EVM User's Guide: CC3301MOD

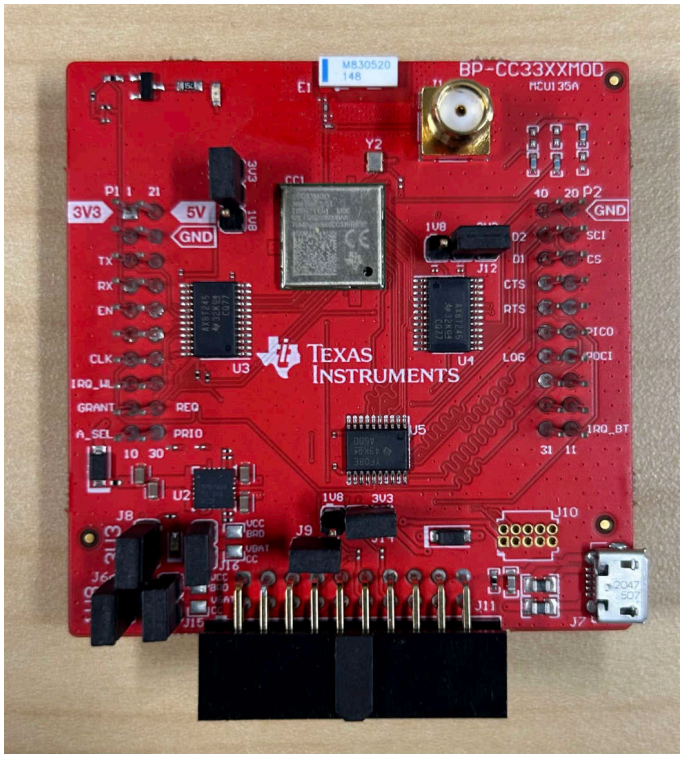
SimpleLink™ CC33X1MOD Wi-Fi 6 and Bluetooth® Low Energy BoosterPack™ Plug-In Module (BP-CC33X1MOD)

Description

The SimpleLink™ CC33X1MOD Wi-Fi 6 and Bluetooth® Low Energy devices enable affordable, reliable, and secure connectivity in embedded applications with a processor host running Linux® or an MCU host running RTOS. The CC3301MOD/CC3351MOD BoosterPack™ (BP-CC3301MOD/BP-CC3351MOD) plug-in modules are test and development boards that can be easily connected to TI LaunchPad™ development kits or processor boards; thus, enabling rapid software development.

Features

- CC33X1MOD Wi-Fi 6® and Bluetooth Low Energy combo device
- Two 20-pin stackable connectors (BoosterPack Standard)
- Onboard chip dual-band antenna
- SMA/U.FL connector for conducted RF testing
- Power from onboard dual rail (3.3V and 1.8V) LDO using USB or LaunchPad™
- Three-level shifters for voltage translation (3.3V to 1.8V)
- JTAG header pins for SWD interface with XDS110 or LP-XDS110ET
- Jumper for current measurement on both power supplies (3.3V and 1.8V) with provision to mount 0.1-ohm (0603) resistors for measurement with a voltmeter
- 32kHz oscillator for lower power evaluation



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1 Evaluation Module Overview

1.1 Introduction

The CC33X1MOD BoosterPack™ plug-in module (BP-CC33X1MOD) is a test and development board that can easily be connected to TI LaunchPad™ or processor boards; thus, enabling rapid software development.

This user's guide is intended to explain the various hardware configurations and features of the BP-CC33X1MOD. For more information about the CC33X1MOD device, please refer to ti.com CC3301MOD or CC3351MOD product page.

1.2 Kit Contents

- BP-CC33X1MOD Evaluation Board
- EVM disclaimer Read Me

1.3 Regulatory Compliance

The CC33X1MOD BoosterPack plug-in modules (BP-CC3301MOD and BP-CC3351MOD) are tested for and found to be in compliance with CE regulations regarding unlicensed intentional radiators. Hereby, Texas Instruments Inc. declares that the radio equipment type, BP-CC3301MOD and BP-CC3351MOD, is in compliance with Directive 2014/53/EU. The BP-CC3301MOD and BP-CC3351MOD is found to be RoHS compliant in accordance to EU Directives. The full text of the EU Declaration of Conformity is available:

- BP-CC3301MOD EU Declaration of Conformity
- BP-CC3351MOD EU Declaration of Conformity

RF Exposure Information (MPE)

These devices have been tested and meets applicable limits for Radio Frequency (RF) exposure. To comply with the RF exposure requirements, this module must be installed in a host platform that is intended to be operated in a minimum of 20-cm separation distance to the user.

Frequency Bands and Max Power

Table 1-1. Maximum RF Output Power - *BP-CC3301MOD*

Band	Output Power (dBm)
2.4GHz WLAN	18.99
Bluetooth LE	6.32

Table 1-2. Maximum RF Output Power - *BP-CC3351MOD*

Band	Output Power (dBm)
2.4GHz WLAN	17.0
5.2GHz WLAN	17.5
5.3GHz WLAN	18.0
5.5GHz WLAN	17.0
5.8GHz WLAN	10.0
Bluetooth LE 125kbps / 500kbps	2.0
Bluetooth LE 1Mbps / 2Mbps	4.0

Indoor Usage Restrictions

The device is restricted to indoor use only when operating in the 5150MHz to 5350MHz frequency range.

	AT	BE	BG	HR	CY	CZ	DK
	EE	FI	FR	DE	EL	HU	IE
	IT	LV	LT	LU	MT	NL	PL
	PT	RO	SK	SI	ES	SE	UK(NI)

This label is not included on product packaging to maintain standard and consistent packaging required by Texas Instruments Incorporated. Users are encouraged to reference the EVM User's Guide for information on device compliance.

1.4 Specification

The BP-CC33X1MOD is a board designed to enable rapid and easy software and hardware development for the CC33X1MOD device. The block diagram for the BP-CC33X1MOD is shown in Figure 1-1.

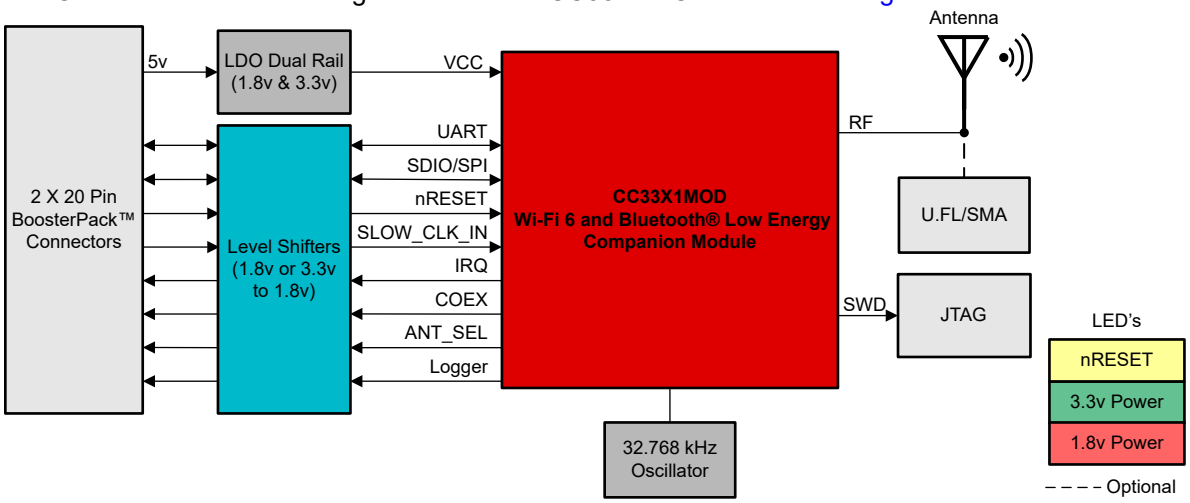

Figure 1-1. BP-CC33X1MOD Block Diagram

This kit can be used in three configurations:

1. MCU and RTOS evaluation: BP-CC33X1MOD + LaunchPad with the MCU running TCP/IP like the LP-AM243
2. Processor and Linux evaluation: BP-CC33X1MOD + BP-CC33-BBB-ADAPT + BEAGL-BONE-BLACK
3. RF-testing with PC tools: BP-CC33X1MOD + LP-XDS110ET

In addition, the BP-CC33X1MOD can also be wired to any other Linux or RTOS host board running TCP/IP stack. Refer to Section 3.1 for more information.

1.5 Device Information

The purpose of the BP-CC33X1MOD Evaluation Board is to showcase the hardware and software capabilities of the CC33x1MOD devices. The other components on the board are populated for testing and support of this main device.

2 Hardware

BP-CC33X1MOD Overview shows the overview of the BP-CC33X1MOD.

