User's Guide
SLLU166–June 2012

# ISO154xEVM Low-Power Bidirectional I²C Isolators Evaluation Module

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# 1 Introduction

This User's Guide details the ISO154x Evaluation Module (EVM) operation of the factory-installed ISO1540 and ISO1541 $I^2C$-compatible bidirectional isolators. The EVM may be reconfigured for use with two ISO1540 or two ISO1541 instead of one of each.

This Guide presents a typical laboratory setup used with this EVM.

**CAUTION**

This Evaluation Module (EVM) 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.

Exceeding the specified input voltage range may cause unexpected operation and irreversible damage to the EVM. If there are questions concerning the input voltage range, contact a TI field representative prior to connecting power.

Applying loads outside the specified output range may result in unintended operation and possible permanent damage to the EVM. If there is uncertainty as to the load specification, contact a TI field representative.

## 1.1 Overview

The ISO154x devices are low-power, bidirectional isolators that are compatible with $I^2C$ interfaces. The logic input and output buffers on these devices are separated by TI's Capacitive Isolation technology utilizing a silicon dioxide ($SiO_2$) barrier. When used in conjunction with isolated power supplies, these devices block high voltages, isolate grounds and prevent noise currents from entering the local ground and interfering with or damaging sensitive circuitry.

The ISO1540 has two isolated bidirectional channels for clock and data lines and is fit for multi-master applications. The ISO1541 has a bidirectional data and a unidirectional clock channel and is useful in applications that have a single master.

These devices achieve isolated bidirectional communication by introducing an offset, making the side 1 low-level output greater than the side 1 low-level input and thus preventing an internal logic latch that otherwise would occur with standard digital isolators.

## 1.2 ISO154xEVM Kit Contents

1. ISO154xEVM Circuit Board (PWB P/N 6547206)
2. ISO154xEVM User's Guide (SLLU166 - this document)
3. ISO154x Datasheet (SLLSEB6)

## 1.3 Functional Configuration

The pinouts of ISO1540 and ISO1541 are displayed in Figure 1. These devices have an input noise-filter that prevents transient pulses of up to 5 ns from being passed to the output of the device.

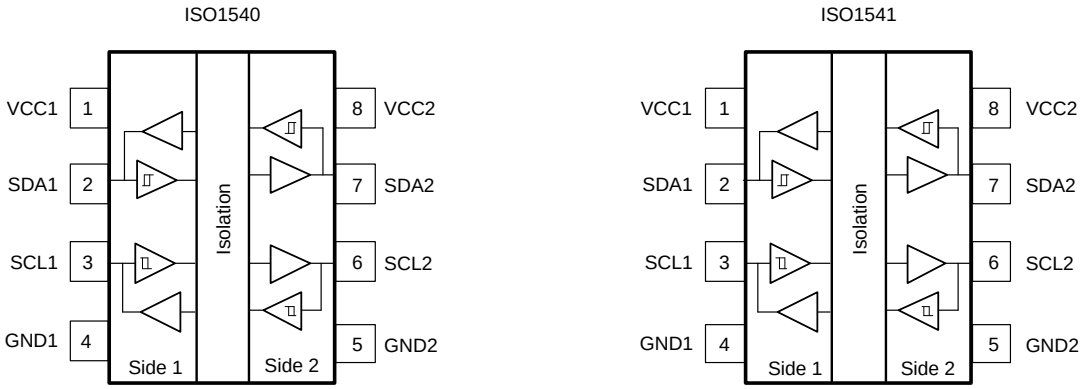



**Figure 1. ISO1540 and ISO1541 Pinout**

The EVM is shown in Figure 2, it comes with an ISO1540 and an ISO1541 installed in place of U1 and U2 respectively. However, this EVM can be configured for use with two ISO1540s or two ISO1541s.

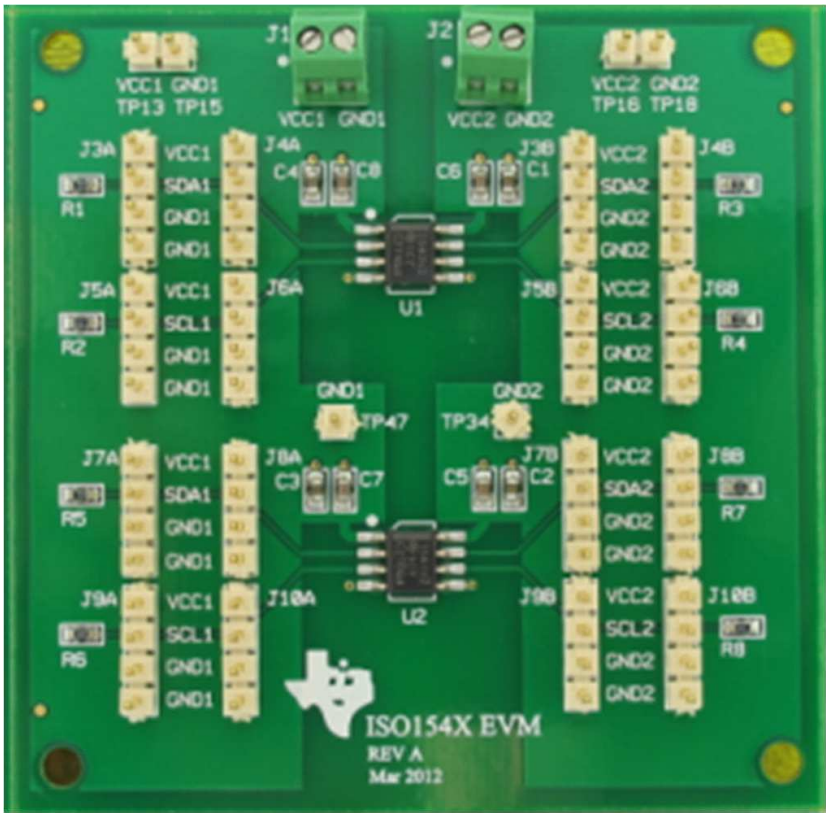



**Figure 2. ISO154xEVM Top Photograph**

An input or output pin can be tied either to supply voltage (VCCx) or Ground (GNDx) using the 4-pin jumpers on the EVM (J3A to J10A on side 1 and J3B to J10B on side 2). These jumpers also provide scope-probe access to each pin.

