EVM User's Guide: ISOW1050DWEEVM

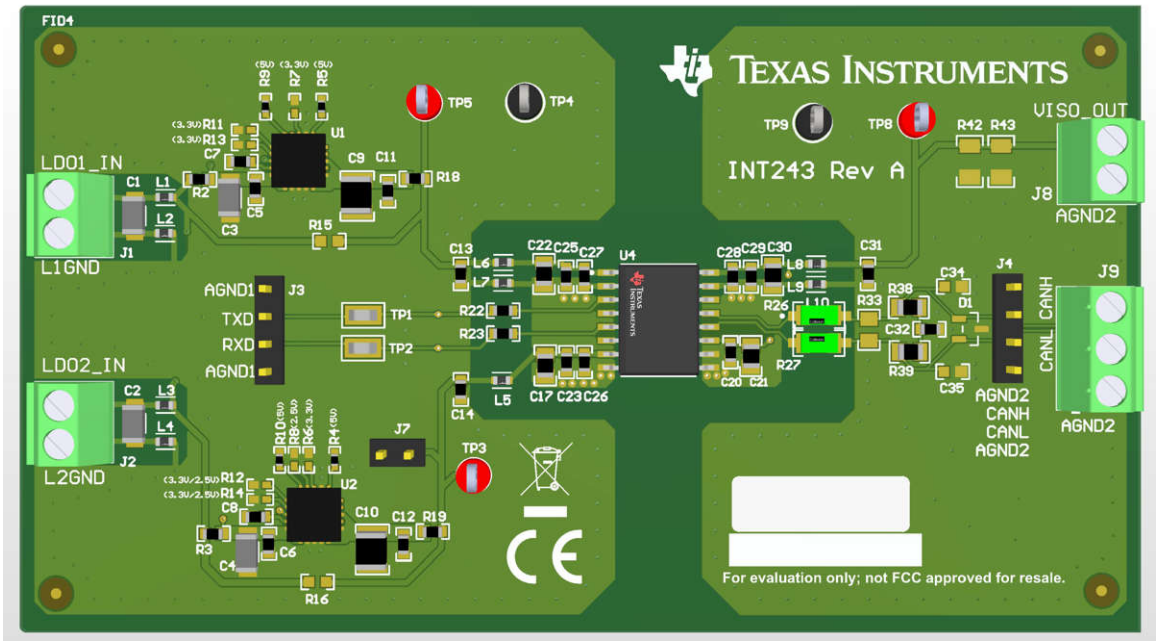
ISOW1050 具有集成式直流/直流转换器的隔离式 CAN 收发器评估模块

说明

ISOW1050(V) 系列器件是电隔离 CAN 收发器，内置隔离式直流/直流转换器，无需在空间受限的隔离式设计中使用单独的隔离式电源。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 WB SOIC 封装 (DWE-16) 的 ISOW1050(V) 系列任何器件型号进行评估。

特性

- 用于全面评估 ISOW1050(V) 系列器件的平台。
- 板载 LDO，为器件电源提供可配置的电压输出。
- 用于 VDD1 引脚及 VDDL 引脚的两个独立可配置 LDO。
- 板载振荡器选项，用于为初级侧输入通道提供动态数据输入。
- 用于探测数据线路和电源电压的测试点。
- CAN 总线提供共模扼流圈选项。
- 其他电阻器和跳线选项，用于配置数据速率和器件电源电压。



ISOW1050DWEEVM

1 评估模块概述

1.1 简介

ISOW1050DWEEVM 用户指南描述了带有集成直流/直流转换器的 ISOW1050V 隔离式 CAN 收发器的功能。本用户指南介绍了在 VDD1 = 5V 和 VDDL = 5V 配置下评估 ISOW1050V 器件的 EVM 操作。对于 ISOW1050V，VISOOUT 在内部设置为 5V。然而，可以使用 EVM，在推荐的电压条件下评估 16 引脚 WB SOIC 封装 (DWE-16) 中 ISOW1050V 和 ISOW1050 系列的两种器件型号。请参见器件信息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

此评估模块包含一个 PCB 评估板，其中包含一个 ISOW1050V 器件。ISOW1050DWEEVM 评估板的主要元件包括：

- ISOW1050VDWER 隔离式 CAN 收发器，带集成电源。
- TPS7A4701RGWR 36V、1A、4.17 μVRMS 射频低压降 (LDO) 稳压器，RGW0020A (VQFN-20)。
- 多个测试点。

