EVM User's Guide: M2-CC3301

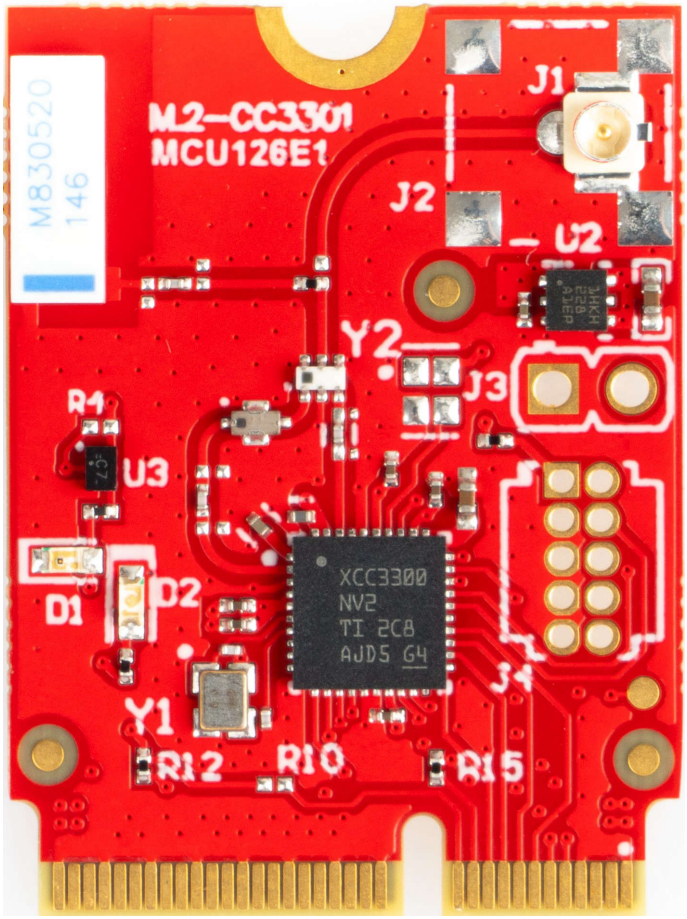
SimpleLink™ CC3301 Wi-Fi 6 and Bluetooth® Low Energy M.2 Add-in Card

Description

The SimpleLink™ CC3301 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 CC3301 M.2 Add-in Card (M2-CC3301) is a test and development board that can be easily connected to TI processor boards or other processor boards with M.2 Key-E interface support; thus enabling rapid software development.

Features

- CC3301 Wi-Fi 6 and Bluetooth Low Energy companion IC in QFN package
- Seamless integration with M.2 Key-E equipped MPU platforms
- Onboard chip antenna with option for U.FL/SMA based testing
- M.2 Type 2230 Key E interface



Top View of M2-CC3301

1 Evaluation Module Overview

1.1 Introduction

This user's guide is intended to explain the various hardware configurations and features of the M2-CC3301.

The CC3301 M.2 Add-in Card (M2-CC3301) is a test and development board that can be easily connected to TI processor boards or other processor boards with an M.2 Type 2230 Key E slot; thus enabling rapid software development.

The M2-CC3301 Add-in card can be easily paired with the following processor boards:

- SK-AM62B-P1
- SK-AM62A-LP
- SK-AM62-LP

1.2 Kit Contents

- M2-CC3301 Board
- EVM disclaimer Read Me

1.3 Specification

The M2-CC3301 is a board designed to enable rapid and easy software and hardware development for the CC3301 device. The block diagram for the Add-in Card is shown below.

