User's Guide

TUSB211RPTR Evaluation Module

ABSTRACT

The TUSB211A is a High-Speed signal conditioner designed to compensate for ISI signal loss in a transmission channel. The TUSB211RPTREVM is designed to provide a simple means of demonstrating the signal conditioning capability of the TUSB211A. The EVM is preconfigured and simply connects the Type B connector on the EVM to the Type A receptacle found on a Host PC with a standard USB cable, a USB device plugs into the Type A receptacle of the EVM board. The TUSB211RPTREVM requires no external power as the EVM is powered from a VBUS, sourced from the Host port. Two LEDs indicate when a device is connected as well as when a high-speed connection is made and the TUSB211A is enabled.

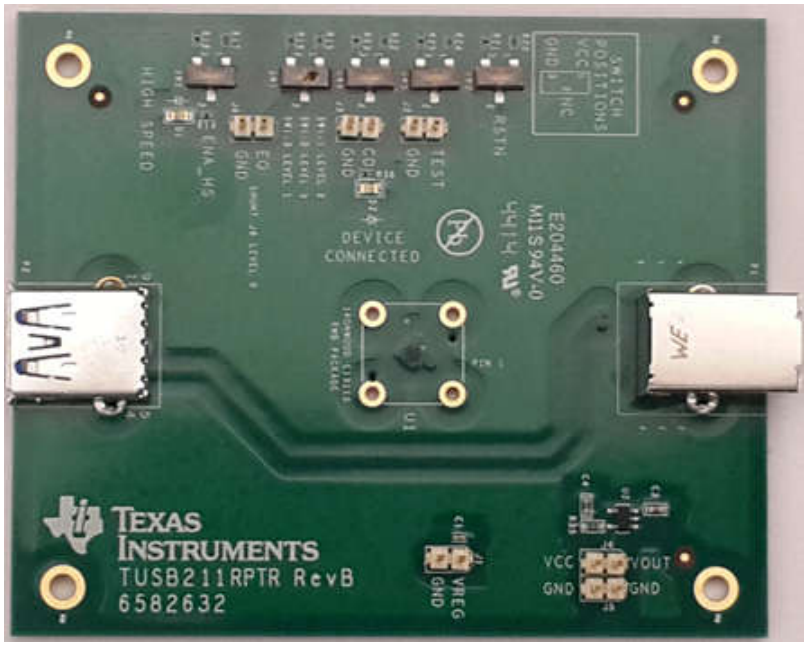

Figure 1-1. TUSB211RPTREVM Top View

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Trademarks

1 Configuration Switches

The TI TUSB211RPTREVM has five sets of 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 TUSB211A 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 data sheet (SLLSEM5) for detailed pin descriptions and functionality along with the EVM schematic for additional information.

The switch definitions are as follows:

SW1 EQ (USB High-Speed (HS) Boost)

1 – Level 2 EQ
2 – Level 3 EQ
3 – Level 1 EQ *Note: Shunt J6 = Level 0 EQ

SW2 ENA_HS (High-Speed Mode Indicator)

1 – VCC
2 – NC (Default Controls LED HS Indication)
3 – GND

SW3 RSTN (Device Disable/Enable)

1 – VCC (Device Enable)
2 – NC (Default)
3 – GND (Device Disabled)

SW4 CD (USB Device Attached Indicator)

1 – VCC
2 – NC (Default Controls LED Device Connected Indication)
3 – GND

SW5 TEST (No Function Available)

1 – VCC
2 – NC (Default)
3 – GND

2 Test Headers

The TUSB211RPTREVM includes headers for monitoring some device pins of the TUSB211A as well as power to the device.

Header J1:

This header is included to monitor the regulator output of the TUSB211A, this is for test purposes only and is not to be used as signal indicator.

Header J2:

This header is included to monitor the TEST pin of the TUSB211A, this is for internal test purposes only.

Header J3:

This header is included to monitor the CD pin of the TUSB211A, this header can be used as an external signal to indicate a connected device (Note: This signal is connected to the LED on the EVM which results in a lower voltage on the header. The resistor connecting this pin to the LED can be removed, if desired).

