EVM User's Guide: ISO7741UDUWEVM

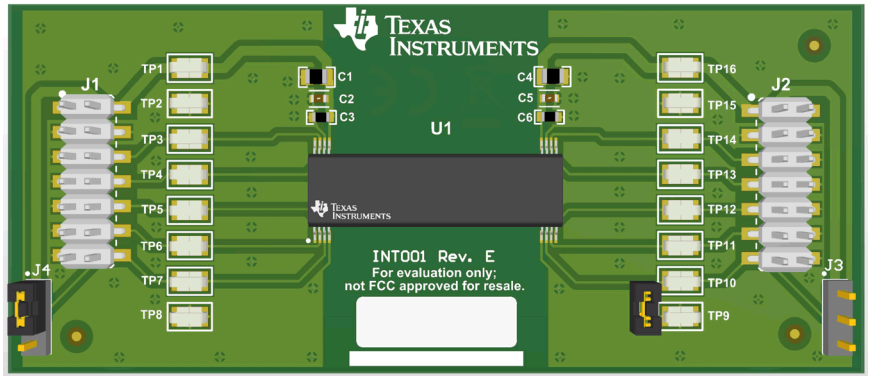
ISO7741U Ultra-Wide Package, Reinforced, Quad-Channel Digital Isolators Evaluation Module

Description

The ISO774xU family of devices are galvanically isolated digital isolators in ultra-wide package with >21.2mm creepage and clearance distance. The devices are designed for applications requiring high working voltages at high altitudes with a single stage digital isolator, removing the need for a second isolator and isolated power island. This EVM allows designers to evaluate device performance for fast development and analysis of isolated systems. The EVM supports evaluation of any device variants of ISO774xU family in a 16-pin Ultra-Wide-SSOP package (DUW-16).

Features

- Platform for complete evaluation of ISO774xU ultra-wide package family of devices.
- Break-out of each and every pin for easy accessibility.
- Test points and jumper options.
- Passives footprints for basic modification included.
- >21.2mm creepage isolation barrier.



ISO7741UDUWEVM

1 Evaluation Module Overview

1.1 Introduction

The ISO7741UDUWEVM user's guide describes the functionality of the ISO7741U Ultra-Wide Package, Reinforced, Quad-Channel Digital Isolators Evaluation Module. This user's guide describes EVM configuration for ISO7741U device. However, the EVM can be utilized for evaluation of any of the device variants of ISO774xU family in a 16-pin Ultra-Wide-SSOP package (DUW-16). See details of each variant in Table 1-1 . This guide also describes the EVM BOM, EVM schematic, EVM PCB layout, and typical laboratory setup.

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 recommended operating conditions of the device.

1.2 Kit Contents

This evaluation module contains one PCB evaluation board containing one ISO7741U device. The major components of the ISO7741UDUW evaluation board are:

- ISO7741UDUW Ultra-Wide Package, Reinforced, Quad-Channel Digital Isolator.
- Jumpers and male headers for probing and external connections.
- Multiple test points.

To demonstrate functionality of the ISO7741UDUW, TI recommends the following (not included):

- 3.3V or 5V voltage supply for supply inputs.
- Signal generator for external dynamic data input.
- Oscilloscope for probing data channels.

1.3 Specification

The EVM enables user to evaluate ISO7741U device thoroughly before incorporating the device into a design. To facilitate the detailed evaluation on EVM each pin of ISO7741U has a dedicated test point(TP1-TP16) and make berg headers(J1 and J2) which enables the user to probe and provide signals with ease and maintain a clean setup. EVM also includes two 3-optin jumpers, J3 and J4, which can be used to enable and disable the output channels on both the isolated sides by setting the state of EN1 and EN2 pins of ISO7741U to HIGH or LOW by shorting to either VCCx or GNDx respectively. The ISO7741U on the EVM can be configured to using external power supply voltages and input signals on either side of the isolation.

1.4 Device Information

The ISO774xU family of devices are galvanically isolated digital isolators in ultra-wide package with >21.2mm creepage and clearance distance. The devices are designed for applications requiring high working voltages at high altitudes with a single stage digital isolator, removing the need for a second isolator and isolated power island. The devices support up to 5000_{RMS} isolation rating per UL 1577. The devices are also certified by VDE, TUV, and CQC.