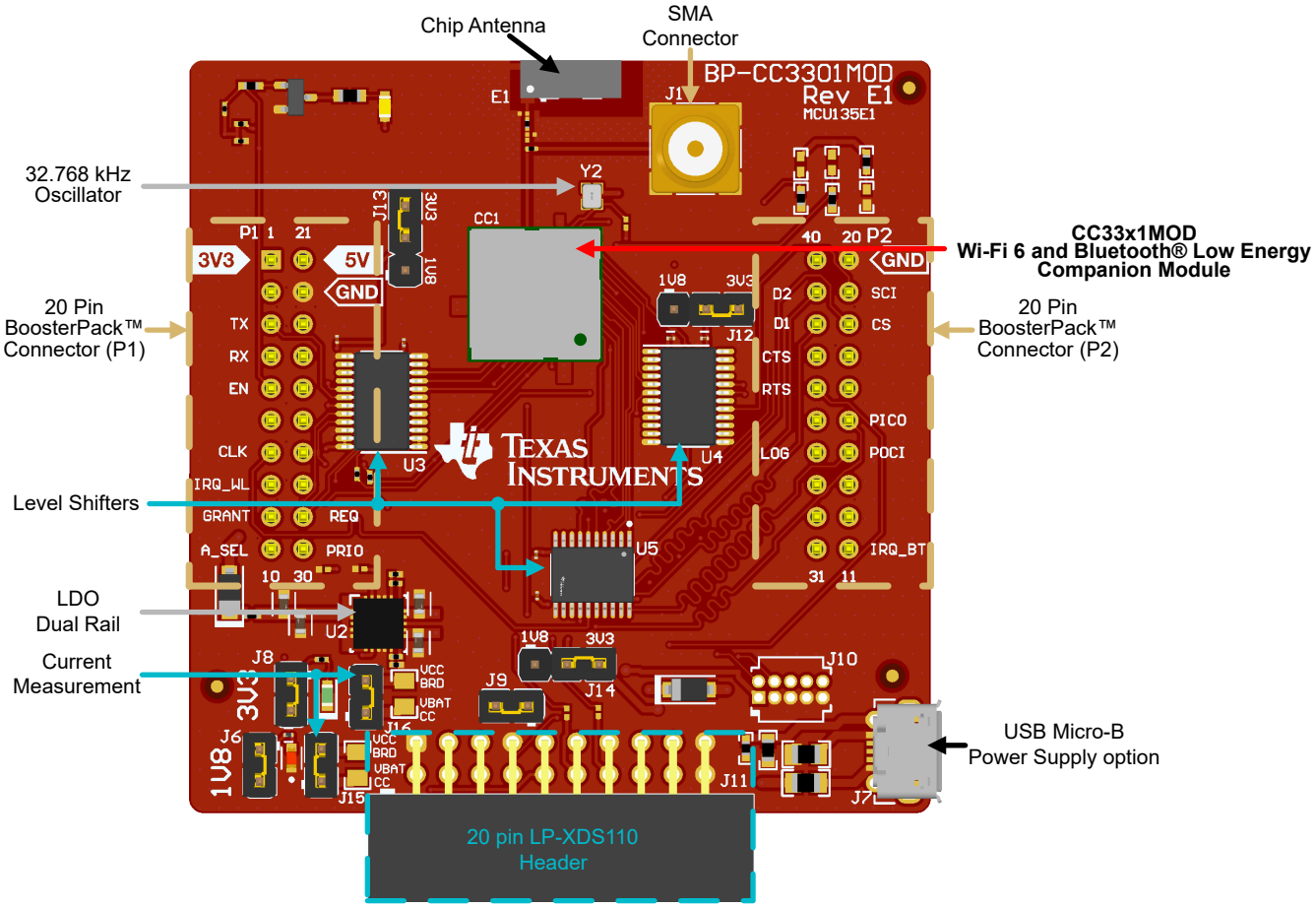

Figure 2-1. BP-CC33X1MOD Overview

2.1 Hardware Features

- CC33X1MOD Wi-Fi 6 and Bluetooth® Low Energy combo device which can interface with MPU or MCU systems; adding connectivity
- Two 20-pin stackable connectors (BoosterPack Standard)
- On-board chip dual-band antenna with on-board SMA/U.FL connector for conducted RF testing
- Power from onboard dual rail (3.3V and 1.8V) LDO using USB or LaunchPad
- Three-level shifters for voltage translation (3.3V to 1.8V)
- JTAG header pins for SWD interface with XDS110 or LP-XDS110ET
- Jumper for current measurement on both power supplies (3.3V and 1.8V) with provision to mount 0.1-ohm (0603) resistors for measurement with a voltmeter
- 32kHz oscillator for low power evaluation

2.2 Connector and Jumper Descriptions

2.2.1 LED Indicators

LEDs lists the descriptions of the LEs, and LEDs on BoosterPack™ shows the mentioned LEDs on the board.

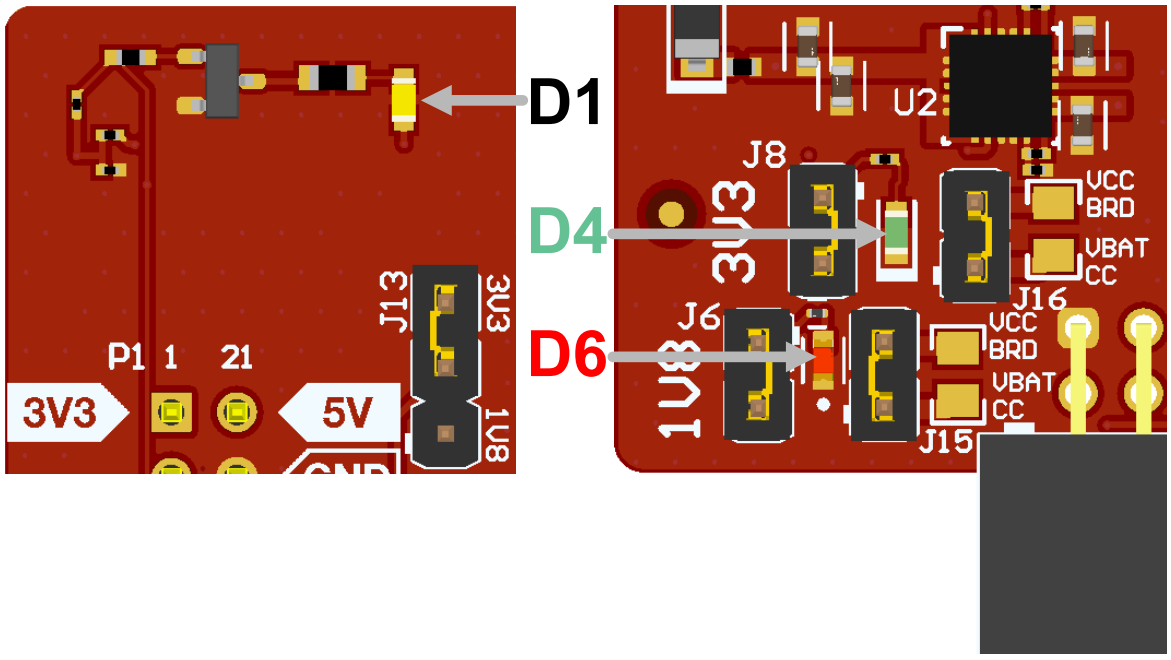

Figure 2-2. LEDs on BoosterPack™

Table 2-1. LEDs

Reference	Color	Usage	Comments
D1	Yellow	nRESET	The LED indicates the state of the nReset pin. If the LED is on, the device is functional, which means nReset is high.
D4	Green	3.3V power indication	On: 3.3V power rail is up. Off: no 3.3V power supplied
D6	Red	1.8V power indication	On: 1.8V power rail is up. Off: no 1.8V power supplied

2.2.2 Jumper Settings

Jumper Settings lists the jumper settings. To reference the default jumper configurations, see BP-CC33X1MOD Overview.

Table 2-2. Jumper Settings

Reference	Usage	Comments
J1, J2	RF Test	SMA connector (J1) or U.FL connector (J2) for conducted testing in the lab. See Section 2.5.
J6, J8	Power to board	Used to enable power to board for both supplies. See Section 2.3.
J15, J16	Current measurement	Used to measure power to device only. See Section 2.3.1.
J7	USB connector	For providing power to the device on the BoosterPack™
J10,J11	JTAG connectors	Headers to interface with XDS110 debug probe. See JTAG Headers.
J9	20-pin header (J11) 5V power	Enables 5V power supply to come from LP-XDS110ET
J12, J13, J14	Level shifter host voltage	Set to 3.3V or 1.8V to enable relevant level shifters to translate to correct host voltage level.
P1, P2	BoosterPack™ header	Two 20 header pins each on the BoosterPack™. See BoosterPack Header Assignment.

2.2.3 BoosterPack Header Assignment

The CC33X1MOD BoosterPack™ has two 20-pin header connectors that provide access to many of the CC33X1MOD pins and features. The signal assignment on these connectors is shown in the figure below and described in Table 2-3 and Table 2-4.