若要演示 ISOW1050VDWER 的功能，TI 建议使用以下器件（另售）：

- 用于提供电源输入的 9V 或 12V 电池。
- 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 ISOW1050V 器件用于设计前，EVM 可帮助用户全面地评估该器件。为便于通过稳压电源、标准直流适配器和电池等各种电源为 EVM 供电，EVM 包括两个可调节输出 LDO (TPS7A4701)，这两者连接到 VDD1 和 VDDL 引脚。EVM 上的 VDD1 及 VDDL 默认设置为 5V。此设置使得 LDO 输入端可以连接到更宽范围的电源电压，而 EVM 正常工作的最佳电压为 9V 至 12V。该 EVM 还包括一个板载振荡器 (LTC6908-1)，该振荡器可通过 0Ω 电阻器连接到 ISOW1050V 的 TXD 输入端。该振荡器帮助提供一个快速测试信号来验证器件工作情况。该 EVM 可以配置为采用各种电源电压和测试配置工作，相关详细信息将在后续几节中介绍。

1.4 器件信息

ISOW1050(V) 系列器件是电隔离 CAN 收发器，内置隔离式直流/直流转换器，无需在空间受限的隔离式设计中使用单独的隔离式电源。集成电源转换器后的高效率有助于在 –55°C 至 125°C 的宽工作环境温度范围内运行。ISOW1050(V) 系列器件在设计时考虑了增强的保护功能，包括限制浪涌电流的软启动、过压和欠压锁定、过载和短路保护以及热关断。

ISOW1050(V) 系列器件有两种型号：ISOW1050 和 ISOW1050V。请参见表 1-1 中所有变体和可订购产品的详细信息。ISOW1050V 通过将 VDDL 和 VDD1 一同连接到 PCB 上，可在 4.5V 至 5.5V 的单一电源下运行。如果需要较低的逻辑电平，可以分离 2.25V 至 5.5V 的逻辑电源 (VDDL)，并独立于 4.5V 至 5.5V 的电源转换器电源 (VDD1) 供电。

表 1-1. 器件比较表

器件型号	隔离	引脚 1（DC/DC 输入电源）	引脚 7（逻辑电源）	CAN 数据速率	VISOOUT（在内部设置）	封装	封装尺寸（标称值）	封装尺寸
ISOW1050	增强型	VDD1	NC	5Mbps	5V	DWE（SOIC，16）	10.30mm × 7.50mm	10.30mm × 10.30mm
ISOW1050V	增强型	VDD1	VDDL	5Mbps	5V	DWE（SOIC，16）		

2 硬件

2.1 ISOW1050(V) 具有集成式直流/直流转换器的隔离式 CAN 收发器引脚配置

图 2-1 和图 2-2 显示了 ISOW1050 和 ISOW1050V 系列器件的引脚配置。V 型号将引脚 7 用作 VDDL，使用户能够选择初级侧逻辑电源电压。对于非 V 型号，逻辑电源与 VDD1 相同。请参阅表 1-1

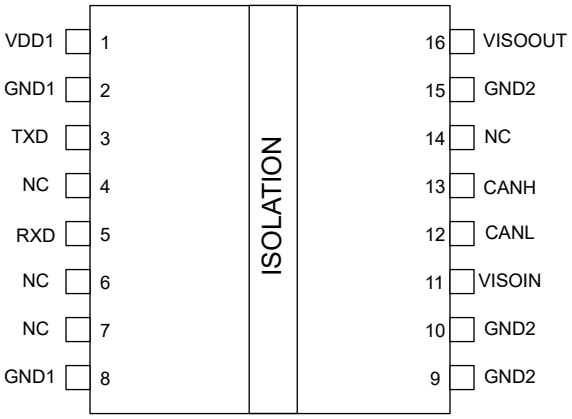


图 2-1. ISOW1050 引脚配置

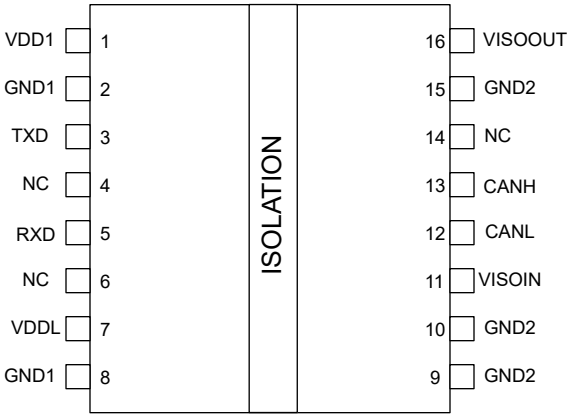


图 2-2. ISOW1050V 引脚配置

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。EVM 典型测试设置 显示了使用两个电源运行 ISOW1050DWEEVM 的典型测试配置。

