EVM User's Guide: ISO7741UDUWEVM

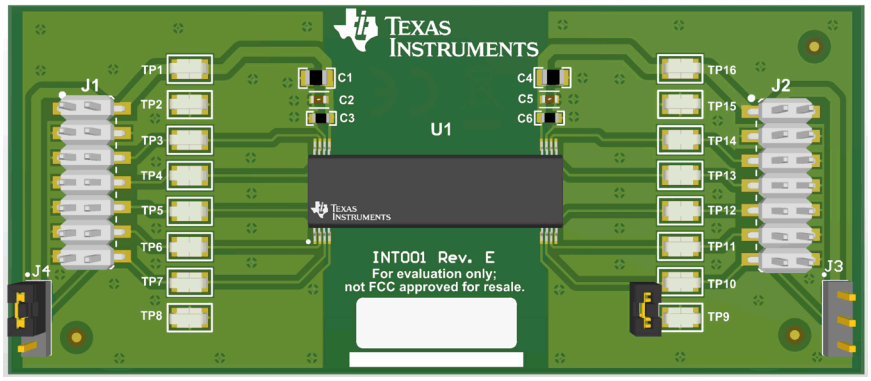
ISO7741U 超宽封装、增强型、四通道数字隔离器评估模块

说明

ISO774xU 系列器件是采用超宽封装的电隔离数字隔离器，爬电距离和间隙大于 21.2mm。这些器件专为需要在高海拔位置提供高工作电压的应用而设计，带有单级数字隔离器，无需使用第二隔离器和隔离式电源岛。该 EVM 可帮助设计人员评估器件的性能，从而快速开发和分析隔离系统。该 EVM 支持对采用 16 引脚超宽 SSOP 封装 (DUW-16) 的 ISO774xU 系列任何器件型号进行评估。

特性

- 用于全面评估 ISO774xU 超宽封装系列器件的平台。
- 每个引脚都分接，便于访问。
- 提供测试点和跳线选项。
- 包含无源器件用于基本修改。
- >21.2mm 爬电隔离栅。



ISO7741UDUWEVM

1 评估模块概述

1.1 简介

ISO7741UDUWEVM 用户指南介绍了 ISO7741U 超宽封装、增强型、四通道数字隔离器评估模块的功能。本用户指南介绍了 ISO7741U 器件的 EVM 配置。然而，EVM 可用于评估 16 引脚超宽 SSOP 封装 (DUW-16) 中 ISO774xU 系列的任何器件变体。请参见表 1-1 中有关每个型号的详细信息。本指南还介绍了 EVM BOM、EVM 原理图、EVM PCB 布局和典型的实验室设置。

小心

此评估模块仅用于隔离器参数性能评估，不适用于隔离电压测试。为防止损坏此 EVM，任何用作电源或数字输入/输出的电压都必须保持在该器件的建议工作条件内。

1.2 套件内容

该评估模块包含一个 PCB 评估板，其中包含一个 ISO7741U 器件。ISO7741UDUW 评估板的主要元件包括：

- ISO7741UDUW 超宽封装、增强型四通道数字隔离器。
- 用于探测及外部连接的跳线和公接头。
- 多个测试点。

若要演示 ISO7741UDUW 的功能，TI 建议使用以下器件（另售）：

- 电源输入为 3.3V 或 5V 电压。
- 用于提供外部动态数据输入的信号发生器。
- 用于探测数据通道的示波器。

1.3 规格

在将 ISO7741U 器件用于设计前，EVM 可帮助用户全面地评估该器件。为了便于对 EVM 进行详细评估，ISO7741U 的每个引脚都有一个专用测试点 (TP1-TP16) 并具备 berg 接头（J1 和 J2），使用户能够轻松探测和提供信号并保持清晰的设置。EVM 还包含两个 3 通道跳线 J3 和 J4，可用于通过分别短接至 VCCx 或 GNDx 将 ISO7741U 的 EN1 和 EN2 引脚的状态设置为高电平或低电平，以启用和禁用隔离侧的输出通道。EVM 上的 ISO7741U 可配置成使用隔离装置任一侧的外部电源电压和输入信号。

