

# ***ISO776xDBQ Six-Channel Digital-Isolator Evaluation Module***

This user's guide describes the ISO776x six-channel digital isolator evaluation module (EVM). This EVM allows designers to evaluate device performance for fast development and analysis of isolated systems. The EVM supports evaluation of any of the TI six-channel digital isolators in a 16-pin SSOP (DBQ) package.

## **CAUTION**

This evaluation module is made available for isolator parameter performance evaluation only and is not intended for isolation voltage testing. To prevent damage to the EVM, any voltage applied as a supply or digital input/output must be maintained within the 0 V to 5.5 V recommended operating range.

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## 1 Introduction

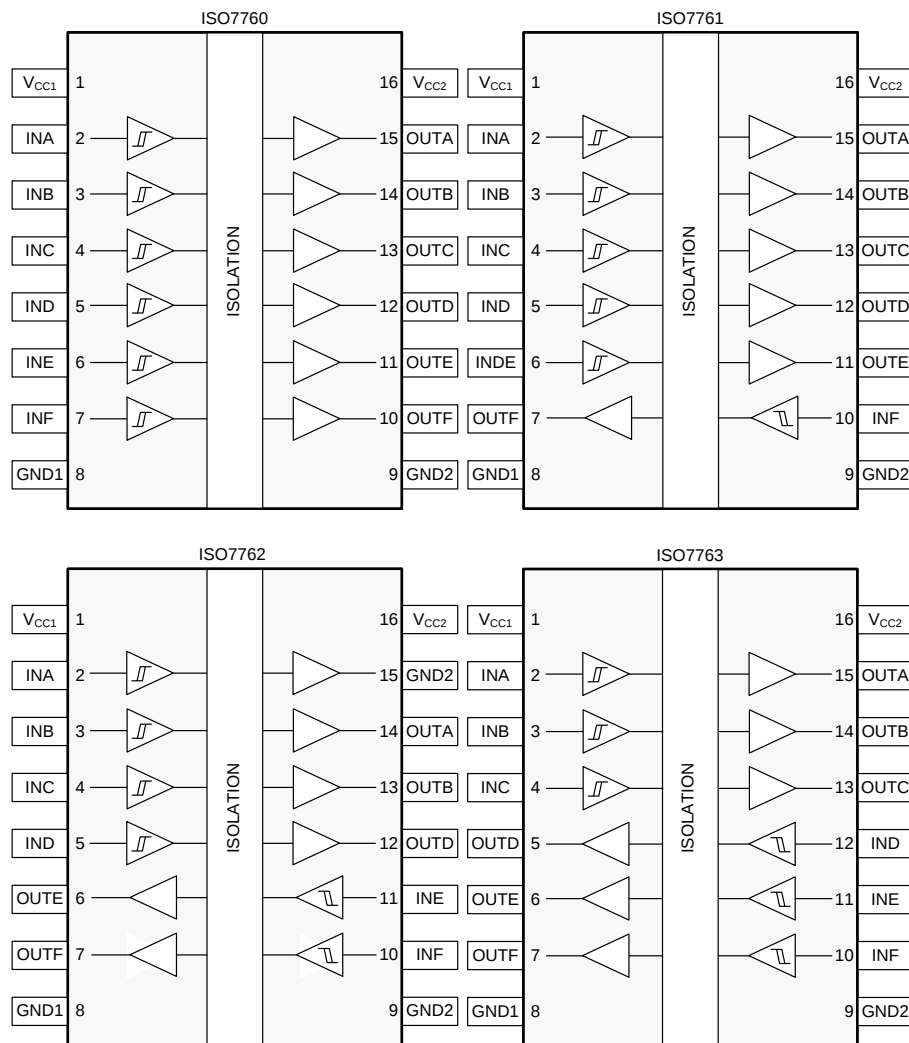
This user's guide describes EVM operation with respect to the ISO7762DBQ six-channel digital isolators. However, the EVM may be reconfigured for evaluation of any of TI's six-channel digital isolators in a 16-pin SSOP (DBQ) package. This guide also describes the available channel configurations within the ISO776x family, the EVM schematic, and typical laboratory setup. A typical input and output waveform is also presented.