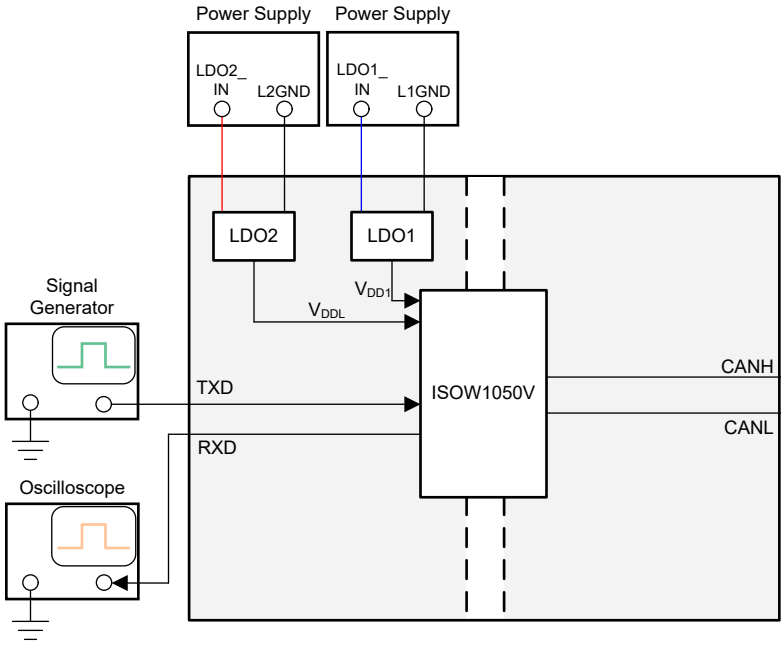


图 2-3. EVM 典型测试设置

ISOW1050DWEEVM 具有很多 DNP 电阻器，为了将 EVM 设置为所需的运行测试条件，用户可以选择连同一些引脚跳线选件组装或不组装这些电阻器。元件配置 列出并介绍了可通过组装各种电阻器和跳线选项实现的所有测试配置。

表 2-1. 元件配置

元件	说明
R1	该电阻器将 LDO 的 U1、U2 输入连接到一起，从而仅允许使用一个电源而不是两个电源。
R2、R15、R18	组装 R15 会绕过 LDO U1，从而能够直接从外部电源为 VDD 供电。组装 R15 时，R2 和 R18 需要保持拆下状态，以断开 LDO。未旁路 LDO 时，LDO 的建议输入电压必须在 9V 和 12V 之间。
R5、R7、R9、R11、R13	将 LDO U1 输出电压设为 5V 或 3.3V，用于 VDD1。仅使用 0Ω 电阻器组装 R5 和 R9，以将 LDO U1 输出电压设置为 5V（默认配置）。仅使用 0Ω 电阻器组装 R7、R11 和 R13，以将 LDO U1 输出电压设置为 3.3V。
R3、R16、R19	组装 R16 会绕过 LDO U2，从而能够直接从外部电源为 VDDL 供电。组装 R16 时，R3 和 R19 需要保持拆下状态，以断开 LDO。未旁路 LDO 时，LDO 的建议输入电压必须在 9V 和 12V 之间。
R4、R6、R8、R10、R12、R14	将 LDO U2 输出电压设为 5V 或 3.3V 或 2.5V，用于 VDDL。仅使用 0Ω 电阻器组装 R4 和 R10，以将 LDO U2 输出电压设置为 5V（默认配置）。仅使用 0Ω 电阻器组装 R6、R12 和 R14，以将 LDO U2 输出电压设置为 3.3V。仅使用 0Ω 电阻器组装 R8、R12 和 R14，以将 LDO U2 输出电压设置为 2.5V。
R17	该电阻器将振荡器 U3 输出信号连接到 ISOW1050V 的 U4 输入端 TXD，从而允许使用测试信号来测试 EVM，而无需任何外部测试信号输入。
R20、R21	组装 R20 会将 U3 输出信号速率设置为 1Mbps（默认配置），而组装 R21 会将该速率设置为 5Mbps。
L10	CAN 总线上的共模扼流圈 (CMC)。如果组装 L10，则移除 R26 和 R27。
R26、R27	组装 R26 和 R27 会绕过 CAN 总线上的 CMC L10。
R33	可选 120Ω 负载电阻器选项。如果组装 R33，请移除 CAN 总线上的分裂终端电阻器 R38 和 R39。
C34、C35	用于在 CAN 总线上进行额外噪声滤波的可选电容器。
D1	用于安装 TVS 二极管的可选 SOT-23 封装。
R42、R43	未使用 CAN 通信时，可以组装可选电阻器以从 VISOOUT 提取 ILOAD。使用 CAN 功能时不得组装。

表 2-1. 元件配置（续）

元件	说明
C18、C19	可选电容器，用于在 Side1 的数字信号线路上进行噪声滤波。
J7	跳线选项，用于向 U3 振荡器上电或断电。

3 硬件设计文件

3.1 原理图

ISOW1050DWEEVM 旨在评估采用 16 引脚 WB SOIC 封装 (DWE-16) 的任何 ISOW1050(V) 器件。若要评估采用 16 引脚 WB SOIC 封装 (DWE-16) 的第二个型号 ISOW1050，请将 ISOW1050DWEEVM 板上已安装的 ISOW1050V 替换为 ISOW1050。不需要对 ISOW1050 器件的其他元件进行任何修改，因为对于非 V 器件，引脚 7 为 NC。图 3-1 显示了 ISOW1050DWEEVM 原理图连接。

