

CC27xxR10 Platform Development Kit for Channel Sounding



Description

The Channel Sounding (CS) evaluation module was designed to provide customers with a wireless device reference design that can be used for channel sounding hardware and software development.

Get Started

1. Order the [LP-XDS110](#) or the [LP-XDS110ET](#) launch pad.
2. Download the latest [software development kit](#) (SDK).
3. Download the comprehensive reference design files from the TI reference design page.
4. See the latest [CC2745R10-Q1](#) product page

Features

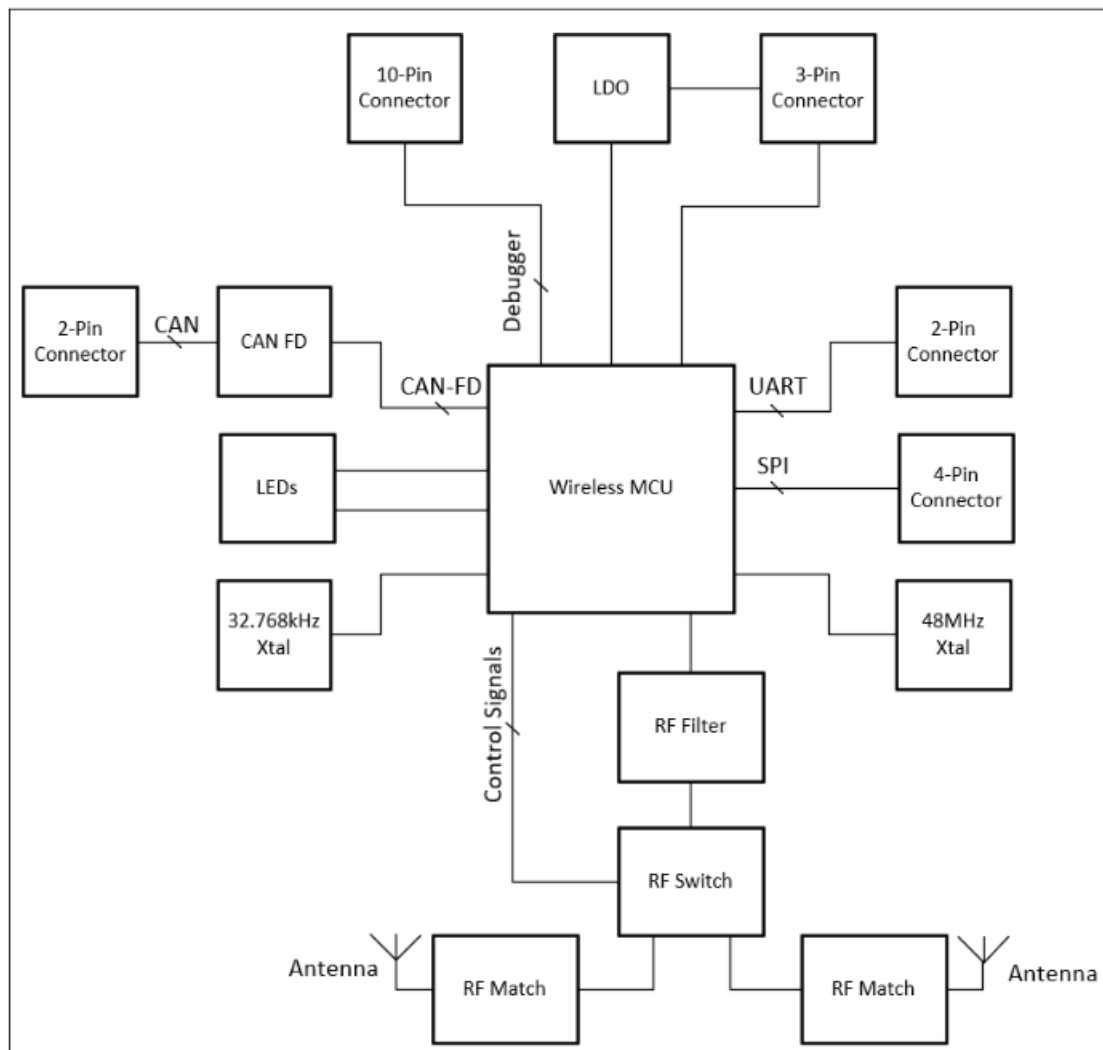
- [CC2745R10-Q1](#) wireless MCU capable of up to +10dBm output power
- 2 - 2.4GHz PCB antenna with U.FL connector for external antennas and conducted measurements
- 10-pin Arm® Cortex® connectors
- [TCAN3404DRQ1](#) CAN FD transceiver
- [TPS7B82-Q1](#) LDO
- 2 Status LEDs
- SPI and UART interfaces

Applications

- [Automotive](#)
 - Channel Sounding
- [Industrial](#)
 - Channel Sounding



CC2745R10-CS-EVM Hardware Image



CC2745R10-CS-EVM Block Diagram

1 Evaluation Module Overview

1.1 Introduction

The Channel Sounding (CS) EVM helps the user with developing and evaluating Channel Sounding (CS) with SimpleLink ultra-low power CC2745R10-Q1 wireless MCU.

1.2 Kit Contents

- [CC2745R10-CS-EVM](#)
- 10-pin flat ribbon cable
- 2-wire female to female cable
- [Standard Terms and Conditions for EVMs](#)
- Abbreviated Terms and Conditions for EVMs

1.3 Specification

The [CC2745R10-CS-EVM](#) is designed using the [CC2745R10-Q1](#) wireless MCU that has a 96MHz Arm Cortex-M33 processor, 1MB of in-system programmable flash, 32kB of ROM for bootloader and drivers, and 162kB of ultralow leakage SRAM with full RAM retention in standby mode. In addition, the [CC2745R10-Q1](#) is a 2.4GHz RF transceiver compatible with Bluetooth Low Energy, contains an integrated balun, supports over-the-air upgrade (OTA), and has a Serial Wire Debug (SWD) interface.

The MCU consumption has a 6.8mA active mode running CoreMark®, consumes less than 900nA in standby mode, and 170nA in shutdown mode with wake-up on a pin.

The Radio consumption is 6.1mA in RX mode, 7.7mA in TX mode at 0dBm, and 24.5mA in TX at +10dBm. In addition, the radio is capable of -103.5dBm sensitivity for Bluetooth Low Energy 125kbps and -97dBm sensitivity for Bluetooth Low Energy 1Mbps.

The CC2745R10-CS-EVM can support:

- 2 - 2.4GHz PCB antenna with U.FL connector for external antennas and conducted measurements
- 10-pin Arm® Cortex® connectors
- [TCAN3404DRQ1](#) CAN FD transceiver
- [TPS7B82-Q1](#) LDO
- 2 Status LEDs
- SPI and UART interfaces

1.4 Device Information

CC2745R10-Q1

The SimpleLink™ 2.4 GHz [CC2745R10-Q1](#) device is an AEC-Q100 compliant wireless microcontroller (MCU) targeting automotive applications. The device is optimized for low-power wireless communication in applications such as channel sounding, and car access. The highlighted features of this device include:

- Support for TI's SimpleLink Low Power SDK with channel sounding capabilities.
- AEC-Q100 qualified for Grade 2 temperature range (–40 °C to +125 °C) and is offered in a 6-mm x 6-mm QFN40 package with wettable flanks.
- Low standby current of 0.9 µA with full RAM retention.

