

# EVM User's Guide: TPS274C65CPEVM

## TPS274C65CP Evaluation Module



### Description

The Texas Instruments TPS274C65CPEVM is an evaluation module that is used to demonstrate and showcase all of the features of the underlying TPS274C65 industrial high side switch. This evaluation board provides a seamless way to connect a set of power supplies to the inputs of the TPS274C65, connect loads to the output channels, and switch on and off the device using the control pins of the chip itself, and easily assert and deassert logic signals by the use of a set of external hardware jumpers.. An on-board 3.3-V buck-converter is included on the EVM to allow for external VDD.

### Features

- On-board 3.3-V buck-converter allowing for external VDD and lower device Iq
- Operating voltage 12 V-36 V
- Programmable current limit with external resistor
- Operating free-air temperature: -40 to 125°C

### Applications

- [Industrial PLC systems](#)
  - [Digital output modules](#)
  - IOLink ports
  - Sensor supplies



# 1 Evaluation Module Overview

## 1.1 Introduction

The TPS274C65CP evaluation module is designed to evaluate the full performance and functionality of the TPS274C65 high side switch. The TPS274C65CP evaluation module allows the user to isolate the TPS27465 before designing into a larger power system. The TPS274C65CPEVM is compatible with the CP version of TPS274C65.

This user's guide provides the connectors and test point description, the schematic, bill of materials, and board layout of the EVM.

	<b>Caution</b>	<b>Hot surface Contact can cause burns Do not touch!</b>
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## 1.2 Kit Contents

[Kit Contents](#) lists the contents of the EVM kit. Contact the Texas Instruments Product Information Center nearest if any component is missing.

**Table 1-1. Kit Contents**

Item	Quantity
TPS274C65CPEVM	1

## 1.3 Specification

This EVM is compatible with the TPS27C65CP device. There are other device versions for the TPS27C65 which can be tested using the TPS27C65EVM. [Table 1-2](#) shows the comparison across different device versions. Please note that TPS274C65CPEVM supports version CP.

**Table 1-2. Device Comparison Table**

Device Version	Part Number	Interface	Reverse Current Blocking (RCB)	Integrated LED Driver	Integrated ADC	Fault Diagnosis
CP	TPS274C65CP	GPIO	Yes	No	No	Per channel fault output
AS	TPS274C65AS	SPI	Yes	Yes	Yes	Global fault output and single channel information available through SPI
BS	TPS274C65BS	SPI	No	No	No	Global fault output and single channel information available through SPI

## 1.4 Device Information

The TPS274C65CP device is a quad-channel smart high-side switch designed to meet the requirements of industrial control systems. Low 65 mΩ RDSON minimizes device power dissipation even when providing large output load current. The device integrates protection and diagnostic features to verify system protection even during harmful events, such as short circuits or load failures. The device protects against faults through a reliable current limit, which is adjustable from 300 mA to 1.9 A to provide protection regardless of output load current. The TPS274C65CP has an internal regulator to create voltage for internal rails. Additionally, a VDD pin is provided to allow the use of external VDD supply, which needs be derived from the VS to reduce the power dissipation. The comprehensive fault reporting include a dedicated VS\_FLT pin to indicate the VS undervoltage, and separate fault pin STx to indicate the faults happening in each channel. The TPS274C65CP is available in a small 6 mm × 6 mm QFN package with 0.5 mm pin pitch, which minimizes PCB footprint.

Part Number	Package	Body Size (nom)
TPS274C65CP	QFN (40)	6 mm × 6 mm

## 2 Hardware

### 2.1 Jumper Information

Table 2-1 shows the relevant configuration jumpers of the TPS274C65CPEVM as well as the associated values. Please refer to the TPS274C65CP data sheet for detailed information on the functionality of each pin.

**Note**

If the ground network is used (J12 unpopulated), then an external VDD needs to be used at a voltage greater than 4 V due to the ground shift and minimum VDD undervoltage lockout threshold.