1.4 器件信息

ISO774xU 系列器件是采用超宽封装的电隔离数字隔离器，爬电距离和间隙大于 21.2mm。这些器件专为需要在高海拔位置提供高工作电压的应用而设计，带有单级数字隔离器，无需使用第二隔离器和隔离式电源岛。器件支持符合 UL 1577 标准的高达 5000_{RMS} 隔离额定值。器件还通过了 VDE、TUV 和 CQC 认证。

请参见表 1-1 中所有变体和可订购产品的详细信息，以及图 1-1 中的系列命名法。

表 1-1. ISO774xU 器件比较表

器件名称	总通道数	反向通道	默认输出	封装	爬电距离/间隙	VDE 隔离等级
ISO7741UDUWR	4	1	高电平	超宽 SSOP (DUW-16)	> 21.2mm	增强型
ISO7741UFDUWR			低电平			
ISO7742UDUWR		2	高电平			
ISO7742UFDUWR			低电平			

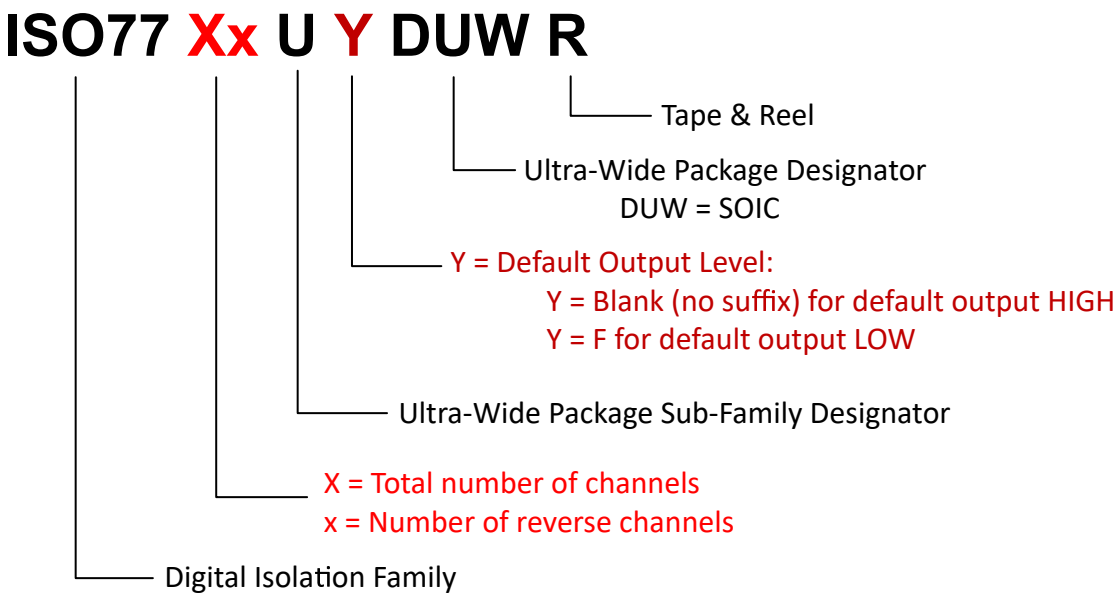


图 1-1. 器件命名规则

2 硬件

2.1 ISO774xU 超宽封装增强型四通道数字隔离器的引脚配置

图 2-1 和图 2-2 显示了 ISO7741U(F) 和 ISO7742U(F) 器件的引脚配置。请参阅表 1-1，了解该器件系列不同型号之间的详细比较

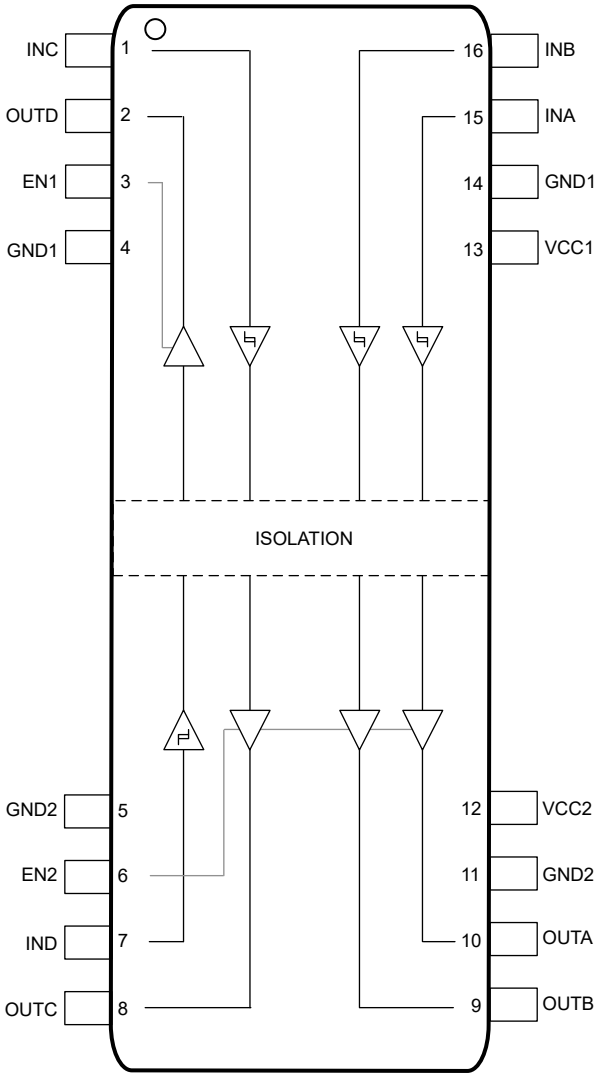


图 2-1. ISO7741U 和 ISO7741UF 引脚配置

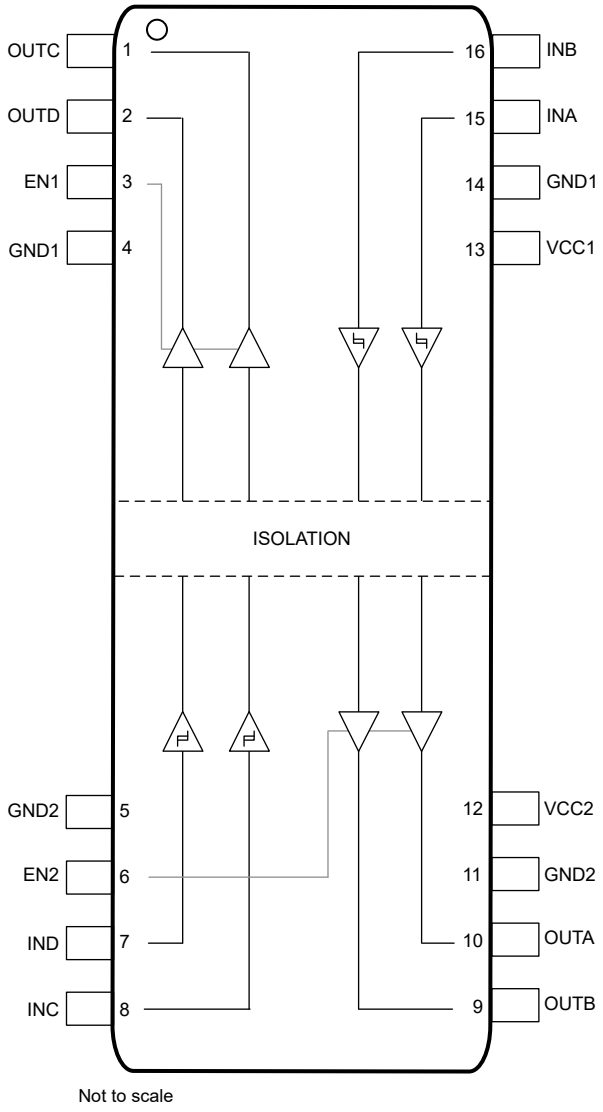


图 2-2. ISO7742U 和 ISO7742UF 引脚配置

2.2 EVM 设置和操作

2.2.1 EVM 设置

本节介绍了用于器件评估的 EVM 的典型设置和操作。图 2-3 显示了使用两个电源运行 ISO7741UDUWEVM 的典型测试配置。

