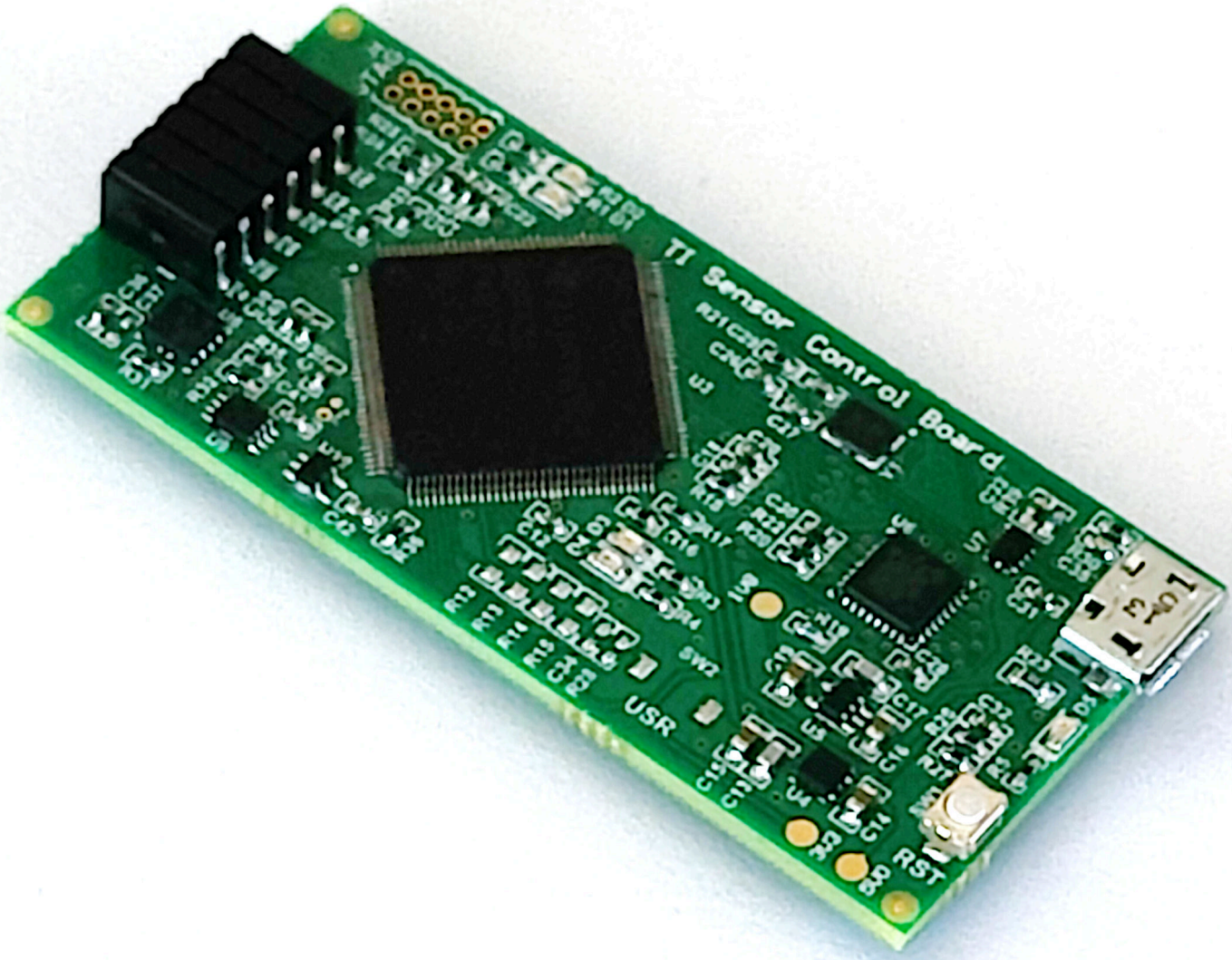
User's Guide

TI Sensor Control Board User's Guide

ABSTRACT

This user's guide describes how to setup the TI Sensor Control Board (SCB) to use with compatible EVMs. Specifically, it outlines the connection and firmware update process. The SCB is not designed as a standalone module, and is only supported with compatible EVMs. This document includes a schematic, reference printed-circuit board (PCB) layouts, and a complete bill of materials (BOM).



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Trademarks

1 Kit Contents

Table 1-1 lists the contents that come in the kit. Contact the nearest Texas Instruments Product Information Center if any component is missing.

Table 1-1. Kit Contents

ITEM	QUANTITY
TI Sensor Control Board (SCB)	1
USB cable	1

2 Hardware

The SCB is designed to be used with specific EVM setups. Each EVM will have an individual user's guide that will explain how to use the SCB with that specific EVM.

If desired, the SCB can be repurposed and programmed manually by adding the JTAG connector to J4, but technical assistance for this use case is not supported.

2.1 Features

- Connects to a variety of detachable EVMs with custom GUI's
- Conveniently powered from a common micro-USB connector

3 Operation

3.1 Quick Start Setup

The following instructions describe how to set up and use the EVM.