## 2 Overview

The ISO776x is TI's new digital isolator family capable of galvanic isolations up to 4000 V<sub>PK</sub>. The devices are certified to meet reinforced isolation requirements by VDE and CSA. These isolators provide high electromagnetic immunity and low emissions at low power consumption, while isolating CMOS or LVCMOS digital I/Os. The ISO776x digital isolators have logic input and output buffers separated by a silicon oxide (SiO<sub>2</sub>) insulation barrier. Used with isolated power supplies, these devices block high voltages, isolate grounds, and prevent noise currents on a data bus or other circuits from entering the local ground and interfering with, or damaging sensitive circuitry.

## 3 Pin Configurations of the ISO776x Six-Channel Digital Isolators

Figure 1 shows the ISO776x six-channel digital isolator pin configurations.

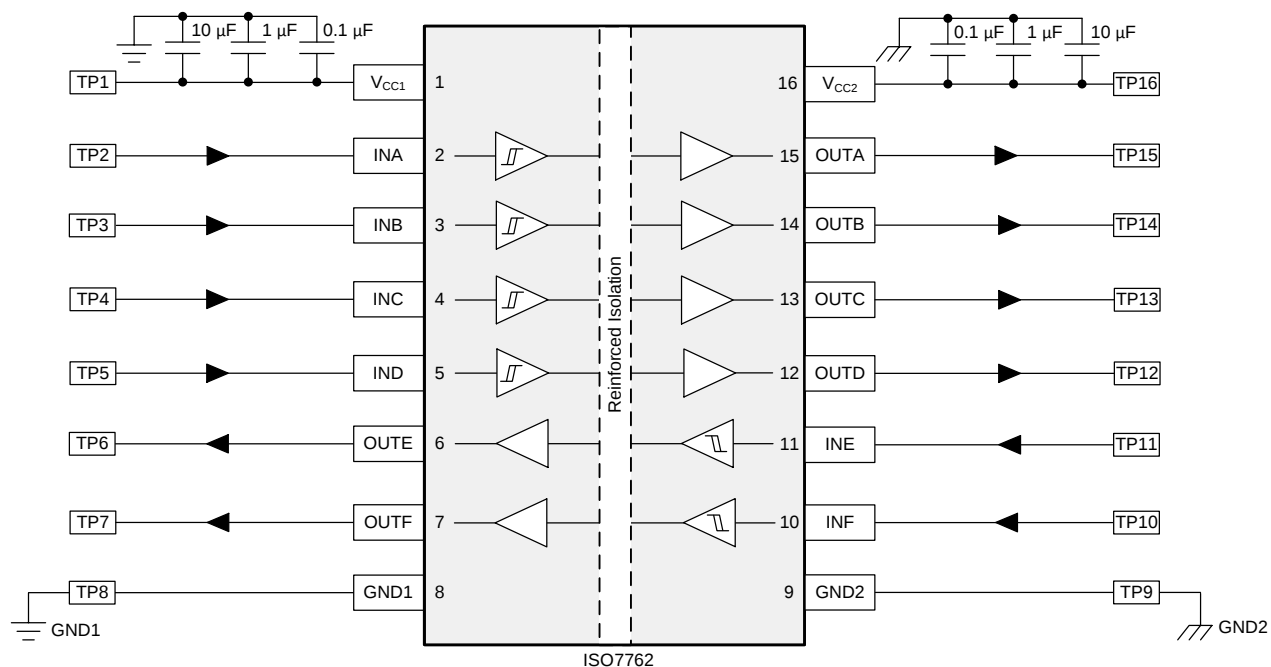


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**Figure 1. ISO776x Six-Channel Digital Isolator Pin Configurations**