Each signal line (SDAx, SCLx) is configured with a 1-kΩ pull-up resistor (R1 to R8) to the corresponding power supply (VCCx). Reconfigure the value of this pull-up resistor as per the application requirement.

## 1.4 EVM Schematic

A schematic diagram for this EVM is presented in Figure 3.

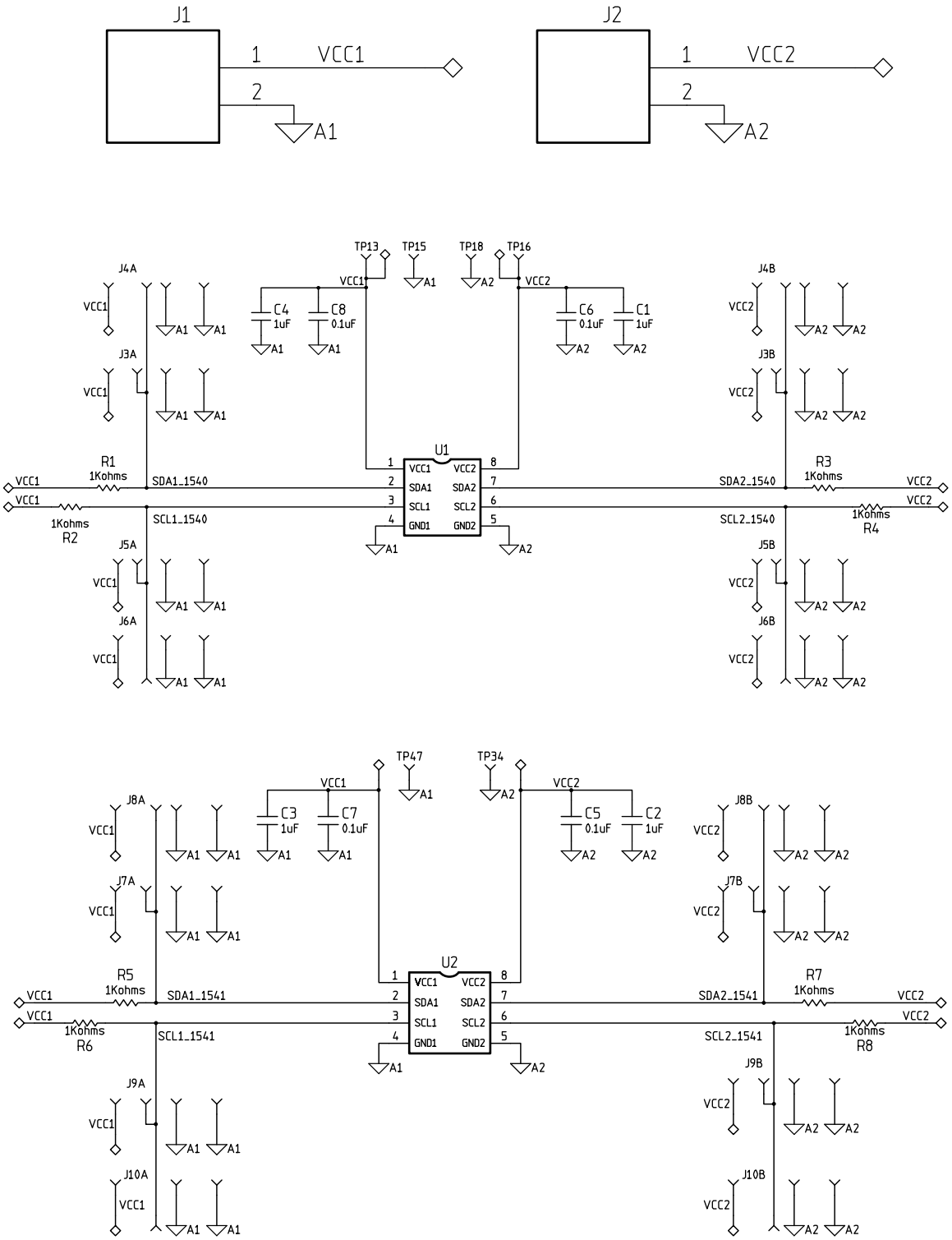



**Figure 3. ISO154xEVM Schematic**

**Table 1. ISO154xEVM Description**

| Label | Description |
|---|---|
| U1 | ISO154x, by default populated as ISO1540 |
| U2 | ISO154x, by default populated as ISO1541 |
| J1 | Side 1 power supply terminal block (VCC1) |
| J2 | Side 2 power supply terminal block (VCC2) |
| TP15, TP47 | Side 1 GND test point (GND1) |
| TP18, TP34 | Side 2 GND test point (GND2) |
| TP13 | VCC1 test point |
| TP16 | VCC2 test point |
| J3A, J4A | 4-pin jumper to VCC1, SDA1, GND1 for U1 |
| J5A, J6A | 4-pin jumper to VCC1, SCL1, GND1 for U1 |
| J3B, J4B | 4-pin jumper to VCC2, SDA2, GND2 for U1 |
| J5B, J6B | 4-pin jumper to VCC2, SCL2, GND2 for U1 |
| J7A, J8A | 4-pin jumper to VCC1, SDA1, GND1 for U2 |
| J9A, J10A | 4-pin jumper to VCC1, SCL1, GND1 for U2 |
| J7B, J8B | 4-pin jumper to VCC2, SDA2, GND2 for U2 |
| J9B, J10B | 4-pin jumper to VCC2, SCL2, GND2 for U2 |