1. Download this driver and install it **as an administrator**: https://www.ti.com/lit/zip/sbac253.
   a. Follow the download prompts, a myTI account will be required.
   b. Note that this driver is labeled as a PAMB driver, but is also used for the SCB.
2. Attach a compatible EVM to the SCB Controller, such as the one in Figure 3-1.
3. Connect the EVM to the PC using the provided USB cable.
   a. Insert the micro USB cable into the SCB Controller onboard USB receptacle J2.
   b. Plug the other end of the USB cable into a PC.
4. Launch the appropriate EVM GUI, per instructions from the EVM specific user's guide in either Chrome, Firefox, or Safari.
5. Connect the GUI to the SCB, and update the firmware.
   a. Press the connect symbol in the bottom left corner.
   b. Go to File -> Program Device...
   c. For more details see Section 3.2.2.1.
6. Use the EVM/SCB as described in the EVM-specific user's guide.

3.2 SCB Operation

To use the SCB Controller with an EVM, connect them together as shown in Figure 3-1.

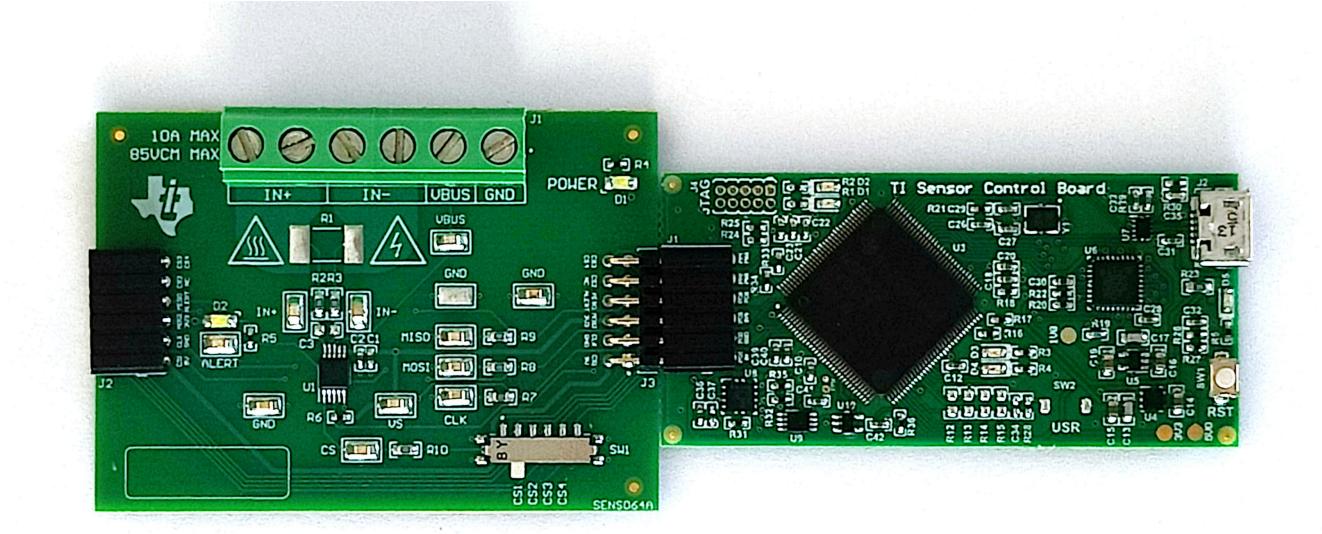

Figure 3-1. EVM (Left) Connected to SCB Controller (Right)

3.2.1 Setup

3.2.1.1 Driver Installation

Download and install this driver: https://www.ti.com/lit/zip/sbac253. This is a one-time step per computer, and will require a myTI account. Note that this driver is labeled as a PAMB driver, but is also used for the SCB. Unzip the folder and **run the .exe file with administrator privileges**.

3.2.2 SCB Connection and Firmware Update

Launch the appropriate EVM GUI, per instructions from the EVM specific user's guide in either Chrome, Firefox, or Safari.

3.2.2.1 GUI to SCB Connection and Firmware Update

To connect the GUI to the SCB and update the firmware, follow these steps:

1. Setup and launch the GUI as described in the EVM specific user's guide.
2. With the EVM plugged in, after launching the GUI, close the README.md file page to initiate the connection. If successful, "Hardware Connected" should be visible near the bottom left corner of the GUI as shown in Figure 3-2.

Figure 3-2. Hardware Connected

   a. A green indicator with the device type and the text "DEVICE CONNECTED" should also be visible near the top left of the GUI, as shown in Figure 3-3.

Figure 3-3. Device Connected

3. If you receive a pop up message asking you to update the firmware, do so.
   a. It is possible that this fails the first time if the SCB didn't properly connect first. In this case, just connect to the GUI following the steps below before updating the firmware.
4. If "Hardware Connected" and "DEVICE CONNECTED" do not show in the GUI, it is possible that the SCB is already in Devce Firmware Update (DFU) mode. If so, then the **Program Device...** button under **File >> Program Device...** will not be grayed out. Click the button to begin the firmware update.
   a. You may need to close another popup message or so letting you know that the GUI couldn't connect to the SCB.
   b. If the firmware fails to update, try the same connectivity steps outlined in step 5.c.
5. If the **Program Device...** button is grayed out, then the device is not in DFU mode. In this case, try to connect the GUI to the SCB by doing any of the following:
   a. Press the (connect) symbol in the bottom left corner.
   b. Check different hardware COM ports under **Options >> Serial Port**, as shown in Figure 3-4.

