

ABSTRACT

This document is the EVM user's guide for the TMUX-8RQX-EVM. This board is designed for TI's mid-voltage analog switch and multiplexers in an 8-pin RQX package, which includes devices such as TMUX7219.

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Trademarks

All trademarks are the property of their respective owners.

1 Introduction

This user's guide describes the TMUX-8RQX-EVM evaluation module (EVM) and its intended use. This board allows for the quick prototyping and DC characterization of TI's mid voltage switches and multiplexers in an 8 Pin RQX package, which includes, but is not limited to, devices like the TMUX7219.

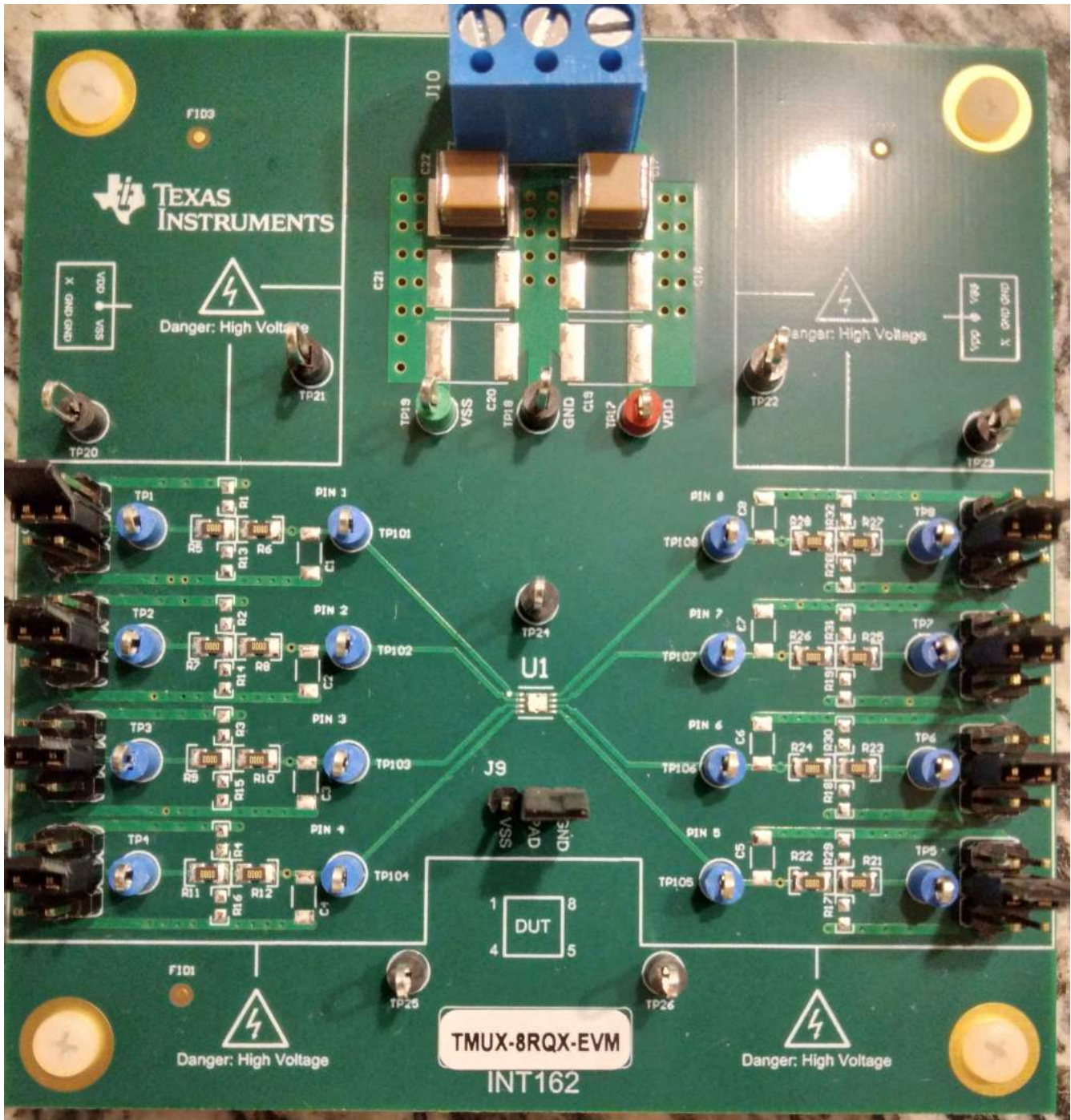


Figure 1-1. TMUX-8RQX-EVM Top Side

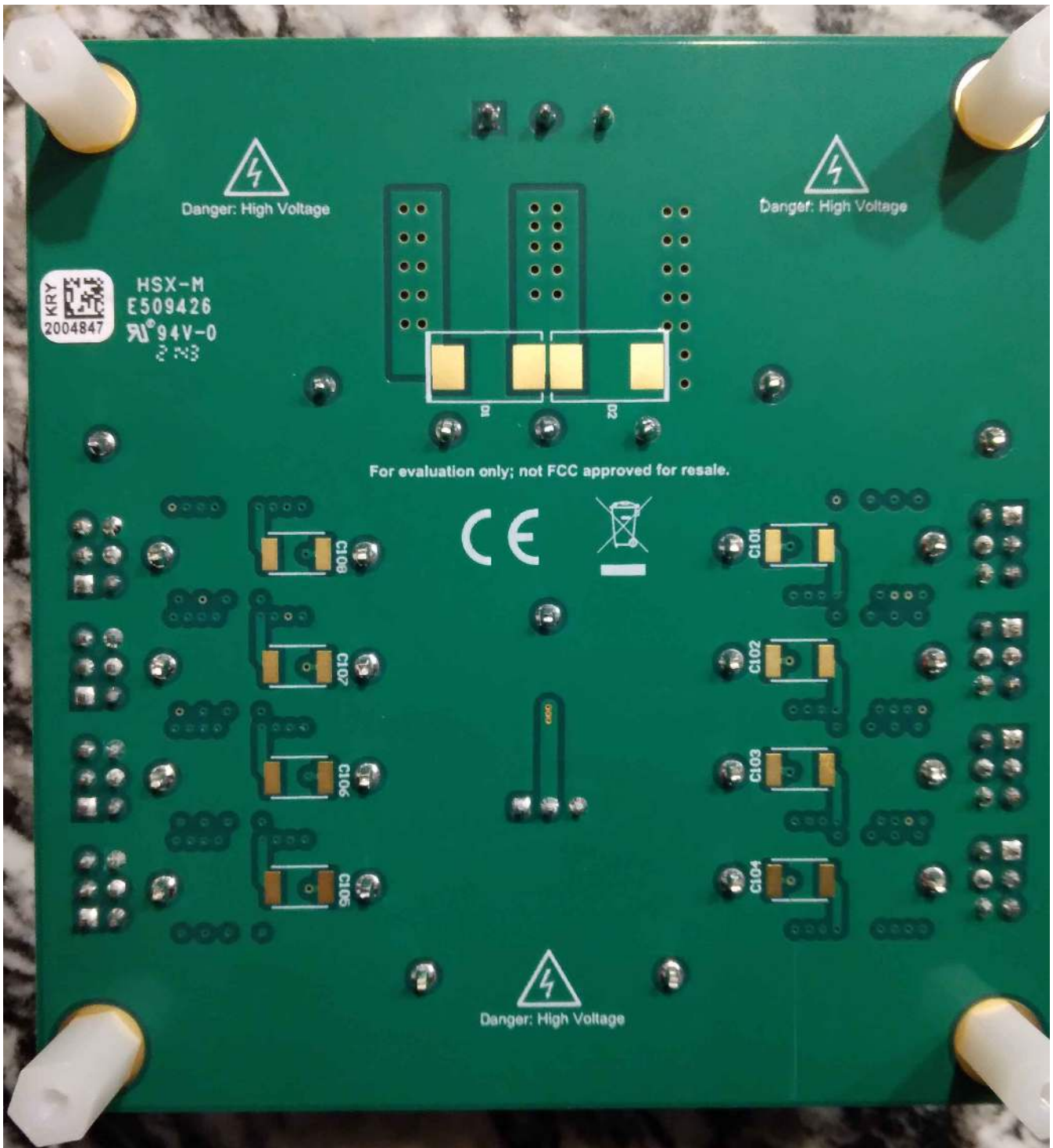


Figure 1-2. TMUX-8RQX-EVM Bottom Side

2 Information About Cautions and Warnings

The information in the warning statement is provided for personal protection and the information in the caution statement is provided to protect the equipment from damage. Read each caution and warning statement carefully.



This EVM contains components that can potentially be damaged by electrostatic discharge. Always transport and store the EVM in its supplied ESD bag when not in use. Handle using an antistatic wristband. Operate on an antistatic work surface. For more information on proper handling, see [Electrostatic Discharge \(ESD\)](#).

3 Features

The EVM has the following features:

- 1 power supply decoupling capacitor from VDD to ground (3.3 μ F, 6 mm \times 5 mm)
- 2 additional power supply decoupling capacitor pads from VDD to ground (6 mm \times 5 mm)
- 1 power supply decoupling capacitor from VSS to ground (3.3 μ F, 6 mm \times 5 mm)
- 2 additional power supply decoupling capacitor pads from VSS to ground (6 mm \times 5 mm)
- Pads available near VDD and VSS input for TVS Diodes (L \times W: 8.13 mm \times 6.22 mm)
- 1 pad for switches and multiplexers in the 8-pin RQX package.
- 8 generic 6-pin headers for power, analog or digital signals being switched, and control signals.
- All 8 generic signal pathways have 2 0805 size 0 Ω resistors installed between IC pad and header.
- All 8 generic signal pathways have 0603 sized pads to add a pull-up, pull-down, or resistive load to the signal pathway.
- All 8 generic signal pathways contain an 1812 sized pad to add a capacitive load to the signal pathway.
- All 8 generic signal pathways contain a 1206 sized pad to add a capacitive load to the signal pathway.
- 1 common 3-port terminal block for GND, VDD, and VSS power signals.
- 1 3-pin header to configure thermal pad voltage (GND for single supply, VSS for dual supply).