| C1, C2, C3, C4 | 1.0 µF filter capacitor |
| C5, C6, C7, C8 | 0.1 µF filter capacitor |
| R1, R2, R5, R6 | 1-kΩ 0603 footprint pull-up resistor to VCC1 |
| R3, R4, R7, R8 | 1-kΩ 0603 footprint pull-up resistor to VCC2 |

# 2 EVM Setup and Operation

This section includes the setup and operation of the EVM for parameter performance evaluation. Typical input and output waveforms are included.

## 2.1 Overview

The basic setup in Figure 4 has the two power supplies required to evaluate isolator performance with any combination of 3.3 V or 5 V on either side. If both sides are evaluated at the same supply voltage, only one power supply is required and can be used to power both sides of the EVM.

**CAUTION**

Note that this EVM is for operating parameter performance evaluation only and not designed for isolation voltage testing. Any voltage applied above the 5.5-V maximum recommended operating voltage of the isolators may damage the EVM.

Please note that if the ISO1541 is used, providing an input signal on the SCL2 pin does not yield any output on SCL1, SCL1 remains pulled up to VCC1.

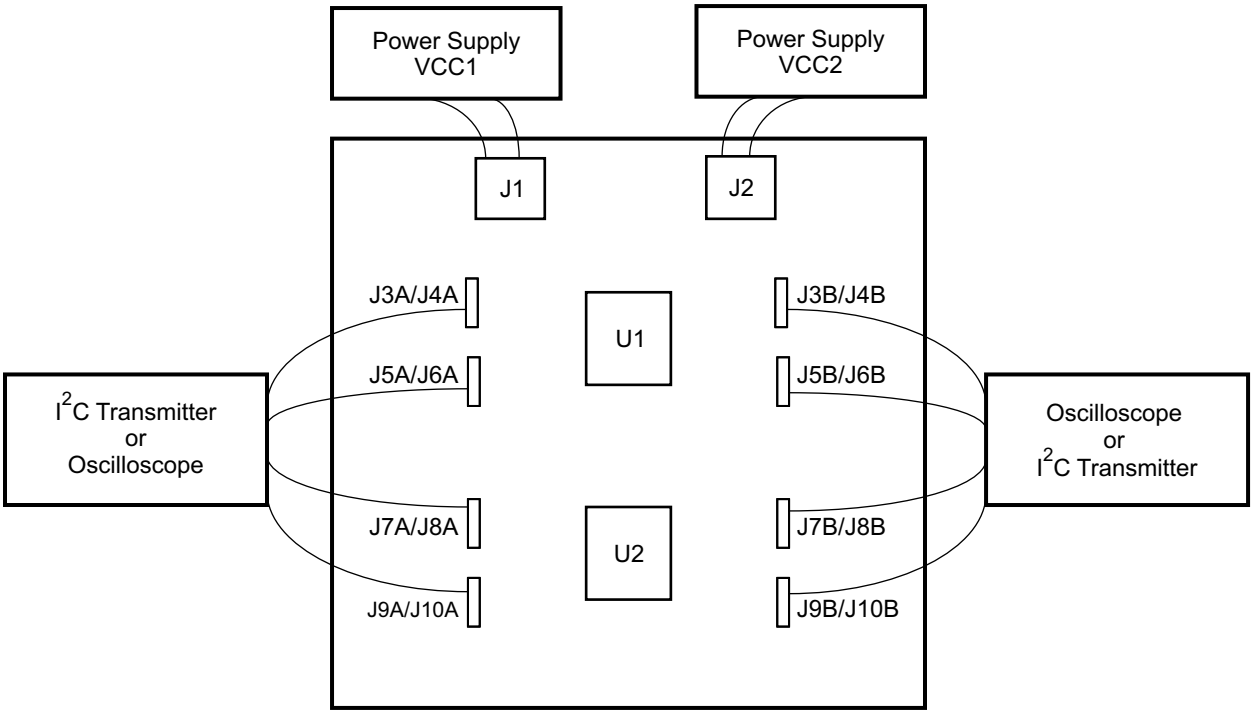
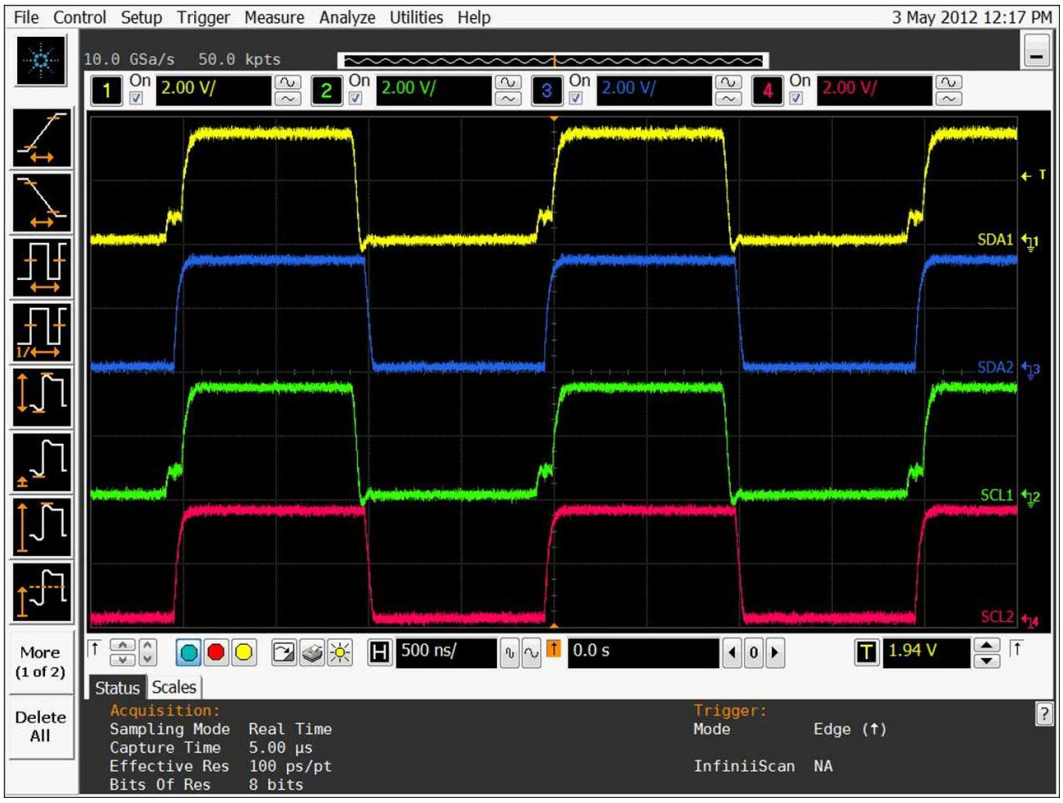