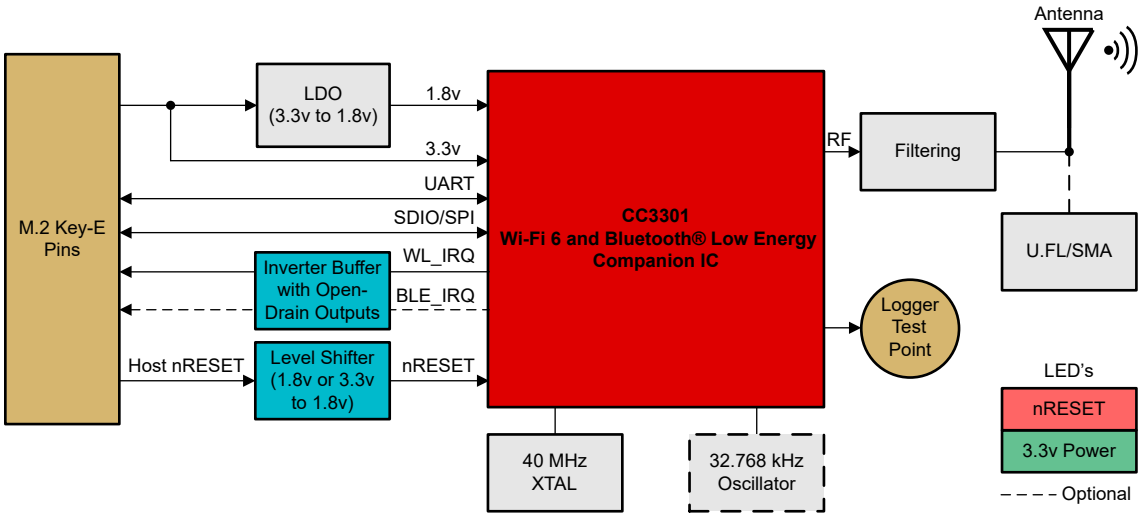


Figure 1-1. Block Diagram of M.2-CC3301

1.4 Device Information

The purpose of the M2-CC3301 is to showcase the hardware and software capabilities of the CC3301 device. Other components on the board are only populated for testing and support of this main device.

2 Hardware

2.1 Overview

The figures below show the features on the Top and Bottom side of the M2-CC3301 board, some of the features highlighted are described below:

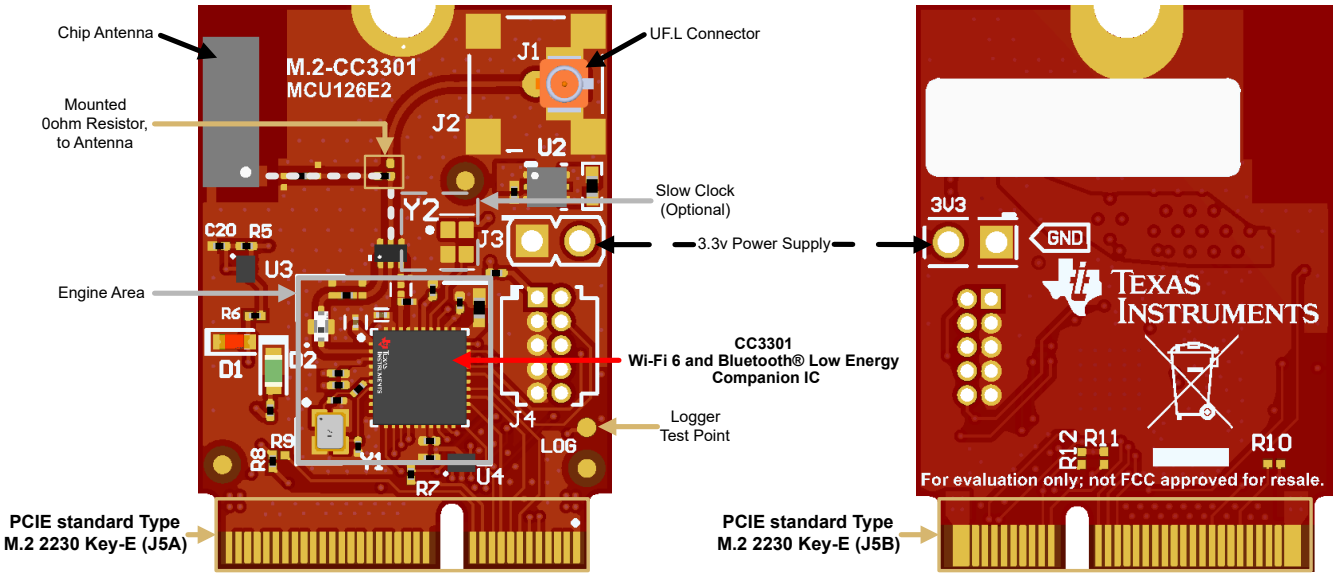


Figure 2-1. M2-CC3301 Features

- The mounted 0 Ohm resistor can be swapped to a different position to do conducted testing with the connector on board (J1/J2), the default configuration allows use of the onboard chip antenna (refer to Figure 2-1). Alternatively there is footprint for an SMA connector (J2) onboard to replace the onboard UF.L connector (J1) for performing conducted testing measurements with a compatible coaxial cable (refer to Figure 2-2).
- There is an optional placement for a 32.768 kHz oscillator (Y2), but the CC3301 already has an internal Slow Clock. The only tradeoff of not having the oscillator (Y2) is a higher power consumption when connected to an AccessPoint.
- With the optional 2 pin header (J3) one can access or provide the 3.3V power source and the board's ground.
- The M2-CC3301 Gold finger Edge connector (J5) follows the PCIE M.2 form factor Type 2230 Key E, as such the board can be compatible with any host that has a 75-position host interface connector for type key E. Refer to Section 2.3 for more information on the pin out.

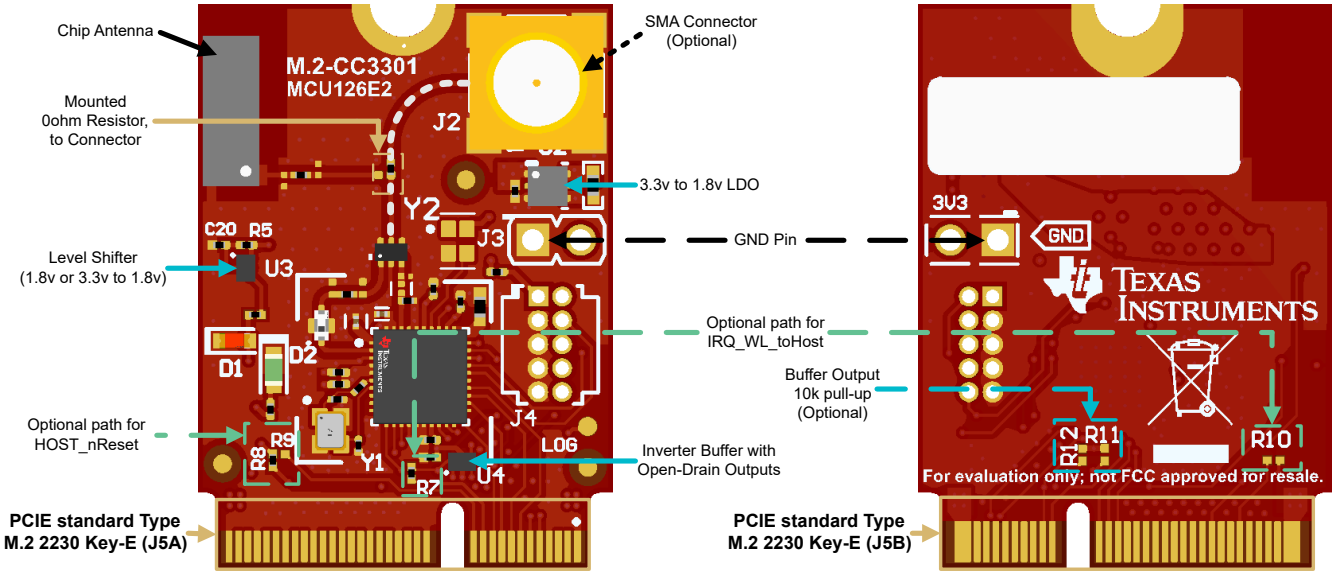


Figure 2-2. M2-CC3301 More Features

- The onboard LDO (U2) is used to derive 1.8V from the provided 3.3V.
- There is an onboard Level Shifter (U3) to receive only 1.8V for the nRESET Net signal (Active Low).
- Important to note that the "Dual Inverter Buffer with Open-Drain Output" (U4) allows the device to output the interrupt lines (Active Low) and conform to the PCI Express M.2 Specification. Since the component is Open-Drain the host platform must have a 10k pull up, pads have been provided to add the resistor (R11 for IRQ_WL, and R12 for IRQ_BLE) in case that is not true.
- There are resistors to optionally change the pin used for the "HOST_nRESET" and "IRQ_WL_toHost" Net signals (refer to Section 2.3).