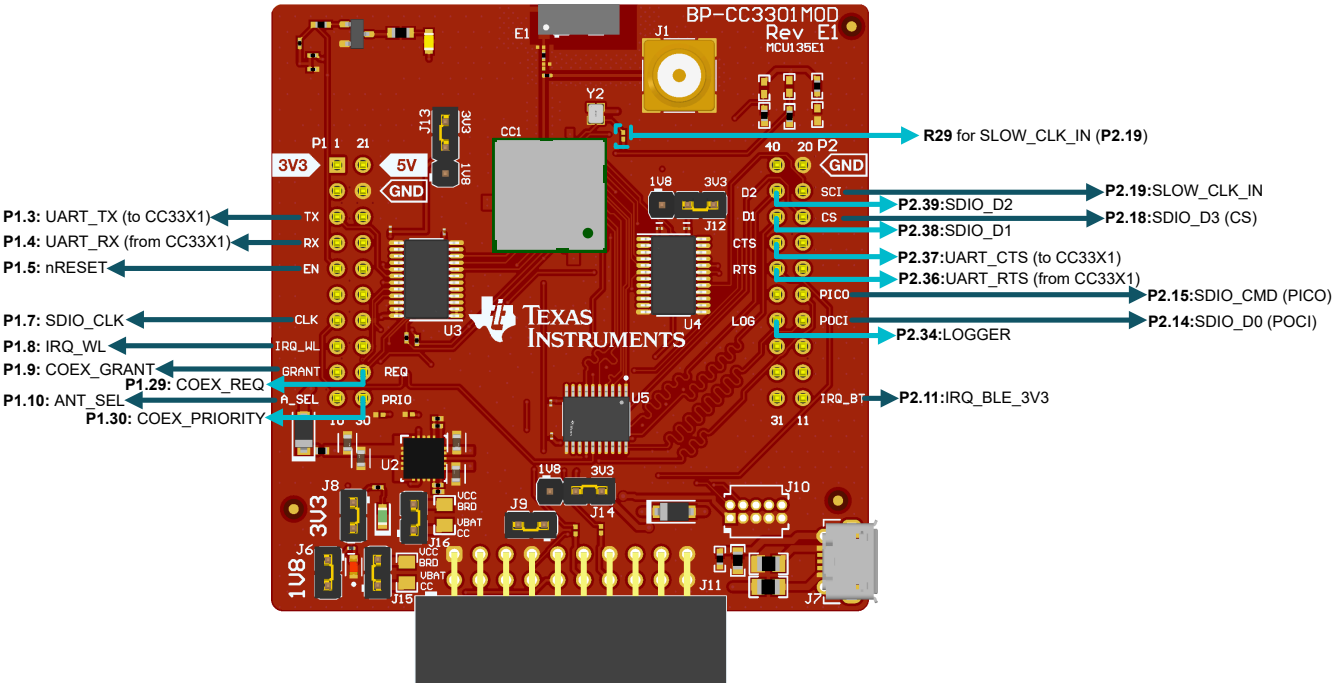

Figure 2-3. CC33X1MOD BoosterPack™ Pinout

Table 2-3. P1 Pin Assignment

Pin	Name (in schematic)	Type/Direction for Device	Description
P1.1	VCC_MCU_3V3	Input	No functional purpose
P1.2	Reserved	N/A	N/A
P1.3	UART_TX_3V3	Output	The CC33X1MOD UART TX to host for BLE host controller interface
P1.4	UART_RX_3V3	Input	The CC33X1MOD UART RX from the host for BLE host controller interface
P1.5	LP_RESET	Input	Reset line for CC33X1MOD used to enable / disable (active low). Driven by host through LaunchPad pins
P1.6	Reserved	N/A	N/A
P1.7	SDIO_CLK_3V3	Input	SDIO clock or SPI clock. Must be driven by host
P1.8	IRQ_WL_3V3	Output	Interrupt request from CC33X1MOD to host for Wi-Fi activity
P1.9	COEX_GRANT_3V3	Output	External coexistence interface - grant (reserved for future use)
P1.10	ANT_SEL_3V3	Output	Antenna select control
P1.21	VCC_MCU_5V	Power	5V supply to board
P1.22	GND	GND	Board ground
P1.23	Reserved	N/A	N/A
P1.24	Reserved	N/A	N/A
P1.25	Reserved	N/A	N/A
P1.26	Reserved	N/A	N/A
P1.27	Reserved	N/A	N/A
P1.28	Reserved	N/A	N/A

Table 2-3. P1 Pin Assignment (continued)

Pin	Name (in schematic)	Type/Direction for Device	Description
P1.29	COEX_REQ_3V3	Input	External coexistence interface - request (reserved for future use)
P1.30	COEX_PRIORITY_3V3	Input	External coexistence interface - priority (reserved for future use)

Table 2-4. P2 Pin Assignment

Pin	Name (in schematic)	Type/Direction for Device	Description
P2.11	IRQ_BLE_3V3	Output	Reserved for future use
P2.12	Reserved	N/A	N/A
P2.13	Reserved	N/A	N/A
P2.14	SDIO_D0_POCI_3V3	Input/Output	SDIO data D0 or SPI POCI
P2.15	SDIO_CMD_PICO_3V3	Input/Output	SDIO command or SPI PICO
P2.16	Reserved	N/A	N/A
P2.17	Reserved	N/A	N/A
P2.18	SDIO_D3_3V3 (CS)	Input/Output	SDIO data D3 or SPI CS
P2.19	SLOW_CLK_IN_3V3	Input	Input for external RTC clock 32.768kHz
P2.20	GND	GND	Board ground
P2.31	Reserved	N/A	N/A
P2.32	Reserved	N/A	N/A
P2.33	Reserved	N/A	N/A
P2.34	LOGGER_3V3	Output	Tracer from CC33X1MOD (UART TX debug logger)
P2.35	Reserved	N/A	N/A
P2.36	UART_RTS_3V3	Output	UART RTS from CC33X1MOD to host for BLE HCI flow control
P2.37	UART_CTS_3V3	Input	UART CTS to CC33X1MOD from host for BLE HCI flow control
P2.38	SDIO_D1_3V3	Input/Output	SDIO data D1
P2.39	SDIO_D2_3V3	Input/Output	SDIO data D2
P2.40	Reserved	N/A	N/A

2.2.4 JTAG Headers

The BP-CC33X1MOD was designed with two headers (J10, and J11) for the SWD interface with the XDS110 debug probe. The signal assignment for these headers are described in the figures and tables below.

The main JTAG interface for the board is via the LP-XDS110ET that is connected to the 20-pin header (J11). An XDS110 debug probe can also interface with this board via a 10-pin header (J10), however, this header is not populated with the default kit.

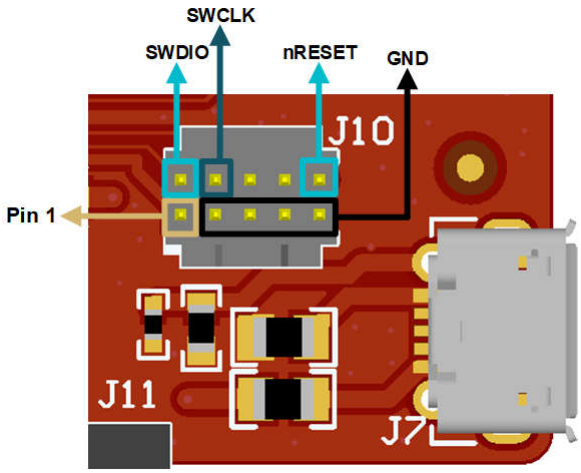

Figure 2-4. ARM 10-Pin JTAG Connector (J10)

Table 2-5. ARM 10-Pin JTAG Connector (J10) Assignment

Pin	Signal Name	Description
J10.1	VCC_BRD_1V8	1.8V supply for a reference voltage to the connector
J10.2	SWDIO	Serial wire data in/out
J10.4	SWCLK	Serial wire clock
J10.10	RESET_1V8	nReset (Enable line for CC33X1MOD)
J10.3, J10.5, J10.7, J10.9	GND	Board ground

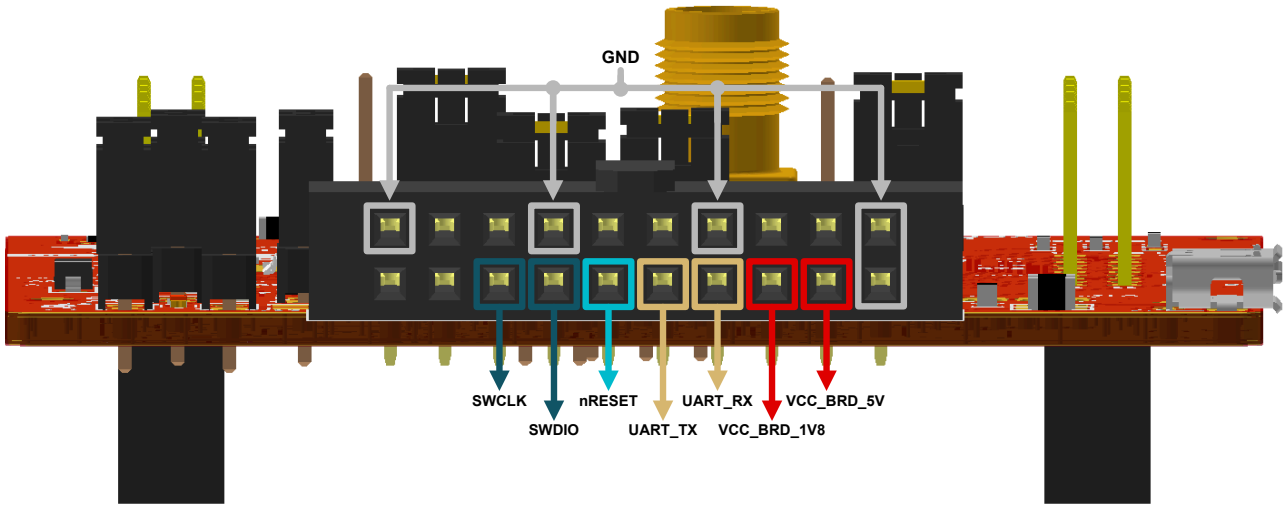

Figure 2-5. 20 pin LP-XDS110 Connector (J11)