The [CC2745R10-Q1](#) device is part of the SimpleLink™ MCU platform, which consists of Wi-Fi, Bluetooth Low Energy, Thread, Zigbee®, Sub-1 GHz MCUs, and host MCUs that all share a common, easy-to-use development environment and rich tool set. For more information, visit [SimpleLink™ MCU platform](#).

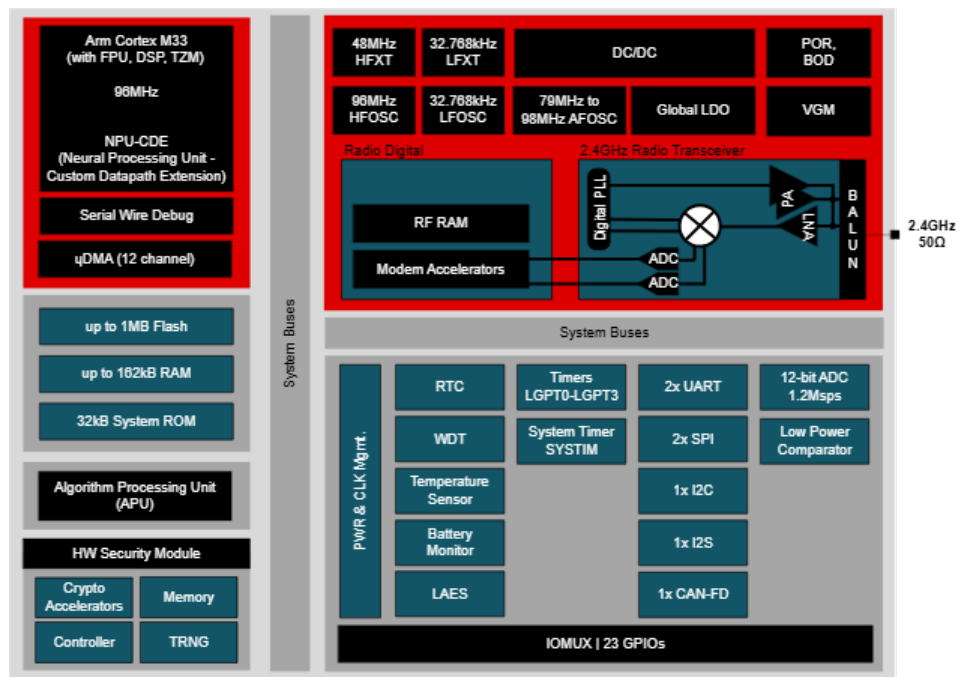


Figure 1-1. CC2745R10 Block Diagram

TCAN3404DRQ1

The TCAN340x-Q1 devices are automotive EMC compliant 3.3V CAN FD transceivers. The devices are data rate agnostic making them backward compatible for supporting classical CAN applications while also supporting CAN FD networks up to 8Mbps. These devices have standby mode support which puts the transceiver in low current consumption mode. Upon receiving valid wake-up pattern on CAN bus, the device signals to the micro-controller through the RXD pin. The MCU can then place the device in normal mode using STB pin.

TCAN3404-Q1 supports ultra-low power shutdown mode where most of the internal blocks are disabled. This feature is optimized for battery-powered applications.

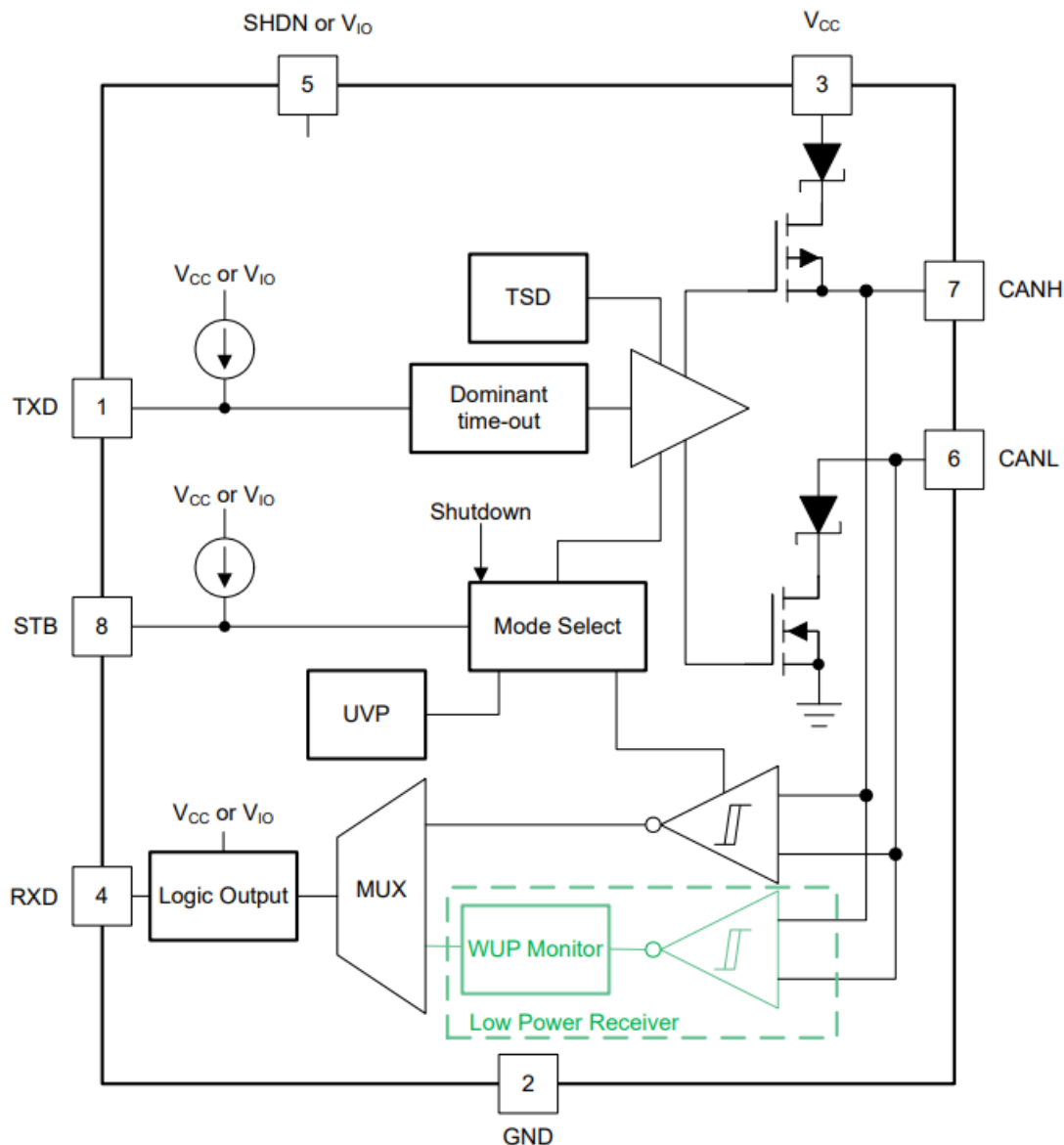


Figure 1-2. TCAN340x-Q1 Block Diagram

TPS7B82-Q1

The TPS7B82-Q1 is a 40-V, 300-mA low-dropout (LDO) linear regulator with ultra-low quiescent current. This voltage regulator consumes only 3 μ A of quiescent current at light load and is designed for the automotive always-on application.