2.2 Setup

The M2-CC3301 must be inserted on the M.2 Key-E socket of the host platform. The figure below (Figure 2-3) shows the M2-CC3301 Add-in Card inserted in the M.2 Key E socket (J2 connector) of the host platform SK-AM62A-LP .

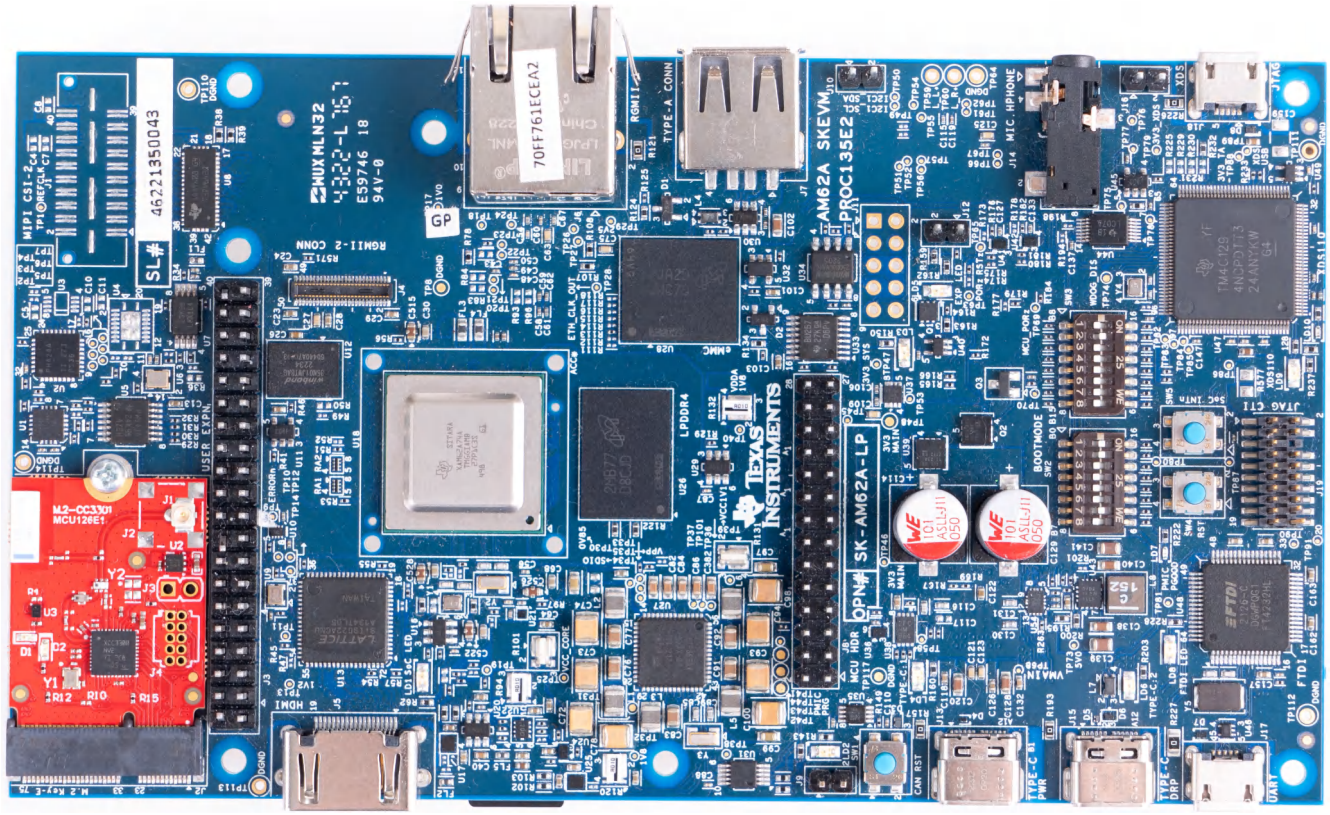


Figure 2-3. M2-CC3301 on SK-AM62A-LP

2.3 Header Information

The CC3301 M.2 Add-in Card has a Gold Finger Edge that plugs into a M.2 Key E connector on the host platform board

The signal assignment for the pins on the M.2 connector Gold Finger Edge is described in Table 2-1 and Table 2-2. Refer to Section 2.1 for view of board.