See details of all variants and orderables in Table 1-1 and family nomenclature in Figure 1-1.

Table 1-1. ISO774xU Device Comparison Table

DEVICE NAME	TOTAL CHANNELS	REVERSE CHANNELS	DEFAULT OUTPUT	PACKAGE	CREEPAGE & CLEARANCE	VDE ISOLATION RATING
ISO7741UDUWR	4	1	HIGH	Ultra-Wide-SSOP (DUW-16)	>21.2mm	Reinforced
ISO7741UFDUWR			LOW			
ISO7742UDUWR		2	HIGH			
ISO7742UFDUWR			LOW			

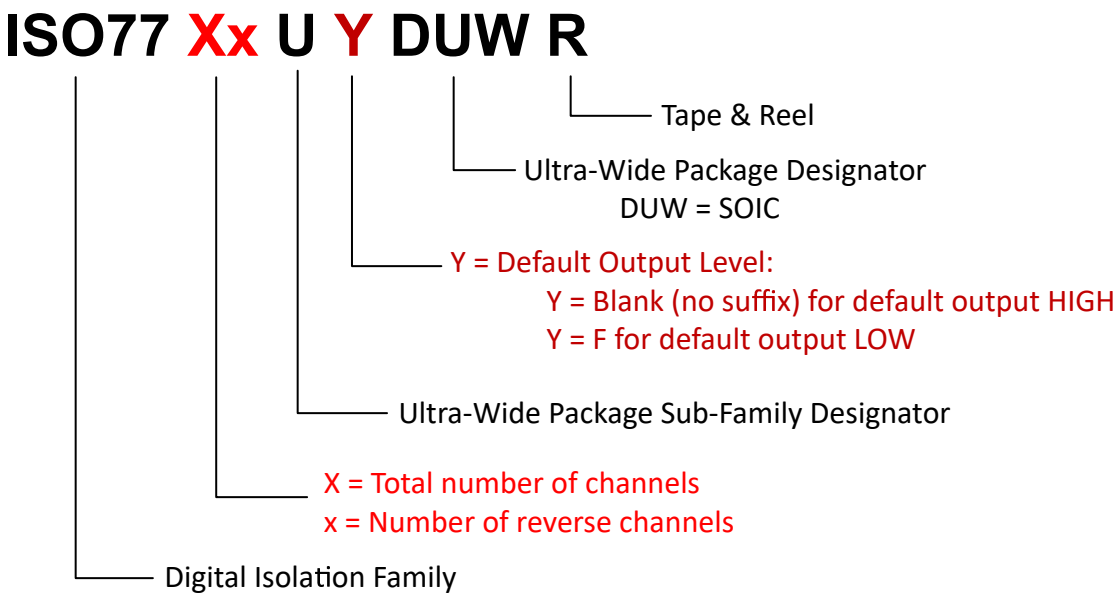


Figure 1-1. Device Nomenclature

2 Hardware

2.1 Pin Configuration of the ISO774xU Ultra-Wide Package, Reinforced, Quad-Channel Digital Isolators

Figure 2-1 and Figure 2-2 shows the pin configuration of ISO7741U(F) and ISO7742U(F) devices. Refer Table 1-1 for detailed comparison between different variants of the device family