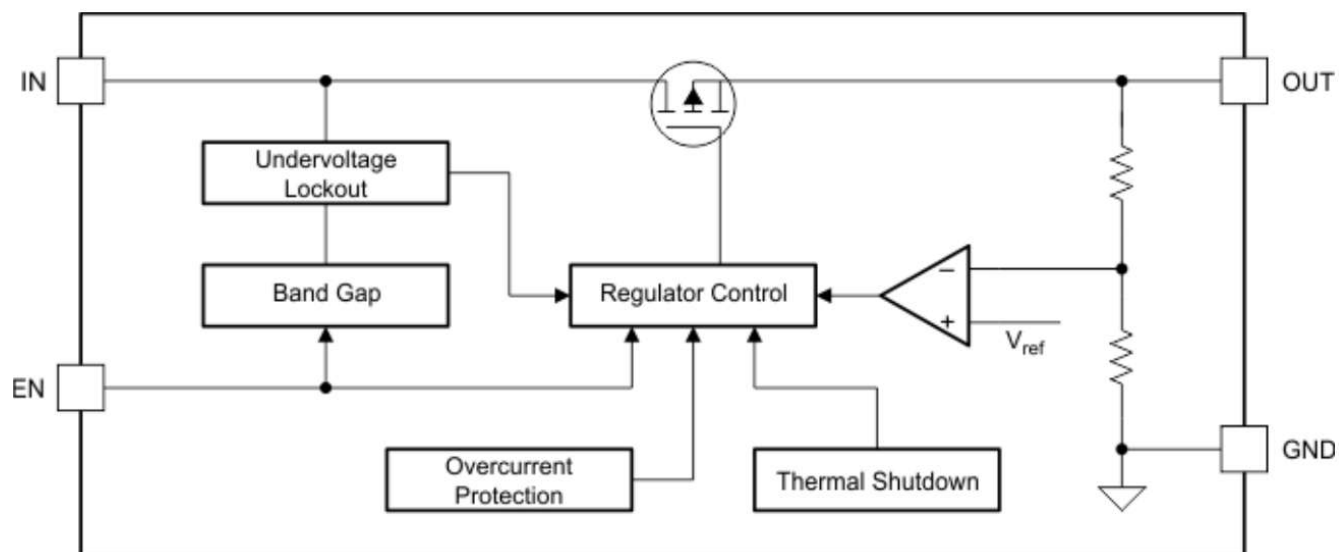


Figure 1-3. TPS7B82-Q1 Block Diagram

2 Hardware

Figure 2-1 shows location of the **CC2745R10-CS-EVM** connectors, LEDs and CC2745R10-Q1. The CAN-FD, LDO and the antenna locations are also shown.

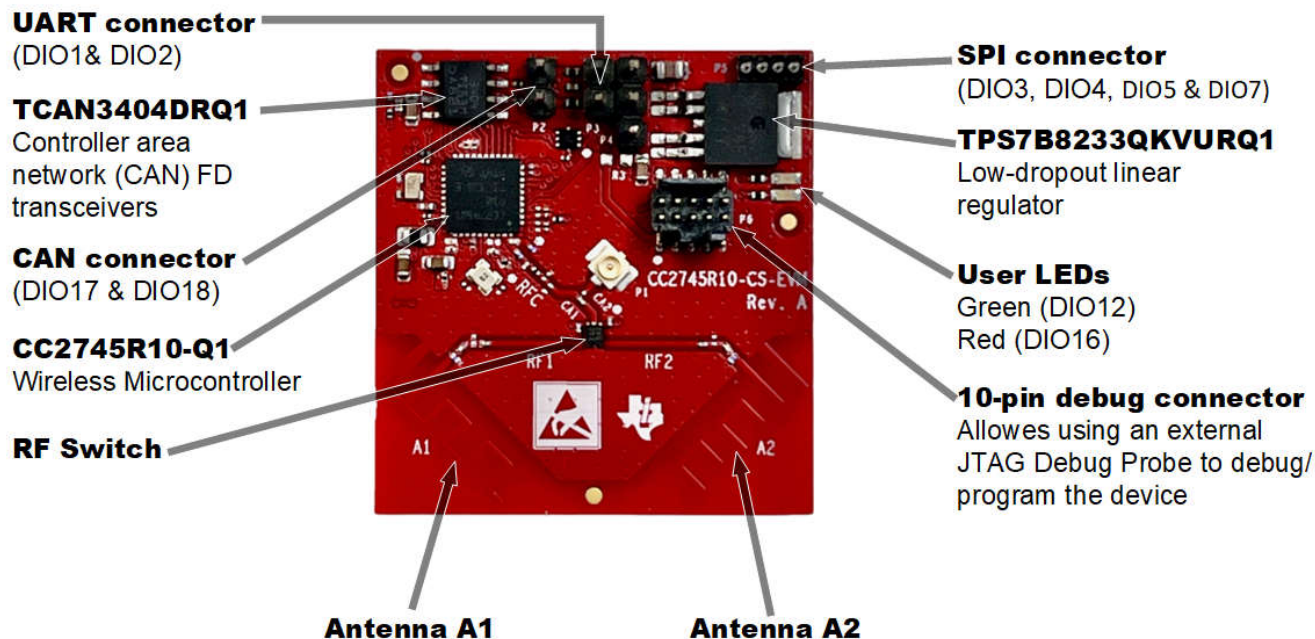


Figure 2-1. CC2745R10-CS-EVM Hardware Layout

2.1 Power Requirements

When powering the **CC2745R10-CS-EVM** there are three ways the user can power the board. It can be powered from the debug connector. It can also be powered through the 3V3 pin header. If the device is powered through the 3V3 pin header the user must ensure the board voltage stays between 3V to 3.6V. The final way the board can be powered is through the 12V pin header with a 12V power supply. If this option is utilized the user must mount the R3 resistor.

Note

Even though the CC2745R10-Q1 supply voltage ranges from 1.8V to 3.8V, the maximum voltage of the CC2745R10-CS-EVM is limited by the TCAN3404 supply requirements of 3V to 3.6V.

2.2 Temperature Range

The EVM is designed for operation from -40°C to $+105^{\circ}\text{C}$. When powering the EVM from an external battery, keep the system within its specified temperature operating range.

2.3 Programming, Debug, and Control

The **CC2745R10-CS-EVM** does not include an onboard debug probe. Compatible debug probes are the LaunchPad XDS110 debug probe (LP-XDS110 or LP-XDS110ET), standalone XDS110 (TMDSEMU110-U with the optional EnergyTrace HDR adapter TMDSEMU110-ETH), or a LaunchPad with an onboard debug probe.

2.3.1 Using a Generic XDS110 Debug Probe, Including a Separate LaunchPad

On the separate LaunchPad:

- Remove all of the header jumpers except GND and 3V3.