Table 2-1. Top M.2 Connector Pins (J5A)

Pin	PCIe M.2 Signal Pinout	M2-CC3301 Net	Type/ Direction	Description
P1	3.3 V	GND	GND	Board ground
P3	USB_D+	NC	N/A	Not connected
P5	USB_D-	NC	N/A	Not connected
P7	GND	GND	GND	Board ground
P9	SDIO_CLK/SYSCLK (I)(0/1.8V)	SDIO_CLK	Input	SDIO clock or SPI clock. Must be driven by host.
P11	SDIO_CMD (I/O)(0/1.8V)	SDIO_CMD	Input/Output	SDIO command or SPI PICO.
P13	SDIO_DATA0 (I/O)(0/1.8V)	SDIO_D0	Input/Output	SDIO data D0.
P15	SDIO_DATA1 (I/O)(0/1.8V)	SDIO_D1	Input/Output	SDIO data D1.
P17	SDIO_DATA2 (I/O)(0/1.8V)	SDIO_D2	Input/Output	SDIO data D2.
P19	SDIO_DATA3 (I/O)(0/1.8V)	SDIO_D3	Input/Output	SDIO data D3.
P21	SDIO_WAKE# (O)(0/1.8V)	IRQ_WL_Option1	Output	Default pin for Active Low interrupt request signal (IRQ_WL_toHost) from CC3301 to host for Wi-Fi activity. Refer to 0 ohm resistor R7.
P23	SDIO_RESET#/TX_BLANKING (I) (0/1.8V)	nRESET_Option2	Input	Alternative pin to HOST_nRESET line for CC3301. Used to enable/disable (Active Low) and driven by host. Refer to 0 ohm resistor R9 .
P25-P31	ADD-IN CARD KEY E	N/A	Key E	Pins reserved for Key E.
P33	GND	GND	GND	Board ground.
P35	PERp0	NC	N/A	Not connected.
P37	PERn0	NC	N/A	Not connected.
P39	GND	GND	GND	Board ground.
P41	PETp0	NC	N/A	Not connected.
P43	PETn0	NC	N/A	Not connected.
P45	GND	GND	GND	Board ground.
P47	REFCLKp0	NC	N/A	Not connected.
P49	REFCLKn0	NC	N/A	Not connected.
P51	GND	GND	GND	Board ground.
P53	CLKREQ0# (I/O)(0/1.8V/3.3V)	NC	N/A	Not connected.
P55	PEWAKE0# (I/O)(0/1.8V/3.3V)	NC	N/A	Not connected.
P57	GND	GND	GND	Board ground.
P59	RESERVED/PERo1	NC	N/A	Not connected.
P61	RESERVED/PERn1	NC	N/A	Not connected.
P63	GND	GND	GND	Board ground.
P65	RESERVED/PETp1	NC	N/A	Not connected.
P67	RESERVED/PETn1	NC	N/A	Not connected.
P69	GND	GND	GND	Board ground.
P71	RESERVED/REFCLKp1	NC	N/A	Not connected.
P73	RESERVED/REFCLKn1	NC	N/A	Not connected.
P75	GND	GND	GND	Board ground.

Table 2-2. Bottom M.2 Connector Pins (J5B)