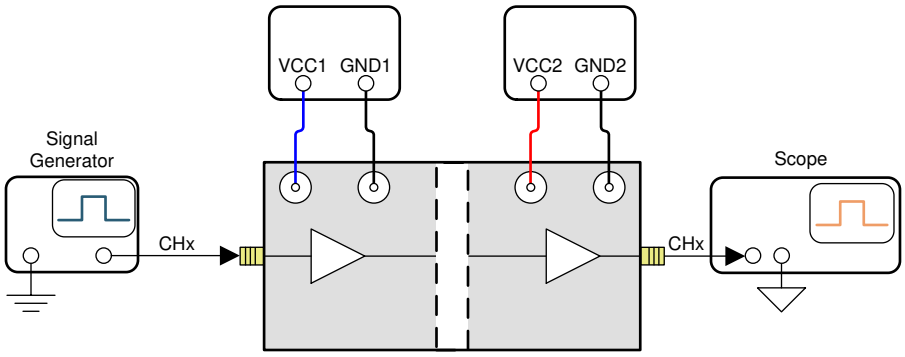


图 2-3. EVM 典型测试设置

图 2-4 显示了用于 1MHz 时钟的 EVM 的典型输入和输出波形。输入显示为通道 1，输出显示为通道 2。

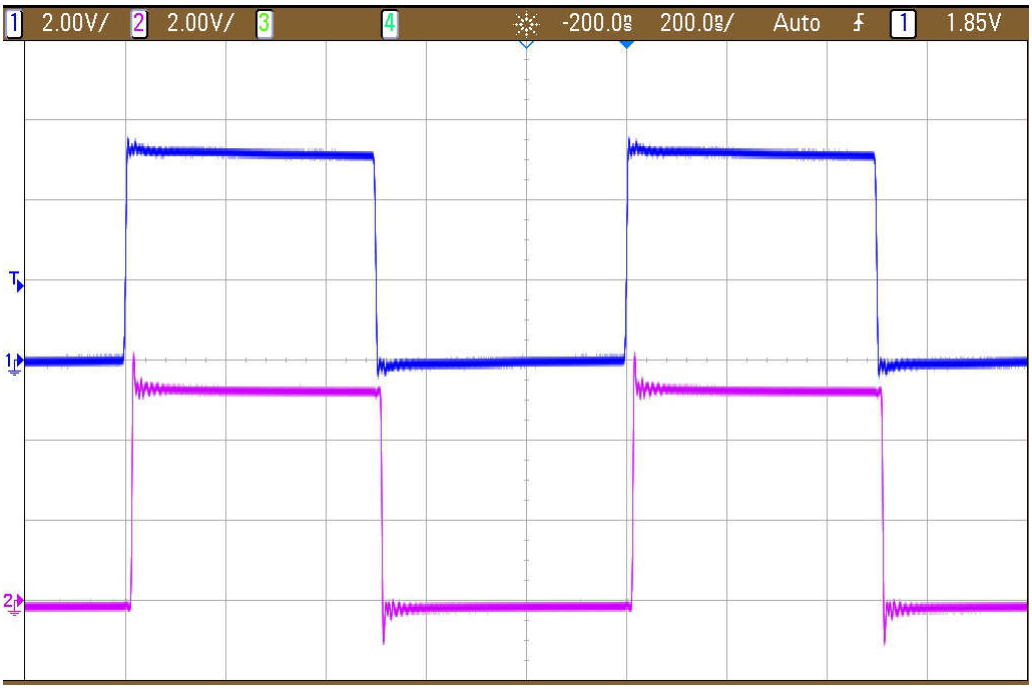


图 2-4. ISO7741U 的典型输入和输出波形

3 硬件设计文件

3.1 原理图

ISO7741UDUWEVM 旨在评估采用 16 引脚超宽 SSOP 封装 (DUW-16) 的任何 ISO774xU 器件。要评估 16 针超宽 SSOP 封装 (DUW-16) 中的任何 ISO774xU 超宽封装四通道隔离器器件，请在 ISO7741UDUWEVM 板上用 ISO774xU 系列的其他器件替换 ISO7741U。其他元件不需要针对 ISO774xU 器件进行任何修改。图 3-1 展示了 ISO7741UDUWEVM 原理图。