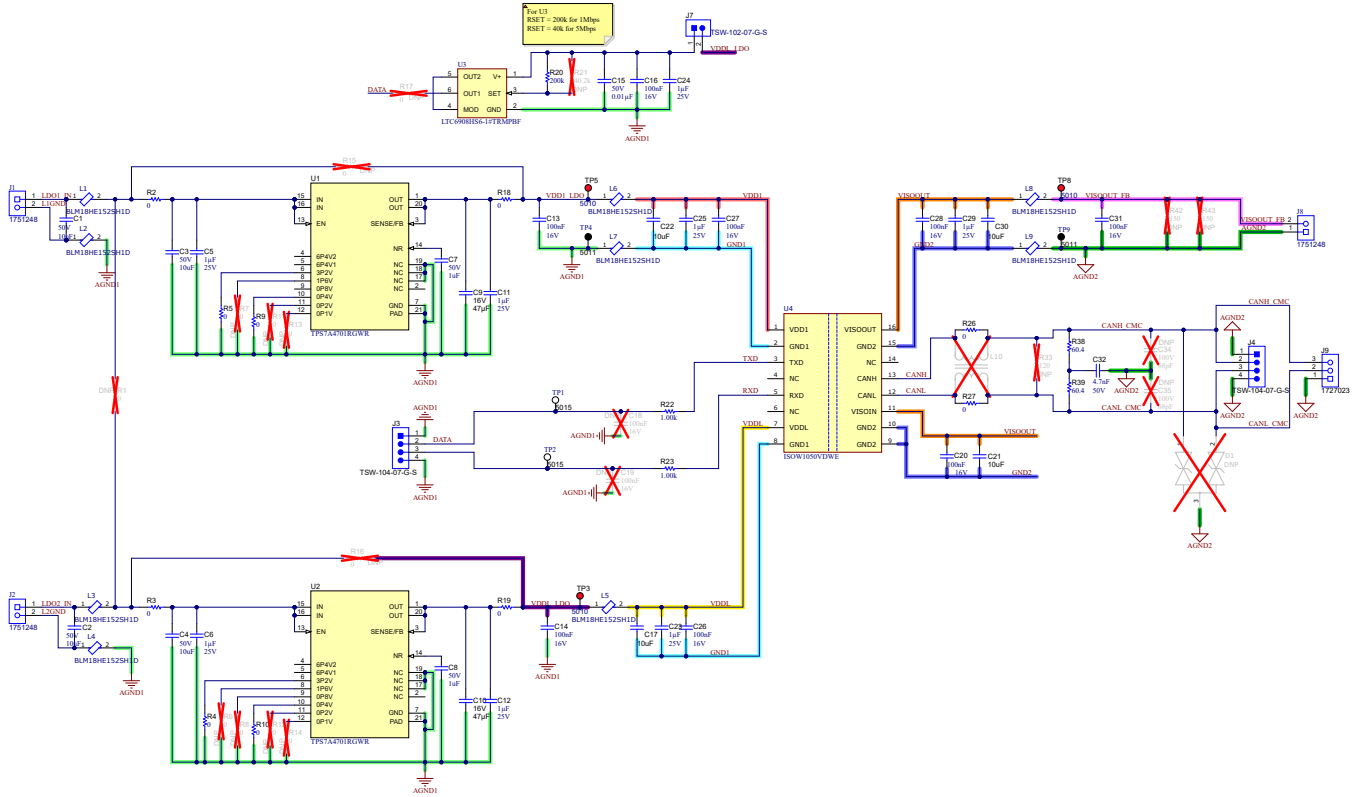


图 3-1. ISOW1050DWEEVM 原理图

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。

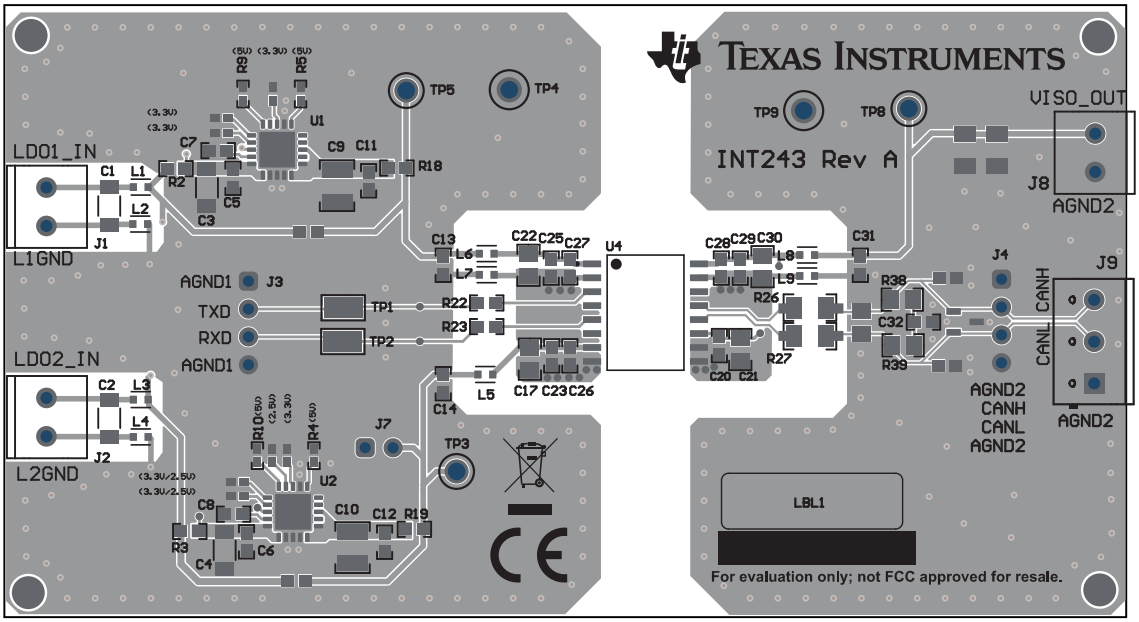