On both Generic XDS110 Debug Probe and Separate LaunchPad:

- Set the power jumper to reflect the scenario. Set the jumper to XDS110 power if the [CC2745R10](#) is to be powered by the XDS110 Debug Probe or the separate LaunchPad. Set this to Extern Pwr if external power is to be provided instead. Care must be taken to keep the board voltage within the board's operating range (3V to 3.6V).
- Connect one end of the 10-pin Debug Cable to the XDS110 Out connector on the LaunchPad.
- Connect the other end of the 10-pin Debug Cable to the P6 connector.

The final configuration is shown in [Figure 2-2](#).

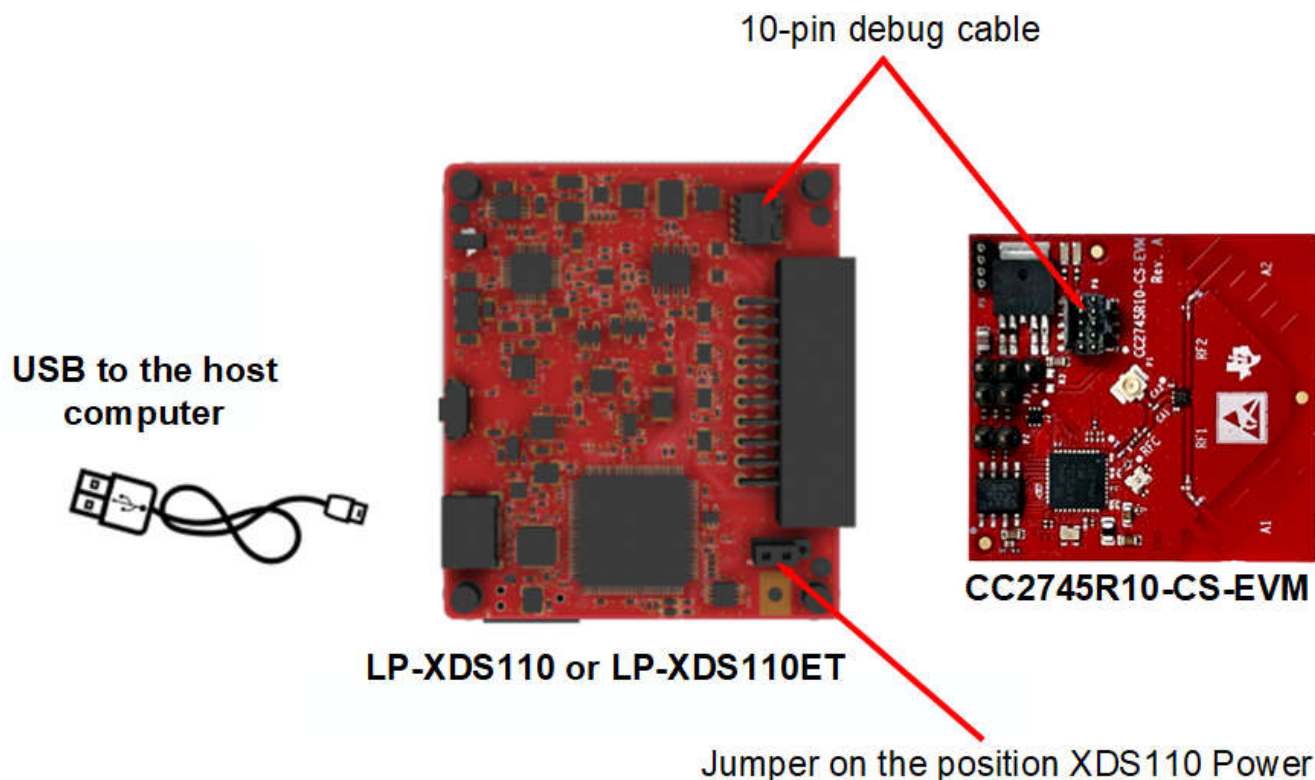


Figure 2-2. Connection of CC2745R10-CS-EVM with XDS110 Debug Probe

2.4 Interfaces

2.4.1 Debug Interface Connector

The [CC2745R10-CS-EVM](#) contains a 10-pin debug connector (P6) that enables the use of an external JTAG Debug Probe to debug/program the device. The pinout information can be found in [Table 2-1](#). For the pin 1 location, refer to Section 5 or the full set of reference design files.

Table 2-1. 10-Pin Debug Interface Connector Pinout

Pin #	Pin Name	Pin Description
1	WMCU_VDD	VDD connection to WMCU device
2	DIO9_SWDIO	SWDIO connection to WMCU device
3	GND	Ground connection
4	DIO10_SWDCCK	SWDCCK connection to WMCU device
5	GND	Ground connection
6	NC	No connect
7	NC	No connect
8	NC	No connect
9	GND	Ground connection

Table 2-1. 10-Pin Debug Interface Connector Pinout (continued)

Pin #	Pin Name	Pin Description
10	RSTN	RESET connection to WMCU device

2.4.2 Power Supply Connector

P4 can be used to power the board through the 12V pin or through the WMCU_VDD pin when the board is not powered through the debug connector. See [Table 2-2](#) for the pinout information.

Table 2-2. Power Supply Connector Pinout

Pin #	Pin Name	Pin Description
1	12V	12V supply pin
2	GND	Ground connection
3	WMCU_VDD	3.3V supply pin

2.4.3 CAN FD Connector

The [CC2745R10-CS-EVM](#) contains connector (P2) for use as a CAN bus interface. See [Table 2-3](#) for the pinout information.

Table 2-3. CAN FD Connector Pinout

Pin #	Pin Name	Pin Description
1	CANL	Low-level CAN bus input/output line
2	CANH	High-level CAN bus input/output line

2.4.4 UART Connector

The [CC2745R10-CS-EVM](#) contains connector (P3) for use as a UART interface. This connector is routed to DIO1 and DIO2 and can be used as GPIOs as well. See [Table 2-4](#) for the pinout information.

Table 2-4. UART Connector Pinout

Pin #	Pin Name	Pin Description
1	DIO1	UART TX
2	DIO2	UART RX

2.4.5 SPI Connector

The [CC2745R10-CS-EVM](#) contains connector (P5) for use as a SPI interface. The pins are routed directly to CC2745R10-Q1 DIOs and can be used as GPIOs as well. See [Table 2-5](#) for the pinout information.

Table 2-5. SPI Connector

Pin #	Pin Name	Pin Description
1	DIO3	SPI SCLK
2	DIO4	SPI PICO/POCI
3	DIO5	SPI PICO/POCI
4	DIO7	SPI CS

2.5 Test Points

The [CC2745R10-CS-EVM](#) has three test points for debug. [Table 2-6](#) shows the test points available on [CC2745R10-CS-EVM](#).

Table 2-6. Test Points

Test Point Name	Test Point Description
TP1	DIO19
TP2	DIO20
TP3	GND

3 Advanced Use of the EVM Hardware

Note

The topics in this section can involve hardware modifications to your development kit. Your board can be damaged if appropriate soldering equipment is not used and proper ESD mitigation procedures are not followed. Make sure you have the expertise to perform these modifications.