## 4 ISO7762DBQEVM Board Block Diagram and Image

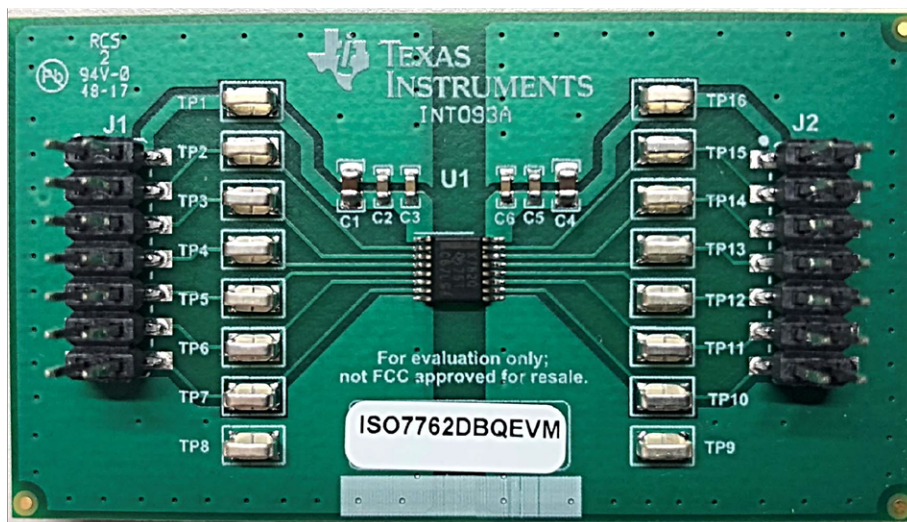
Figure 2 shows the board configuration for evaluation of the ISO7762 six-channel digital isolator.



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**Figure 2. ISO7762DBQEVM Configuration**

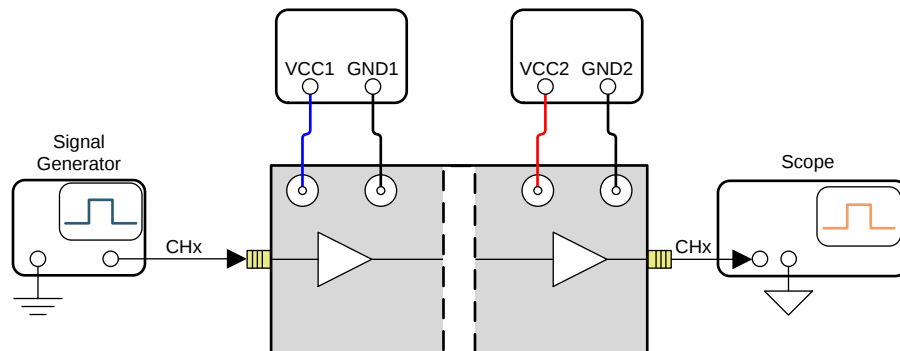
Figure 3 shows the photograph of the EVM.



**Figure 3. ISO7762DBQEVM Photograph**

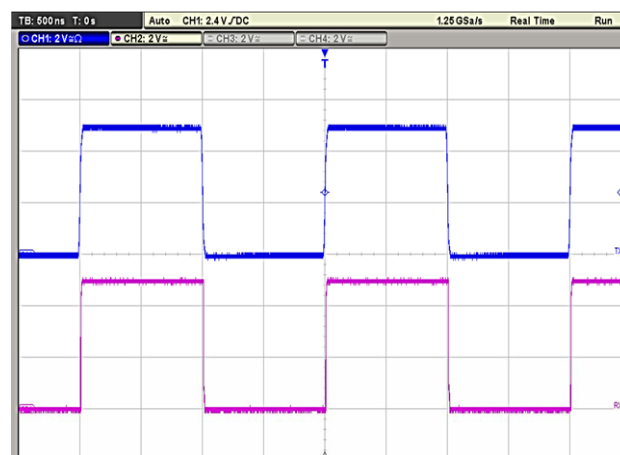
## 5 EVM Setup and Operation

This section describes the setup and operation of the EVM for parameter performance evaluation. [Figure 4](#) shows the configuration for operating the ISO776x six-channel digital isolator EVM using two power supplies.



**Figure 4. Basic EVM Operation**

[Figure 5](#) shows typical input and output waveforms of the EVM for a 1-MHz clock. The input is shown as channel 1, and the output is shown as channel 2.