**Figure 4. Basic EVM Operation**

## 2.2 Input/Output Signal Characteristics

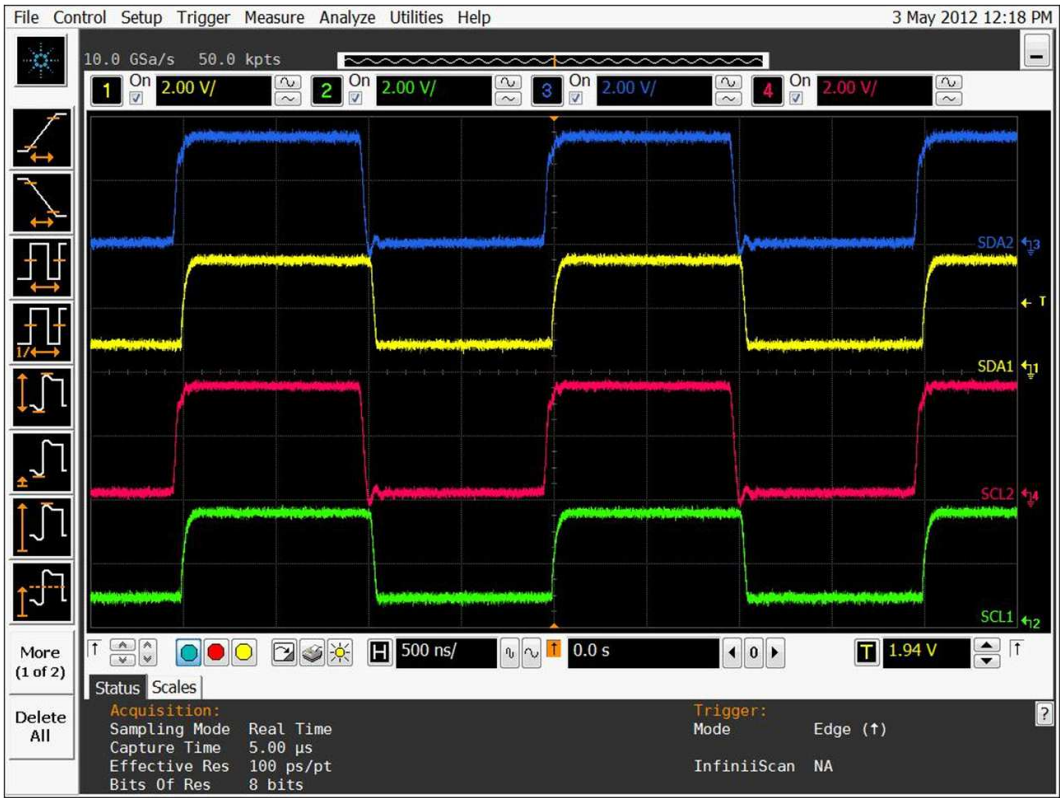
Figure 5 illustrates SDA1 and SCL1 of U1 being treated as inputs and driven by an $I^2C$ transmitter connected to J3A/J4A (for SDA1) and J5A/J6A (for SCL1). The output waveforms at SDA2 and SCL2 are captured on the oscilloscope at J3B/J4B and J5B/J6B respectively. Note the step in the rising edge of the input waveforms at SDA1 and SCL1 indicative of the tLOOP parameter of the device and demonstrating the effect of the difference in the low levels for the side 1 output and input enabling the device to avoid a latch-up state.




Note the $t_{LOOP}$ effect on the rising edge of the input waveforms on SDA1 and SCL1.