3.1 Radiated/Conducted Testing

Radiated Testing: There are two 0201 package 15pF capacitors (CA1 and CA2) on the board which determines if the RF signal is routed to the on-board antennas, or the U.FL connector. Only one can be populated at any given time. By default, CA2 is populated, and the RF signal is routed to the on-board antennas. This configuration will be used to execute radiated testing.

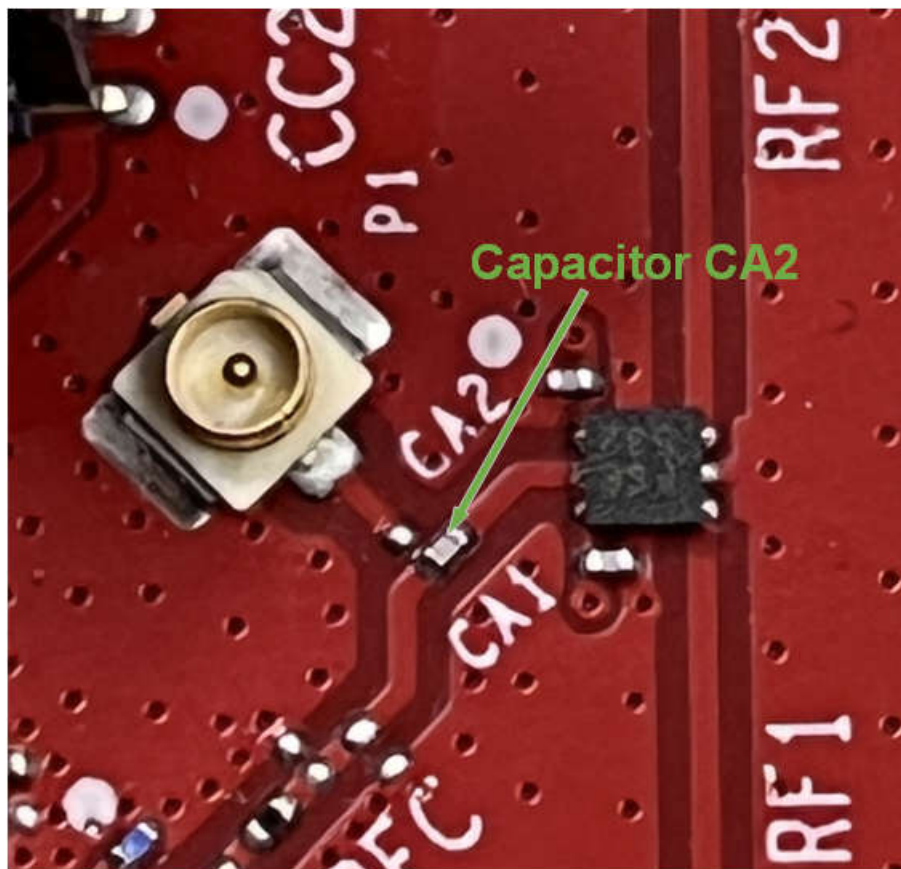


Figure 3-1. Capacitors for Radiated or Conducted Testing

Conducted Testing: When the 15pF capacitor is rotated and installed in the CA1 location, the RF signal is routed to the U.FL connector P1. This configuration will be used to execute conducted testing.

Supplying with 12V

By default, the R3 resistor is unpopulated. If the user wants to supply the board with 12V through the 12V pin, R3 should be mounted on the board.

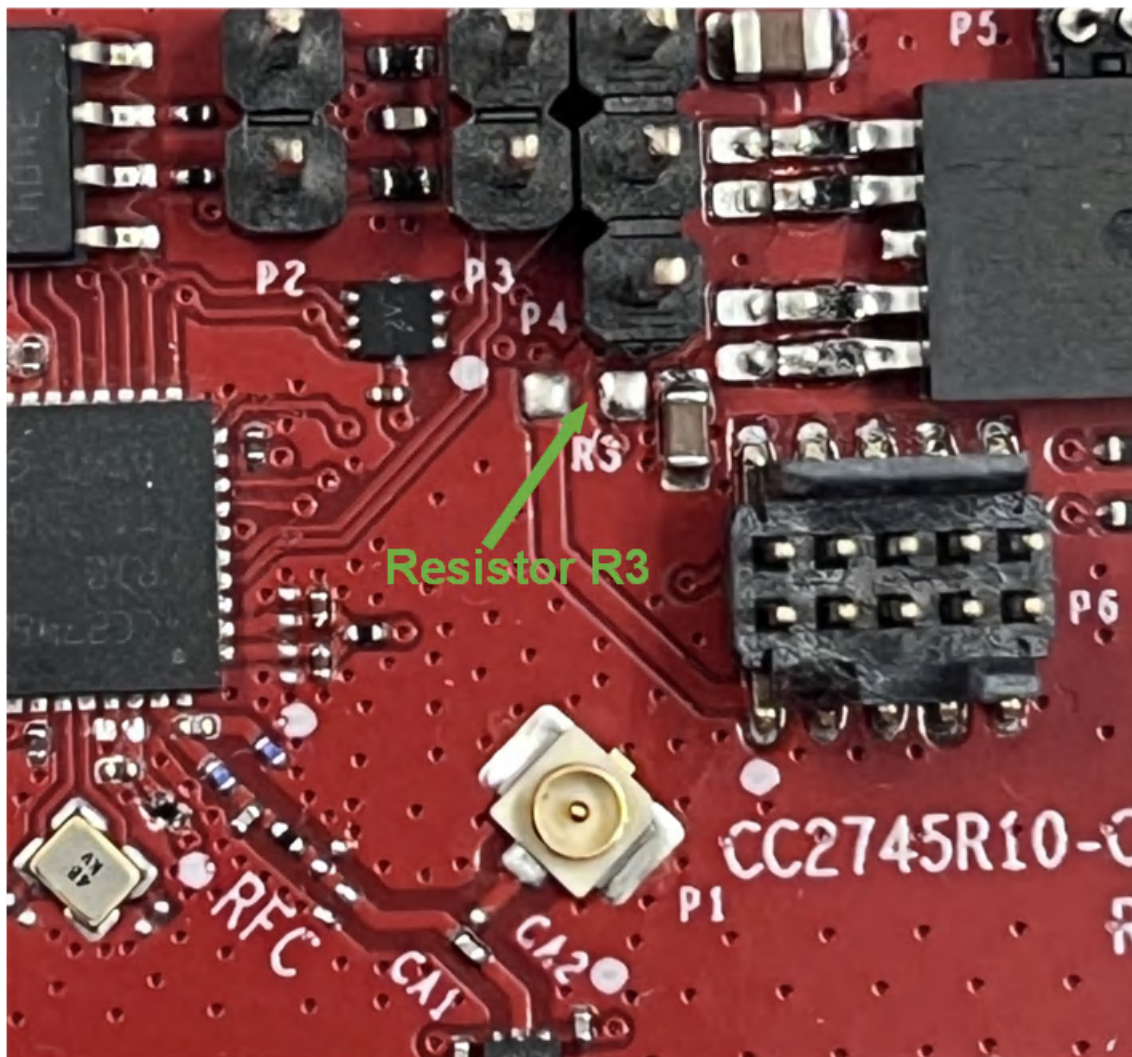


Figure 3-2. 12V Supply Configuration

4 Software

4.1 Software Development

For software development and example projects, please refer to the user's guide in the [SimpleLink LowPower software development kit](#).