**Figure 5. Typical Input and Output Waveforms**

## 6 Bill of Materials

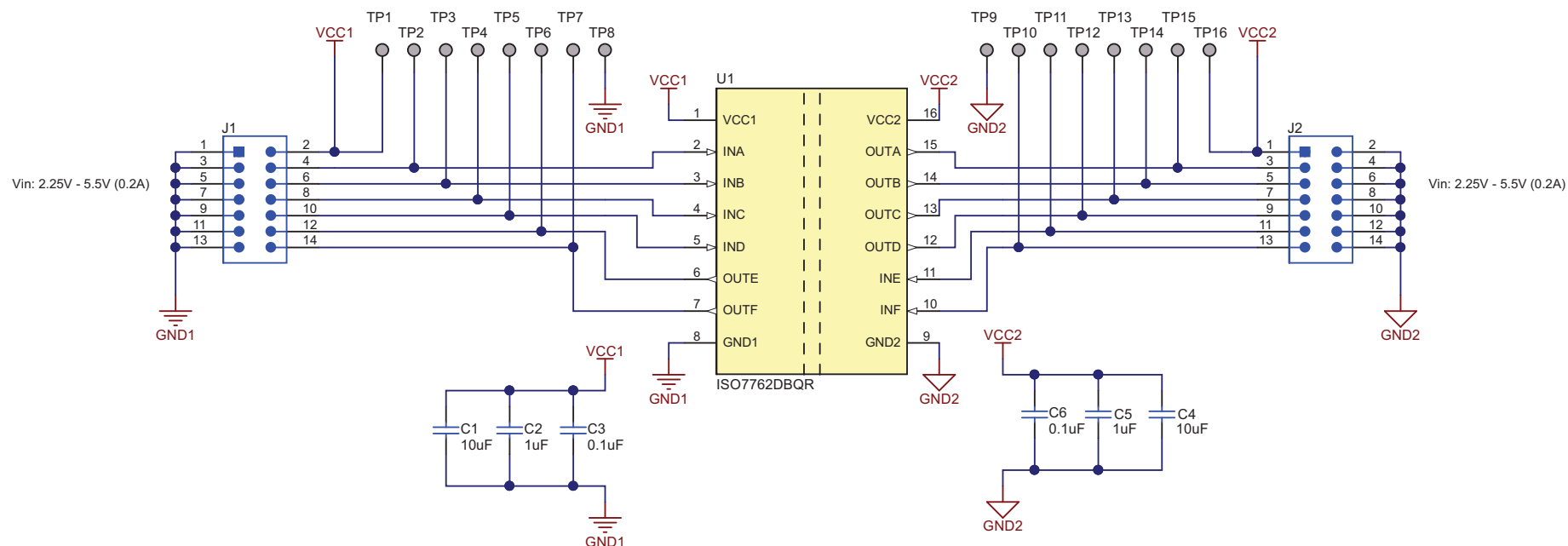
[Table 1](#) shows the bill of materials (BOM) for this EVM.

**Table 1. Bill of Materials**

| Item No. | Designator                                                                            | Quantity | Value | Part Number        | Manufacturer      | Description                                                                         | Package Reference          |
|----------|---------------------------------------------------------------------------------------|----------|-------|--------------------|-------------------|-------------------------------------------------------------------------------------|----------------------------|
| 1        | C1, C4                                                                                | 2        | 10uF  | GRM21BR6YA106KE43L | MuRata            | CAP, CERM, 10 $\mu$ F, 35 V, +/- 10%, X5R, 0805                                     | 0805                       |
| 2        | C2, C5                                                                                | 2        | 1uF   | GRM188R61H105KAALD | MuRata            | CAP, CERM, 1 $\mu$ F, 50 V, +/- 10%, X5R, 0603                                      | 0603                       |
| 3        | C3, C6                                                                                | 2        | 0.1uF | GRM188R71E104KA01D | MuRata            | CAP, CERM, 0.1 $\mu$ F, 25 V, +/- 10%, X7R, 0603                                    | 0603                       |
| 4        | H1, H2, H3, H4                                                                        | 4        |       | SJ-5303 (CLEAR)    | 3M                | Bumpon, Hemisphere, 0.44 X 0.20, Clear                                              | Transparent Bumpon         |
| 5        | J1, J2                                                                                | 2        |       | 0015912140         | Molex             | Header, 100mil, 7x2, SMT                                                            | Header, 100 mil, 7x2, SMT  |
| 6        | TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10, TP11, TP12, TP13, TP14, TP15, TP16 | 16       |       | 5019               | Keystone          | Test Point, Miniature, SMT                                                          | Test Point, Miniature, SMT |
| 7        | U1                                                                                    | 1        |       | ISO7762DBQR        | Texas Instruments | High Speed, Robust EMC, Reinforced Six-Channel Digital Isolator, DBQ0016A (SSOP-16) | DBQ0016A                   |

