

EVM User's Guide: TPS4141Q1EVM

TPS4141-Q1 评估模块



说明

TPS4141Q1EVM 是包含多个测试点和跳线的硬件评估模块 (EVM)，用于全面评估器件的性能和功能。该评估模块包含测试和评估 TPS4141Q1 所需的一切功能，测试和评估之后就可将 TPS4141Q1 集成到大型应用的电源系统设计中。TPS4141Q1EVM 可单独使用，也可选择与外部微控制器配对使用，用于驱动器件的使能和配置逻辑信号。通过使用这个评估模块，可以启用和查看一系列完整的应用功能，例如用于优化 ADC 性能的可调检测电压增益和双向电压监测。此 EVM 组装了采用 SOIC 封装的 TPS4141Q1。

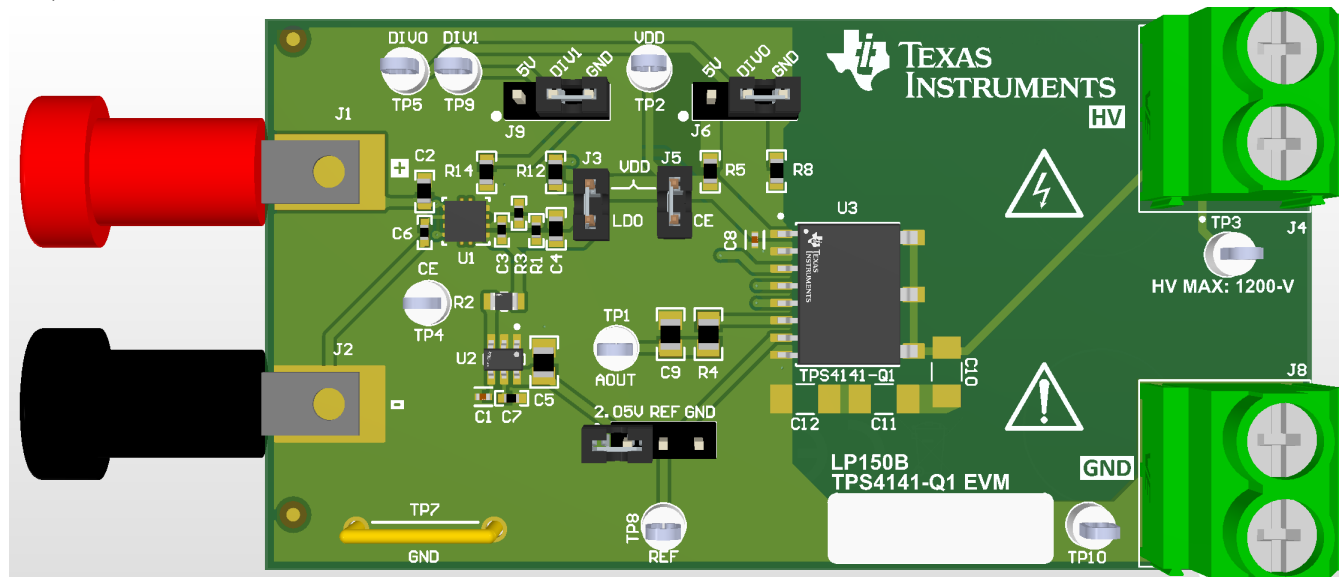
特性

- 用于 VDD 电源轨和芯片使能电源的板载 5V LDO 稳压器

- 用于优化 ADC 性能的可配置放大器增益设置
- 可配置的双向和单向电压监测模式
- 可支持双向电压监测的板载 2.05V 电压基准
- 每个引脚和电压电源都有测试点，用于验证功能是否正常
- 用于通过外部微控制器有选择地驱动控制信号的可重用测试点
- 用于轻松进行高压电路板有线连接的端子块

应用

- 混合动力、电动和动力传动系统
- 电池管理系统 (BMS)
- 车载充电器
- 直流链路预充电电压测量
- 太阳能
- 电动汽车充电器 (EV)