5 Hardware Design Files

5.1 Schematics

Figure 5-1, Figure 5-2, Figure 5-3, and Figure 5-4 show the schematic implementation of the CC2745R10-CS-EVM. The full CC2745R10-CS-EVM reference schematic can be downloaded from the CC2745R10-CS-EVM reference design files.

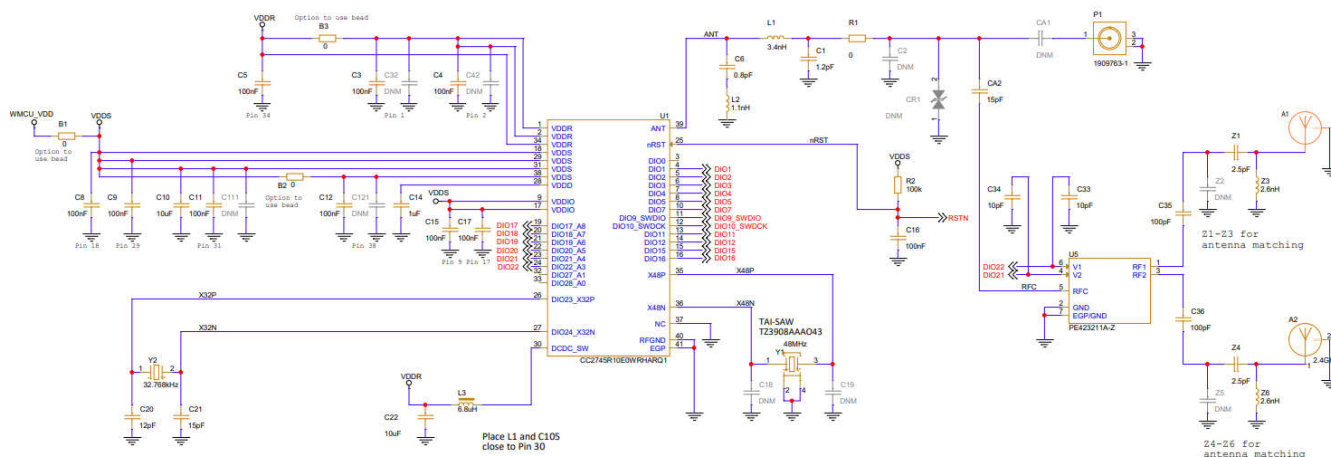


Figure 5-1. Schematic Sheet 1

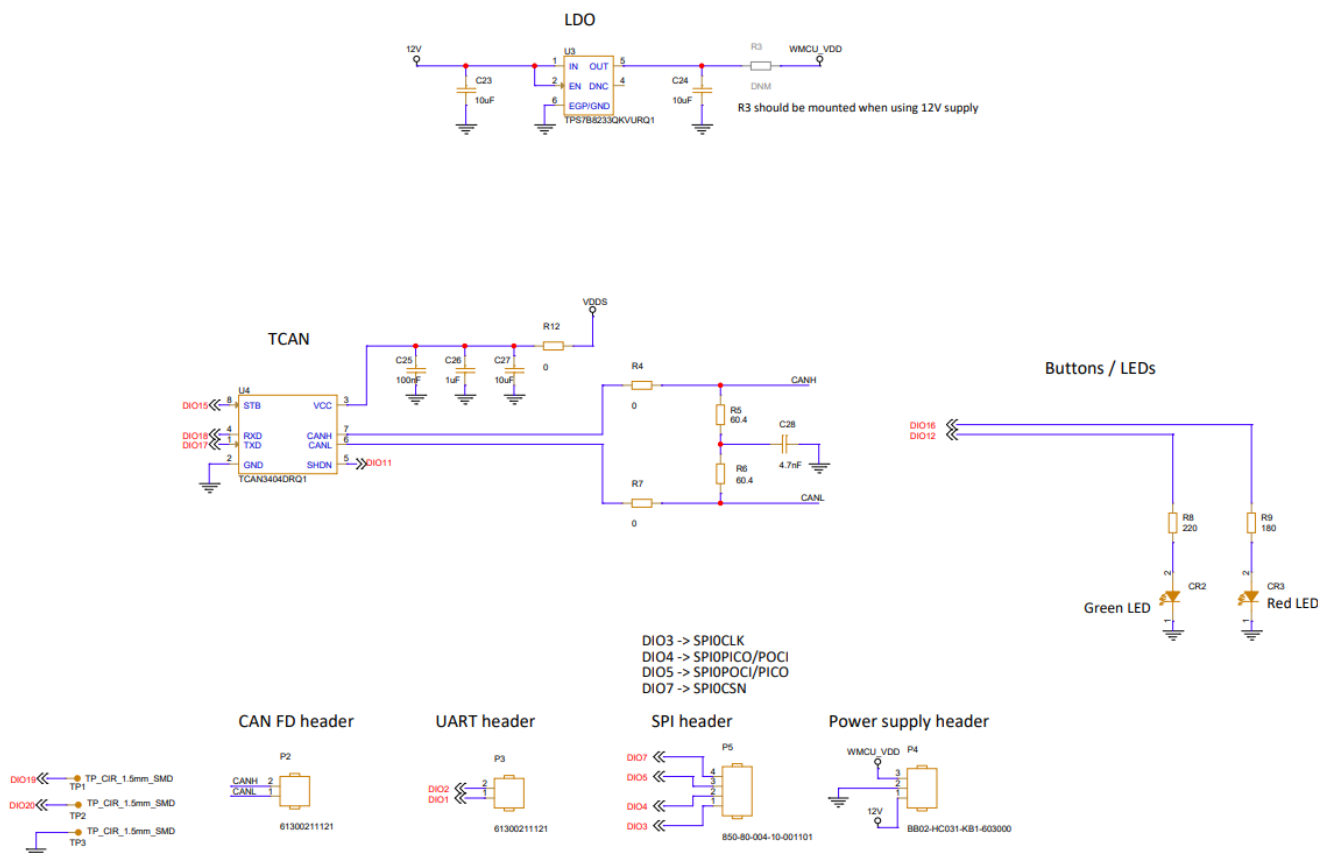


Figure 5-2. Schematic Sheet 2

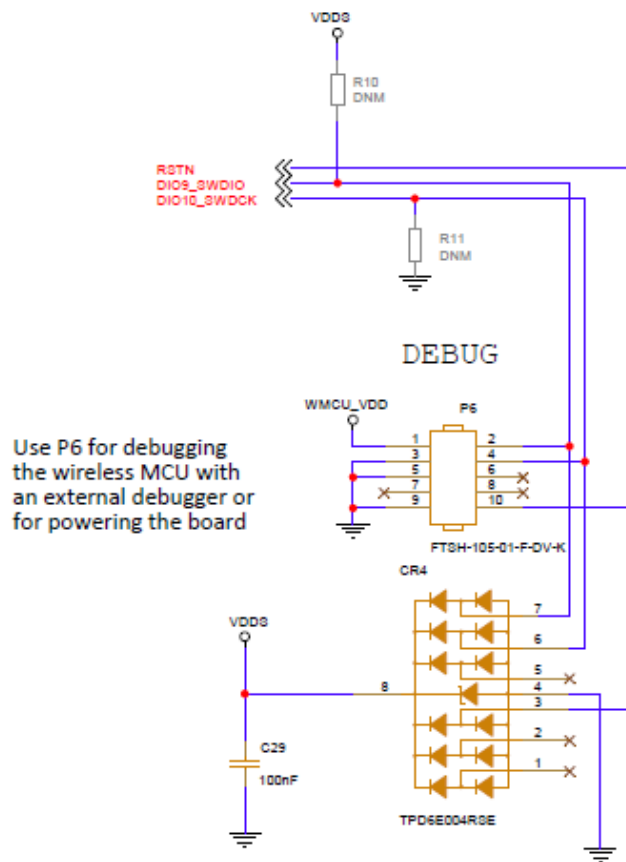


Figure 5-3. Schematic Sheet 3

Labels



Fiducials



PCB



Figure 5-4. Schematic Sheet 4

5.2 PCB Layouts

The top and bottom side PCB layout view of the [CC2745R10-CS-EVM](#) can be seen in Top Side PCB Layout View ([Top Side PCB Layout View](#)) and Bottom Side PCB Layout View ([Bottom Side PCB Layout View](#)), respectively. The full [CC2745R10-CS-EVM](#) layout files can be downloaded from the [CC2745R10-CS-EVM](#) reference design files .