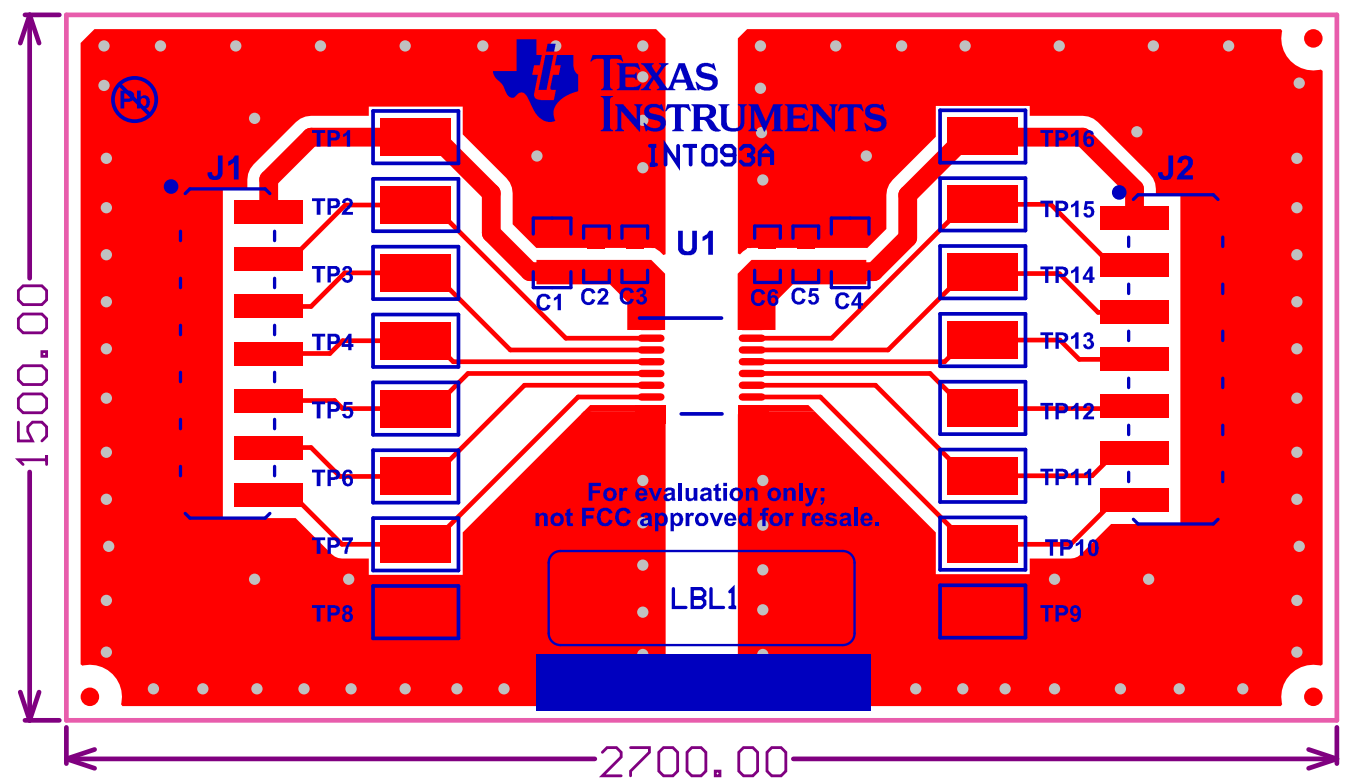
## 7 EVM Schematics and Layout

The ISO7762DBQEVM is designed to accommodate any of the ISO776x six-channel devices in a 16-pin SSOP. To evaluate any of the ISO776x six-channel devices in a 16-pin SSOP package, replace ISO7762DBQ with the device of interest on the ISO7762DBQEVM PCB. No other component requires any modification. Figure 6 shows the ISO7762DBQEVM schematic and Figure 7 shows the printed-circuit board (PCB) layout.



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**Figure 6. ISO7762DBQEVM Schematic**



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**Figure 7. ISO7762DBQEVM PCB Layout**

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- 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。  
[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)

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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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##### 3.4.1 *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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##### 4.2 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.

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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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9. *Return Policy.* Except as otherwise provided, TI does not offer any refunds, returns, or exchanges. Furthermore, no return of EVM(s) will be accepted if the package has been opened and no return of the EVM(s) will be accepted if they are damaged or otherwise not in a resalable condition. If User feels it has been incorrectly charged for the EVM(s) it ordered or that delivery violates the applicable order, User should contact TI. All refunds will be made in full within thirty (30) working days from the return of the components(s), excluding any postage or packaging costs.

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Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265  
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