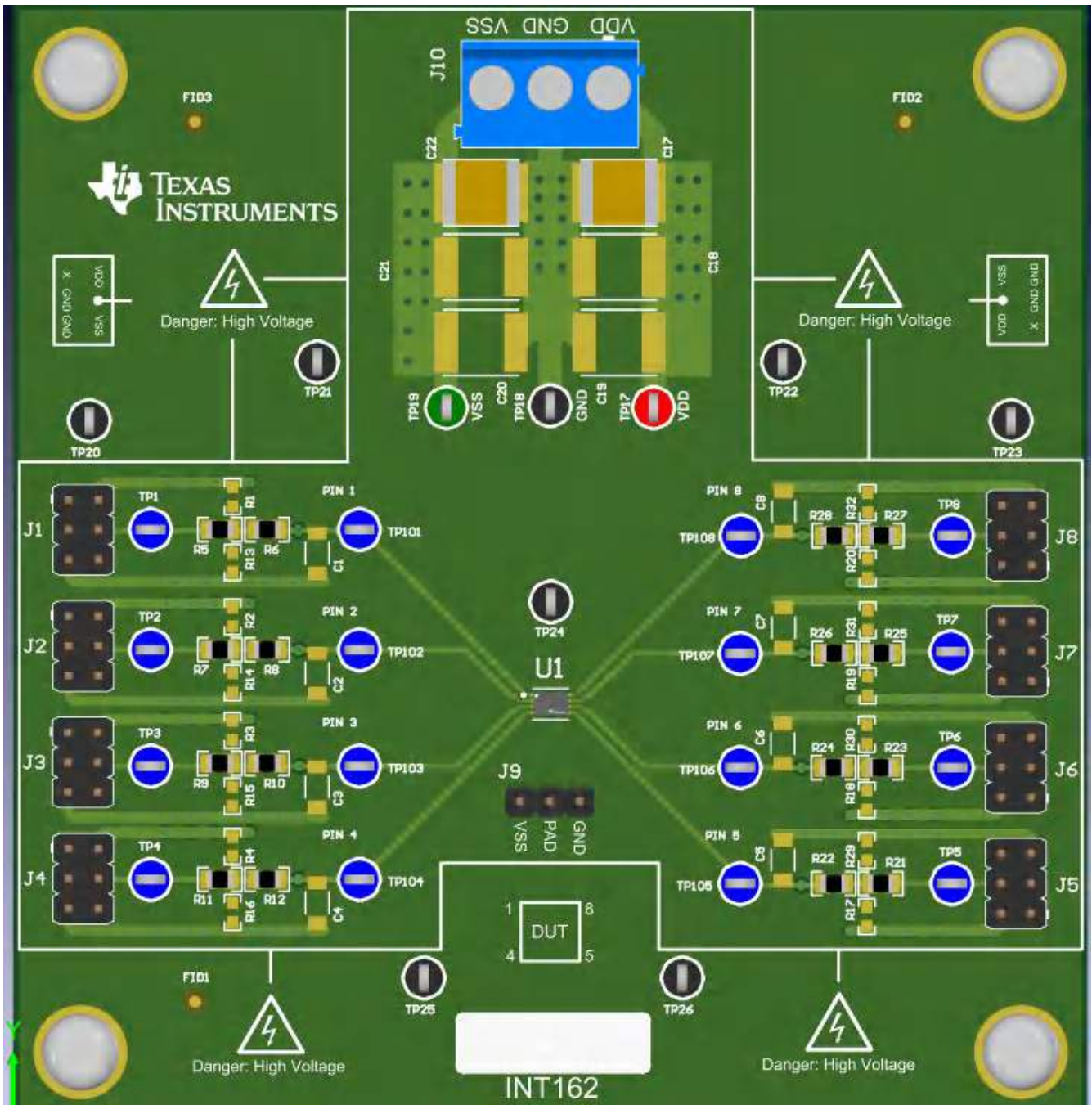


Figure 3-1. TMUX-8RQX-EVM Top Layout (Default + U1 Installed)

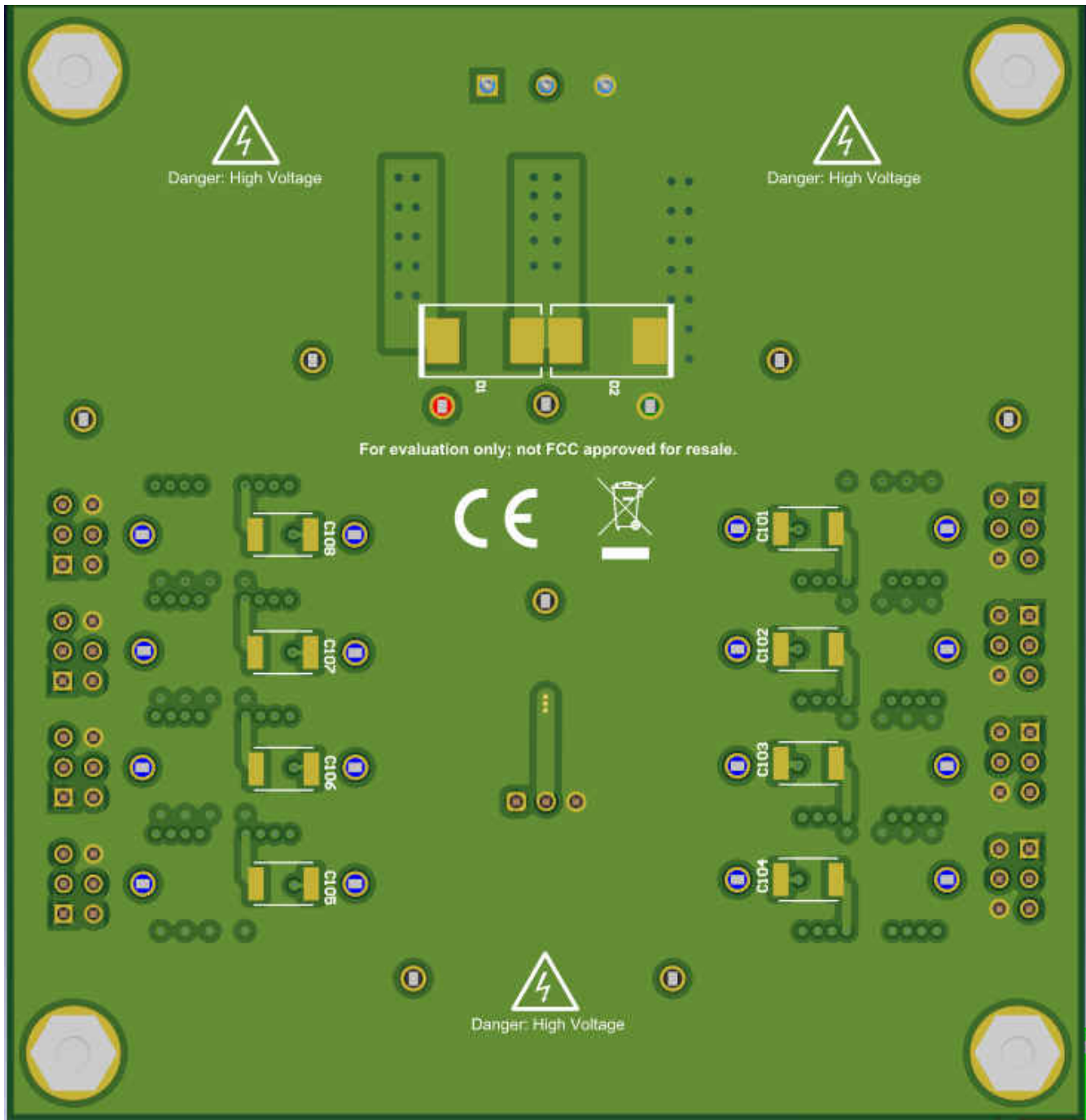


Figure 3-2. TMUX-8RQX-EVM Bottom Layout (Default)

4 TMUX-8RQX-EVM Setup

1. The default setup of the board has all 8 generic pathways grounded, with the IC set to single supply operation as the pad voltage is also set to ground. If dual operation is desired, then move to step 2. If not, then move to step 3.
2. If dual supply operation is desired, then locate J9 on the EVM. Move the shunt so that the pins labeled *PAD* and *VSS* are shorted together instead of the default *PAD* to *VDD* connection. This will ensure the *PAD* of the RQX package is exposed to the lowest potential in the system w.r.t. ground during dual supply operation.
3. All 8 generic signal pathway headers contain six pins. [Figure 4-1](#) and [Figure 4-2](#) show the generalized pinout of the headers for the left and right side of the board respectively. Please note that the orientation is based on J10 being on the top of the board.