Table 2-6. 20 Pin LP-XDS110 Connector (J11) Assignment

Pin	Signal Name	Description
J11.6	SWCLK	Serial wire clock
J11.8	SWDIO	Serial wire data in/out
J11.10	RESET_1V8	nReset (Enable line for the CC33X1MOD)
J11.12	UART_TX_1V8	The CC33X1MOD UART TX to host for BLE host controller interface
J11.14	UART_RX_1V8	The CC33X1MOD UART RX from host for BLE host controller interface
J11.16	VCC_BRD_1V8	1.8V supply for a reference voltage to connector
J11.18	VCC_BRD_5V	5V supply to BP-CC33X1MOD from LP-XDS110ET
J11.1, J11.7, J11.13, J11.19, J11.20	GND	Board ground

2.3 Power

The board is designed to accept power from a connected LaunchPad kit. Some LaunchPad kits cannot source the peak current requirements for Wi-Fi®, which can be as high as 500mA. In such cases, the USB connector (J7) on the BoosterPack™can be used to aid in extra current. Schottky diodes make sure that load sharing occurs between the USB connectors on the LaunchPad kit and the BoosterPack module without any board modifications. The jumpers labeled J6 (1.8V) and J8 (3.3V) can be used to measure the total current consumption of the board from the onboard LDO.

2.3.1 Measure the CC33X1MOD Current Draw

2.3.1.1 Low Current Measurement (LPDS)

To measure the current draw of the CC33X1MOD device for both power supplies (3.3V or 1.8V), a jumper labeled J16 (for 3.3V supply) and a jumper labeled J15 (for 1.8V supply) is provided on the board. By removing J16, users can place an ammeter into this path to observe the current on the 3.3V supply. The same process can be used to observe the current on the 1.8V supply with J15. TI recommends this method for measuring the LPDS.

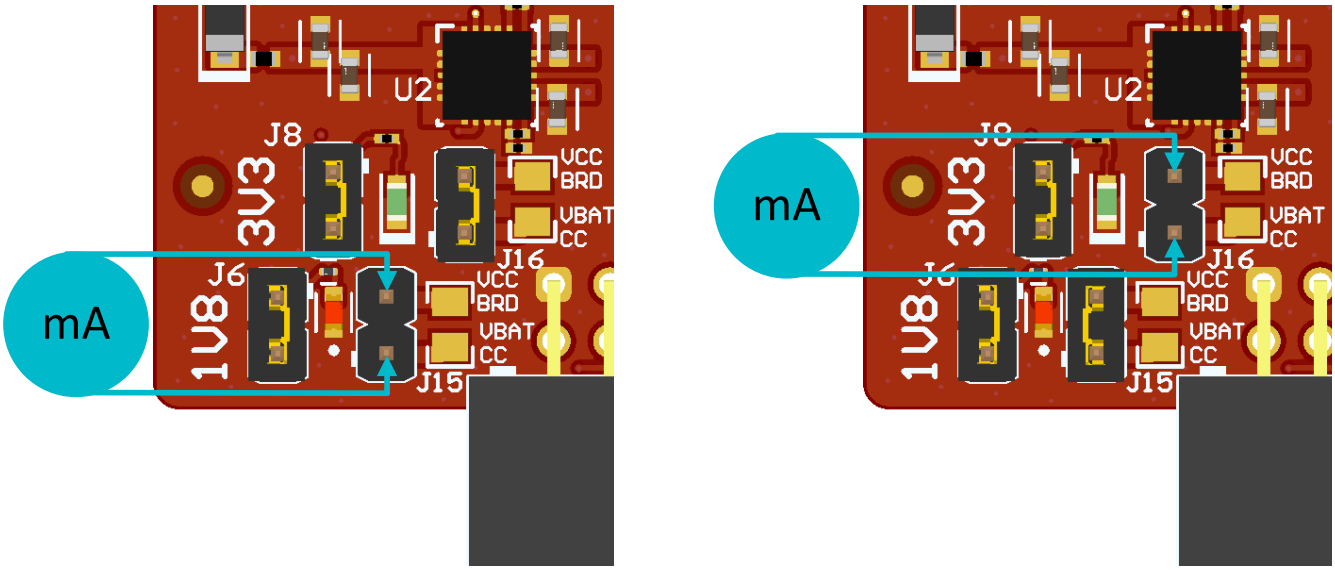

Figure 2-6. Low Current Measurement

2.3.1.2 Active Current Measurement

To measure active current in a profile form, TI recommends utilizing a 0.1Ω 0603 sized resistor, and measuring the differential voltage across the resistor. This can be done using a voltmeter or an oscilloscope for measuring the current profile for both power supplies (3.3V or 1.8V).

The jumper J15 shunt should be removed and the 0.01Ω resistor is populated in parallel to measure the active currents on the 1.8V supply (see Figure 2-8). Similar operation with jumper J16 and 3.3V supply.

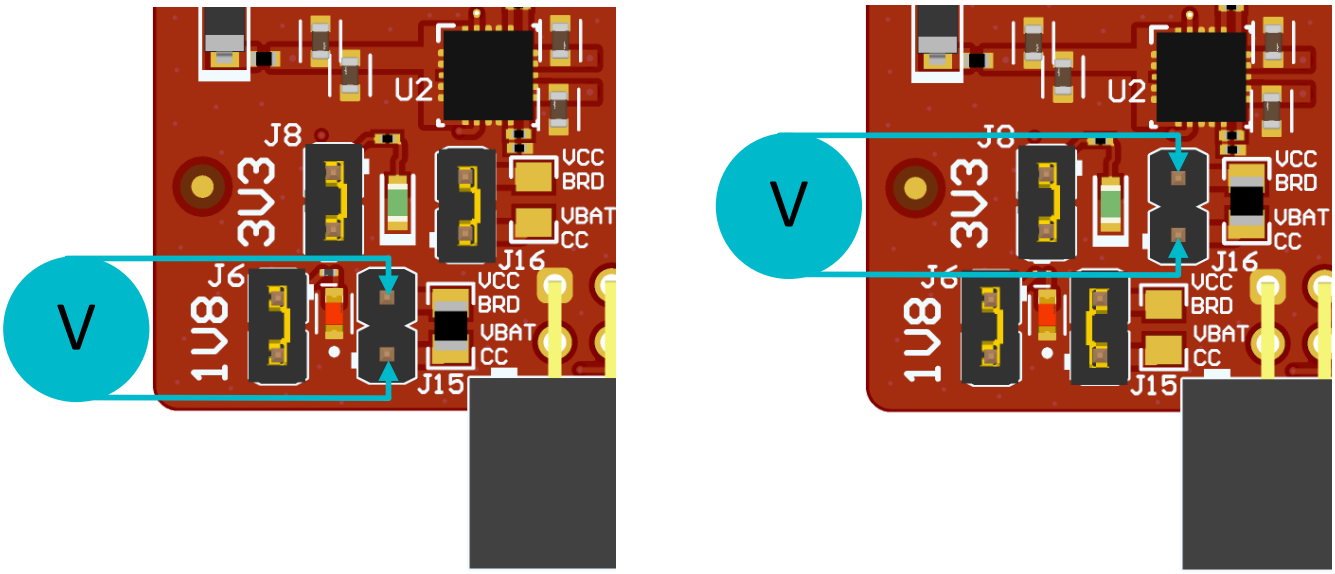

Figure 2-7. Active Current Measurement

2.4 Clocking

The BoosterPack™ plug-in module provides a 32.768kHz oscillator (Y2) component for slow clock input to the CC33X1MOD device.

If the user desires to provide their own external slow clock through the Slow Clock Input pin (P2.19), then some rework must be performed. The Y2 oscillator needs to be removed, and a 0201 sized 0-ohm resistor be populated on R29 pad. See Figure 2-8. The slow clock can also be generated internally to save on BOM.

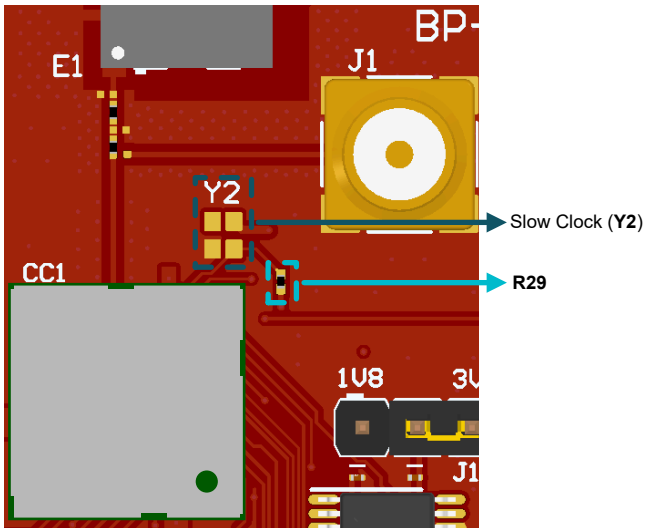

Figure 2-8. BP-CC33X1MOD Extenal Slow Clock

2.5 Performing Conducted Testing

As mentioned in Section 2.1, the BoosterPack™ has an onboard SMA connector and component antenna. The SMA connector (J1) provides a way for testing conducted measurements. Alternately, a footprint for a U.FL connector (J2) is provided on-board to replace the SMA connector and provide a way to test in the lab using a compatible cable.