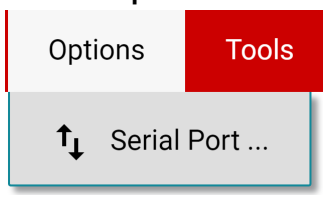

Figure 3-4. Change Serial Port

   c. If neither of those work, many connectivity issues can be addressed by doing one of the following:
      i. Long-press the RESET button on the SCB with the EVM and SCB connected to each other.
         1. Refresshing the GUI can also sometimes help.
      ii. Connect the SCB using a different USB port.
         1. Avoid using long cables and USB hubs.
         2. If using a desktop PC, try a USB port on the back.
   d. If the hardware still does not connect, you may need to update the firmware manually, as described in Section 3.2.3.1.
6. After the SCB has connected to the GUI, update the firmware by going to **File >> Program Device...**, as shown in Figure 3-5.

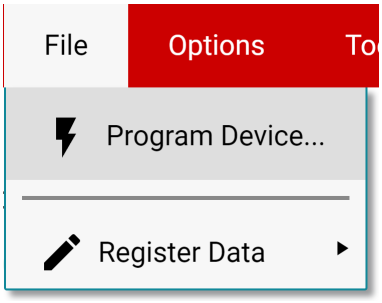

Figure 3-5. Program Device

a. If the firmware fails to update, try the same connectivity steps outlined in step 5.c.
b. If the Firmware still fails to update, you may need to update the firmware manually, as described in Section 3.2.3.1 .

7. Once the firmware has been updated, the SCB can be used with the EVM and GUI per the EVM-specific user's guide.

3.2.3 Firmware

Firmware updates will be pushed through the GUI (requires previous driver to be installed). Downloaded offline GUIs will only update the SCB Controller with the latest firmware available at the time of download. To check for the latest GUI or Firmware updates, launch the latest GUI version from the web browser.

3.2.3.1 Firmware Debug

If the firmware must be manually reinstalled for any reason, follow these steps to reinstall the firmware. After the firmware update (if the EVM is not already connected), power down the SCB, connect the EVM to the SCB, and then power them up together.

1. See if the GUI can program the firmware already by following the steps in Section 3.2.2.1.
2. If that is unsuccessful (or if the "Program Device" button is grayed out, and the SCB will not connect), manually configure the MCU on the SCB Controller to be in DFU Mode. This can be done through either of the below methods with the SCB Controller powered on and connected to the PC:
   a. Through software:
      i. Send the command 'bsl' on the SCB's USB Serial (COM) port.
   b. Though hardware:
      i. For safety, **turn off and disconnect all load sources and external voltages**.
      ii. While shorting the two test points labeled "DFU" (shown in Figure 3-6) with a pair of tweezers (or wire), press and release the RESET button.

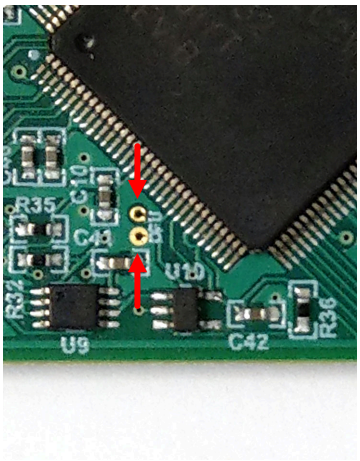

Figure 3-6. Test Points Used to Enter DFU Mode Manually

With the MCU in DFU mode, the firmware can now be uploaded through the method outlined in Section 3.2.2.1.

4 Schematics, PCB Layout, and Bill of Materials

Note

Board layouts are not to scale. These figures are intended to show how the board is laid out. The figures are not intended to be used for manufacturing EVM PCBs.

4.1 Schematics

Figure 4-1 through Figure 4-4 show the schematic of the EVM. Figure 4-1 shows the circuitry related to the MSP432E. Figure 4-2 shows the circuitry related to the USB ULPI feature. Figure 4-3 shows the circuirty related to power. Figure 4-4 shows the mechanical components included with the EVM.