TPS4141Q1EVM

1 评估模块概述

1.1 简介

TPS4141-Q1 是一款高压监测器件，专为汽车和工业应用而设计。TPS4141-Q1 将精密匹配的薄膜 SiCr 电阻分压器与可编程增益放大器紧密集成，用于检测需要在 -1kV 至 1kV 范围内进行精确测量的系统电压。该器件的高压 (HV) 检测引脚可以通过集成的高压开关与更广泛的系统无缝连接和断开，并且在断开时，这些开关还提供单向电流阻断功能。TPS4141-Q1 的标称 HV 至 GND 电阻为 30M Ω ，可实现高效率的 HV 检测，且该检测功能通过放大器的可编程增益设置进行优化，适用于各种模数转换器满量程电压，这些增益设置可通过 DIV0 和 DIV1 引脚进行选择。

TPS4141Q1EVM 可帮助设计人员评估 TPS4141-Q1 的运行情况和性能。TPS4141-Q1 是一款紧凑型 -1kV:1kV 高压监测器。电路板的输入和输出连接是端子块，可轻松实现有线连接。TPS4141Q1EVM 包含多个测试点，用于监测 TPS4141-Q1 的功能。本用户指南介绍了该 EVM 的连接器、测试点描述、工作模式、原理图、物料清单和电路板布局布线。

警告



请勿使用 EVM 在高于 $V_{IOWM} = 1414V_{DC}$ 高电压的条件下测试隔离性

小心



表面高温。接触会导致烫伤。请勿触摸！

小心



使用前先阅读用户指南。

小心



在无人看管的情况下，请勿让 EVM 处于通电状态。

1.2 套件内容

表 1-1. 套件内容

条目	数量
TPS4141Q1EVM	1

1.3 规格

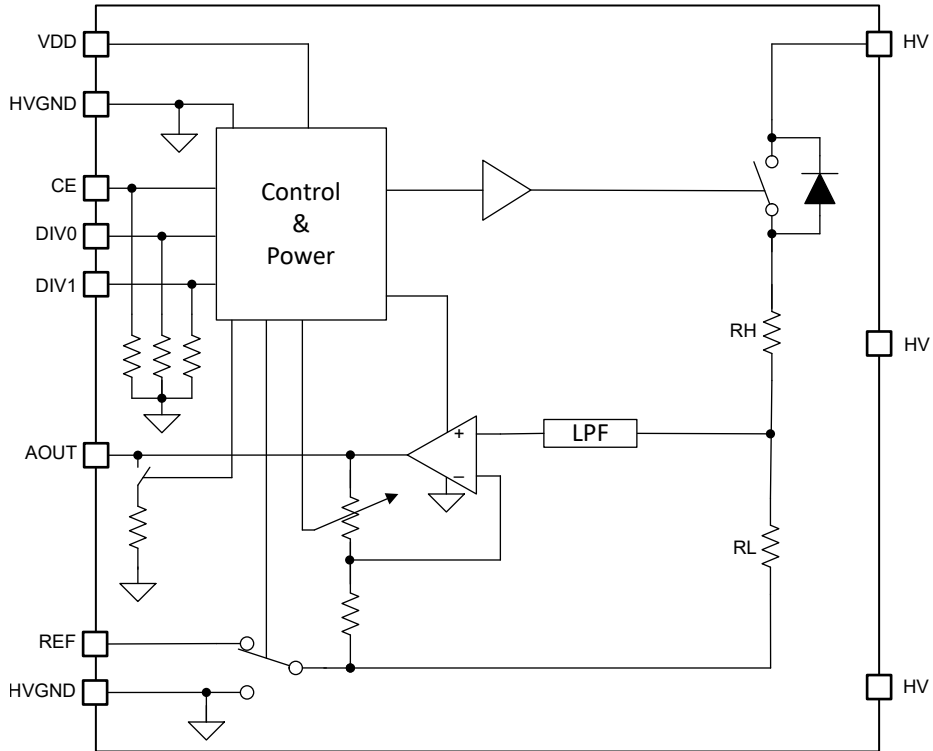


图 1-1. TPS4141-Q1 功能框图

1.4 器件信息

表 1-2. 封装信息

器件型号	封装	封装尺寸 (标称值)
TPS4141-Q1	SOIC 11 引脚 (DWQ)	10.3mm × 7.5mm

1.5 通用德州仪器 (TI) 高压评估模块 (TI HV EVM) 用户安全指南



务必遵循 TI 的设置和应用说明，包括在建议的电气额定电压和功率限制范围内使用所有接口元件。务必采取电气安全防护措施，这样有助于确保自身和周围人员的人身安全。如需了解更多信息，请联系 TI 的产品信息中心，网址为 <http://ti.com/customer support>。