**Figure 5. Typical Waveforms, Inputs on Side 1**

Figure 6 illustrates SDA2 and SCL2 of U1 being treated as inputs and driven by an I²C transmitter connected to J3B/J4B (for SDA2) and J5B/J6B (for SCL2). The output waveforms for SDA1 and SCL1 are captured on the oscilloscope at J3A/J4A and J5A/J6A respectively. Note the low level of the SDA1 and SCL1 outputs offset from the ground level. This is due to the high output low level on side 1 designed to prevent a latch-up state.




Note the offset of the output low level voltage from ground on SDA1 and SCL1.

**Figure 6. Typical Waveforms, Inputs on Side 2**

In addition to the cases shown here, the SDA and SCL signals also propagate in mutually opposing directions. However, if using ISO1541, the SCL line is unidirectional and only allows the signal to propagate from SCL1 to SCL2 and not vice-versa.

# 3 Bill of Materials

The parts list for the ISO154xEVM is shown in Table 2.

**Table 2. ISO154x EVM Bill of Materials**

| Item | Qty. | References | Part | Manufacturer |
|---|---|---|---|---|
| 1 | 4 | C1,C2,C3,C4 | CAPACITOR, SMT, 0603, CERAMIC, 1.0 µF, 25 V, 10%, X5R | TAIYO_YUDEN/ANY |
| 2 | 4 | C5,C6,C7,C8 | CAPACITOR, SMT, 0603, CERAMIC, 1.0 µF, 25 V, 10%, X5R | TAIYO_YUDEN/ANY |
| 3 | 2 | J1,J2 | CONNECTOR, THU, TERMINAL BLOCK, 2.54 mm LS, 2P | TYCO/ANY |
| 4 | 8 | R1,R2,R3,R4,R5,R6,R7,R8 | RESISTOR, SMT, 0603, 1.0 kΩ, 0.1%, 1/10W | PANASONIC/ANY |
| 5 | 70 | TP1,TP2,TP3,TP4,TP5,TP6,TP7,TP8,TP9, TP10,TP11,TP12,TP13,TP14,TP15,TP16, TP17,TP18,TP19,TP20,TP21,TP22,TP23, TP24,TP25,TP26,TP27,TP28,TP29,TP30, TP31,TP32,TP33,TP34,TP35,TP36,TP37, TP38,TP39,TP40,TP41,TP42,TP43, TP44, TP45,TP46,TP47,TP48,TP49,TP50,TP51, TP52,TP53,TP54,TP55,TP56,TP57,TP58, TP59,TP60,TP61,TP62,TP63,TP64,TP65, TP66,TP67,TP68,TP69,TP70 | HEADER, THU, 1P, MALE, SINGLE ROW | SAMTEC/ANY |
| 6 | 1 | U1 | IC, ISO1540, SMT, SOIC8D | TI |
| 7 | 1 | U2 | IC, ISO1541, SMT, SOIC8D | TI |
| 8 | 4 | | Rubber feet, SJ5303, Bumpon hemisphere | 2M |

Notes:
1. J3A on EVM silkscreen is TP30, TP63, TP33, TP32 grouped as single row 4-pin jumper.
2. J4A on EVM silkscreen is TP23, TP5, TP17, TP25 grouped as single row 4-pin jumper.
3. J5A on EVM silkscreen is TP36, TP65, TP39, TP38 grouped as single row 4-pin jumper
4. J6A on EVM silkscreen is TP27, TP6, TP20, TP24 grouped as single row 4-pin jumper.
5. J3B on EVM silkscreen is TP35, TP66, TP34, TP37 grouped as single row 4-pin jumper.
6. J4B on EVM silkscreen is TP29, TP7, TP2, TP26 grouped as single row 4-pin jumper.
7. J5B on EVM silkscreen is TP41, TP64, TP40, TP43 grouped as single row 4-pin jumper.
8. J6B on EVM silkscreen is TP31, TP8, TP4, TP28 grouped as single row 4-pin jumper
9. J7A on EVM silkscreen is TP44, TP68, TP47, TP46 grouped as single row 4-pin jumper.
10. J8A on EVM silkscreen is TP42, TP9, TP19, TP45 grouped as single row 4-pin jumper.
11. J9A on EVM silkscreen is TP49, TP69, TP51, TP50 grouped as single row 4-pin jumper.
12. J10A on EVM silkscreen is TP48, TP10, TP22, TP53 grouped as single row 4-pin jumper.
13. J7B on EVM silkscreen is TP54, TP70, TP57, TP56 grouped as single row 4-pin jumper.
14. J8B on EVM silkscreen is TP52, TP11, TP3, TP55 grouped as single row 4-pin jumper.
15. J9B on EVM silkscreen is TP61, TP67, TP60, TP62 grouped as single row 4-pin jumper.
16. J10B on EVM silkscreen is TP58, TP12, TP1, TP59 grouped as single row 4-pin jumper.
17. SJ5303 Bumpon Hemisphere: one each to be assembled at every corner of the board on the bottom side.

## 4 ISO154xEVM Layout

Figure 7 shows the top-layer routing of the ISO154xEVM.