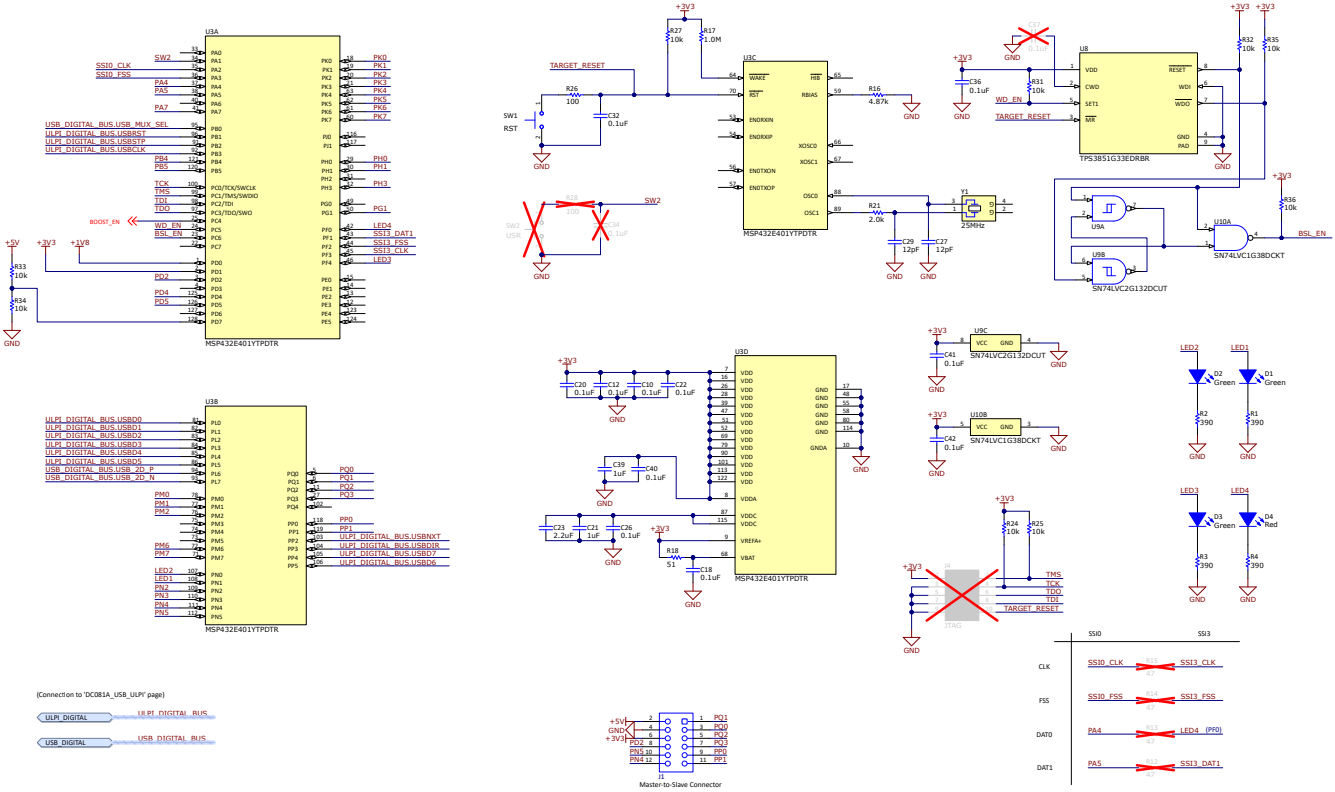

Figure 4-1. MSP432E Schematic

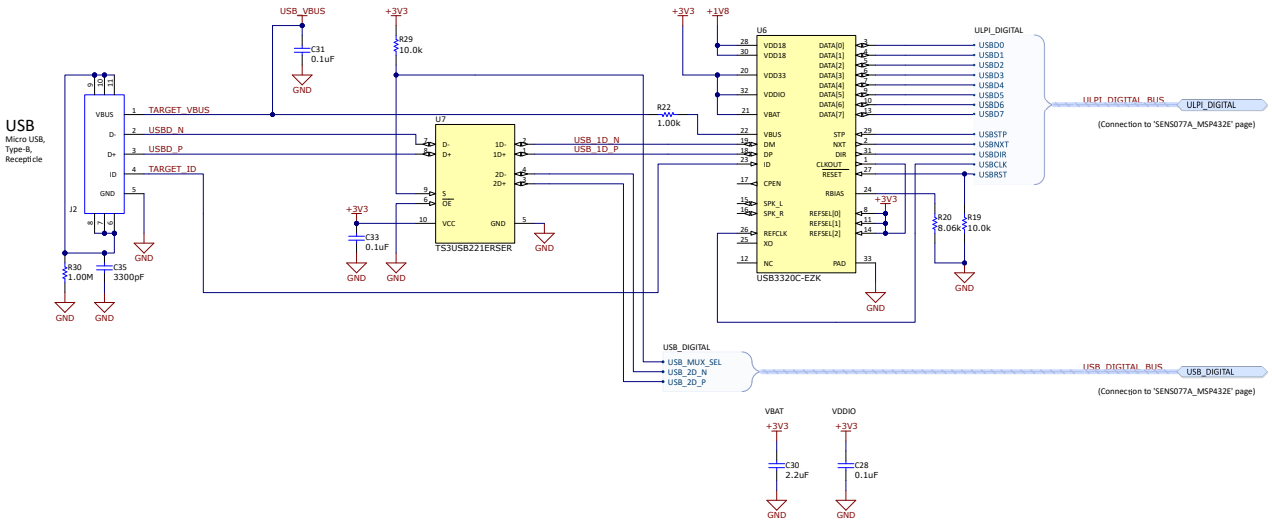

Figure 4-2. USB ULPI Schematic

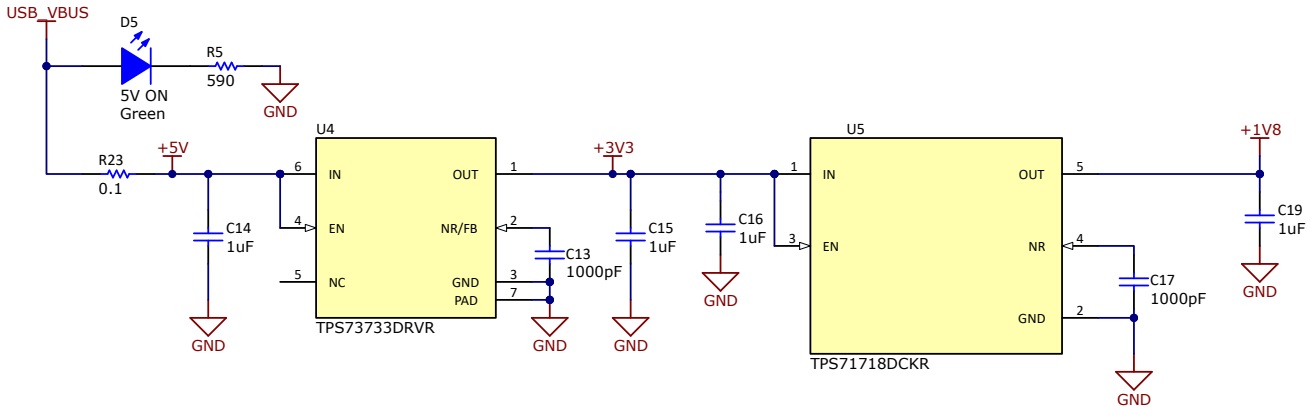