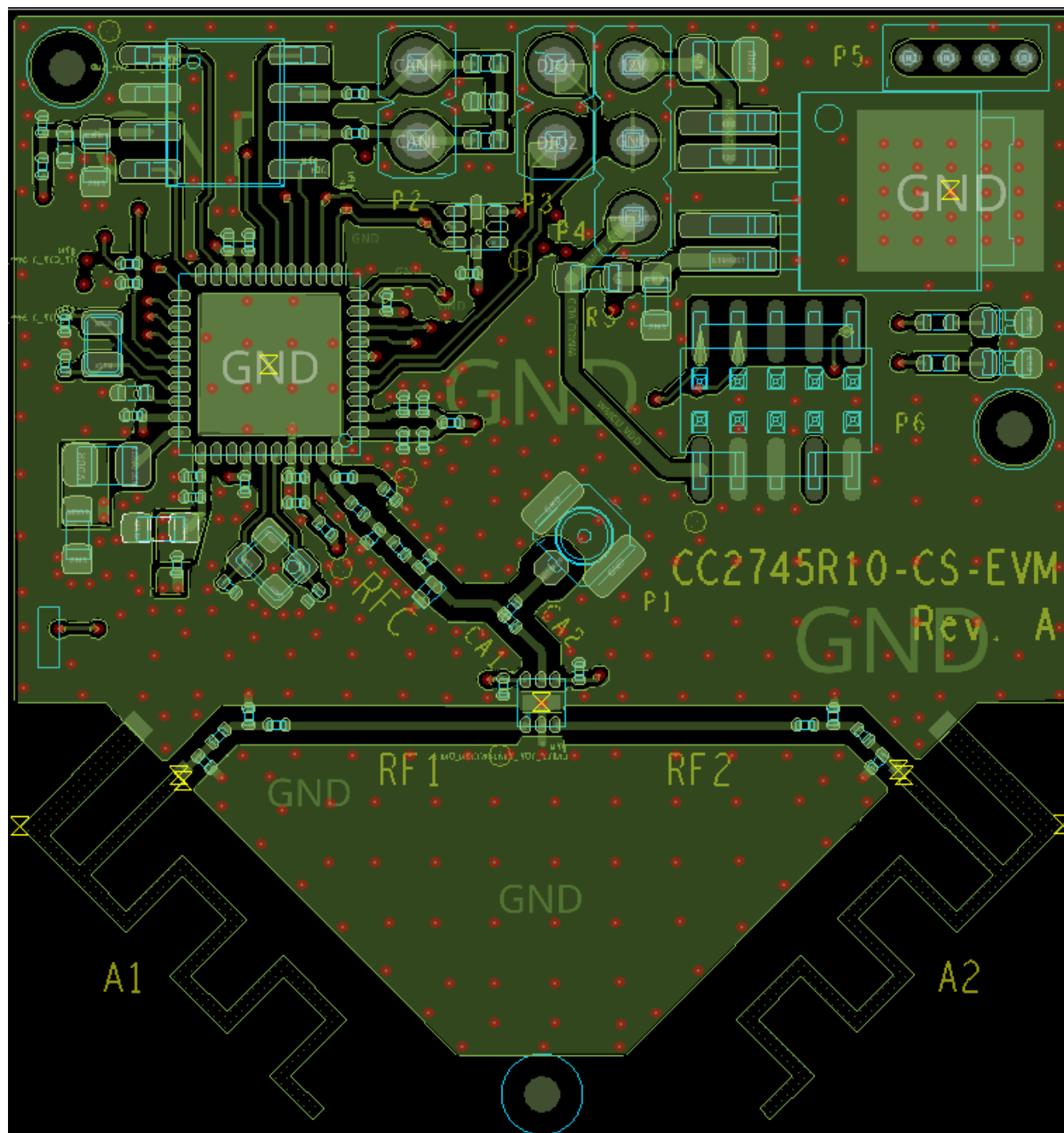


Figure 5-5. Top Side PCB Layout View

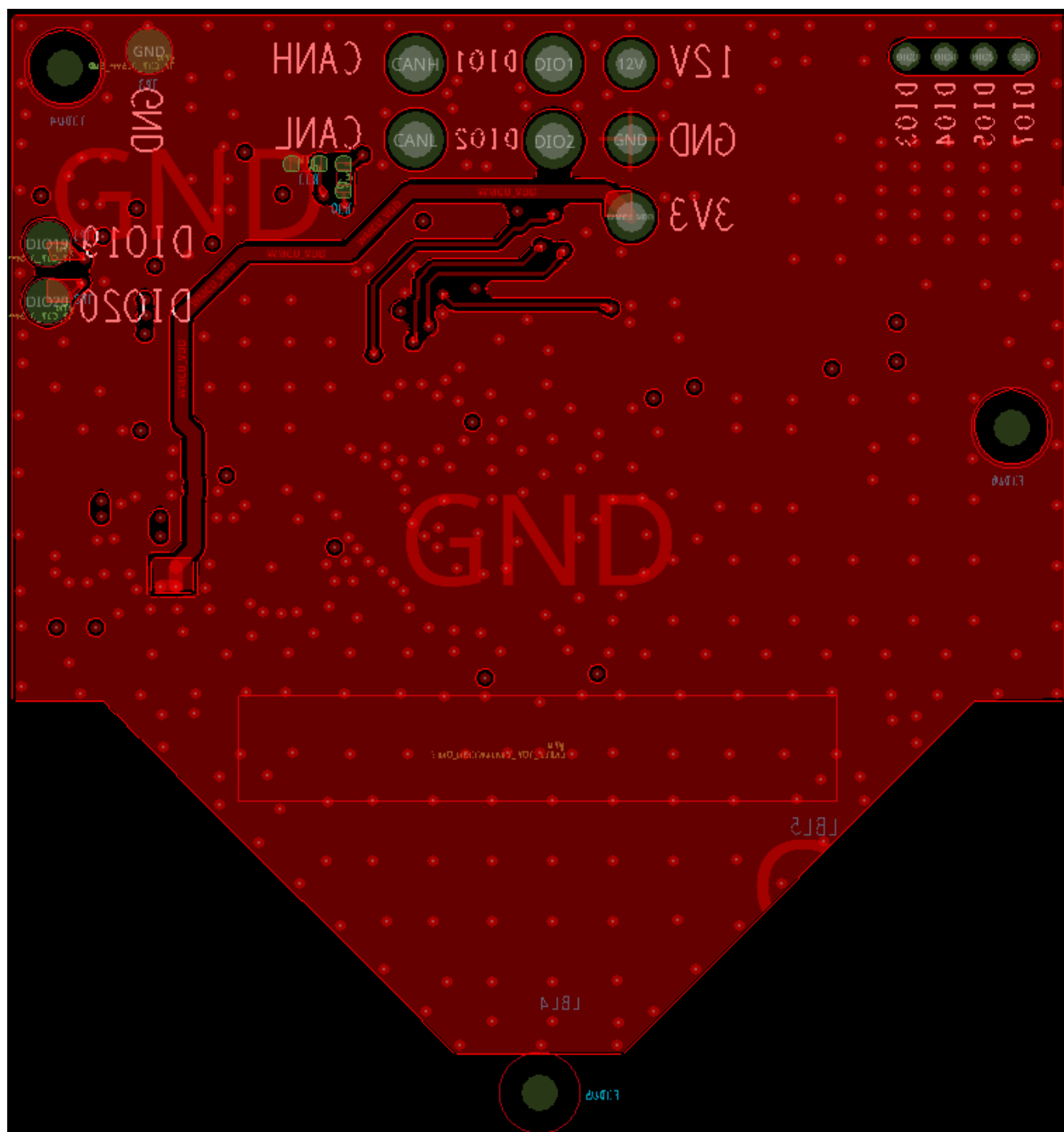


Figure 5-6. Bottom Side PCB Layout View

5.3 Bill of Materials (BOM)

Table 5-1 shows the simplified Bill of Materials (BOM) for the [CC2745R10-CS-EVM](#). The full [CC2745R10-CS-EVM](#) BOM can be downloaded from the [CC2745R10-CS-EVM](#) reference design files.

Table 5-1. CC2745R10-CS-EVM Bill-of-Materials

Part Reference Designator	Quantity	Value	Vendor Part Number	Vendor
A1 A2	2	2.4GHz	AN043	TEXAS INSTRUMENTS
B1	1	0	AF0201JR-130RL	MURATA
B2	1	0	AF0201JR-130RL	MURATA

Table 5-1. CC2745R10-CS-EVM Bill-of-Materials (continued)

Part Reference Designator	Quantity	Value	Vendor Part Number	Vendor
B3 R1 R4 R7 R12	5	0	AF0201JR-130RL	YAGEO
C1	1	1.2pF	GRT0335C1E1R2CA02D	MURATA
C3 C4 C5 C8 C9 C11 C12 C15 C16 C17 C25 C29	12	100nF	GCM033M8ED104KE07D	MURATA
C6	1	0.8pF	GCQ0335C1HR80BB01D	MURATA
C10 C22 C24 C27	4	10uF	GRT188D71A106ME13D	MURATA
C14 C26	2	1uF	GRT155R70J105KE01D	MURATA
C20	1	12pF	GRT0335C1H120FA02D	MURATA
C21 CA2	2	15pF	GRT0335C1H150FA02D	MURATA
C23	1	10uF	CL21Y106KABVPNE	SAMSUNG ELECTRO-MECHANICS
C28	1	4.7nF	GCM155R71H472KA37D	MURATA
C33 C34	2	10pF	GRT0335C1H100JA02D	MURATA
C35 C36	2	100pF	GRT0335C1H101FA02D	MURATA
CR2	1	150060VS55040	150060VS55040	WURTH
CR3	1	150060RS55040	150060RS55040	WURTH
CR4	1	TPD6E004RSE	TPD6E004RSER	TEXAS INSTRUMENTS
L1	1	3.4nH	LQP03TN3N4BZ2D	MURATA
L2	1	1.1nH	LQP03TN1N1BZ2D	MURATA
L3	1	6.8uH	MLZ2012N6R8LTD25	TDK GLOBAL
P1	1	1909763-1	1909763-1	TE CONNECTIVITY
P2 P3	2	61300211121	61300211121	WURTH
P4	1	BB02-HC031-KB1-603000	BB02-HC031-KB1-603000	GRADCONN
P5	1	850-80-004-10-001101	850-80-004-10-001101	PRECI-DIP
P6	1	FTSH-105-01-F-DV-K	FTSH-105-01-F-DV-K	SAMTEC
PCB1	1	PCB	PCB	TEXAS INSTRUMENTS
R2	1	100k	RK73B1HTTCM104J	KOA SPEER
R5 R6	2	60.4	ERJ2RKF60R4X	PANASONIC INDUSTRIAL
R8	1	220	CRCW0402220RJNED	VISHAY
R9	1	180	CRCW0402180RJNED	VISHAY
U1	1	CC2745R10E0WRHARQ1	CC2745R10E0WRHARQ1	TEXAS INSTRUMENTS
U3	1	TPS7B8233QKVURQ1	TPS7B8233QKVURQ1	TEXAS INSTRUMENTS
U4	1	TCAN3404DRQ1	TCAN3404DRQ1	TEXAS INSTRUMENTS