A rework is needed before using the connector (J1/J2) instead of the Chip Antenna (E1). This involves swapping the position of the existing 10pF capacitor to lead the transmission line on the desired connection (see Figure 2-9).

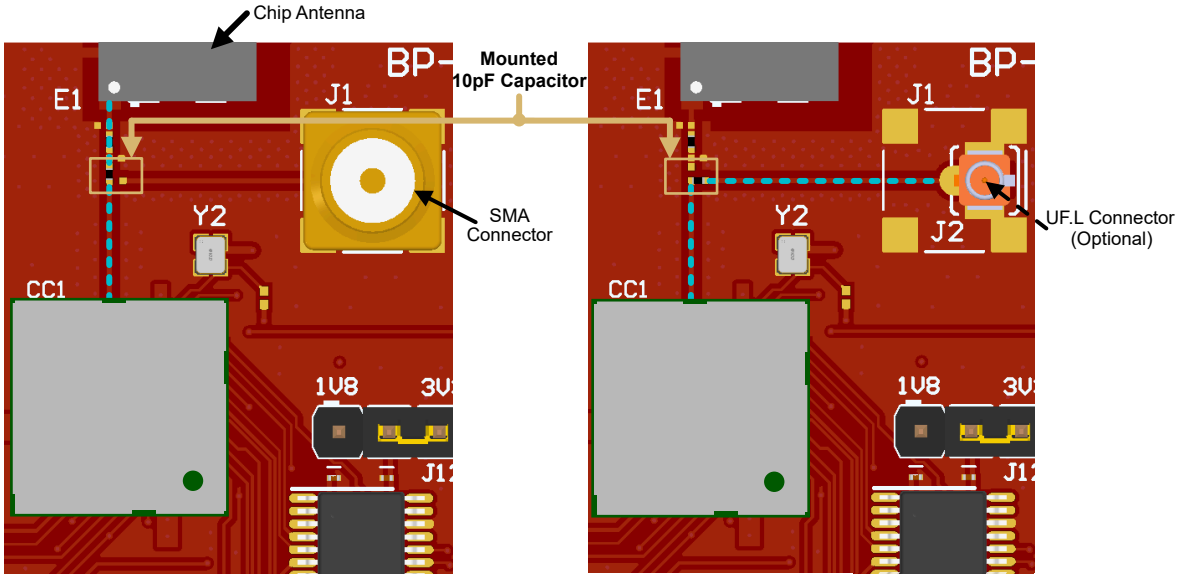

Figure 2-9. RF Paths on BP-CC33X1MOD

3 Implementation Results

3.1 Evaluation Setups

The CC33X1MOD BoosterPack can be used in the following configurations:

- MCU and RTOS evaluation: BP-CC33X1MOD + LaunchPad with the MCU running TCP/IP like the LP-AM243
- Processor and Linux evaluation: BP-CC33X1MOD + BP-CC33-BBB-ADAPT + BEAGL-BONE-BLACK
- RF testing with PC tools: BP-CC33X1MOD + LP-XDS110ET

In addition, the BP-CC33X1MOD can also be wired to any other Linux or RTOS host board running a TCP/IP stack.

3.1.1 MCU and RTOS

The BP-CC33X1MOD can be used with an MCU running TCP/IP, like the LP-AM243, and can easily integrate with the LaunchPad by stacking the 40-pin headers, as shown in Figure 3-1.

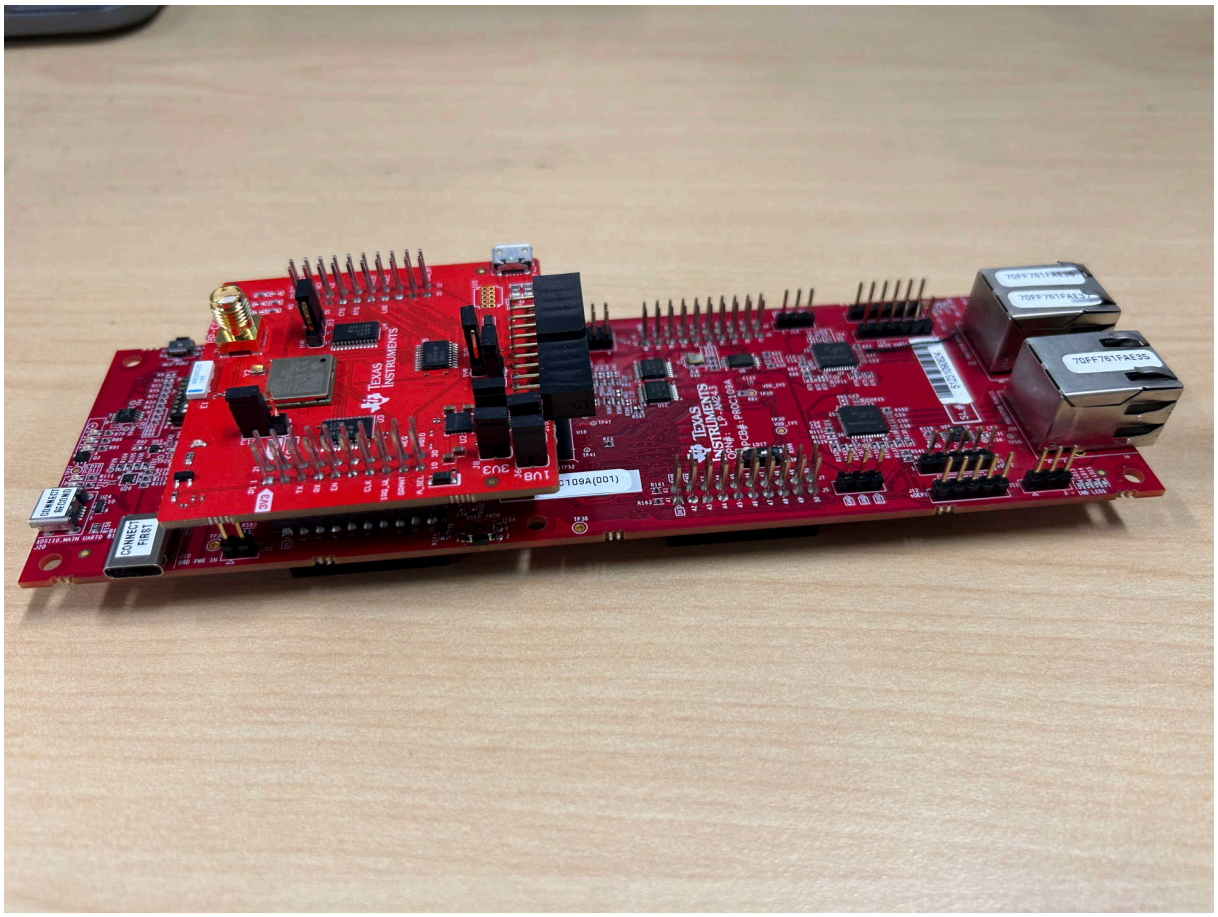

Figure 3-1. BP-CC33X1MOD with LP-AM243

3.1.2 Processor and Linux

The BP-CC33X1MOD can integrate with a host platform running Linux OS, like the BeagleBone Black (BBB). The BeagleBone Black is a low-cost, community-supported development platform as shown below.

Figure 3-2. BeagleBone Black Board

To interface the BoosterPack™ with a BeagleBone Black, the user also needs the BP-CC33X1MOD to BBB Adapter Board.