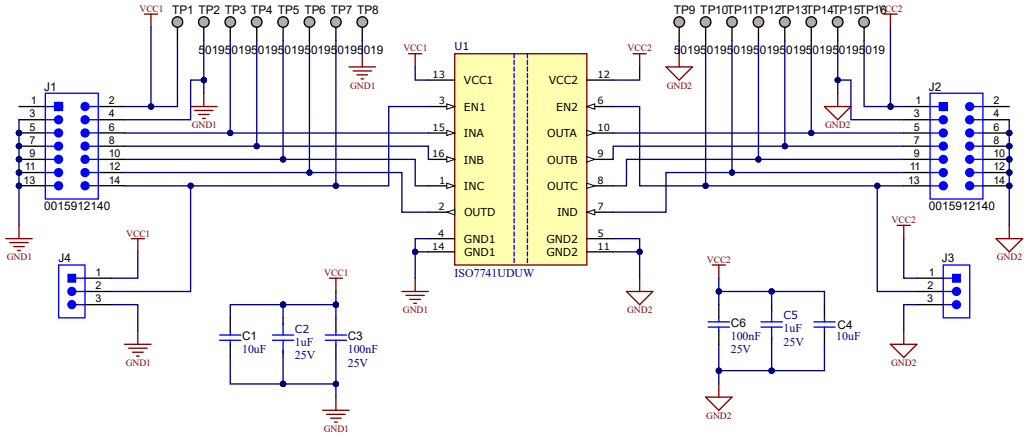


图 3-1. ISO7741UDUWEVM 原理图

3.2 PCB 布局和 3D 图

图 3-2 和图 3-3 分别显示了印刷电路板 (PCB) 布局的顶层和底层。图 3-4 和图 3-5 显示了 PCB 的 3D 图，其中指示了成品电路板的外观。