Figure 4-3. USB Power Schematic

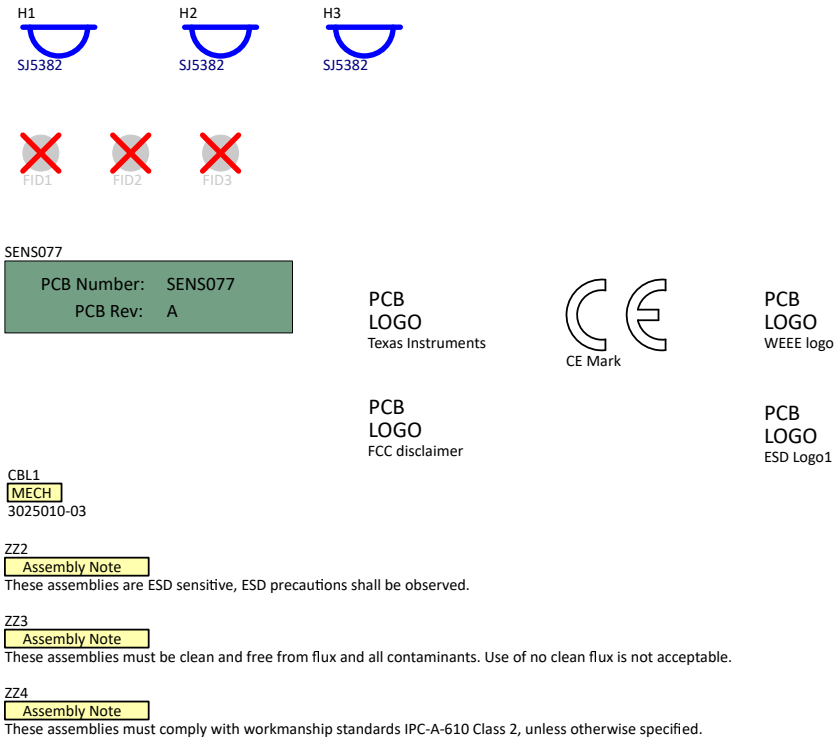

Figure 4-4. Hardware Schematic

4.2 PCB Layout

Figure 4-5 through Figure 4-8 illustrate the PCB layers of the EVM.