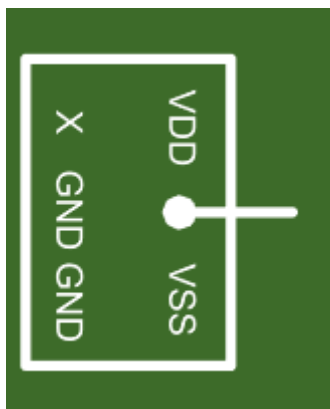


Figure 4-1. Left Side Jumper (J1-J4) Configuration or Pinout

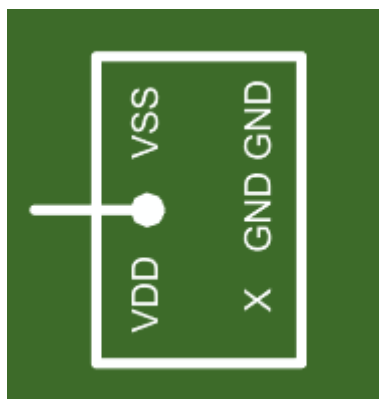


Figure 4-2. Right Side Jumper (J5-J8) Configuration or Pinout

For the left side header, pin 1 is at the top left corner pin (denoted as an X). The pin number increases counter-clockwise from 1 to 6. The right side header has pin 1 (denoted as an X), which is at the bottom right corner. The right side header pin number increases counter-clockwise from 1 to 6. [Table 4-1](#) shows the jumper configurations. Note; *U1* refers to the signal pathway that connects to the U1 8-pin RQX footprint.

Table 4-1. Generic Jumper Pinout Map

Jumper ID	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6
J1	Floating	GND	GND	VSS	U1 Pin 1	VDD
J2	Floating	GND	GND	VSS	U1 Pin 2	VDD
J3	Floating	GND	GND	VSS	U1 Pin 3	VDD
J4	Floating	GND	GND	VSS	U1 Pin 4	VDD
J5	Floating	GND	GND	VSS	U1 Pin 5	VDD
J6	Floating	GND	GND	VSS	U1 Pin 6	VDD
J7	Floating	GND	GND	VSS	U1 Pin 7	VDD
J8	Floating	GND	GND	VSS	U1 Pin 8	VDD

Check the device specific data sheet for the pin-out. For power (VDD or VSS) and ground (GND), lines connect shunts on the appropriate jumpers to short the U1 pin to the respective VDD, VSS, or GND line. For testing where control pins will not change state (such as the select or enable pin always being at a logic '1' for the duration of testing), shunts can be connected on the appropriate jumpers to short the U1 control pins to VDD or GND. For the remaining I/O pins (VDD, VSS, and GND), signals can be applied using shunts in the same manner as before or the shunt can be removed and an external signal can be applied to the jumper's 'U1' pin or its respective test point.

4. In cases where the tests requires pull-up or pull-down resistors versus directly attaching the source to the respective U1 pin, all 8 generic pathways contain 0603 resistor pads to add these components. [Table 4-2](#) shows the ID's.

Table 4-2. Pull-Up or Pull-Down Resistor Configuration Map

0603 Sized Resistor Pad ID	Jumper ID	Function
R1	J1	Pull Up
R13	J1	Pull Down
R2	J2	Pull Up
R14	J2	Pull Down
R3	J3	Pull Up
R15	J3	Pull Down
R4	J4	Pull Up
R16	J4	Pull Down
R29	J5	Pull Down
R17	J5	Pull Up
R30	J6	Pull Down
R18	J6	Pull Up
R31	J7	Pull Down
R19	J7	Pull Up
R32	J8	Pull Down
R20	J8	Pull Up

5. Now loads can be attached to the board. If a pull-down pad was unused, then this pad can now be used as a pad for a resistive load. There are also pads for capacitive loads for each of the 8 generic signal pathways that can also be utilized. [Table 4-3](#) shows the corresponding pad and jumper ID's. Note: the 1812 sized capacitor pads are on the bottom side of the EVM.

Table 4-3. RC Load Configuration Map

Jumper ID	0603 Sized Resistor Pad ID	1206 Sized Capacitor Pad ID	1812 Sized Capacitor Pad ID
J1	R13	C1	C101
J2	R14	C2	C102
J3	R15	C3	C103
J4	R16	C4	C104
J5	R29	C5	C105
J6	R30	C6	C106
J7	R31	C7	C107
J8	R32	C8	C108

6. Now that the loading is complete for the board, additional supply decoupling capacitance to ground can be added for the VDD or VSS lines. [Table 4-4](#) shows the power supply decoupling capacitance for each VDD or VSS line. If the default capacitance is enough, then move on to step 7.

Table 4-4. Power Supply Decoupling Capacitor Configuration Map

Capacitor Pad ID	Pad Size (LxW)	Associated Power Signal
C18	6 mm × 5 mm	VDD
C19	6 mm × 5 mm	VDD
C20	6 mm × 5 mm	VSS
C21	6 mm × 5 mm	VSS

7. If testing with protection diodes is desired, then there are two protection diode pads (one for each VDD and VSS) on the bottom side of the board. The board was designed with the 5.0SMDJ100A protection diode's footprint. [Table 4-5](#) shows the connections if it is desired to add them. If not, then move to step 8.