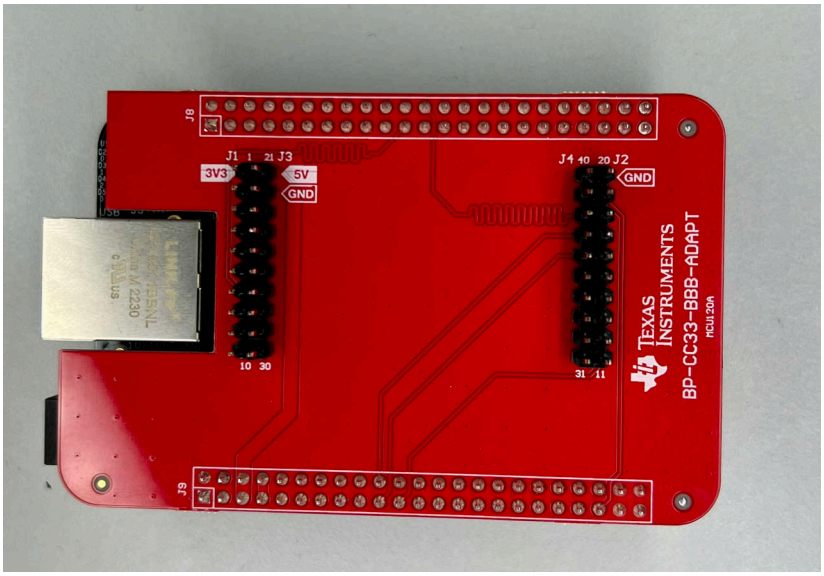

Figure 3-3. Adapter Board for the BeagleBone Black

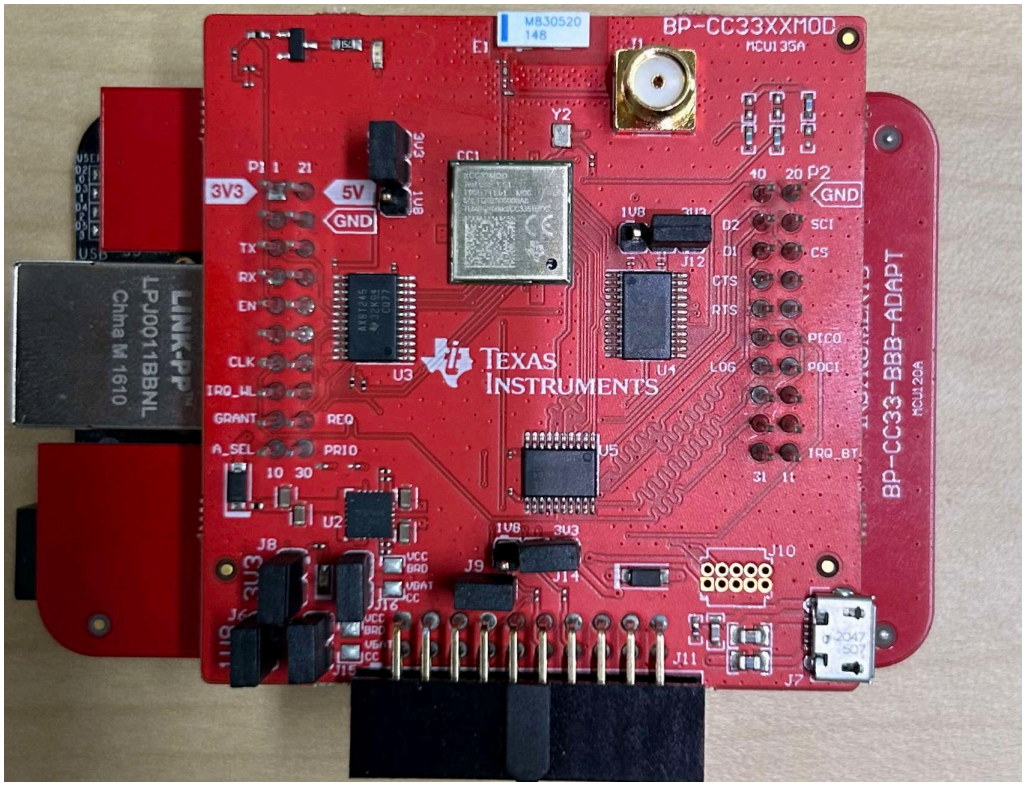

Figure 3-4. BP-CC33X1MOD + BBB with Adapter Board

To ensure the BeagleBone Black boots up from the SD card, remove the 100k resistor R68 seen on the bottom of the BBB, and add the component to R93 footprint on the top of the BBB. Alternatively, you can press and hold the S2 button on the BeagleBone board during power-up if the hardware modifications were not made (see Figure 3-6 and Figure 3-7).

Lastly, adding a right-angle header on the bottom of the BBB to easily connect the FTDI cable is optional. When the adapter board is attached to the BBB, the FTDI cable can get pinched between the BBB and the adapter board, which can cause communication problems (see Figure 3-7).

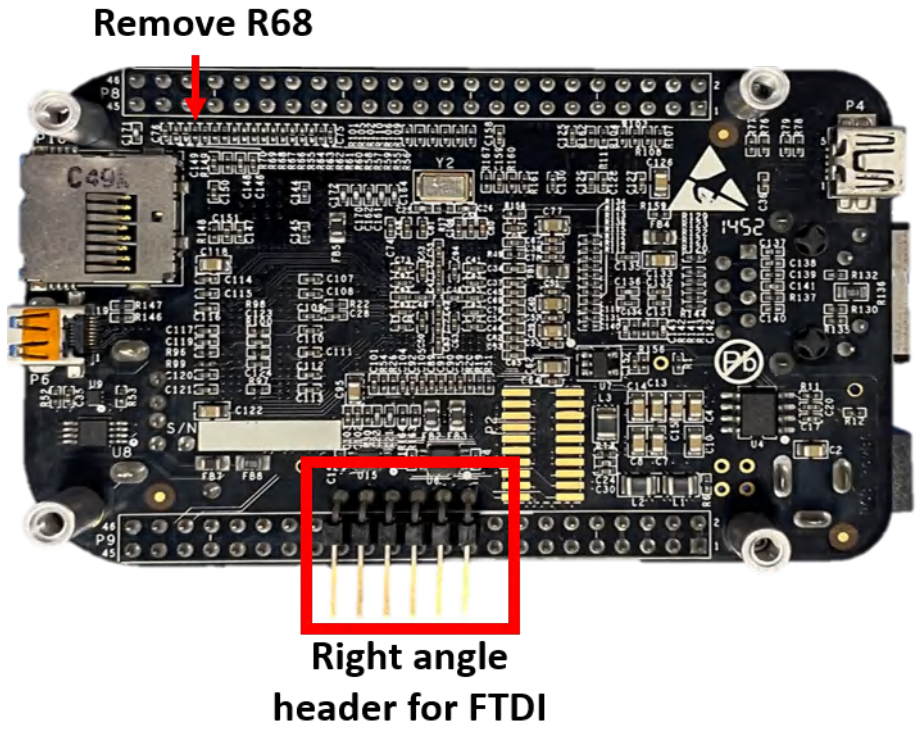

Figure 3-5. Bottom View of Modified BBB

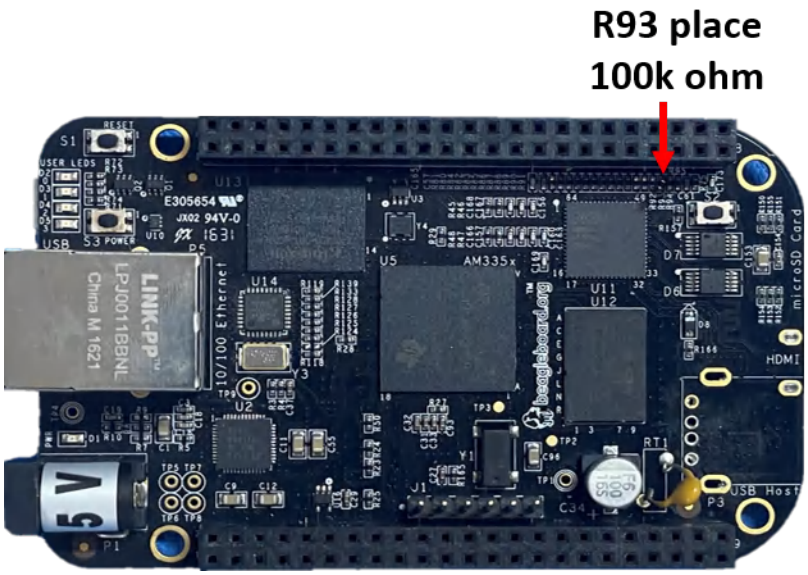

Figure 3-6. Top View of Modified BBB

3.1.3 Standalone RF Testing

The BP-CC33X1MOD can be used standalone (without a host) to test RF capabilities, using Radio Tool. For more information on Radio Tool and where to download it, refer to Wi-Fi Toolbox BP-CC33X1MOD Hardware Setup.

The BP-CC33X1MOD has an on-board SMA connector and component antenna, and a U.FL can be populated on the board, for conducted RF testing using compatible cables (a rework can be needed). For more information, see Section 2.5.

3.1.3.1 Radio Tool BP-CC33X1MOD Hardware Setup

Radio Tool is a GUI-based tool for RF evaluation and testing of CC33xx designs during development and certification. The tool enables low-level radio testing capabilities by manually setting the radio into transmit or receive modes. The use of the tool requires familiarity with radio circuit theory and radio test methods. To perform conducted RF testing on the BP-CC33X1MOD, refer to Section 2.5. Note that a rework is necessary for conducted testing.

The user can download this tool in the SIMPLELINK-WIFI-TOOLBOX from CC33XX-SOFTWARE on ti.com.

HW Prerequisites

- Windows 10 64bit/ Ubuntu 18 (or higher) 64-bit operation system
- Latest Chrome web browser
- Installation of Simplelink Wi-Fi Toolbox
- BP-CC33X1MOD
- LP-XDS110ET debugger for SWD communication

The LP-XDS110ET enables direct communication to the CC33X1MOD device through the SWD interface. This allows external tools, such as the Radio Tool, to send commands directly to the device without using an embedded host.

Testing with LP-XDS110ET

To use the LP-XDS110ET with the BP-CC33X1MOD, connect the 20-pin connector (J11) on the BoosterPack™ (refer to Figure 2-5) to the corresponding connector on the LP-XDS110ET. Make sure that the jumper on the LaunchPad™ (labeled EXT. XDS) is in the EXT. configuration, as shown in Figure 3-7. This verifies that the target voltage for the JTAG signals are sourced from the BP-CC3301MOD (which is 1.8V) instead of the default LP-XDS110ET target voltage (3.3V).