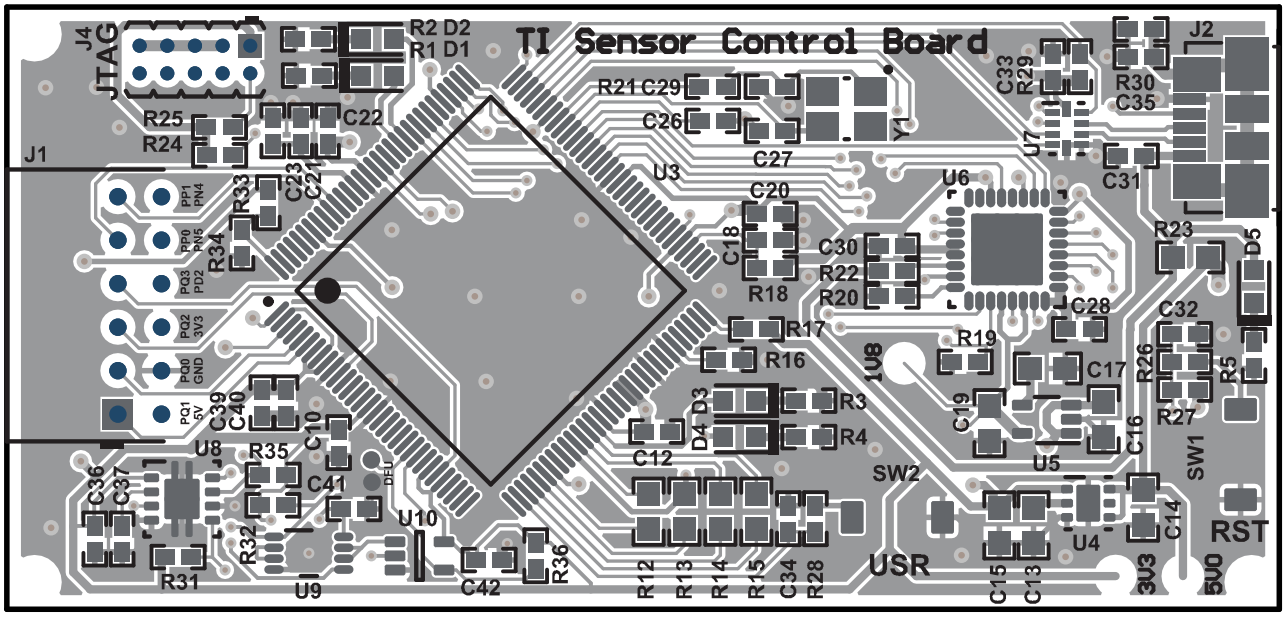

Figure 4-5. Top View

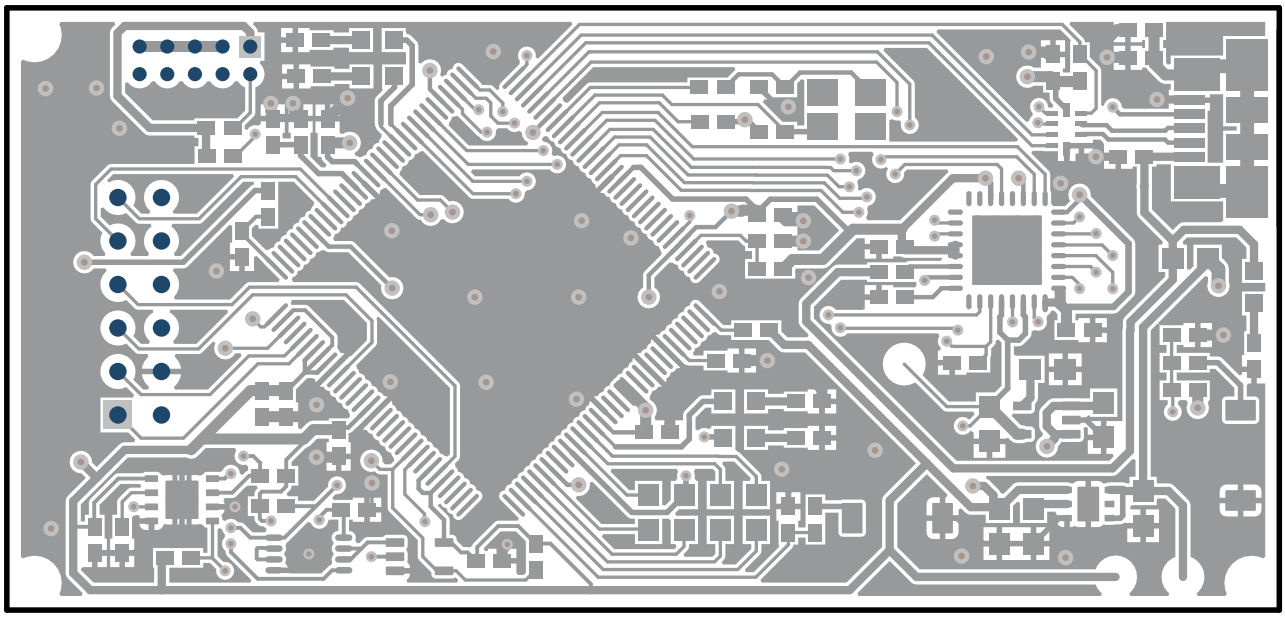

Figure 4-6. Top Layer

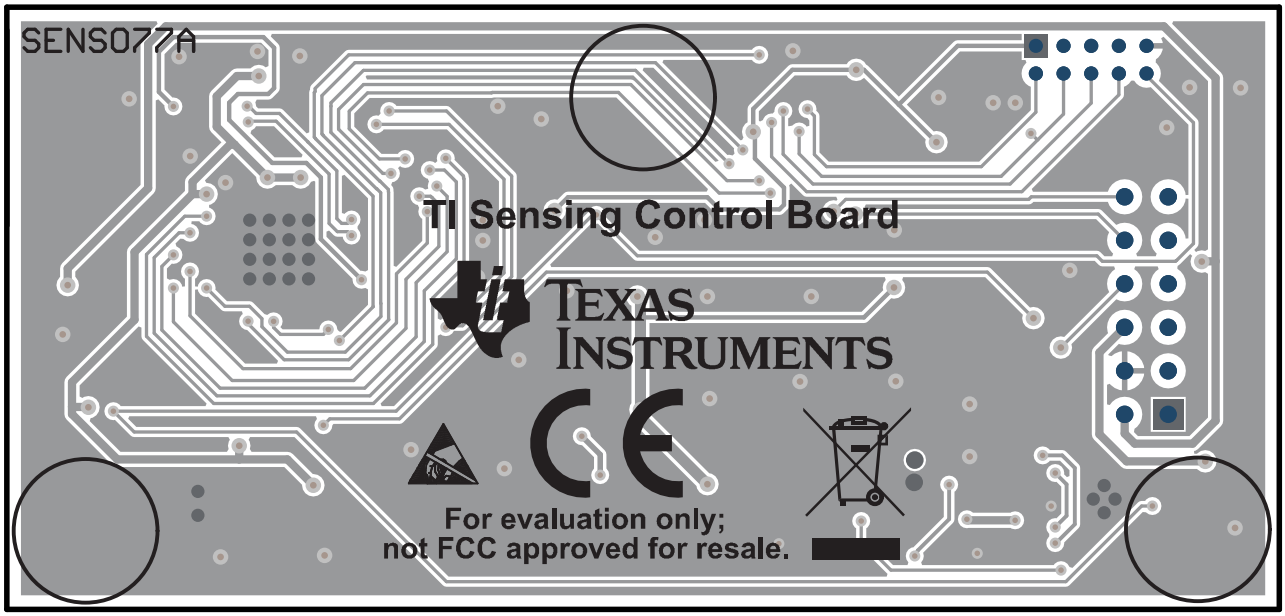

Figure 4-7. Bottom View

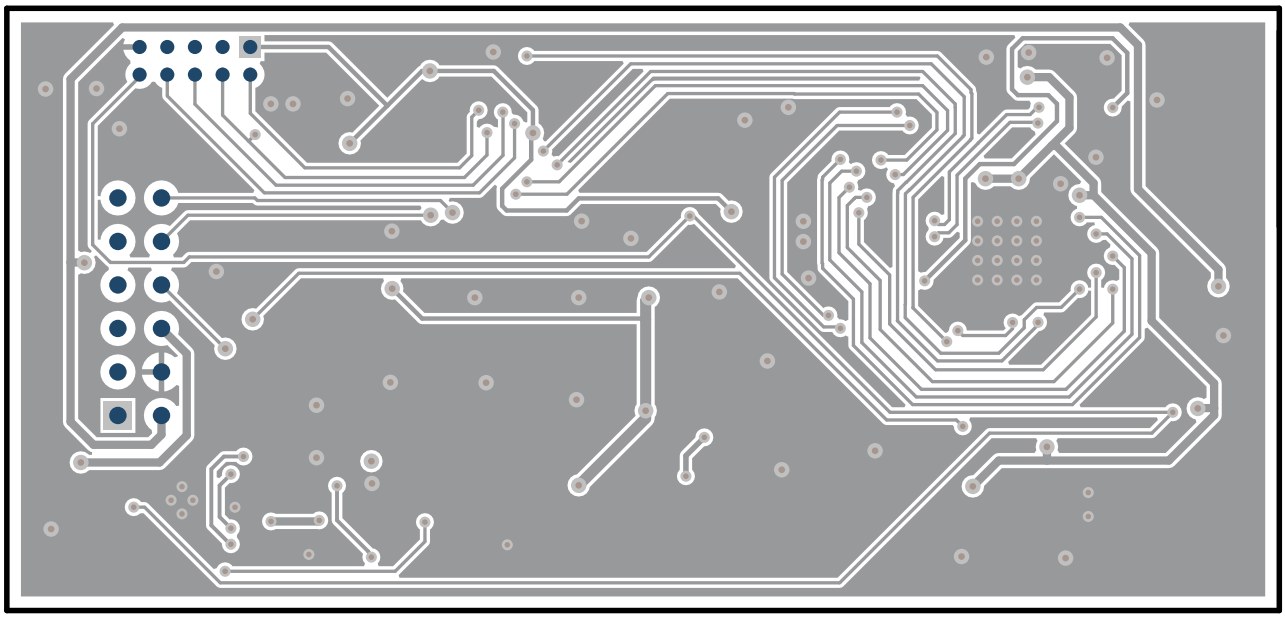

Figure 4-8. Bottom Layer

4.3 Bill of Materials

Table 4-1 provides the parts list for the SCB.

Table 4-1. Bill of Materials

Designator	Quantity	Value	Description	Package Reference	PartNumber	Manufacturer
!PCB	1		Printed Circuit Board		SENS077	Any
C10, C12, C18, C20, C22, C26, C28, C31, C32, C33, C36, C40, C41, C42	14	0.1uF	CAP, CERM, 0.1 uF, 50 V, +/- 20%, X7R, 0402	0402	GRM155R71H104ME14D	MuRata
C13, C17	2	1000pF	CAP, CERM, 1000 pF, 100 V, +/- 5%, X7R, 0603	0603	06031C102JAT2A	AVX
C14, C15, C16, C19	4	1uF	CAP, CERM, 1 uF, 50 V, +/- 10%, X7R, 0603	0603	UMK107AB7105KA-T	Taiyo Yuden
C21, C39	2	1uF	CAP, CERM, 1 uF, 35 V, +/- 10%, X5R, 0402	0402	GRM155R6YA105KE11D	MuRata
C23, C30	2	2.2uF	CAP, CERM, 2.2 uF, 35 V, +/- 10%, X5R, 0402	0402	C1005X5R1V225K050BC	TDK
C27, C29	2	12pF	CAP, CERM, 12 pF, 50 V, +/- 5%, C0G/NP0, 0402	0402	CL05C120JB5NNNC	Samsung Electro-Mechanics