图 3-2. ISOW1050DWEEVM PCB 布局 - 顶层

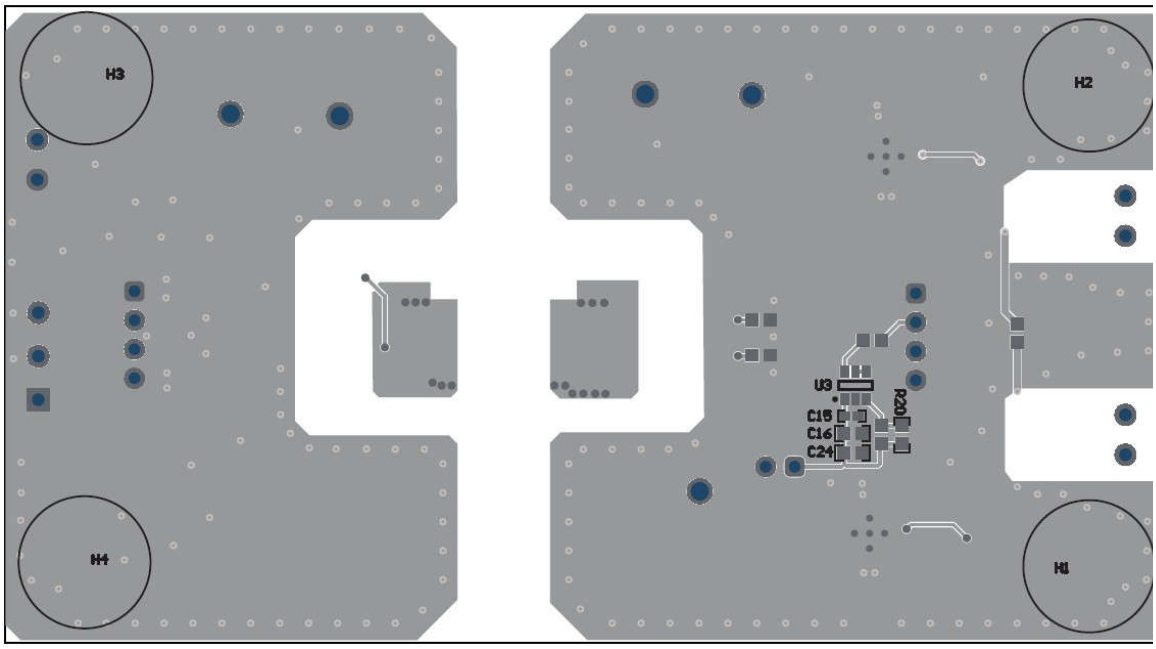


图 3-3. ISOW1050DWEEVM PCB 布局 - 底层

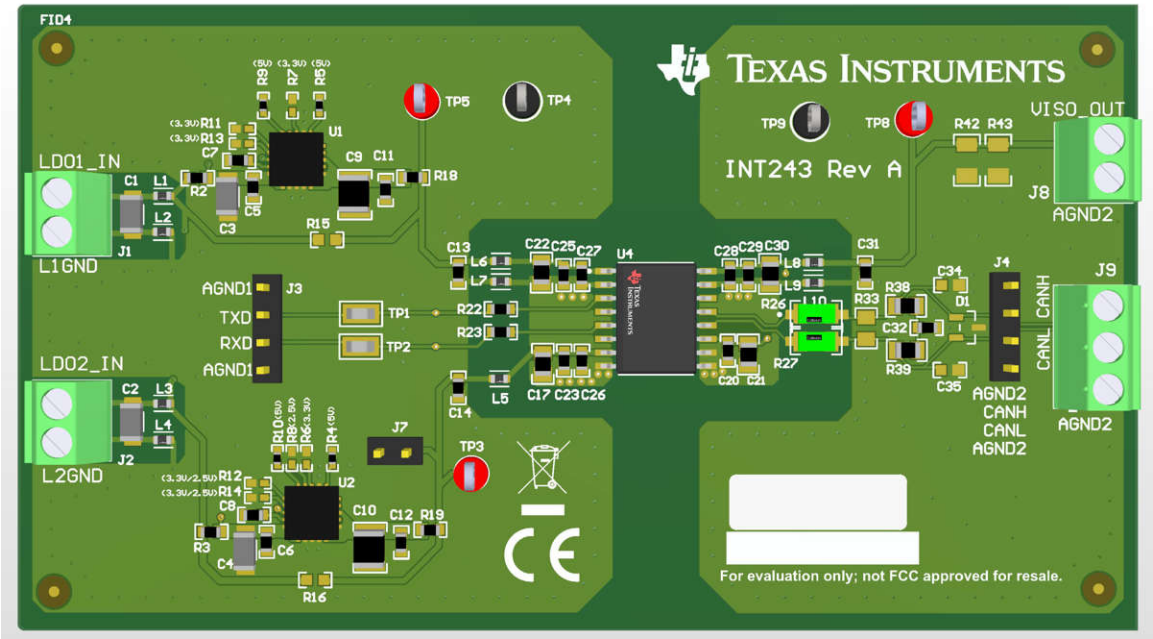