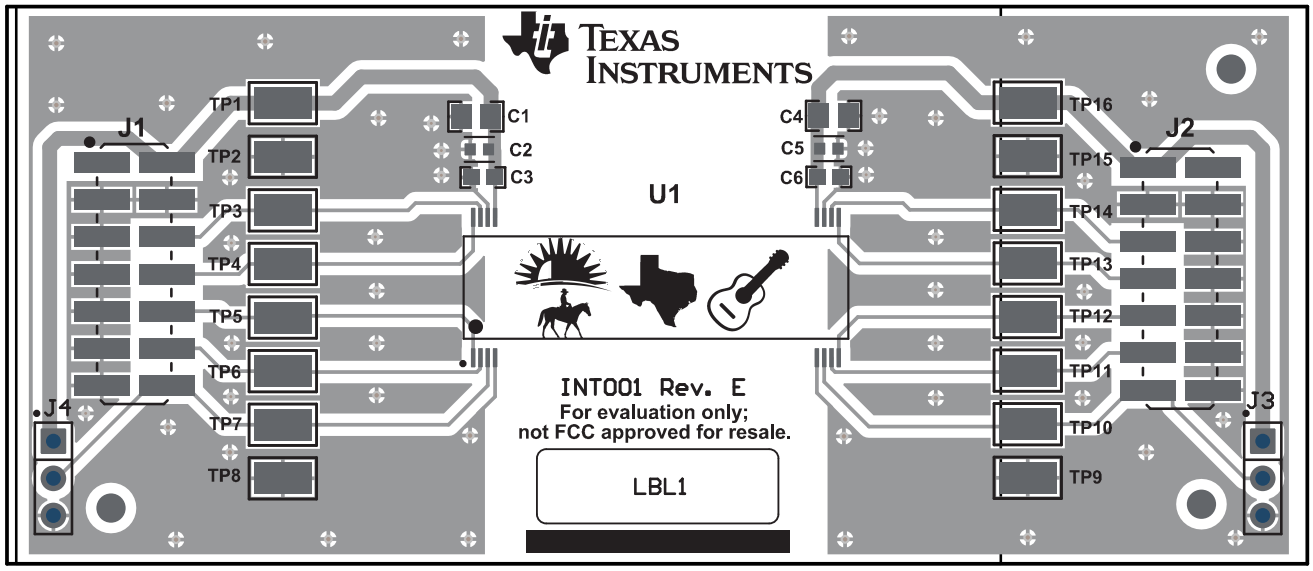


图 3-2. ISO7741UDUWEVM PCB 布局 - 顶层

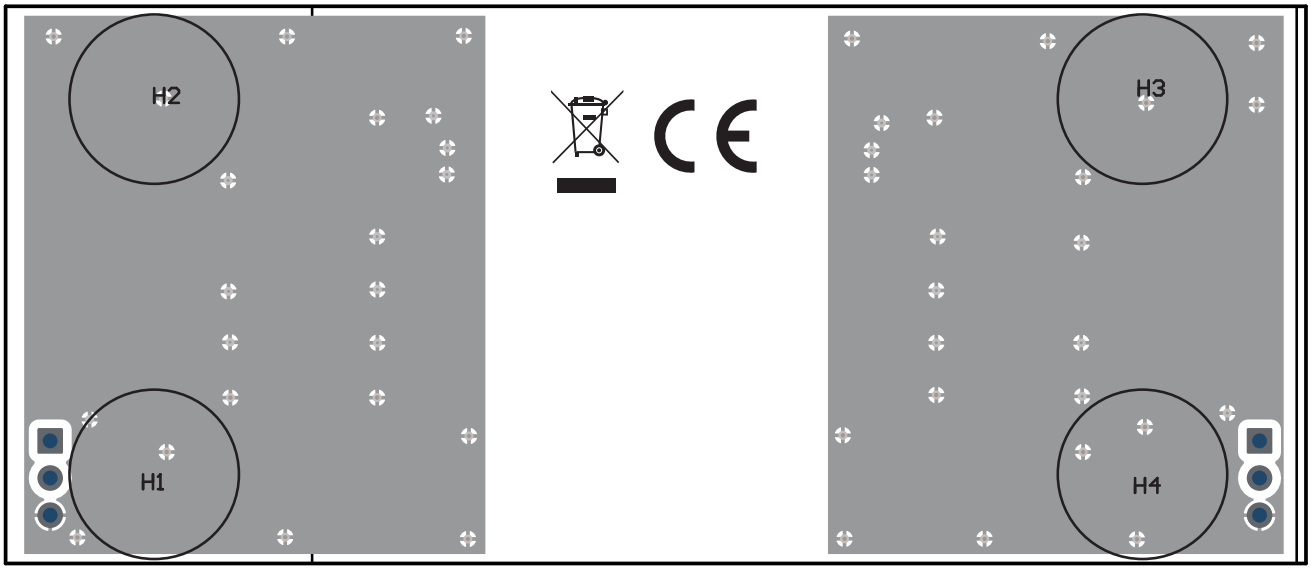


图 3-3. ISO7741UDUWEVM PCB 布局 - 底层

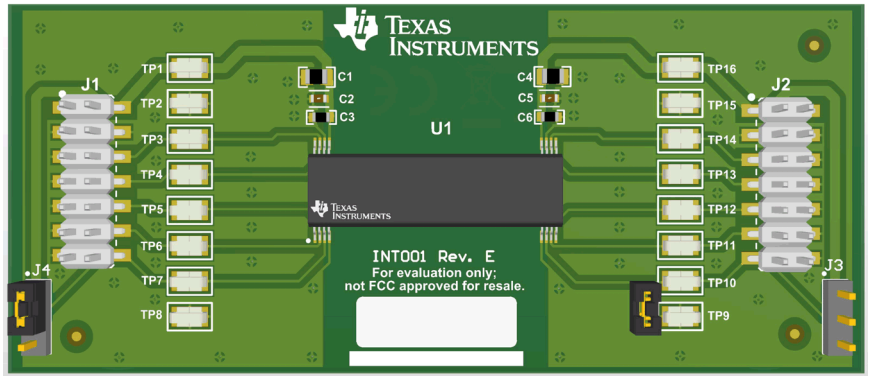


图 3-4. ISO7741UDUWEVM PCB 3D 视图 - 顶层

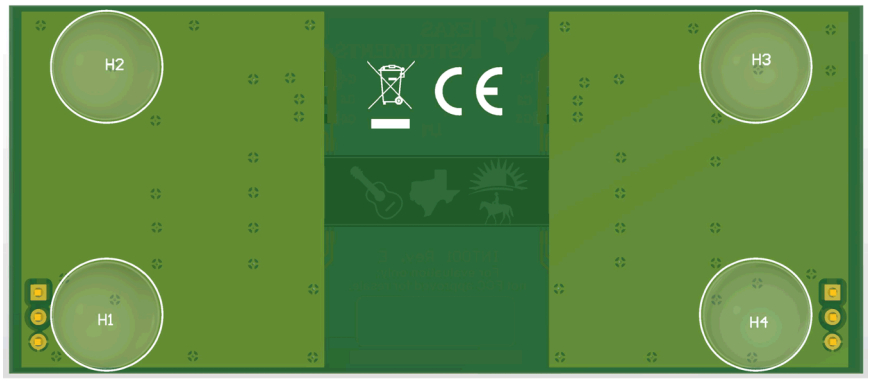


图 3-5. ISO7741UDUWEVM PCB 3D 视图 - 底层

3.3 物料清单 (BOM)

下面的表 3-1 列出了此 EVM 的物料清单 (BOM)。

表 3-1. 物料清单

条目	位号	说明	制造商	器件型号	数量
1	C1、C4	CAP，CERM，10µF，35V，+/-10%，X5R，0805	MuRata	GRM21BR6YA106KE43L	2
2	C2、C5	电容，陶瓷，1 µ F，25V，X5R，±10%，焊盘，SMD，0603，+85°C，T/R	Samsung	CL10A105KA8NNNC	2
3	C3、C6	电容，陶瓷，0.1µF，25V，+/-5%，X7R，0603	Kemet	C0603C104J3RACTU	2
4	H1、H2、H3、H4	Bumpon，半球形，0.44 × 0.20，透明	3M	SJ-5303 (CLEAR)	4
5	J1、J2	接头，100mil，7x2，SMT	Molex	15912140	2
6	J3、J4	接头，100mil，3x1，金，TH	Samtec	HTSW-103-07G-S	2
7	TP1、TP2、TP3、TP4、TP5、TP6、TP7、TP8、TP9、TP10、TP11、TP12、TP13、TP14、TP15、TP16	测试点，微型，SMT	Keystone	5019	16
8	U1	ISO7741UDUW	德州仪器 (TI)	ISO7741UDUWR	1

4 其他信息

4.1 商标

所有商标均为其各自所有者的财产。

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 semiconductors 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 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

3.3 *Japan*

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.

【無線電波を送信する製品の開発キットをお使いになる際の注意事項】 開発キットの中には技術基準適合証明を受けていないものがあります。 技術適合証明を受けていないもののご使用に際しては、電波法遵守のため、以下のいずれかの措置を取っていただく必要がありますのでご注意ください。

1. 電波法施行規則第6条第1項第1号に基づく平成18年3月28日総務省告示第173号で定められた電波暗室等の試験設備でご使用いただく。
2. 実験局の免許を取得後ご使用いただく。
3. 技術基準適合証明を取得後ご使用いただく。

なお、本製品は、上記の「ご使用にあたっての注意」を譲渡先、移転先に通知しない限り、譲渡、移転できないものとします。

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

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西新宿三井ビル

3.3.3 *Notice for EVMs for Power Line Communication:* Please see http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_02.page

電力線搬送波通信についての開発キットをお使いになる際の注意事項については、次のところをご覧ください。https://www.ti.com/ja-jp/legal/notice-for-evaluation-kits-for-power-line-communication.html

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.

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:*

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