Table 4-5. Protection Diode Configuration Map

Protection Diode Pad ID	Pad Size (LxW)	Associated Power Signal
D1	8.13 mm × 6.22 mm	VDD
D2	8.13 mm × 6.22 mm	VSS

8. Finally, attach the supply signals (VDD, GND, or VSS) to the appropriate pins of the terminal block labeled J10. Power is now ready to be applied to the board. For test points, please see the next section.

5 TMUX-8RQX-EVM Test Points

- There are multiple test points (26) on the board that can be used to either measure the associated trace or apply external signals to for testing purposes. [Table 5-1](#) shows the test points for the 8 generic U1 connections. There are 2 test points per pin of the IC, which are colored blue. The test points with format TPX are farther from the U1 device than test points with the format TP10X.

Table 5-1. Test Points for Generic Jumpers Map

Jumper ID	Test Point ID	Test Point ID	U1 Pin
J1	TP1	TP101	1
J2	TP2	TP102	2
J3	TP3	TP103	3
J4	TP4	TP104	4
J5	TP5	TP105	5
J6	TP6	TP106	6
J7	TP7	TP107	7
J8	TP8	TP108	8

- There are also test points that connect to VSS, VDD, and GND planes. [Table 5-2](#) shows these test points.

Table 5-2. VDD, VSS, and GND Test Point Map

Test Point ID	Color	Signal
TP17	Red	VDD
TP18	Black	GND
TP19	Green	VSS
TP20	Black	GND
TP21	Black	GND
TP22	Black	GND
TP23	Black	GND
TP24	Black	GND
TP25	Black	GND
TP26	Black	GND