图 3-4. ISOW1050DWEEVM PCB 3D 视图 - 顶层

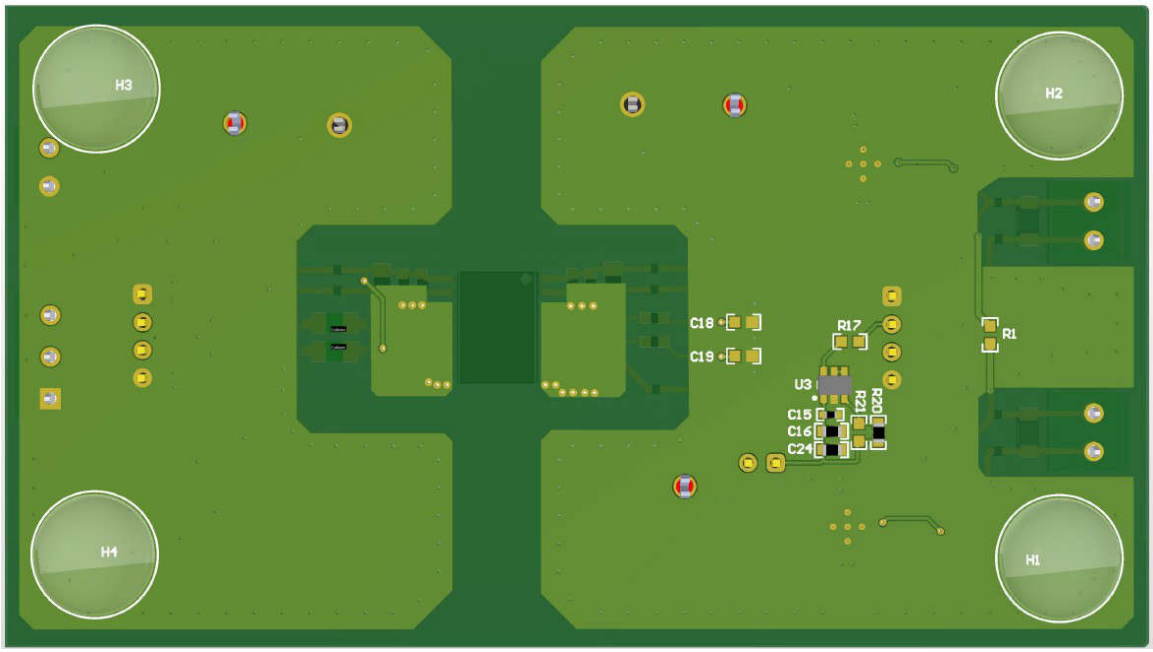


图 3-5. ISOW1050DWEEVM PCB 3D 视图 - 底层

3.3 物料清单 (BOM)