The power supply for the BP-CC33X1MOD comes from the LP-XDS110ET in this case, but there can be usage scenarios where additional current is needed from the USB connection (J7).

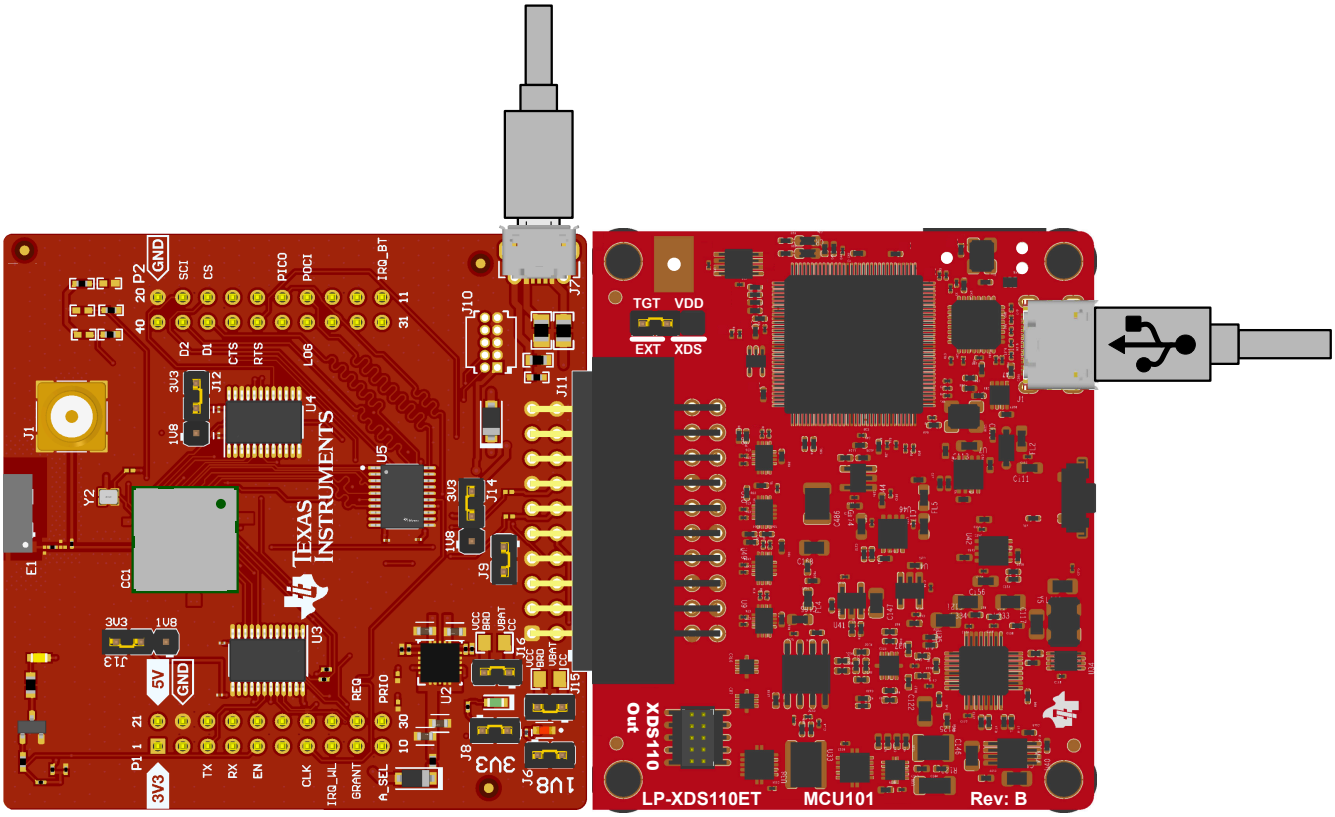

Figure 3-7. BP-CC33X1MOD Connected to LP-XDS110ET

4 Hardware Design Files

4.1 Schematics

To access the schematics for the BP-CC33X1MOD, the user can access the Design Files from the CC33X1MOD tool folder.

4.2 PCB Layouts

To access the Gerber filesfor the BP-CC33X1MOD, the user can access the Design Files from the CC33X1MOD tool folder.

4.3 Bill of Materials (BOM)

To access the BOM list for the BP-CC33X1MOD, the user can access the Design Files from the CC33X1MOD tool folder.

5 Additional Information

5.1 Trademarks

SimpleLink™, BoosterPack™, LaunchPad™ are trademarks of Texas Instruments.
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Linux® is a registered trademark of Linux Foundation.
Wi-Fi 6® and Wi-Fi® are registered trademarks of Wi-Fi Alliance.
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6 Revision History

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

Changes from September 30, 2024 to February 28, 2026 (from Revision * (September 2024) to Revision A (February 2026)) **Page**

STANDARD TERMS FOR EVALUATION MODULES

1. *Delivery:* TI delivers TI evaluation boards, kits, or modules, including any accompanying demonstration software, components, and/or documentation which may be provided together or separately (collectively, an “EVM” or “EVMs”) to the User (“User”) in accordance with the terms set forth herein. User's acceptance of the EVM is expressly subject to the following terms.

   1.1 EVMs are intended solely for product or software developers for use in a research and development setting to facilitate feasibility evaluation, experimentation, or scientific analysis of TI semiconductors products. EVMs have no direct function and are not finished products. EVMs shall not be directly or indirectly assembled as a part or subassembly in any finished product. For clarification, any software or software tools provided with the EVM (“Software”) shall not be subject to the terms and conditions set forth herein but rather shall be subject to the applicable terms that accompany such Software

   1.2 EVMs are not intended for consumer or household use. EVMs may not be sold, sublicensed, leased, rented, loaned, assigned, or otherwise distributed for commercial purposes by Users, in whole or in part, or used in any finished product or production system.

2 *Limited Warranty and Related Remedies/Disclaimers*:

   2.1 These terms do not apply to Software. The warranty, if any, for Software is covered in the applicable Software License Agreement.

   2.2 TI warrants that the TI EVM will conform to TI's published specifications for ninety (90) days after the date TI delivers such EVM to User. Notwithstanding the foregoing, TI shall not be liable for a nonconforming EVM if (a) the nonconformity was caused by neglect, misuse or mistreatment by an entity other than TI, including improper installation or testing, or for any EVMs that have been altered or modified in any way by an entity other than TI, (b) the nonconformity resulted from User's design, specifications or instructions for such EVMs or improper system design, or (c) User has not paid on time. Testing and other quality control techniques are used to the extent TI deems necessary. TI does not test all parameters of each EVM. User's claims against TI under this Section 2 are void if User fails to notify TI of any apparent defects in the EVMs within ten (10) business days after delivery, or of any hidden defects with ten (10) business days after the defect has been detected.

   2.3 TI's sole liability shall be at its option to repair or replace EVMs that fail to conform to the warranty set forth above, or credit User's account for such EVM. TI's liability under this warranty shall be limited to EVMs that are returned during the warranty period to the address designated by TI and that are determined by TI not to conform to such warranty. If TI elects to repair or replace such EVM, TI shall have a reasonable time to repair such EVM or provide replacements. Repaired EVMs shall be warranted for the remainder of the original warranty period. Replaced EVMs shall be warranted for a new full ninety (90) day warranty period.

WARNING

Evaluation Kits are intended solely for use by technically qualified, professional electronics experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems, and subsystems.

User shall operate the Evaluation Kit within TI’s recommended guidelines and any applicable legal or environmental requirements as well as reasonable and customary safeguards. Failure to set up and/or operate the Evaluation Kit within TI’s recommended guidelines may result in personal injury or death or property damage. Proper set up entails following TI’s instructions for electrical ratings of interface circuits such as input, output and electrical loads.

NOTE:

EXPOSURE TO ELECTROSTATIC DISCHARGE (ESD) MAY CAUSE DEGREDATION OR FAILURE OF THE EVALUATION KIT; TI RECOMMENDS STORAGE OF THE EVALUATION KIT IN A PROTECTIVE ESD BAG.

3 *Regulatory Notices:*

3.1 *United States*

3.1.1 *Notice applicable to EVMs not FCC-Approved:*

FCC NOTICE: This kit is designed to allow product developers to evaluate electronic components, circuitry, or software associated with the kit to determine whether to incorporate such items in a finished product and software developers to write software applications for use with the end product. This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required FCC equipment authorizations are first obtained. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of this chapter, the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under part 5 of this chapter.

3.1.2 *For EVMs annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant:*

CAUTION

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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

FCC Interference Statement for Class A EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Interference Statement for Class B EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- *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.*

3.2 *Canada*

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

Concerning EVMs Including Radio Transmitters:

This device complies with Industry Canada license-exempt RSSs. Operation is subject to the following two conditions:

(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.

Concernant les EVMs avec appareils radio:

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Concerning EVMs Including Detachable Antennas:

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication. This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

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

3.3 *Japan*

3.3.1 *Notice for EVMs delivered in Japan:* Please see http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_01.page 日本国内に輸入される評価用キット、ボードについては、次のところをご覧ください。

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

3.3.2 *Notice for Users of EVMs Considered "Radio Frequency Products" in Japan:* EVMs entering Japan may not be certified by TI as conforming to Technical Regulations of Radio Law of Japan.