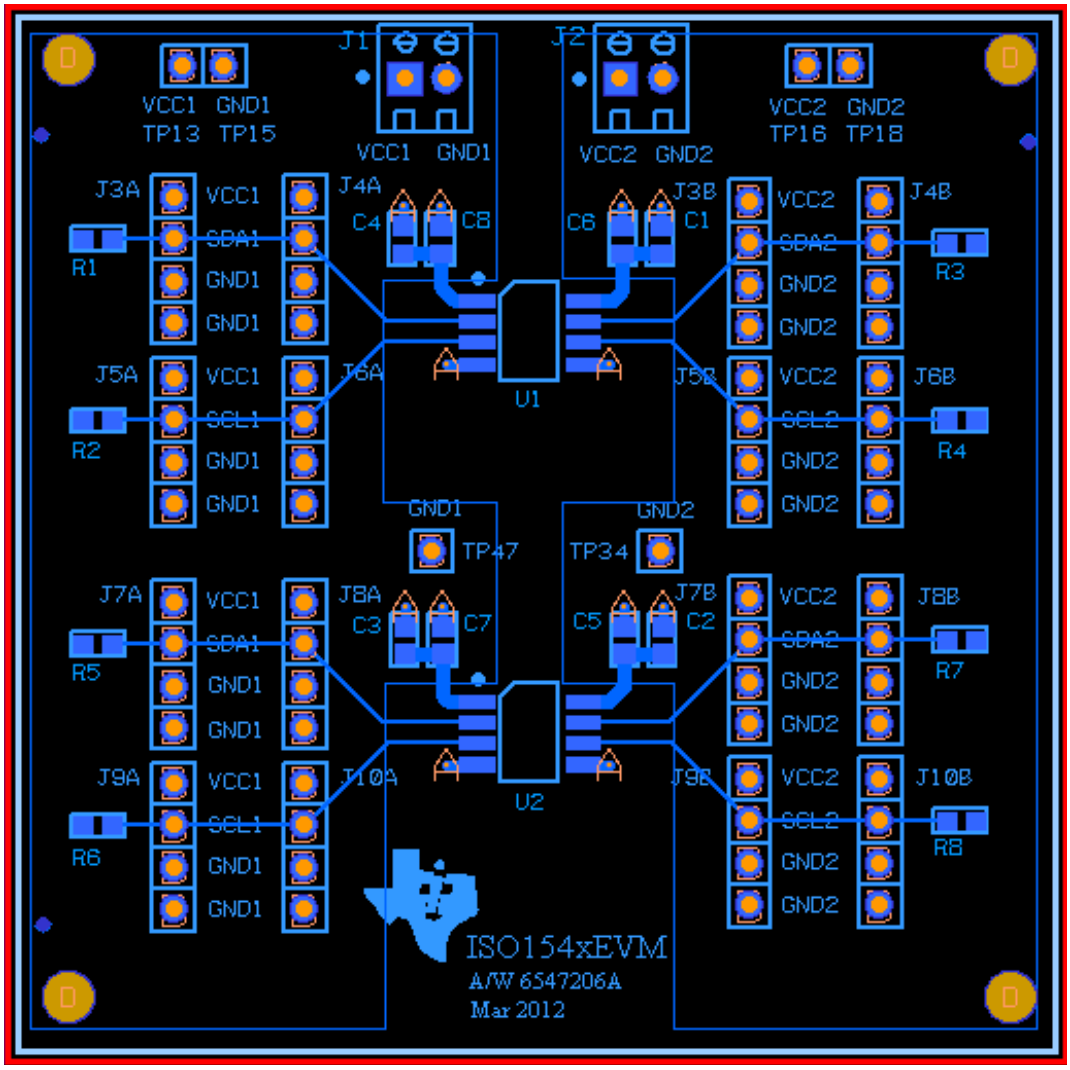



**Figure 7. ISO154xEVM Top-layer Routing**

Figure 8 shows the bottom-layer ground planes (shaded areas).