C35	1	3300pF	CAP, CERM, 3300 pF, 50 V, +/- 10%, X7R, AEC-Q200 Grade 1, 0402	0402	GCM155R71H332KA37D	MuRata
CBL1	1		Cable, USB-A to micro USB-B, 0.3 m. Kitting item.		3025010-03	Qualtek
D1, D2, D3, D5	4	Green	LED, Green, SMD	1.6x0.8x0.8mm	LTST-C190GKT	Lite-On
D4	1	Red	LED, Red, SMD	Red LED, 1.6x0.8x0.8mm	LTST-C190CKT	Lite-On
H1, H2, H3	3		Bumpon, Hemisphere, 0.25 X 0.075, Clear	75x250 mil	SJ5382	3M
J1	1		Receptacle, 2mm, 6x2, Gold, R/A, TH	Receptacle, 2mm, 6x2, R/A, TH	NPPN062FJFN-RC	Sullins Connector Solutions
J2	1		Connector, Receptacle, Micro-USB Type B, R/A, Bottom Mount SMT	7.5x2.45x5mm	473460001	Molex
R1, R2, R3, R4	4	390	RES, 390, 5%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW0402390RJNED	Vishay-Dale
R5	1	590	RES, 590, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW0402590RFKED	Vishay-Dale
R16	1	4.87k	RES, 4.87 k, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW04024K87FKED	Vishay-Dale
R17	1	1.0Meg	RES, 1.0 M, 5%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW04021M00JNED	Vishay-Dale
R18	1	51	RES, 51, 5%, 0.0625 W, 0402	0402	RC0402JR-0751RL	Yageo America