If User uses EVMs in Japan, not certified to Technical Regulations of Radio Law of Japan, User is required to follow the instructions set forth by Radio Law of Japan, which includes, but is not limited to, the instructions below with respect to EVMs (which for the avoidance of doubt are stated strictly for convenience and should be verified by User):

1. Use EVMs in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry's Rule for Enforcement of Radio Law of Japan,
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
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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1. 電波法施行規則第6条第1項第1号に基づく平成18年3月28日総務省告示第173号で定められた電波暗室等の試験設備でご使用いただく。
2. 実験局の免許を取得後ご使用いただく。
3. 技術基準適合証明を取得後ご使用いただく。

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西新宿三井ビル

3.3.3 *Notice for EVMs for Power Line Communication:* Please see http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_02.page

電力線搬送波通信についての開発キットをお使いになる際の注意事項については、次のところをご覧ください。https://www.ti.com/ja-jp/legal/notice-for-evaluation-kits-for-power-line-communication.html

3.4 *European Union*

3.4.1 *For EVMs subject to EU Directive 2014/30/EU (Electromagnetic Compatibility Directive)*:

This is a class A product intended for use in environments other than domestic environments that are connected to a low-voltage power-supply network that supplies buildings used for domestic purposes. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

4 *EVM Use Restrictions and Warnings:*

4.1 EVMS ARE NOT FOR USE IN FUNCTIONAL SAFETY AND/OR SAFETY CRITICAL EVALUATIONS, INCLUDING BUT NOT LIMITED TO EVALUATIONS OF LIFE SUPPORT APPLICATIONS.

4.2 User must read and apply the user guide and other available documentation provided by TI regarding the EVM prior to handling or using the EVM, including without limitation any warning or restriction notices. The notices contain important safety information related to, for example, temperatures and voltages.

4.3 *Safety-Related Warnings and Restrictions:*

4.3.1 User shall operate the EVM within TI's recommended specifications and environmental considerations stated in the user guide, other available documentation provided by TI, and any other applicable requirements and employ reasonable and customary safeguards. Exceeding the specified performance ratings and specifications (including but not limited to input and output voltage, current, power, and environmental ranges) for the EVM may cause personal injury or death, or property damage. If there are questions concerning performance ratings and specifications, User should contact a TI field representative prior to connecting interface electronics including input power and intended loads. Any loads applied outside of the specified output range may also result in unintended and/or inaccurate operation and/or possible permanent damage to the EVM and/or interface electronics. Please consult the EVM user guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative. During normal operation, even with the inputs and outputs kept within the specified allowable ranges, some circuit components may have elevated case temperatures. These components include but are not limited to linear regulators, switching transistors, pass transistors, current sense resistors, and heat sinks, which can be identified using the information in the associated documentation. When working with the EVM, please be aware that the EVM may become very warm.

4.3.2 EVMs are intended solely for use by technically qualified, professional electronics experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems, and subsystems. User assumes all responsibility and liability for proper and safe handling and use of the EVM by User or its employees, affiliates, contractors or designees. User assumes all responsibility and liability to ensure that any interfaces (electronic and/or mechanical) between the EVM and any human body are designed with suitable isolation and means to safely limit accessible leakage currents to minimize the risk of electrical shock hazard. User assumes all responsibility and liability for any improper or unsafe handling or use of the EVM by User or its employees, affiliates, contractors or designees.

4.4 User assumes all responsibility and liability to determine whether the EVM is subject to any applicable international, federal, state, or local laws and regulations related to User's handling and use of the EVM and, if applicable, User assumes all responsibility and liability for compliance in all respects with such laws and regulations. User assumes all responsibility and liability for proper disposal and recycling of the EVM consistent with all applicable international, federal, state, and local requirements.

5. *Accuracy of Information:* To the extent TI provides information on the availability and function of EVMs, TI attempts to be as accurate as possible. However, TI does not warrant the accuracy of EVM descriptions, EVM availability or other information on its websites as accurate, complete, reliable, current, or error-free.

6. *Disclaimers:*

6.1 EXCEPT AS SET FORTH ABOVE, EVMS AND ANY MATERIALS PROVIDED WITH THE EVM (INCLUDING, BUT NOT LIMITED TO, REFERENCE DESIGNS AND THE DESIGN OF THE EVM ITSELF) ARE PROVIDED "AS IS" AND "WITH ALL FAULTS." TI DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, REGARDING SUCH ITEMS, INCLUDING BUT NOT LIMITED TO ANY EPIDEMIC FAILURE WARRANTY OR IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF ANY THIRD PARTY PATENTS, COPYRIGHTS, TRADE SECRETS OR OTHER INTELLECTUAL PROPERTY RIGHTS.

6.2 EXCEPT FOR THE LIMITED RIGHT TO USE THE EVM SET FORTH HEREIN, NOTHING IN THESE TERMS SHALL BE CONSTRUED AS GRANTING OR CONFERRING ANY RIGHTS BY LICENSE, PATENT, OR ANY OTHER INDUSTRIAL OR INTELLECTUAL PROPERTY RIGHT OF TI, ITS SUPPLIERS/LICENSORS OR ANY OTHER THIRD PARTY, TO USE THE EVM IN ANY FINISHED END-USER OR READY-TO-USE FINAL PRODUCT, OR FOR ANY INVENTION, DISCOVERY OR IMPROVEMENT, REGARDLESS OF WHEN MADE, CONCEIVED OR ACQUIRED.

7. *USER'S INDEMNITY OBLIGATIONS AND REPRESENTATIONS.* USER WILL DEFEND, INDEMNIFY AND HOLD TI, ITS LICENSORS AND THEIR REPRESENTATIVES HARMLESS FROM AND AGAINST ANY AND ALL CLAIMS, DAMAGES, LOSSES, EXPENSES, COSTS AND LIABILITIES (COLLECTIVELY, "CLAIMS") ARISING OUT OF OR IN CONNECTION WITH ANY HANDLING OR USE OF THE EVM THAT IS NOT IN ACCORDANCE WITH THESE TERMS. THIS OBLIGATION SHALL APPLY WHETHER CLAIMS ARISE UNDER STATUTE, REGULATION, OR THE LAW OF TORT, CONTRACT OR ANY OTHER LEGAL THEORY, AND EVEN IF THE EVM FAILS TO PERFORM AS DESCRIBED OR EXPECTED.

8. *Limitations on Damages and Liability:*

   8.1 *General Limitations*. IN NO EVENT SHALL TI BE LIABLE FOR ANY SPECIAL, COLLATERAL, INDIRECT, PUNITIVE, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES IN CONNECTION WITH OR ARISING OUT OF THESE TERMS OR THE USE OF THE EVMS , REGARDLESS OF WHETHER TI HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. EXCLUDED DAMAGES INCLUDE, BUT ARE NOT LIMITED TO, COST OF REMOVAL OR REINSTALLATION, ANCILLARY COSTS TO THE PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES, RETESTING, OUTSIDE COMPUTER TIME, LABOR COSTS, LOSS OF GOODWILL, LOSS OF PROFITS, LOSS OF SAVINGS, LOSS OF USE, LOSS OF DATA, OR BUSINESS INTERRUPTION. NO CLAIM, SUIT OR ACTION SHALL BE BROUGHT AGAINST TI MORE THAN TWELVE (12) MONTHS AFTER THE EVENT THAT GAVE RISE TO THE CAUSE OF ACTION HAS OCCURRED.

   8.2 *Specific Limitations.* IN NO EVENT SHALL TI'S AGGREGATE LIABILITY FROM ANY USE OF AN EVM PROVIDED HEREUNDER, INCLUDING FROM ANY WARRANTY, INDEMITY OR OTHER OBLIGATION ARISING OUT OF OR IN CONNECTION WITH THESE TERMS, , EXCEED THE TOTAL AMOUNT PAID TO TI BY USER FOR THE PARTICULAR EVM(S) AT ISSUE DURING THE PRIOR TWELVE (12) MONTHS WITH RESPECT TO WHICH LOSSES OR DAMAGES ARE CLAIMED. THE EXISTENCE OF MORE THAN ONE CLAIM SHALL NOT ENLARGE OR EXTEND THIS LIMIT.

9. *Return Policy.* Except as otherwise provided, TI does not offer any refunds, returns, or exchanges. Furthermore, no return of EVM(s) will be accepted if the package has been opened and no return of the EVM(s) will be accepted if they are damaged or otherwise not in a resalable condition. If User feels it has been incorrectly charged for the EVM(s) it ordered or that delivery violates the applicable order, User should contact TI. All refunds will be made in full within thirty (30) working days from the return of the components(s), excluding any postage or packaging costs.

10. *Governing Law:* These terms and conditions shall be governed by and interpreted in accordance with the laws of the State of Texas, without reference to conflict-of-laws principles. User agrees that non-exclusive jurisdiction for any dispute arising out of or relating to these terms and conditions lies within courts located in the State of Texas and consents to venue in Dallas County, Texas. Notwithstanding the foregoing, any judgment may be enforced in any United States or foreign court, and TI may seek injunctive relief in any United States or foreign court.

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