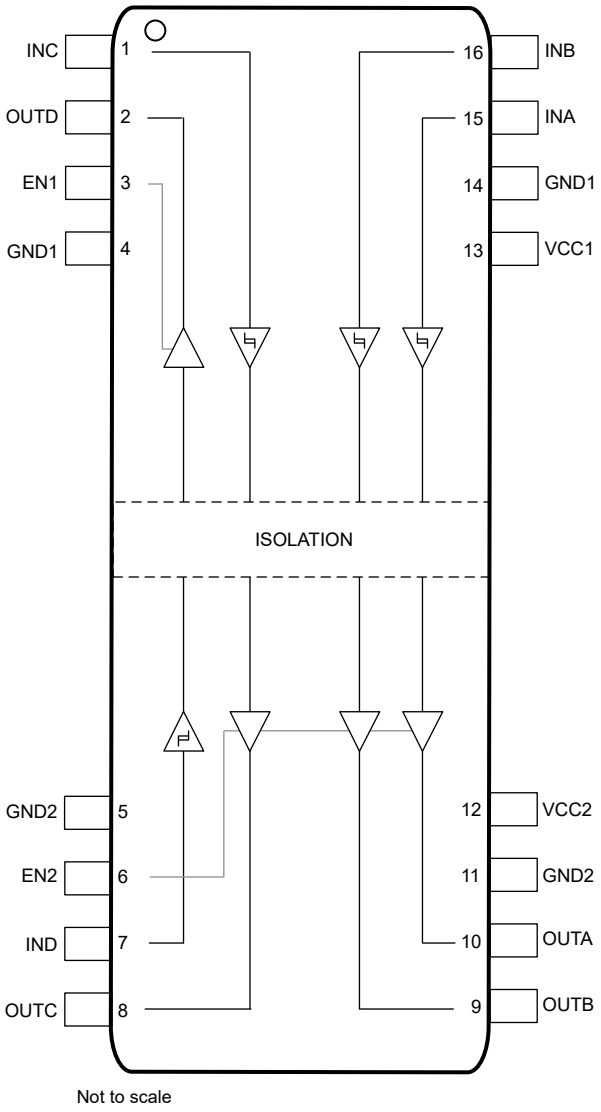


Figure 2-1. ISO7741U and ISO7741UF Pin Configuration

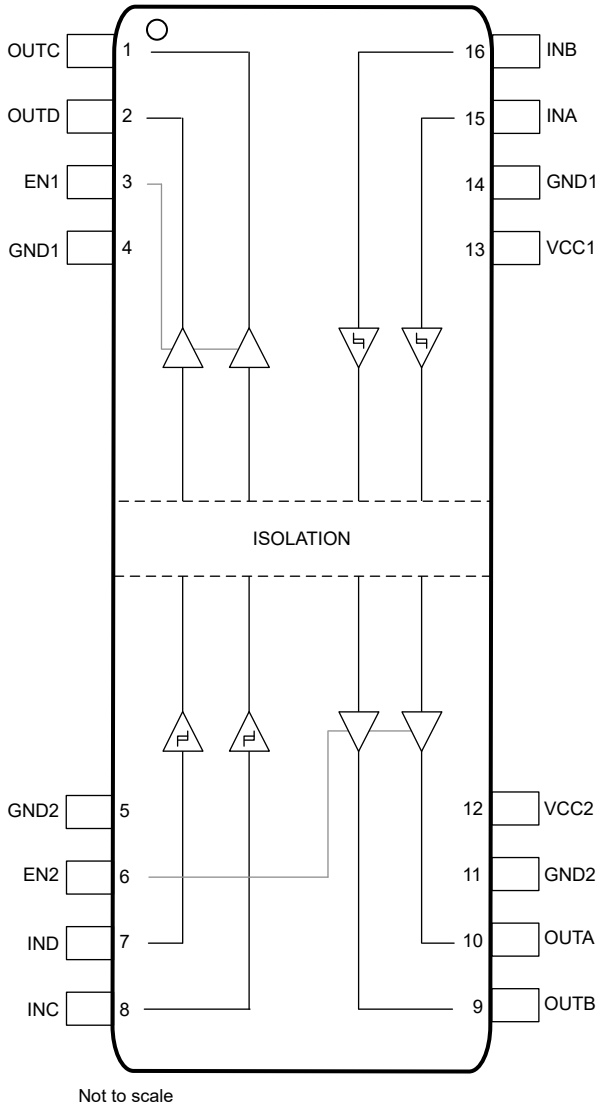


Figure 2-2. ISO7742U and ISO7742UF Pin Configuration

2.2 EVM Setup and Operation

2.2.1 EVM Setup

This section describes the typical setup and operation of the EVM for device evaluation. Figure 2-3 shows a typical test configuration for operating the ISO7741UDUWEVM using two power supplies.