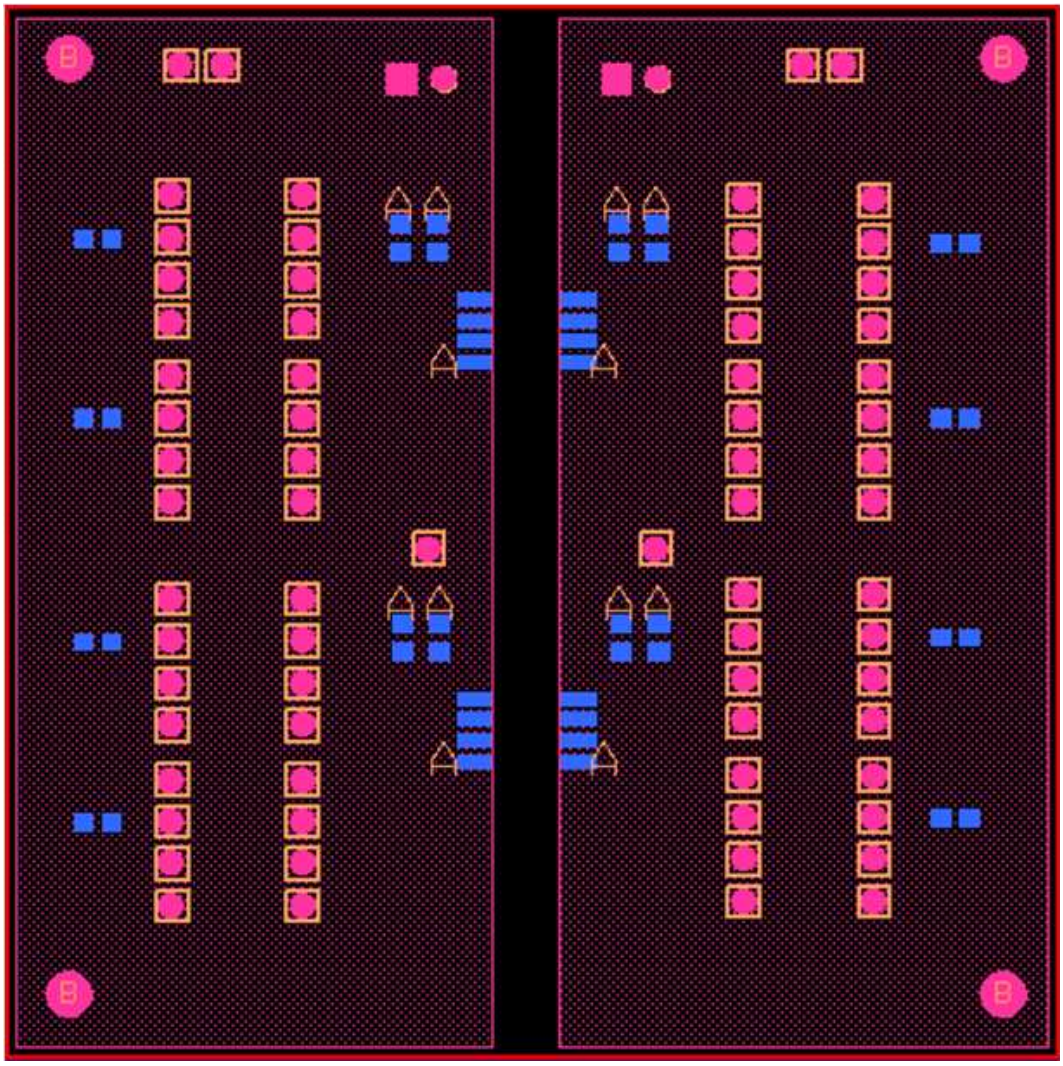


**Figure 8. ISO154xEVM Bottom-layer Ground Planes**

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## REGULATORY COMPLIANCE INFORMATION

As noted in the EVM User's Guide and/or EVM itself, this EVM and/or accompanying hardware may or may not be subject to the Federal Communications Commission (FCC) and Industry Canada (IC) rules.

For EVMs **not** subject to the above rules, this evaluation board/kit/module is intended for use for ENGINEERING DEVELOPMENT, DEMONSTRATION OR EVALUATION PURPOSES ONLY and is not considered by TI to be a finished end product fit for general consumer use. It generates, uses, and can radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to part 15 of FCC or ICES-003 rules, which are designed to provide reasonable protection against radio frequency interference. Operation of the equipment may cause interference with radio communications, in which case the user at his own expense will be required to take whatever measures may be required to correct this interference.

**General Statement for EVMs including a radio**

*User Power/Frequency Use Obligations*: This radio is intended for development/professional use only in legally allocated frequency and power limits. Any use of radio frequencies and/or power availability of this EVM and its development application(s) must comply with local laws governing radio spectrum allocation and power limits for this evaluation module. It is the user's sole responsibility to only operate this radio in legally acceptable frequency space and within legally mandated power limitations. Any exceptions to this are strictly prohibited and unauthorized by Texas Instruments unless user has obtained appropriate experimental/development licenses from local regulatory authorities, which is responsibility of user including its acceptable authorization.

**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**

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**

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.

**For EVMs annotated as IC – INDUSTRY CANADA Compliant**

This Class A or B digital apparatus complies with Canadian ICES-003.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

**Concerning EVMs including radio transmitters**

This device complies with Industry Canada licence-exempt RSS standard(s). 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.

**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.

Cet appareil numérique de la classe A ou B est conforme à la norme NMB-003 du Canada.

Les changements ou les modifications pas expressément approuvés par la partie responsable de la conformité ont pu vider l'autorité de l'utilisateur pour actionner l'équipement.

**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.

**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.

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**This development kit is NOT certified as Confirming to Technical Regulations of Radio Law of Japan**

If you use this product in Japan, you are required by Radio Law of Japan to follow the instructions below with respect to this product:

1. Use this product 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 this product only after you obtained the license of Test Radio Station as provided in Radio Law of Japan with respect to this product, or
3. Use of this product only after you obtained the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to this product. Also, please do not transfer this product, unless you give the same notice above to the transferee. Please note that if you could not follow the instructions above, you will be subject to penalties of Radio Law of Japan.

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**Certain Instructions**. It is important to operate this EVM within TI's recommended specifications and environmental considerations per the user guidelines. Exceeding the specified EVM ratings (including but not limited to input and output voltage, current, power, and environmental ranges) may cause property damage, personal injury or death. If there are questions concerning these ratings please 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 result in unintended and/or inaccurate operation and/or possible permanent damage to the EVM and/or interface electronics. Please consult the EVM User's 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, some circuit components may have case temperatures greater than 60°C as long as the input and output are maintained at a normal ambient operating temperature. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors which can be identified using the EVM schematic located in the EVM User's Guide. When placing measurement probes near these devices during normal operation, please be aware that these devices may be very warm to the touch. As with all electronic evaluation tools, only qualified personnel knowledgeable in electronic measurement and diagnostics normally found in development environments should use these EVMs.

**Agreement to Defend, Indemnify and Hold Harmless.** You agree to 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 use of the EVM that is not in accordance with the terms of the agreement. This obligation shall apply whether Claims arise under law of tort or contract or any other legal theory, and even if the EVM fails to perform as described or expected.

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Should this evaluation board/kit not meet the specifications indicated in the User's Guide, the board/kit may be returned within 30 days from the date of delivery for a full refund. THE FOREGOING LIMITED WARRANTY IS THE EXCLUSIVE WARRANTY MADE BY SELLER TO BUYER AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. EXCEPT TO THE EXTENT OF THE INDEMNITY SET FORTH ABOVE, NEITHER PARTY SHALL BE LIABLE TO THE OTHER FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.