Table 4-1. Bill of Materials (continued)

Designator	Quantity	Value	Description	Package Reference	PartNumber	Manufacturer
R19, R29	2	10.0k	RES, 10.0 k, 1%, 0.1 W, 0402	0402	ERJ-2RKF1002X	Panasonic
R20	1	8.06k	RES, 8.06 k, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW04028K06FKED	Vishay-Dale
R21	1	2.0k	RES, 2.0 k, 5%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW04022K00JNED	Vishay-Dale
R22	1	1.00k	RES, 1.00 k, 1%, 0.1 W, 0402	0402	ERJ-2RKF1001X	Panasonic
R23	1	0.1	RES, 0.1, 1%, 0.1 W, AEC-Q200 Grade 1, 0603	0603	ERJ-L03KF10CV	Panasonic
R24, R25, R27, R31, R32, R33, R34, R35, R36	9	10k	RES, 10 k, 5%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW040210K0JNED	Vishay-Dale
R26	1	100	RES, 100, 5%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW0402100RJNED	Vishay-Dale
R30	1	1.00Meg	RES, 1.00 M, 1%, 0.1 W, 0402	0402	ERJ-2RKF1004X	Panasonic
SW1	1		Switch, Tactile, SPST-NO, 0.05A, 12V, SMT	Switch, 4.4x2x2.9 mm	TL1015AF160QG	E-Switch
U3	1		MSP432E401YTPDT, PDT0128A (TQFP-128)	PDT0128A	MSP432E401YTPDTR	Texas Instruments
U4	1		Single Output LDO, 1A, Adj. (1.2 to 5.0V), Reverse Current Protection, DRV0006A (WSON-6)	DRV0006A	TPS73733DRVR	Texas Instruments
U5	1		150mA, High PSRR, Low Quiescent Current, Low Noise LDO, DCK0005A (SOT-SC70-5)	DCK0005A	TPS71718DCKR	Texas Instruments
U6	1		Highly Integrated Full Featured Hi-Speed USB 2.0 ULPI Transceiver, QFN-32	5x5 QFN-32	USB3320C-EZK	Microchip
U7	1		High-Speed USB 2.0 (480 Mbps) 1:2 Multiplexer / Demultiplexer Switch with Single Enable, 6 ohm RON, 2.5 to 3.3V, -40°C to 85°C, 10-Pin UQFN (RSE), Green (RoHS & no Sb/Br)	RSE0010A	TS3USB221ERSER	Texas Instruments
U8	1		High-Accuracy Voltage Supervisor With Integrated Watchdog Timer, DRB0008A (VSON-8)	DRB0008A	TPS3851G33EDRBR	Texas Instruments
U9	1		Dual 2-Input NAND Gate with Schmitt-Trigger Inputs, DCU0008A, SMALL T&R	DCU0008A		Texas Instruments
U10	1		Single 2-Input NAND Gate with Open Drain Output, DCK0005A, SMALL T&R	DCK0005A		Texas Instruments
Y1	1		Crystal, 25 MHz, 8pF, SMD	3.2x0.75x2.5mm	NX3225GA-25.000M-STD-CRG-2	NDK

Table 4-1. Bill of Materials (continued)

Designator	Quantity	Value	Description	Package Reference	PartNumber	Manufacturer
C34, C37	0	0.1uF	CAP, CERM, 0.1 uF, 50 V, +/- 20%, X7R, 0402	0402	GRM155R71H104ME14D	MuRata
FID1, FID2, FID3	0		Fiducial mark. There is nothing to buy or mount.	N/A	N/A	N/A
J4	0		Header, 1.27 mm, 5x2, Au, TH	Header, 1.27mm, 5x2, TH	20021111-00010T4LF	FCI
R12, R13, R14, R15	0	47	RES, 47, 5%, 0.1 W, AEC-Q200 Grade 0, 0603	0603	CRCW060347R0JNEA	Vishay-Dale
R28	0	100	RES, 100, 5%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW0402100RJNED	Vishay-Dale
SW2	0		Switch, Tactile, SPST-NO, 0.05A, 12V, SMT	Switch, 4.4x2x2.9 mm	TL1015AF160QG	E-Switch

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。

なお、本製品は、上記の「ご使用にあたっての注意」を譲渡先、移転先に通知しない限り、譲渡、移転できないものとします。

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東京都新宿区西新宿 6 丁目 2 4 番 1 号

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

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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.

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.

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