6 Schematics

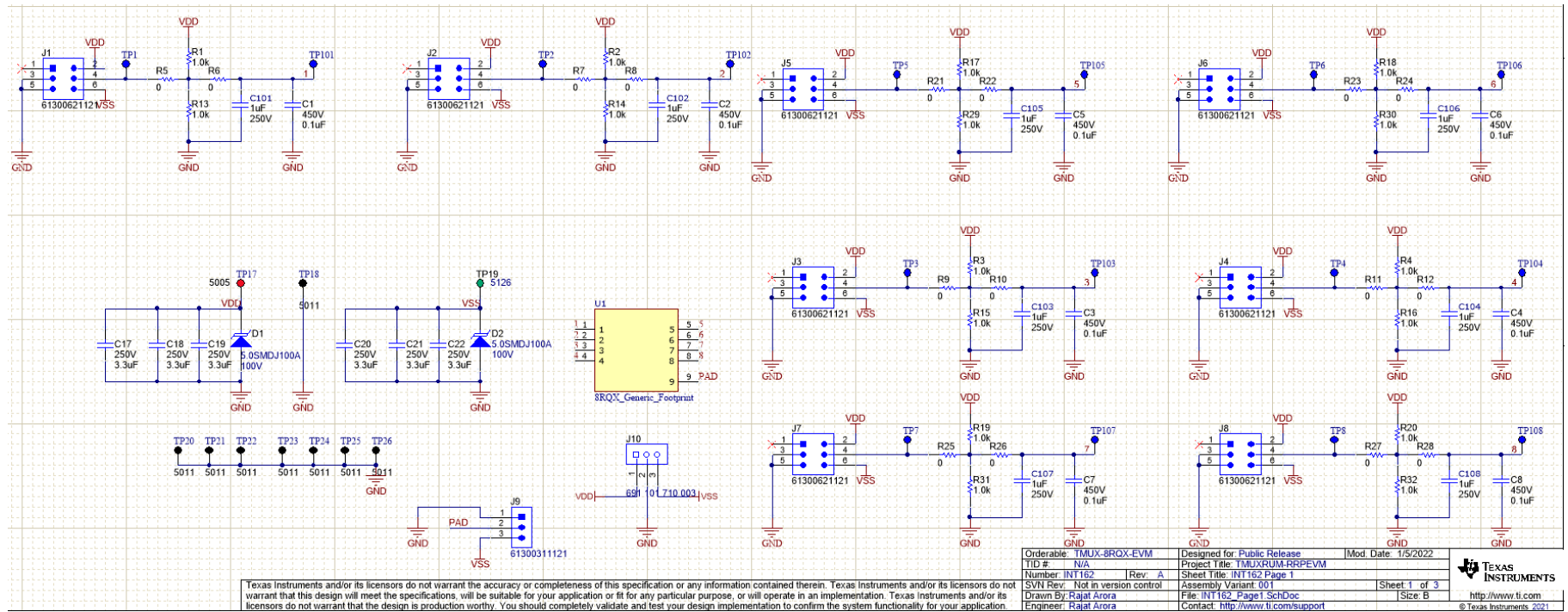


Figure 6-1. Main Schematic – TMUX-8RQX-EVM All Components Shown

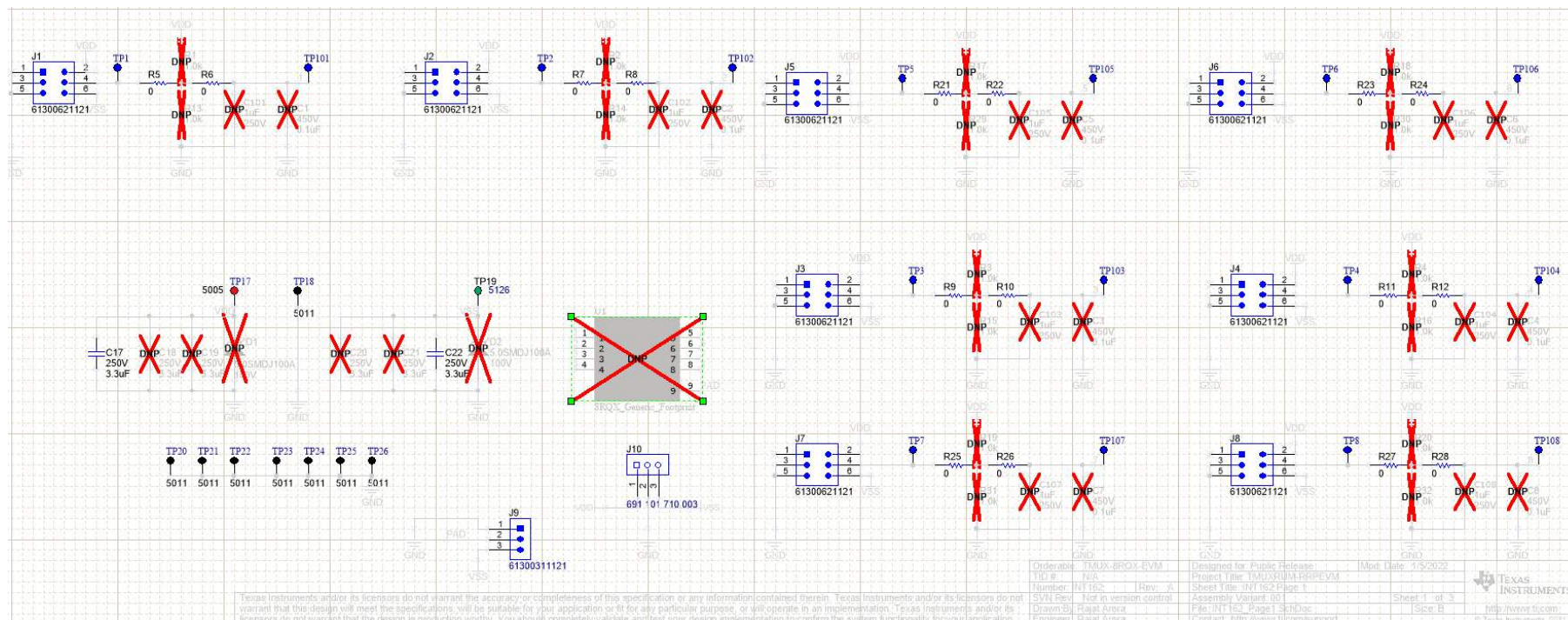


Figure 6-2. Main Schematic – TMUX-8RQX-EVM Default + U1 Pad Shown

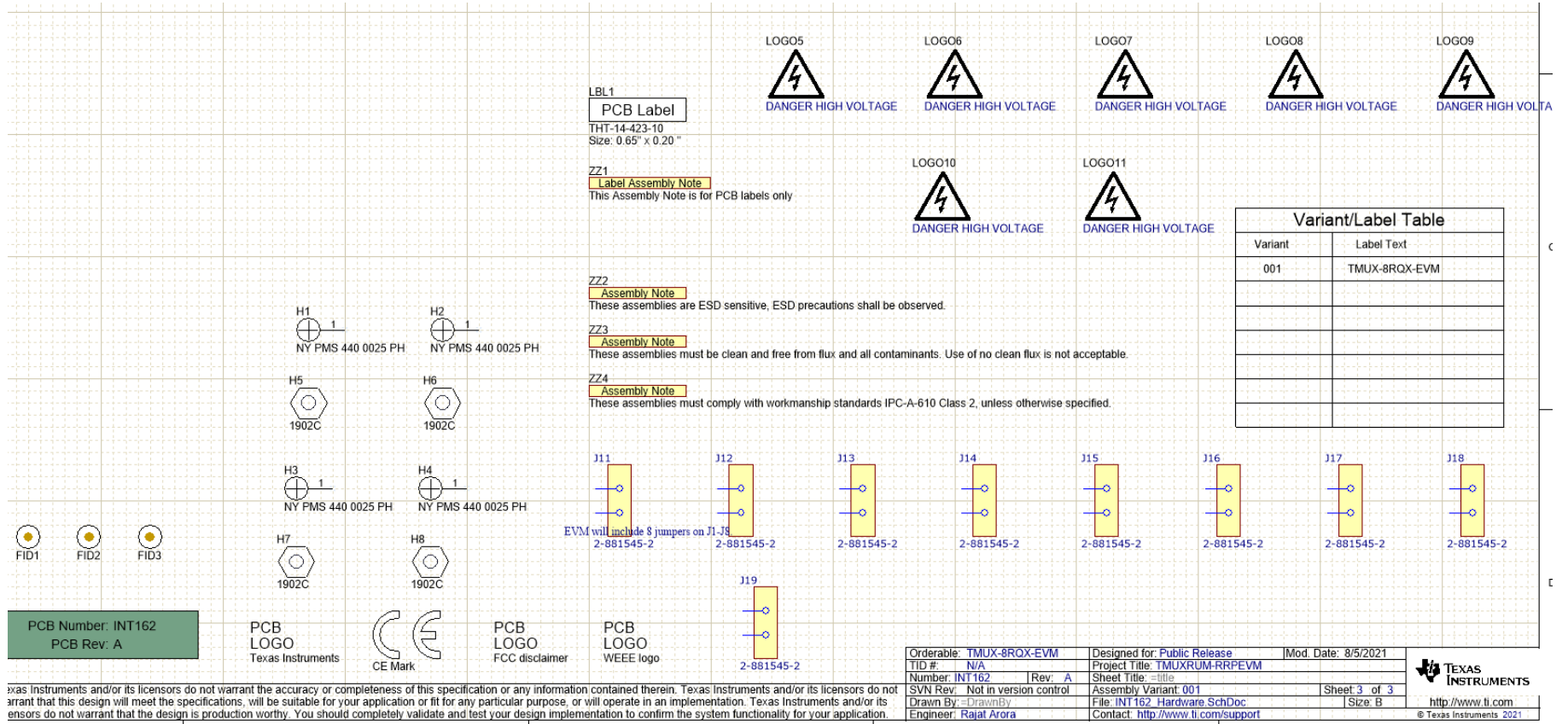


Figure 6-3. Hardware Schematic – TMUX-8RQX-EVM Default Setup

7 Layout

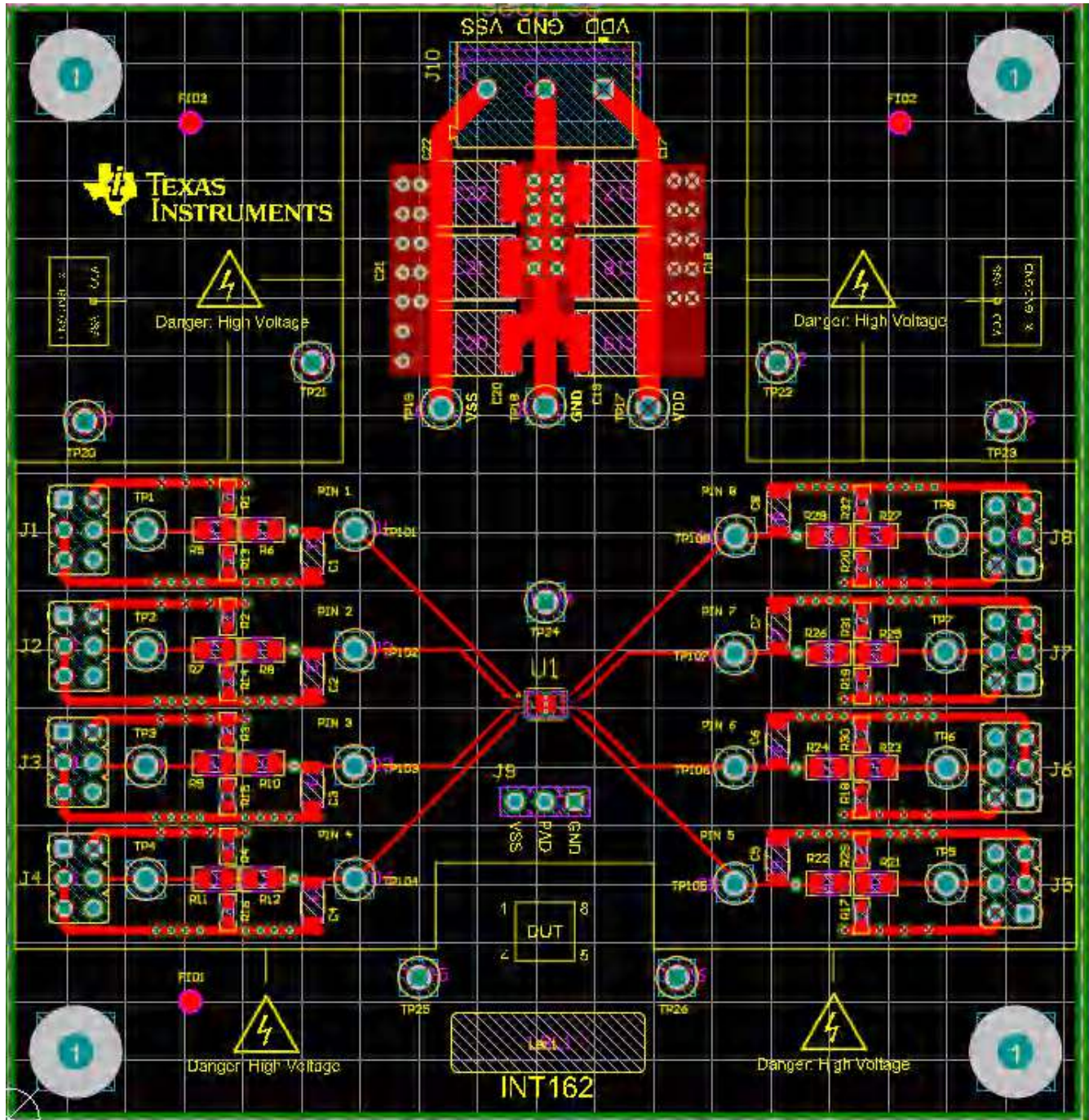


Figure 7-1. PCB Top Layer TMUX-8RQX-EVM

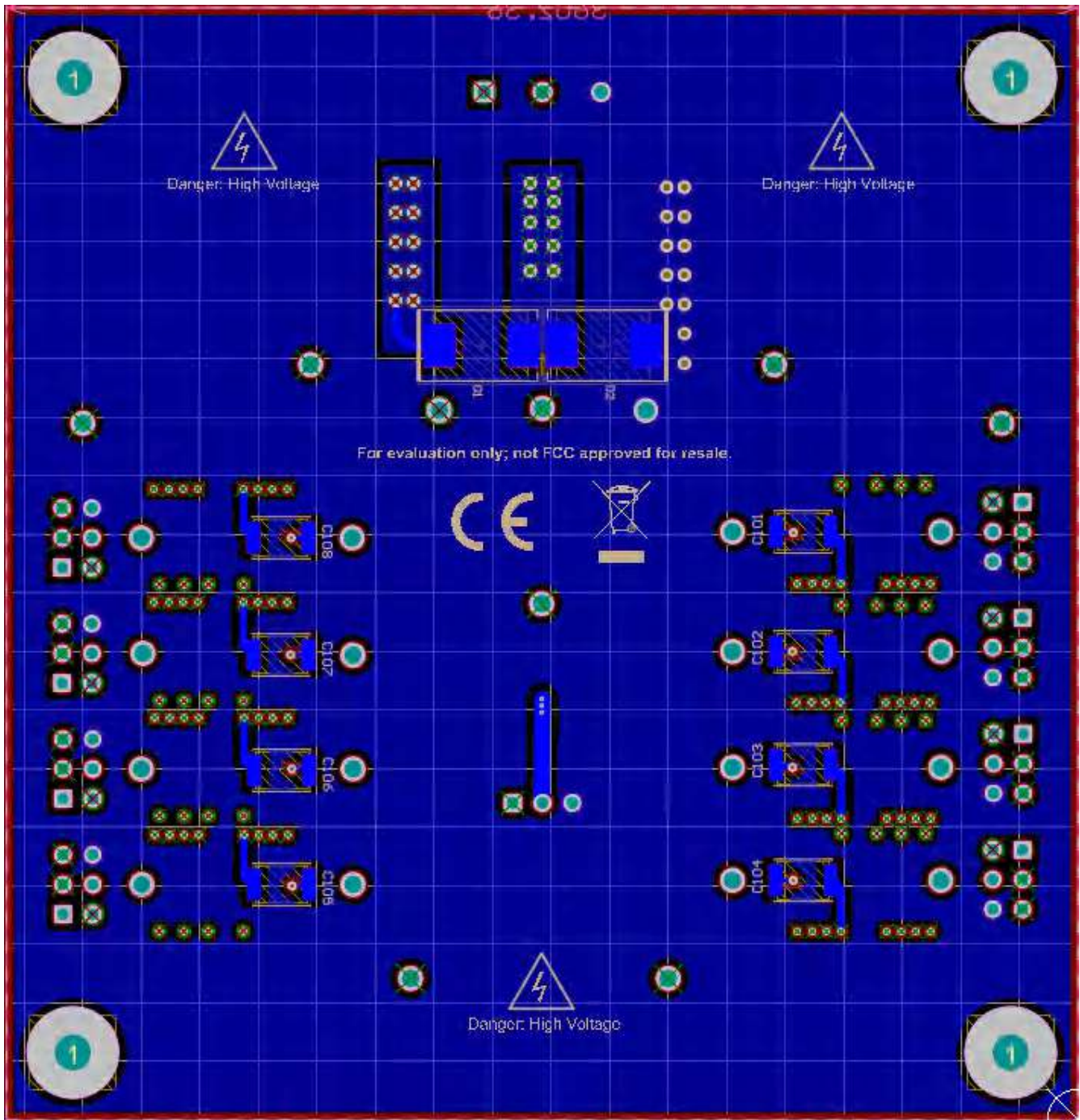


Figure 7-2. PCB Bottom Layer TMUX-8RQX-EVM

8 Bill of Materials

Table 8-1. Bill of Materials (NI Parts have Quantity of 0)

Description	Designator	Part Number	Quantity	Manufacturer	Pkg Reference	Value
CAP, CERM, 3.3 μ F, 250 V, \pm 20%, X7T, AEC-Q200 Grade 1, 6 \times 5 \times 5 mm	C17, C22	CKG57NX7T2E335M500 JH	2	TDK	6 \times 5 \times 5 mm	3.3 μ F
Machine Screw, Round, #4-40 \times 1/4, Nylon, Philips panhead	H1, H2, H3, H4	NY PMS 440 0025 PH	4	B&F Fastener Supply	Screw	
Standoff, Hex, 0.5"L #4-40 Nylon	H5, H6, H7, H8	1902C	4	Keystone	Standoff	