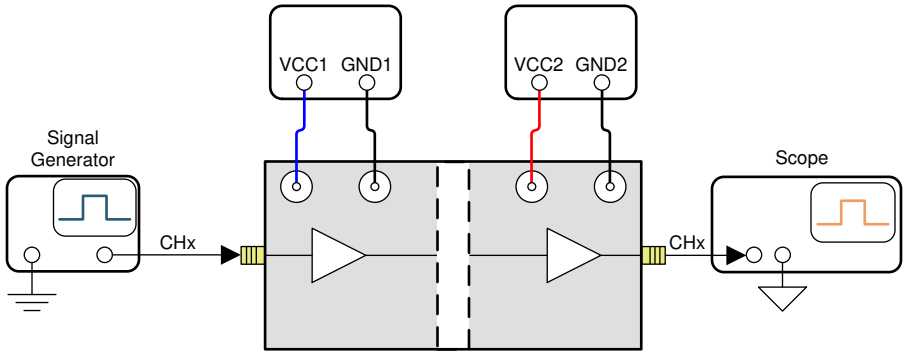


Figure 2-3. Typical EVM Test Setup

Figure 2-4 shows typical input and output waveforms of the EVM for a 1MHz clock. The input is shown as channel 1, and the output is shown as channel 2.

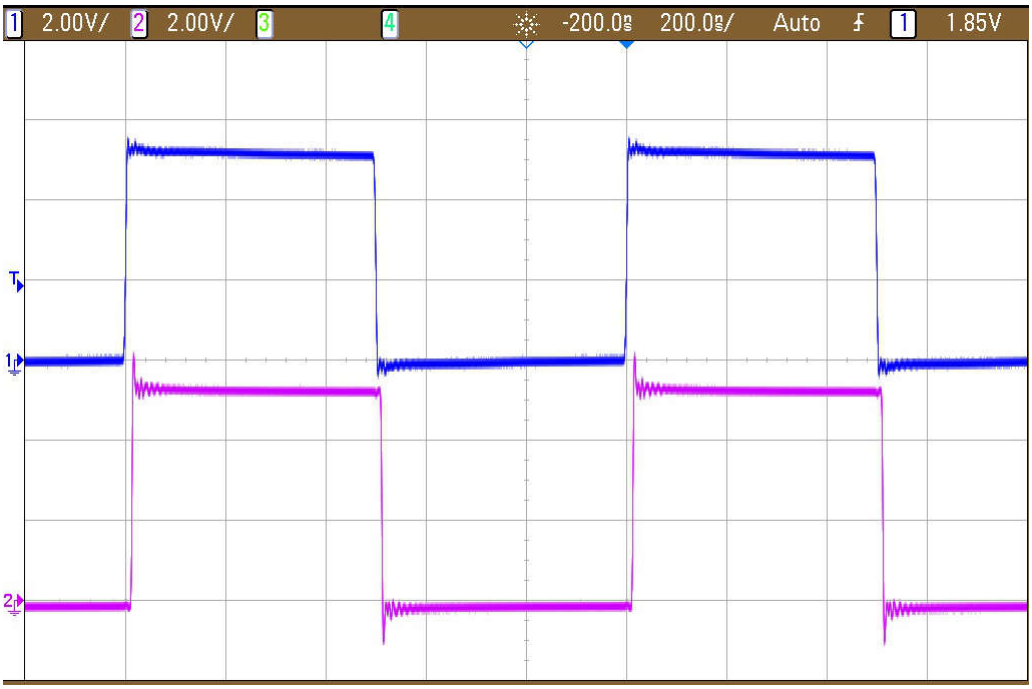


Figure 2-4. Typical Input and Output Waveform of ISO7741U

3 Hardware Design Files

3.1 Schematics

The ISO7741UDUWEVM is designed to accommodate any of the ISO774xU devices in a 16-pin ultra-wide-SSOP package (DUW-16). To evaluate any of the ISO774xU ultra-wide-package quad-channel isolator devices in a 16-pin ultra-wide-SSOP package (DUW-16), replace ISO7741U with the other device of ISO774xU family on the ISO7741UDUWEVM board. No other component requires any modification for ISO774xU devices. Figure 3-1 shows the ISO7741UDUWEVM schematic.