Please read the User's Guide and, specifically, the Warnings and Restrictions notice in the User's Guide prior to handling the product. This notice contains important safety information about temperatures and voltages. For additional information on TI's environmental and/or safety programs, please visit www.ti.com/esh or contact TI.

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## REGULATORY COMPLIANCE INFORMATION

As noted in the EVM User's Guide and/or EVM itself, this EVM and/or accompanying hardware may or may not be subject to the Federal Communications Commission (FCC) and Industry Canada (IC) rules.

For EVMs **not** subject to the above rules, this evaluation board/kit/module is intended for use for ENGINEERING DEVELOPMENT, DEMONSTRATION OR EVALUATION PURPOSES ONLY and is not considered by TI to be a finished end product fit for general consumer use. It generates, uses, and can radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to part 15 of FCC or ICES-003 rules, which are designed to provide reasonable protection against radio frequency interference. Operation of the equipment may cause interference with radio communications, in which case the user at his own expense will be required to take whatever measures may be required to correct this interference.

**General Statement for EVMs including a radio**

*User Power/Frequency Use Obligations*: This radio is intended for development/professional use only in legally allocated frequency and power limits. Any use of radio frequencies and/or power availability of this EVM and its development application(s) must comply with local laws governing radio spectrum allocation and power limits for this evaluation module. It is the user's sole responsibility to only operate this radio in legally acceptable frequency space and within legally mandated power limitations. Any exceptions to this are strictly prohibited and unauthorized by Texas Instruments unless user has obtained appropriate experimental/development licenses from local regulatory authorities, which is responsibility of user including its acceptable authorization.

**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**

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**

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.

**For EVMs annotated as IC – INDUSTRY CANADA Compliant**

This Class A or B digital apparatus complies with Canadian ICES-003.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

**Concerning EVMs including radio transmitters**

This device complies with Industry Canada licence-exempt RSS standard(s). 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.

**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.

Cet appareil numérique de la classe A ou B est conforme à la norme NMB-003 du Canada.

Les changements ou les modifications pas expressément approuvés par la partie responsable de la conformité ont pu vider l'autorité de l'utilisateur pour actionner l'équipement.

**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.

**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.

## 【Important Notice for Users of this Product in Japan】

**This development kit is NOT certified as Confirming to Technical Regulations of Radio Law of Japan**

If you use this product in Japan, you are required by Radio Law of Japan to follow the instructions below with respect to this product:

1. Use this product 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 this product only after you obtained the license of Test Radio Station as provided in Radio Law of Japan with respect to this product, or
3. Use of this product only after you obtained the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to this product. Also, please do not transfer this product, unless you give the same notice above to the transferee. Please note that if you could not follow the instructions above, you will be subject to penalties of Radio Law of Japan.

**Texas Instruments Japan Limited**
**(address) 24-1, Nishi-Shinjuku 6 chome, Shinjuku-ku, Tokyo, Japan**

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http://www.tij.co.jp

# EVALUATION BOARD/KIT/MODULE (EVM)
# WARNINGS, RESTRICTIONS AND DISCLAIMERS

**For Feasibility Evaluation Only, in Laboratory/Development Environments.** Unless otherwise indicated, this EVM is not a finished electrical equipment and not intended for consumer use. It is intended solely for use for preliminary feasibility evaluation in laboratory/development environments by technically qualified electronics experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems and subsystems. It should not be used as all or part of a finished end product.

Your Sole Responsibility and Risk. You acknowledge, represent and agree that:

1. You have unique knowledge concerning Federal, State and local regulatory requirements (including but not limited to Food and Drug Administration regulations, if applicable) which relate to your products and which relate to your use (and/or that of your employees, affiliates, contractors or designees) of the EVM for evaluation, testing and other purposes.
2. You have full and exclusive responsibility to assure the safety and compliance of your products with all such laws and other applicable regulatory requirements, and also to assure the safety of any activities to be conducted by you and/or your employees, affiliates, contractors or designees, using the EVM. Further, you are responsible to assure 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.
3. You will employ reasonable safeguards to ensure that your use of the EVM will not result in any property damage, injury or death, even if the EVM should fail to perform as described or expected.
4. You will take care of proper disposal and recycling of the EVM's electronic components and packing materials.

**Certain Instructions**. It is important to operate this EVM within TI's recommended specifications and environmental considerations per the user guidelines. Exceeding the specified EVM ratings (including but not limited to input and output voltage, current, power, and environmental ranges) may cause property damage, personal injury or death. If there are questions concerning these ratings please 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 result in unintended and/or inaccurate operation and/or possible permanent damage to the EVM and/or interface electronics. Please consult the EVM User's 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, some circuit components may have case temperatures greater than 60°C as long as the input and output are maintained at a normal ambient operating temperature. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors which can be identified using the EVM schematic located in the EVM User's Guide. When placing measurement probes near these devices during normal operation, please be aware that these devices may be very warm to the touch. As with all electronic evaluation tools, only qualified personnel knowledgeable in electronic measurement and diagnostics normally found in development environments should use these EVMs.

**Agreement to Defend, Indemnify and Hold Harmless.** You agree to 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 use of the EVM that is not in accordance with the terms of the agreement. This obligation shall apply whether Claims arise under law of tort or contract or any other legal theory, and even if the EVM fails to perform as described or expected.

**Safety-Critical or Life-Critical Applications.** If you intend to evaluate the components for possible use in safety critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, such as devices which are classified as FDA Class III or similar classification, then you must specifically notify TI of such intent and enter into a separate Assurance and Indemnity Agreement.

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