**Note**

*Please note that a white mark on the jumper silkscreen is reflecting the position 1 of the jumper.*

**Table 2-1. Jumper Configurations**

Jumper	Function/Settings
J10	Connect to pull the REG_EN signal low.
J11	Connect to use the external 3.3V rail generated by the on-board buck converter to power the VDD of the device. Connecting this jumper lowers the quiescent current used by the device in comparison to when the internal VDD is used.
J12	Connect to override the ground network and connect IC ground to module ground.
J13	Connect 1 and 2 to power EN1 with VDD Connect 2 and 3 to pull EN1 low.
J14	Connect 1 and 2 to power EN2 with VDD Connect 2 and 3 to pull EN2 low.
J15	Connect 1 and 2 to power EN3 with VDD Connect 2 and 3 to pull EN3 low.
J16	Connect 1 and 2 to power EN4 with VDD Connect 2 and 3 to pull EN4 low.
J17	Connect 1 and 2 to pull LATCH HI to configure the device in latch (on fault) mode Connect 2 and 3 to pull LATCH LO to configure device in auto-retry on fault.
J18	Connect 1 and 2 to pull DIAG_EN HI to enable diagnostic reporting Connect 2 and 3 to disable. Diagnostic reporting.

Please refer to Table 2-2 for ILIM DIP switch configuration.

**Table 2-2. ILIM DIP Switch Configurations**

DIP Switch Position	Resistor Value	ILIM Threshold typ (A)
1	110 kΩ	1.9
2	78.7 kΩ	1.6
3	59 kΩ	1.25
4	44.2 kΩ	1
5	31.6 kΩ	0.72
6	23.7 kΩ	0.56
7	17.8 kΩ	0.4
8	13.3 kΩ	0.25

## 2.2 Test Points

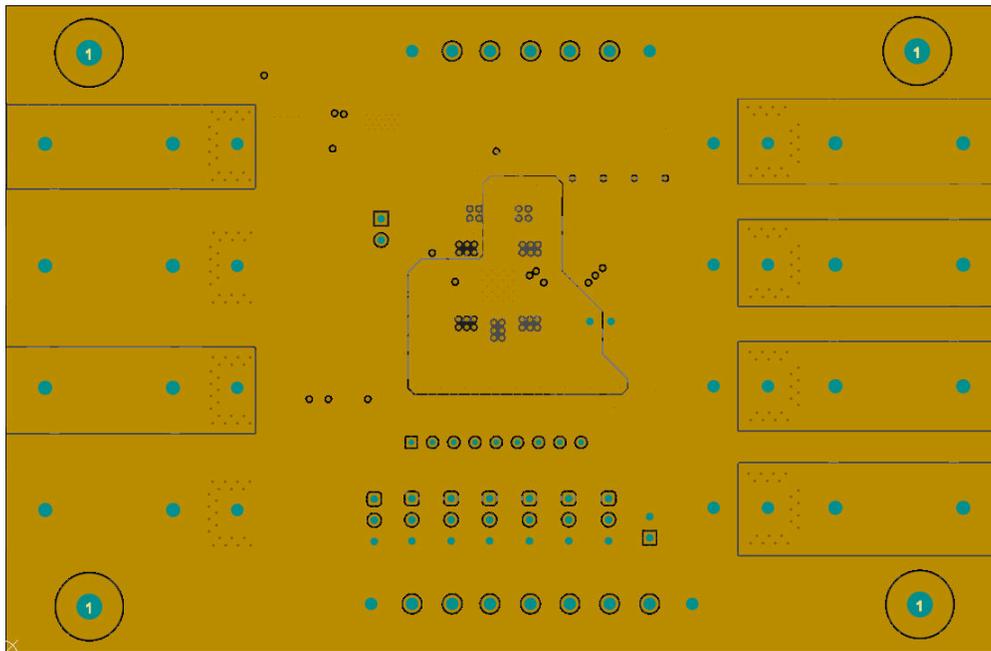
Table 2-3 shows the test points populated on the board as well as the signal connectors.