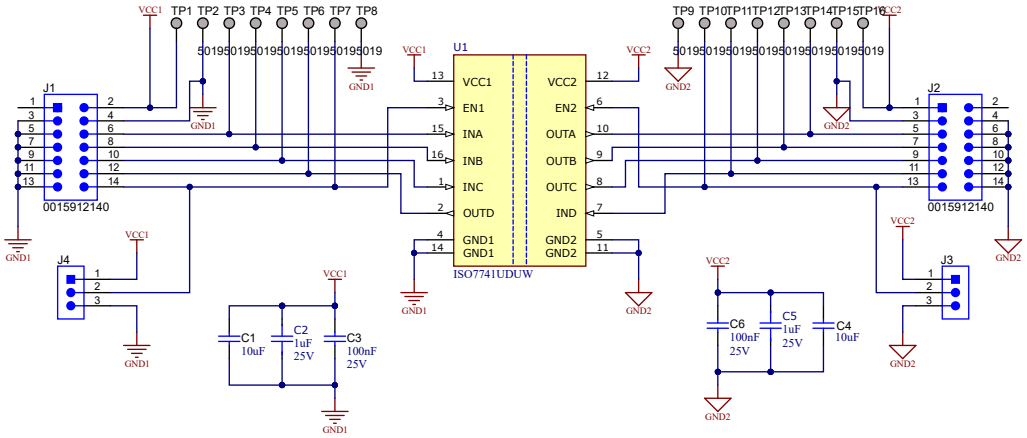


Figure 3-1. ISO7741UDUWEVM Schematic

3.2 PCB Layout and 3D Diagram

Figure 3-2 and Figure 3-3 show the printed-circuit board (PCB) layout top and bottom layers, respectively. Figure 3-4 and Figure 3-5 shows a 3D diagram of the PCB indicating how a finished board looks like.