Pin	PCIe M.2 Signal Pinout	M2-CC3301 Net	Type/ Direction	Description
P2	3.3 V	3V3	Input/VCC	Power provided to the board and LDO
P4	3.3 V	3V3	Input/VCC	Power provided to the board and LDO
P6	LED_1# (O)(OD)	NC	N/A	Not connected
P8	PCM_CLK/I2S_SCK (I/O)(0/1.8V)	NC	N/A	Not connected
P10	PCM_SYNC/I2S_WS (I/O)(0/1.8V)	NC	N/A	Not connected
P12	PCM_OUT/I2S_SD_OUT (O)(0/1.8V)	NC	N/A	Not connected
P14	PCM_IN/I2S_SD_IN (I)(0/1.8V)	NC	N/A	Not connected
P16	LED_2# (O)(OD)	NC	N/A	Not connected
P18	VIO_CFG (O)	NC	N/A	Not connected
P20	UART_WAKE# (O)(0/3.3V)	IRQ_BLE_toHost	Output	Pin for Interrupt request from CC3301 to host for BLE activity.
P22	UART_TXD (O)(0/1.8V)	UART_TX	Output	The CC3301 UART TX to host for BLE host controller interface
P24-P30	ADD-IN CARD KEY E	N/A	Key E	Pins reserved for Key E
P32	UART_RXD (I)(0/1.8V)	UART_RX	Input	The CC3301 UART RX from host for BLE host controller interface
P34	UART_RTS (O)(0/1.8V)	UART_RTS	Output	UART RTS from CC3301 to host for BLE HCI flow control
P36	UART_CTS (I)(0/1.8V)	UART_CTS	Input	UART CTS to CC3301 from host for BLE HCI flow control
P38	VENDOR DEFINED	NC	N/A	Not connected
P40	VENDOR DEFINED	NC	N/A	Not connected
P42	VENDOR DEFINED	NC	N/A	Not connected
P44	COEX3 (I/O)(0/1.8V)	NC	N/A	Not connected
P46	COEX_TXD (O)(0/1.8V)	NC	N/A	Not connected
P48	COEX_RXD (I)(0/1.8V)	NC	N/A	Not connected
P50	SUSCLK (I)(0/1.8V/3.3V)	NC	N/A	Not connected
P52	PERST0# (I)(0/1.8V/3.3V)	NC	N/A	Not connected
P54	W_DISABLE2# (I)(0/1.8V/3.3V)	NC	N/A	Not connected
P56	W_DISABLE1# (I)(0/1.8V/3.3V)	nRESET_Option1	Input	Default pin to HOST_nRESET line for CC3301. Used to enable/ disable (Active Low) and Driven by host. Refer to 0 ohm resistor R8
P58	I2C_DATA (I/O)(0/1.8 V)	NC	N/A	Not connected
P60	I2C_CLK (I)(0/1.8 V)	NC	N/A	Not connected
P62	ALERT# (O)(0/1.8 V)	IRQ_WL_Option2	Output	Alternative pin for Interrupt request Active Low (IRQ_WL_toHost) from CC3301 to host for Wi-Fi activity. Refer to 0 ohm resistor R10.
P64	VIO 1.8 V	NC	N/A	Not connected
P66	UIM_SWP/PERST1#	NC	N/A	Not connected
P68	UIM_POWER_SNK/CLKREQ1#	NC	N/A	Not connected
P70	UIM_POWER_SRC/GPIO_1/PEWAKE1#	NC	N/A	Not connected
P72	3.3 V	3V3	Input/VCC	Power provided to the board and LDO
P74	3.3 V	3V3	Input/VCC	Power provided to the board and LDO

3 Software

3.1 Software Description

To access the software resources available, the user can submit a request on the ti.com CC3301 tool folder under Request more information section. Request Now

4 Hardware Design Files

4.1 Schematics

All design files including the schematics for the M2-CC3301 are made available for download on the M2-CC3301 tool folder.

4.2 PCB Layouts

All design files including the Gerber files for the M2-CC3301 are made available for download on the M2-CC3301 tool folder.

4.3 Bill of Materials (BOM)

All design files including the BOM list for the M2-CC3301 are made available for download on the M2-CC3301 tool folder.

5 Compliance Information

5.1 Compliance and Certifications

The M2-CC3301 is found to be in RoHS compliant in accordance to EU Directives. The full text of the EU declaration of conformity is available at this link.

6 Additional Information

6.1 Trademarks

SimpleLink™ is a trademark of Texas Instruments.
Bluetooth® is a registered trademark of Bluetooth Sig, Inc.
Linux® is a registered trademark of Linux Foundation.
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7 Revision History

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

Changes from Revision * (July 2023) to Revision A (November 2023)	Page
• Updated Block Diagram to reflect M.2-CC3301	2
• Added new figures and descriptions of the features for M2-CC3301	3
• Updated description and images to reflect new setup steps	5
• Added links to design files on ti.com	8

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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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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

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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.

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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.

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