or directly plugged into the Type A receptacle connector (P2) on the TUSB217 EVM.

7 TUSB217EVM Schematics

Figure 3. TUSB217EVM Schematic



8 TUSB217EVM BOM

Item	Quantity	Reference	Part
1	5	C1,C4,C5,C8,C9	0.1uF
2	1	C2	10uF
3	2	C3,C6	1uF
4	1	C7	2.2uF
5	2	D1,D2	LED
6	3	J1,J2,J3	HDR2X1 M .1
7	2	J4,J5	HDR3X1 M .1
8	1	P1	USB3.0 Type B Receptacle
9	1	P2	USB3.0 Type A Receptacle
10	2	R1,R2,R6	2K
11	1	R3	1.8K
12	1	R4	3.9K
13	2	R5,R8	75
14	2	R7,R9	22K
15	1	SW1	Switch - Push Button
16	2	SW2,SW3	Switch CJS-1201
17	1	U2	TPS706
18	1	U3	TUSB217RGY

Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Original (September 2018) to A Revision	Page
• Changed Figure 2	3
• Added NOTE to J1 in Table 1	4

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- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
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2. Use EVMs only after User obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
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