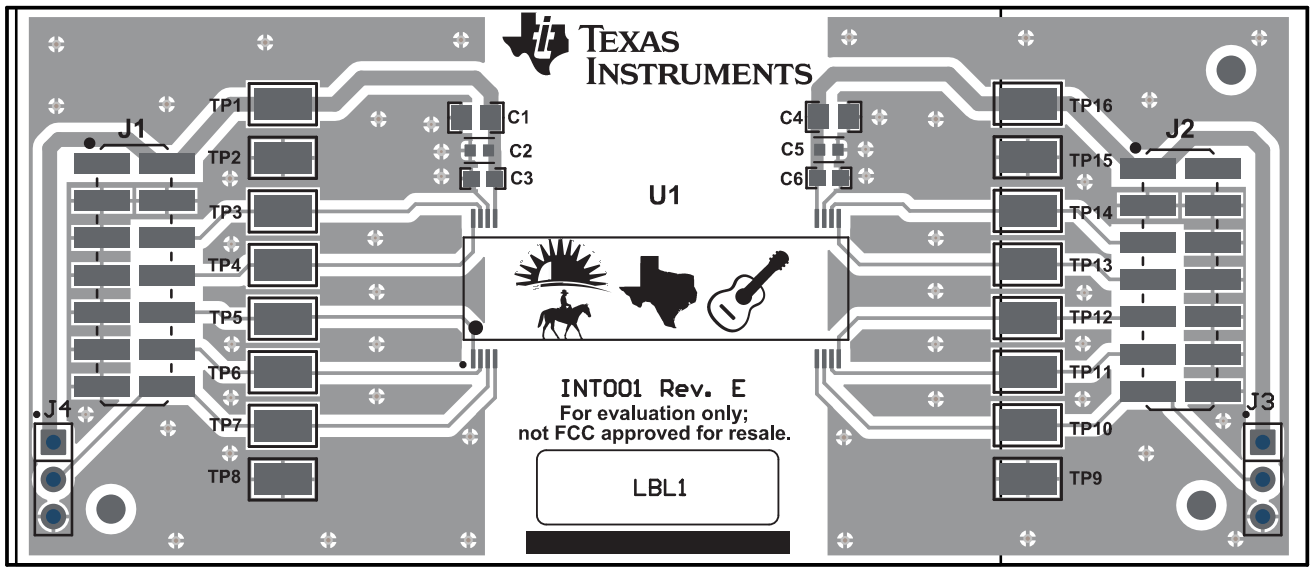


Figure 3-2. ISO7741UDUWEVM PCB Layout - Top

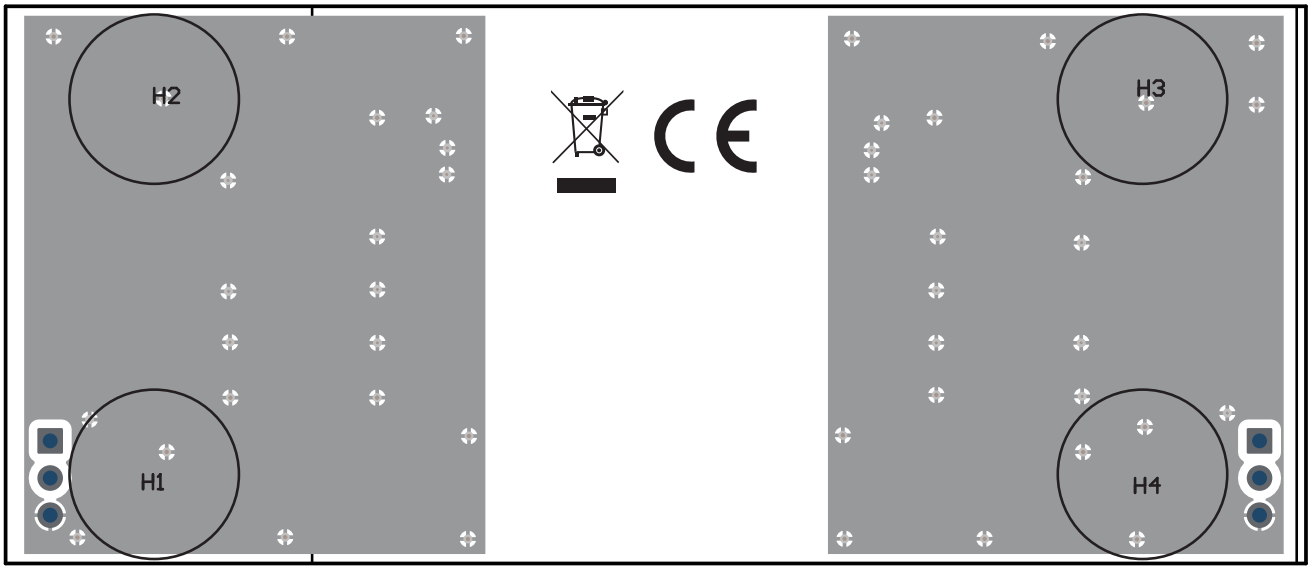


Figure 3-3. ISO7741UDUWEVM PCB Layout - Bottom

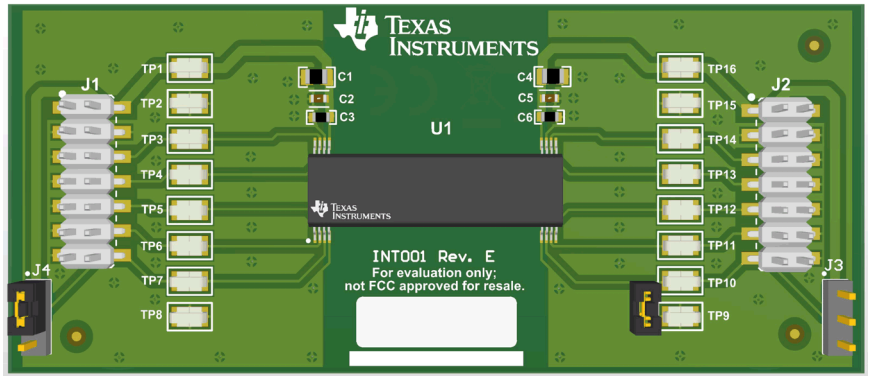


Figure 3-4. ISO7741UDUWEVM PCB 3D View - Top

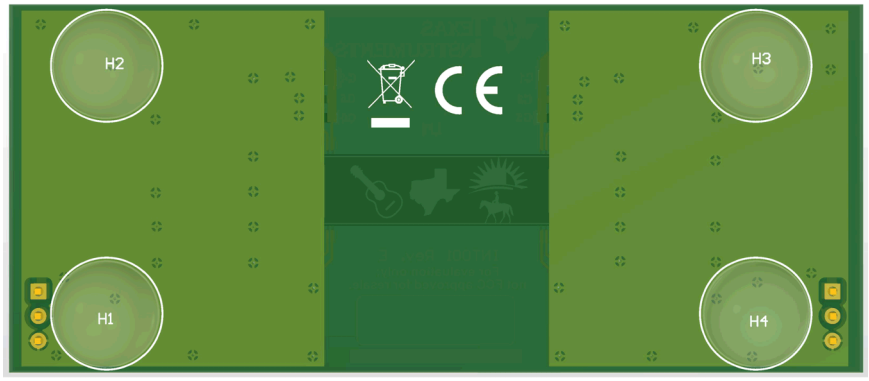


Figure 3-5. ISO7741UDUWEVM PCB 3D View - Bottom

3.3 Bill of Materials (BOM)

Table 3-1 below lists the bill of materials (BOM) for this EVM.

Table 3-1. Bill of Materials

Item	Designator	Description	Manufacturer	Part Number	Quantity
1	C1, C4	CAP, CERM, 10uF, 35V, +/- 10%, X5R, 0805	MuRata	GRM21BR6YA106KE43L	2
2	C2, C5	Cap Ceramic 1uF 25V X5R ±10% Pad SMD 0603 +85°C T/R	Samsung	CL10A105KA8NNNC	2
3	C3, C6	CAP, CERM, 0.1uF, 25V, +/- 5%, X7R, 0603	Kemet	C0603C104J3RACTU	2
4	H1, H2, H3, H4	Bumpon, Hemisphere, 0.44X 0.20, Clear	3M	SJ-5303 (CLEAR)	4
5	J1, J2	Header, 100mil, 7x2, SMT	Molex	15912140	2
6	J3, J4	Header, 100mil, 3x1, Gold, TH	Samtec	HTSW-103-07G-S	2
7	TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10, TP11, TP12, TP13, TP14, TP15, TP16	Test Point, Miniature, SMT	Keystone	5019	16
8	U1	ISO7741UDUW	Texas Instruments	ISO7741UDUWR	1

4 Additional Information

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   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

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User shall operate the Evaluation Kit within TI’s recommended guidelines and any applicable legal or environmental requirements as well as reasonable and customary safeguards. Failure to set up and/or operate the Evaluation Kit within TI’s recommended guidelines may result in personal injury or death or property damage. Proper set up entails following TI’s instructions for electrical ratings of interface circuits such as input, output and electrical loads.

NOTE:

EXPOSURE TO ELECTROSTATIC DISCHARGE (ESD) MAY CAUSE DEGREDATION OR FAILURE OF THE EVALUATION KIT; TI RECOMMENDS STORAGE OF THE EVALUATION KIT IN A PROTECTIVE ESD BAG.

3 *Regulatory Notices:*

3.1 *United States*

3.1.1 *Notice applicable to EVMs not FCC-Approved:*

FCC NOTICE: This kit is designed to allow product developers to evaluate electronic components, circuitry, or software associated with the kit to determine whether to incorporate such items in a finished product and software developers to write software applications for use with the end product. This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required FCC equipment authorizations are first obtained. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of this chapter, the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under part 5 of this chapter.

3.1.2 *For EVMs annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant:*

CAUTION

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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

FCC Interference Statement for Class A EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Interference Statement for Class B EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- *Reorient or relocate the receiving antenna.*
- *Increase the separation between the equipment and receiver.*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
- *Consult the dealer or an experienced radio/TV technician for help.*

3.2 *Canada*

3.2.1 *For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210 or RSS-247*

Concerning EVMs Including Radio Transmitters:

This device complies with Industry Canada license-exempt RSSs. Operation is subject to the following two conditions:

(1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Concernant les EVMs avec appareils radio:

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Concerning EVMs Including Detachable Antennas:

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication. This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante. Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur

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3.3.1 *Notice for EVMs delivered in Japan:* Please see http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_01.page 日本国内に輸入される評価用キット、ボードについては、次のところをご覧ください。

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

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

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

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

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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.

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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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Last updated 10/2025