**Table 2-3. Connections and Test Points**

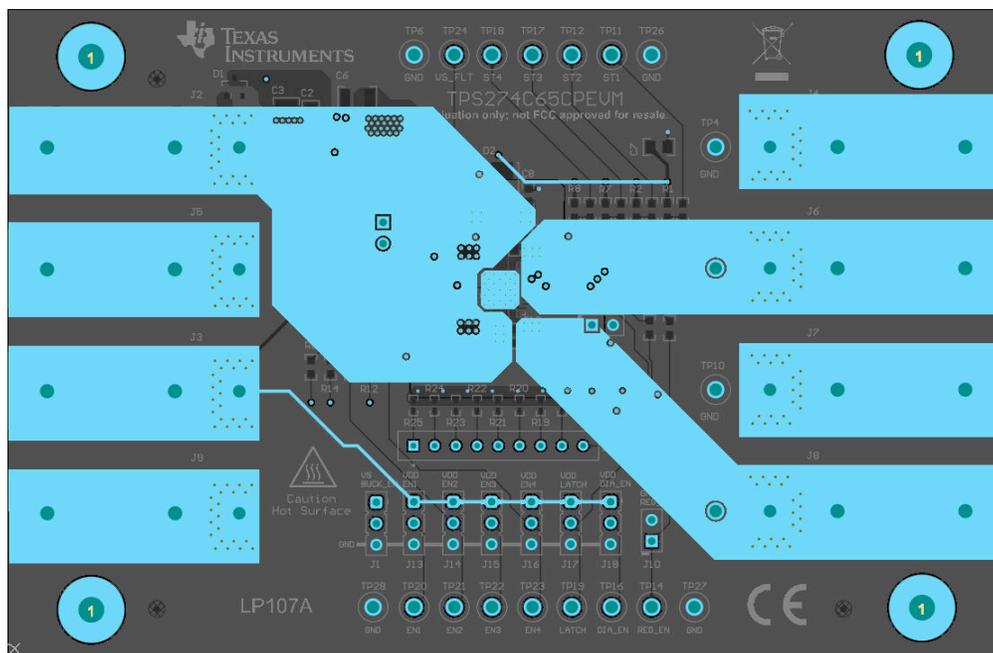
Connector and Test Point	Description
J2, TP1	Supply Voltage VS.
J3, TP2	VDD voltage. Connect a supply if internal VDD is not used.
J4, TP3	Output voltage 1 (VOUT1).
J6, TP7	Output voltage 2 (VOUT2).
J7, TP9	Output voltage 3 (VOUT3).
J8, TP13	Output voltage 4 (VOUT4).
TP4, TP5, TP6, TP8, TP10, TP15, TP25, TP26, TP26, TP28, J5, J9	Ground.
TP11	ST1 Signal.
TP12	ST2 Signal.
TP17	ST3 Signal.
TP18	ST4 Signal.
TP14	REG_EN Signal.
TP16	DIA_EN Signal.
TP19	Latch Signal.
TP24	FAULT Signal.
TP20	EN1 Signal.
TP21	EN2 Signal.
TP22	EN3 Signal.
TP23	EN4 Signal.