Header, 2.54 mm, 3 \times 2, Gold, TH	J1, J2, J3, J4, J5, J6, J7, J8	61300621121	8	Würth Elektronik	Header, 2.54 mm, 3 \times 2, TH	
Header, 2.54 mm, 3 \times 1, Gold, TH	J9	61300311121	1	Würth Elektronik	Header, 2.54 mm, 3 \times 1, TH	
Default shunt positioning: between pins 1 and 2 of J9.	J10	2-881545-2	1	TE	CONN_SHUNT-2POS	
Default shunt positioning: between pins 3 and 4 of J1-J16.	J11, J12, J13, J14, J15, J16, J17, J18	2-881545-2	8	TE	CONN_SHUNT-2POS	
Terminal Block, 5 mm, 3 \times 1, Tin, TH	J19	691 101 710 003	1	Würth Elektronik	Terminal Block, 5 mm, 3 \times 1, TH	
Thermal Transfer Printable Labels, 0.650" W \times 0.200" H - 10,000 per roll	LBL1	THT-14-423-10	1	Brady	PCB Label 0.650 \times 0.200 inch	
RES, 0, 0%, W, AEC-Q200 Grade 0, 0805	R5, R6, R7, R8, R9, R10, R11, R12, R21, R22, R23, R24, R25, R26, R27, R28	PMR10EZPJ000	16	Rohm	0805	0
Test Point, Compact, Blue, TH	TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP101, TP102, TP103, TP104, TP105, TP106, TP107, TP108	5122	16	Keystone	Blue Compact Testpoint	