Header J4, J5:
These headers are included to monitor power to the TUSB211A, one side of header J4 connects to the power pins of the TUSB211A, the other connects to the output of the regulator (5 V to 3.3 V).

Header J6:

This header is included to monitor the EQ pin of the TUSB211A, refer to SW1 settings in Section 1 as well as the data sheet for details.

3 EVM Operation

Install the EVM using 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 TUSB211RPTREVM.
2. Attach a USB device either via cable or directly plugged into the Type-A receptacle connector (P2) on the TUSB211RPTREVM:
   a. When LED D2 is lit, this indicates a USB device connection.
   b. When LED D1 is lit, this indicates a USB High-Speed connection with the TUSB211A active.

4 USB 2.0 High-Speed Eye Diagram Testing

When performing USB 2.0 Compliance Eye-Diagram testing with a Host or the downstream port of a HUB with the TUSB211A, a scenario can occur where the TUSB211A signal boosting is not enabled. This can occur when the test packets are being transmitted before the USB Test Fixture is connected to the TUSB211A. This scenario does not occur during Device Compliance Eye-Diagram testing as the USB Test Fixture must always be connected while testing a Device. This scenario only occurs during the Compliance testing with the USB Test Fixtures and does not affect normal operation with a Host, HUB, or Device.

Closely following the test procedures provided by the scope equipment vendor and USB-IF (links provided at the end of this section) avoids this scenario. Specifically, the USB HS test fixture must be connected prior to executing the TEST PACKETS using the HSETT test tool. Alternatively, if the test fixture is hot-plugged to the Host or downstream HUB port after the command to send Test Packets has already been entered using the HSETT tool, it is necessary to select TEST PACKETS and click *Execute* again after the test fixture is connected to make sure the TUSB211A detects a compliance test set-up.

The following generic procedure can be used to take the USB 2.0 compliance eye-diagrams. Details are provided in the *Test Procedure* documents referenced at the end of this section:

1. **Connect the USB Test Fixture to the host, downstream HUB (+ TUSB211A) Port or Device under test.**
2. **Configure the Host, or HUB, or Device using xHSETT or HSETT to send test packets using the procedure detailed in the HSETT documentation.**
3. **Start sending Test Packets.**
4. **Capture Test Packet on scope to display eye (Running Compliance software on the scope).**

USB 2.0 Compliance Eye-Diagrams can be taken on Host, Device, and HUB platform ports configured with the TUSB211A using the EHCI and xHCI High-Speed Electrical Test Tool application provided by the USB Implementers Forum.

Details for setting up and running the application are detailed in the *Test Tool Setup Instruction* document provided by the USB-IF at the following link:

http://www.usb.org/developers/tools/HSETT_Instruction_0_4_1.pdf

xHCI (USB 3.0 Host) – XHSETT test application:

http://www.usb.org/developers/tools/

EHCI (USB 2.0 Host) – EHSETT test application:

http://www.usb.org/developers/tools/usb20_tools/

Vendor-Specific Test Procedures:

http://www.usb.org/developers/compliance/electrical_tests/

5 Revision History

Changes from Revision B (July 2015) to Revision C (January 2024)	Page
• Updated all instances of part number TUSB211 to TUSB211A throughout the document	1
• Updated the numbering format for tables, figures, and cross-references throughout the document	1
• Changed formatting in switch definitions list	2

Changes from Revision A (May 2015) to Revision B (July 2015)	Page
• Changed TUSB211 EVM and TUSB211RWBEVM to TUSB211RPTREVM globally in the document	1
• Changed *TUSB211RPTREVM Top View* image	1

Changes from Revision * (January 2015) to Revision A (May 2015)	Page
• Changed capitalization and punctuation throughout the document for revision A. No technical changes	2
• Deleted schematic and bill of materials sections	3

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Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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- *Reorient or relocate the receiving antenna.*
- *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.*
- *Consult the dealer or an experienced radio/TV technician for help.*

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3.2.1 *For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210 or RSS-247*

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(1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

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Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante. Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur

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https://www.ti.com/ja-jp/legal/notice-for-evaluation-kits-delivered-in-japan.html

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3. Use of EVMs only after User obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless User gives the same notice above to the transferee. Please note that if User does not follow the instructions above, User will be subject to penalties of Radio Law of Japan.

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