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
1	C1、C2、C3、C4	CAP，CERM，10µF，50V，+/-10%，X5R，1206	TDK	C3216X5R1H106K160AB
1	C1、C2、C3、C4	CAP，CERM，10µF，50V，+/-10%，X5R，1206	TDK	C3216X5R1H106K160AB
2	C5、C6、C11、C12、C23、C24、C25、C29	电容，陶瓷，1µF，25V，+/– 10%，X7R，AEC-Q200 1 级，0603	MuRata	GCM188R71E105KA64D
3	C7、C8	电容，陶瓷，1µF，50V，+/-10%，X5R，0603	TDK	C1608X5R1H105K080AB
4	C9、C10	CAP，CERM，47µF，16V，+/-10%，X5R，1210	Samsung Electro-Mechanics	CL32A476KOJNNNE
5	C13、C14、C16、C20、C26、C27、C28、C31	电容，陶瓷，0.1uF，16V，+/-10%，X7R，0603	Samsung Electro-Mechanics	CL10B104KO8NNNC
6	C15	CAP，CERM，0.01µF，50V，+/- 10%，X7R，0402	Walsin	0402B103K500CT
7	C17、C21、C22、C30	CAP，CERM，10µF，35V，+/-10%，X5R，0805	MuRata	GRM21BR6YA106KE43L
8	C32	电容，陶瓷，4700pF，50V，+/-10%，X7R，0603	Kemet	C0603C472K5RACTU
9	H1、H2、H3、H4	Bumpon，半球形，0.44 × 0.20，透明	3M	SJ-5303 (CLEAR)
10	J1、J2、J8	连接端子块，2 位，3.5mm，TH	Phoenix Contact	1751248
11	J3、J4	接头，100mil，4x1，金，TH	Samtec	TSW-104-07G-S
12	J7	接头，100mil，2x1，金，TH	Samtec	TSW-102-07G-S
13	J9	接线端子插座，3x1，3.81mm，R/A，TH	Phoenix Contact	1727023
14	L1、L2、L3、L4、L5、L6、L7、L8、L9	芯片铁氧体磁珠，0603，1500Ω (100MHz)，0.5Ω，25%，500mA	Murata	BLM18HE152SH1D
15	LBL1	热转印打印标签，0.650" (宽) x 0.200" (高) - 10,000/卷	Brady	THT-14-423-10
16	R2、R3、R18、R19	电阻，0，5%，0.1W，0603	Yageo	RC0603JR-070RL
17	R4、R5、R9、R10	电阻，0，5%，0.063W，0402	Vishay-Dale	CRCW04020000Z0ED
18	R20	电阻，200k，1%，0.1W，0603	Yageo	RC0603FR-07200KL
19	R22、R23	电阻，1.00k，1%，0.1W，0603	Yageo	RC0603FR-071KL
20	R26、R27	电阻，0，5%，0.25W，1206	Vishay-Dale	CRCW12060000Z0EA
21	R38、R39	电阻，60.4，1%，0.125W，AEC-Q200 0 级，0805	Vishay-Dale	CRCW080560R4FKEA
22	TP1、TP2	测试点，微型，SMT	Keystone	5015
23	TP3、TP5、TP8	测试点，红色，穿孔，RoHS，大容量	Keystone	5010
24	TP4、TP9	测试点，多用途，黑色，TH	Keystone	5011

表 3-1. 物料清单（续）

条目	位号	说明	制造商	器件型号
25	U1、U2	36V、1A、4.17 μVRMS 射频低压降 (LDO) 稳压器，RGW0020A (VQFN-20)	德州仪器 (TI)	TPS7A4701RGWR
26	U3	电阻器 Set SOT-23 振荡器，2.7V 至 5.5V，6 引脚 SOT23 (S6-6)，-40°C 至 85°C，无铅	Linear Technology	LTC6908HS6-1#TRMPBF
27	U4	ISOW1050VDWE	德州仪器 (TI)	ISOW1050VDWE
28	C18、C19	电容，陶瓷，0.1uF，16V，+/-10%，X7R，0603	Samsung Electro-Mechanics	CL10B104KO8NNNC
29	C34、C35	电容，陶瓷，68pF，100V，+/-5%，C0G/NP0，0603	MuRata	GRM1885C2A680JA01D
30	D1	双通道双向 24V ESD 和浪涌保护二极管 3-SOT-23		选择任何 2 通道 SOT-23 封装 TVS
31	L10	100μH @ 100kHz 2 路共模扼流圈，表面贴装，5.8kΩ @ 10MHz 150mA DCR 2Ω	TDK	ACT45B-101-2P-TL003
32	R1、R15、R16、R17	电阻，0，5%，0.1W，0603	Yageo	RC0603JR-070RL
33	R6、R7、R8、R11、R12、R13、R14	电阻，0，5%，0.063W，0402	Vishay-Dale	CRCW04020000Z0ED
34	R21	电阻，40.2k，1%，0.1W，0603	Yageo	RC0603FR-0740K2L
35	R33	电阻，120，1%，0.4W，0805	Rohm	ESR10EZPF1200
36	R42、R43	电阻，0，5%，0.25W，1206	Yageo America	RC1206JR-070RL

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

東京都新宿区西新宿 6 丁目 2 4 番 1 号

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:*

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.

4.4 User assumes all responsibility and liability to determine whether the EVM is subject to any applicable international, federal, state, or local laws and regulations related to User's handling and use of the EVM and, if applicable, User assumes all responsibility and liability for compliance in all respects with such laws and regulations. User assumes all responsibility and liability for proper disposal and recycling of the EVM consistent with all applicable international, federal, state, and local requirements.