U5	1	PE423211A-Z	PE423211A-Z	PSEMI
Y1	1	48MHz	TZ3908AAAO43	TAI-SAW
Y2	1	32.768kHz	FC2012AA 32.768K-70NN75KC7	EPSON
Z1 Z4	2	2.5pF	GCQ0335C1H2R5BB01D	MURATA
Z3 Z6	2	2.6nH	LQP03TN2N6BZ2D	MURATA

6 Compliance Information

6.1 CE Compliance

This evaluation board is only for development and not an end-product. Developers and integrators who incorporate the chipset in any end products are responsible for obtaining applicable regulatory approvals for such end products. See the EU Declaration of Conformity

6.2 REACH Compliance

Texas Instruments declares that this product is in compliance with the EU REACH regulation.

6.3 Waste Electrical and Electronic Equipment (WEEE) Compliance



Waste Electrical and Electronic Equipment (WEEE)

This symbol means that according to local laws and regulations your product and/or battery shall be disposed of separately from household waste. When this product reaches its end of life, take it to a collection point designated by local authorities. Proper recycling of your product will protect human health and the environment.

7 Additional Information

7.1 Known Hardware or Software Issues

- On Rev. A, the silk screen is showing pin 1 of U5 incorrectly. This is fixed in Rev. B.

Trademarks

All trademarks are the property of their respective owners.

8 References

Development tools and software

- [SimpleLink Low Power F3 software development kit](#)
- [SmartRF™ Studio](#) for simple radio configuration
- [SysConfig](#) system configuration tool

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 DEGRADATION 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 instructions, 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/sds/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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3.3.3 *Notice for EVMs for Power Line Communication:* Please see http://www.tij.co.jp/sds/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.

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.

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Last updated 10/2025