Test Point, Compact, Red, TH	TP17	5005	1	Keystone	Red Compact Testpoint	
Test Point, Multipurpose, Black, TH	TP18, TP20, TP21, TP22, TP23, TP24, TP25, TP26	5011	8	Keystone	Black Multipurpose Testpoint	
Test Point, Multipurpose, Green, TH	TP19	5126	1	Keystone	Green Multipurpose Testpoint	

Table 8-1. Bill of Materials (NI Parts have Quantity of 0) (continued)

Description	Designator	Part Number	Quantity	Manufacturer	Pkg Reference	Value
CAP, CERM, 0.1 μ F, 450 V, \pm 10%, X7T, 1206	C1, C2, C3, C4, C5, C6, C7, C8	C3216X7T2W104K160A E	0	TDK	1206	0.1 μ F
CAP, CERM, 3.3 μ F, 250 V, \pm 20%, X7T, AEC-Q200 Grade 1, 6 \times 5 \times 5 mm	C18, C19, C20, C21	CKG57NX7T2E335M500 JH	0	TDK	6x5x5 mm	3.3 μ F
Multilayer Ceramic Capacitors 1 μ F \pm 10% 250 V X7T SMD 1812	C101, C102, C103, C104, C105, C106, C107, C108	C4532X7T2E105K250KA	0	TDK	1812	1 μ F
Diode, TVS, Uni, 100 V, 162 Vc, SMC	D1, D2	5.0SMDJ100A	0	Littelfuse	SMC	100 V
Fiducial mark. There is nothing to buy or mount.	FID1, FID2, FID3	N/A	0	N/A	N/A	
RES, 1.0 k, 5%, 0.1 W, AEC-Q200 Grade 0, 0603	R1, R2, R3, R4, R13, R14, R15, R16, R17, R18, R19, R20, R29, R30, R31, R32	CRCW06031K00JNEA	0	Vishay-Dale	0603	1.0k

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 semiconductor 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 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/lstds/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。
http://www.tij.co.jp/lstds/ti_ja/general/eStore/notice_01.page

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。

上記を遵守頂けない場合は、電波法の罰則が適用される可能性があることをご留意ください。日本テキサス・インスツルメンツ株式会社
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/lstds/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。
http://www.tij.co.jp/lstds/ti_ja/general/eStore/notice_02.page

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.

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- 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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