5. *Accuracy of Information:* To the extent TI provides information on the availability and function of EVMs, TI attempts to be as accurate as possible. However, TI does not warrant the accuracy of EVM descriptions, EVM availability or other information on its websites as accurate, complete, reliable, current, or error-free.

6. *Disclaimers:*

6.1 EXCEPT AS SET FORTH ABOVE, EVMS AND ANY MATERIALS PROVIDED WITH THE EVM (INCLUDING, BUT NOT LIMITED TO, REFERENCE DESIGNS AND THE DESIGN OF THE EVM ITSELF) ARE PROVIDED "AS IS" AND "WITH ALL FAULTS." TI DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, REGARDING SUCH ITEMS, INCLUDING BUT NOT LIMITED TO ANY EPIDEMIC FAILURE WARRANTY OR IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF ANY THIRD PARTY PATENTS, COPYRIGHTS, TRADE SECRETS OR OTHER INTELLECTUAL PROPERTY RIGHTS.

6.2 EXCEPT FOR THE LIMITED RIGHT TO USE THE EVM SET FORTH HEREIN, NOTHING IN THESE TERMS SHALL BE CONSTRUED AS GRANTING OR CONFERRING ANY RIGHTS BY LICENSE, PATENT, OR ANY OTHER INDUSTRIAL OR INTELLECTUAL PROPERTY RIGHT OF TI, ITS SUPPLIERS/LICENSORS OR ANY OTHER THIRD PARTY, TO USE THE EVM IN ANY FINISHED END-USER OR READY-TO-USE FINAL PRODUCT, OR FOR ANY INVENTION, DISCOVERY OR IMPROVEMENT, REGARDLESS OF WHEN MADE, CONCEIVED OR ACQUIRED.

7. *USER'S INDEMNITY OBLIGATIONS AND REPRESENTATIONS.* USER WILL 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 HANDLING OR USE OF THE EVM THAT IS NOT IN ACCORDANCE WITH THESE TERMS. THIS OBLIGATION SHALL APPLY WHETHER CLAIMS ARISE UNDER STATUTE, REGULATION, OR THE LAW OF TORT, CONTRACT OR ANY OTHER LEGAL THEORY, AND EVEN IF THE EVM FAILS TO PERFORM AS DESCRIBED OR EXPECTED.

8. *Limitations on Damages and Liability:*

   8.1 *General Limitations*. IN NO EVENT SHALL TI BE LIABLE FOR ANY SPECIAL, COLLATERAL, INDIRECT, PUNITIVE, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES IN CONNECTION WITH OR ARISING OUT OF THESE TERMS OR THE USE OF THE EVMS , REGARDLESS OF WHETHER TI HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. EXCLUDED DAMAGES INCLUDE, BUT ARE NOT LIMITED TO, COST OF REMOVAL OR REINSTALLATION, ANCILLARY COSTS TO THE PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES, RETESTING, OUTSIDE COMPUTER TIME, LABOR COSTS, LOSS OF GOODWILL, LOSS OF PROFITS, LOSS OF SAVINGS, LOSS OF USE, LOSS OF DATA, OR BUSINESS INTERRUPTION. NO CLAIM, SUIT OR ACTION SHALL BE BROUGHT AGAINST TI MORE THAN TWELVE (12) MONTHS AFTER THE EVENT THAT GAVE RISE TO THE CAUSE OF ACTION HAS OCCURRED.

   8.2 *Specific Limitations.* IN NO EVENT SHALL TI'S AGGREGATE LIABILITY FROM ANY USE OF AN EVM PROVIDED HEREUNDER, INCLUDING FROM ANY WARRANTY, INDEMITY OR OTHER OBLIGATION ARISING OUT OF OR IN CONNECTION WITH THESE TERMS, , EXCEED THE TOTAL AMOUNT PAID TO TI BY USER FOR THE PARTICULAR EVM(S) AT ISSUE DURING THE PRIOR TWELVE (12) MONTHS WITH RESPECT TO WHICH LOSSES OR DAMAGES ARE CLAIMED. THE EXISTENCE OF MORE THAN ONE CLAIM SHALL NOT ENLARGE OR EXTEND THIS LIMIT.

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.

10. *Governing Law:* These terms and conditions shall be governed by and interpreted in accordance with the laws of the State of Texas, without reference to conflict-of-laws principles. User agrees that non-exclusive jurisdiction for any dispute arising out of or relating to these terms and conditions lies within courts located in the State of Texas and consents to venue in Dallas County, Texas. Notwithstanding the foregoing, any judgment may be enforced in any United States or foreign court, and TI may seek injunctive relief in any United States or foreign court.

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

重要通知和免责声明

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最后更新日期：2025 年 10 月