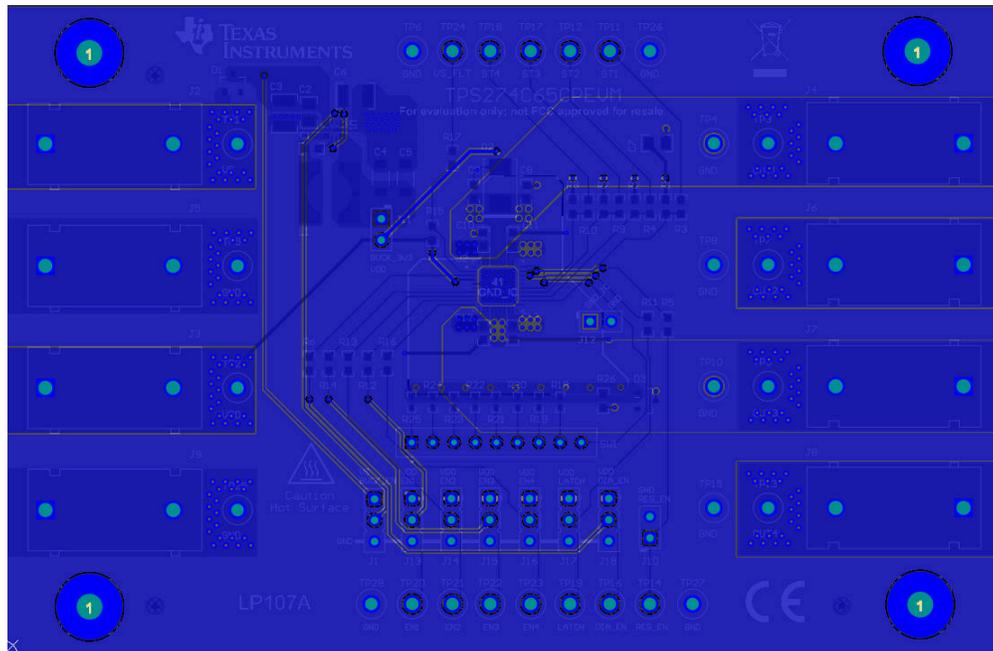




**Figure 3-4. Ground Layer**



**Figure 3-5. Power Layer**



**Figure 3-6. Bottom Layer**

### 3.3 Bill of Materials (BOM)

**Table 3-1. Bill of Materials**

Designator	Value	Description	Package Reference	Part Number	Manufacturer
C1	0.1uF	CAP, CERM, 0.1 uF, 50 V, +/- 10%, X7R, 0603	0603	C1608X7R1H104K080AA	TDK
C2	0.1uF	CAP, CERM, 0.1 uF, 100 V, +/- 10%, X7R, 0805	0805	C0805C104K1RACTU	Kemet
C3	2.2uF	CAP, CERM, 2.2 uF, 100 V, +/- 10%, X7R, 1210	1210	C1210C225K1RACTU	Kemet
C4, C5	22uF	CAP, CERM, 22 uF, 10 V, +/- 10%, X7R, 1206	1206	GRM31CR71A226KE15L	MuRata
C6	1uF	CAP, CERM, 1 uF, 100 V, +/- 10%, X7R, 1210	1210	C3225X7R2A105K200AA	TDK
C7	2.2uF	CAP, CERM, 2.2 uF, 50 V, +/- 10%, X7R, AEC-Q200 Grade 1, 0805	0805	CGA4J3X7R1H225K125AB	TDK
C8	4700 pF	CAP, CERM, 4700 pF, 100 V, +/- 10%, X7R, AEC-Q200 Grade 1, 0603	0603	CGA3E2X7R2A472K080AA	TDK
C9	0.1uF	CAP, CERM, 0.1 uF, 100 V, +/- 10%, X7R, AEC-Q200 Grade 1, 0603	0603	GCJ188R72A104KA01D	MuRata
C10, C11, C12, C13	0.022uF	CAP, CERM, 0.022 uF, 100 V, +/- 10%, X7R, AEC-Q200 Grade 1, 0603	0603	CGA3E2X7R2A223K080AA	TDK
D1, D3	200 V	Diode, Switching, 200 V, 0.2 A, SOT-23	SOT-23	BAS21-7-F	Diodes Inc.
D2	36 V	Diode, TVS, Uni, 36 V, 58.1 Vc, SMB	SMB	SMBJ36A-13-F	Diodes Inc.
H1, H2, H3, H4		Machine Screw, Round, #4-40 x 1/4, Nylon, Philips panhead	Screw	NY PMS 440 0025 PH	B&F Fastener Supply
H5, H6, H7, H8		Standoff, Hex, 0.5"L #4-40 Nylon	Standoff	1902C	Keystone
J1, J13, J14, J15, J16, J17, J18		Header, 2.54mm, 3x1, Gold, TH	Header, 2.54mm, 3x1, TH	HMTSW-103-07-G-S-240	Samtec
J2, J3, J4, J6, J7, J8		Standard Banana Jack, insulated, 10 A, red	571-0500	571-0500	DEM Manufacturing
J5, J9		Standard Banana Jack, insulated, 10 A, black	571-0100	571-0100	DEM Manufacturing
J10, J11, J12		Header, 100mil, 2x1, Gold, TH	Header, 2.54mm, 2x1, TH	HMTSW-102-07-G-S-240	Samtec
L1	15uH	Inductor, Shielded Drum Core, Ferrite, 15 uH, 1.1 A, 0.08 ohm, SMD	SMD, 2-Leads, Body 6.8x6.8mm	744062150	Würth Elektronik
R1, R2, R7, R8, R15, R26	4.7k	RES, 4.7 k, 5%, 0.1 W, AEC-Q200 Grade 0, 0603	0603	ERJ-3GEYJ472V	Panasonic

**Table 3-1. Bill of Materials (continued)**

Designator	Value	Description	Package Reference	Part Number	Manufacturer
R3, R4, R5, R6, R9, R10, R11, R12, R13, R14, R16, R17	7.50k	RES, 7.50 k, 1%, 0.1 W, 0603	0603	ERJ-3EKF7501V	Panasonic
R18	13.3k	RES, 13.3 k, 1%, 0.1 W, AEC-Q200 Grade 0, 0402	0402	ERJ-2RKF1332X	Panasonic
R19	17.8k	RES, 17.8 k, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW040217K8FKED	Vishay-Dale
R20	23.7k	RES, 23.7 k, 1%, 0.1 W, AEC-Q200 Grade 0, 0402	0402	ERJ-2RKF2372X	Panasonic
R21	31.6k	RES, 31.6 k, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW040231K6FKED	Vishay-Dale
R22	44.2k	RES, 44.2 k, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW040244K2FKED	Vishay-Dale
R23	59.0k	RES, 59.0 k, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW040259K0FKED	Vishay-Dale
R24	78.7k	RES, 78.7 k, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW040278K7FKED	Vishay-Dale
R25	110k	RES, 110 k, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW0402110KFKED	Vishay-Dale
SH-J1, SH-J2, SH-J3, SH-J4, SH-J5, SH-J6, SH-J7, SH-J8, SH-J9, SH-J10	1x2	Shunt, 100mil, Gold plated, Black	Shunt	SNT-100-BK-G	Samtec
SW1		Dip Switch SPST 8 Position Through Hole Slide (Standard) Actuator 10 mA 5VDC	DIP8	STV08	TE Connectivity
TP1, TP2, TP3, TP7, TP9, TP13		Test Point, Multipurpose, Red, TH	Red Multipurpose Testpoint	5010	Keystone Electronics
TP4, TP5, TP6, TP8, TP10, TP15, TP25, TP26, TP27, TP28		Test Point, Multipurpose, Black, TH	Black Multipurpose Testpoint	5011	Keystone Electronics
TP11, TP12, TP14, TP16, TP17, TP18, TP19, TP20, TP21, TP22, TP23, TP24		Test Point, Multipurpose, Green, TH	Green Multipurpose Testpoint	5126	Keystone Electronics
U1		LMR36503/06-Q1 Wide Input 60-V Synchronous, DC-DC Buck Converter, RPE0009A (VQFN-9)	RPE0009A	LMR36506R3RPET	Texas Instruments
U2		65-mΩ Quad-Channel Smart High-Side Switch with Diagnostics	VQFN40	TPS274C65CPWRHAR	Texas Instruments

## **4 Additional Information**

### **4.1 Trademarks**

All trademarks are the property of their respective owners.

## 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](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。

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

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

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

1. Use EVMs in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry's Rule for Enforcement of Radio Law of Japan,
2. Use EVMs only after User obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
3. Use of EVMs only after User obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless User gives the same notice above to the transferee. Please note that if User does not follow the instructions above, User will be subject to penalties of Radio Law of Japan.

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3.3.3 *Notice for EVMs for Power Line Communication:* Please see [http://www.tij.co.jp/lstds/ti\\_ja/general/eStore/notice\\_02.page](http://www.tij.co.jp/lstds/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.

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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.
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