保存所有警告和说明以供将来参考。

警告

务必遵循警告和说明，否则可能引发电击和灼伤危险，进而造成财产损失或人员伤亡。

TI HV EVM 一词是指通常以开放式框架、敞开式印刷电路板装配形式提供的电子器件。该器件严格用于开发实验室环境，仅供了解开发和应用高压电路相关电气安全风险且接受过专门培训、具有专业知识背景的合格专业用户使用。德州仪器 (TI) 严禁任何其他不合规的使用和/或应用。如果不满足合格要求，应立即停止进一步使用 HV EVM。

1. 工作区安全：

- a. 保持工作区整洁有序。
- b. 每次电路通电时，都必须由具有资质的观察员在场监督。
- c. TI HV EVM 及接口电子元件通电区域必须设有有效的防护栏和标识；指示可能存在高压操作，以避免意外接触。
- d. 开发环境中使用的所有接口电路、电源、评估模块、仪器、仪表、示波器和其他相关装置如果超过 50Vrms/75VDC，则必须置于紧急断电 EPO 保护电源板内。
- e. 使用稳定且不导电的工作台。
- f. 使用充分绝缘的夹钳和导线来连接测量探针和仪器。尽量不要徒手进行测试。

2. 电气安全：

- a. 作为一项预防措施，假定整个 EVM 可能存在用户可完全接触到的高电压是一种好的工程做法。
- b. 执行任何电气测量或其他诊断测量之前，需切断 TI HV EVM 及其全部输入、输出和电气负载的电源。再次确认 TI HV EVM 已安全断电。
- c. 确认 EVM 断电后，根据所需的电路配置、接线、测量设备连接和其他应用需求执行进一步操作，同时仍假定 EVM 电路和测量仪器均带电。
- d. EVM 准备就绪后，根据需要 will EVM 通电。

警告

EVM 通电后，请勿触摸 EVM 或电路，因为 EVM 或电路可能存在高压，会造成电击危险。

3. 人身安全

- a. 穿戴个人防护装备（例如乳胶手套或具有侧护板的安全眼镜）或将 EVM 放置于带有联锁装置的透明塑料箱，避免意外接触。

安全使用限制条件：

勿将 EVM 作为整体或部分生产单元使用。

2 硬件

2.1 测试设备

建议使用以下设备测试 TPS4141Q1EVM：

- 用于输入的可调节电源
- 示波器
- 数字万用表
- 可选：用于切换芯片使能引脚的函数发生器或微控制器

2.2 连接说明

表 2-1 显示了输入/输出连接器的概览。表 2-2 显示了测试点和跳线。

表 2-1. 输入和输出连接器说明

连接器	标签	说明
J1	LDO_INPUT+	用于连接外部电源的 LDO 输入
J2	GND	初级侧 GND
J4	HV	次级侧高电压输入
J8	GND	次级侧 GND

表 2-2. 测试点和跳线说明

测试点、跳线	标签	说明
J3	LDO	将 LDO 输出连接到 VDD 电源轨
J5	CE	未连接时，将芯片使能输入信号连接到 VDD 或外部输入
J6	DIV0	将 DIV0 (分压器分压比输入) 连接到 5V/GND，或在未连接时悬空
J7	REF	将 REF (基准电压输入) 连接到 2.05V/GND 以实现双向/单向电压监测模式
J9	DIV1	将 DIV1 (分压器分压比输入) 连接到 5V/GND，或在未连接时悬空
TP1	AOUT	HV 检测信号模拟输出
TP2	VDD	初级侧电源测试点
TP3	HV	HV 次级侧测试点
TP4	CE	CE 初级侧测试点，可用于在 J5 断开连接时从外部驱动 CE
TP5	DIV0	DIV0 选择电压测试点
TP7	GND	初级侧 GND 测试点
TP8	REF	REF 选择电压测试点
TP9	DIV1	DIV1 选择电压测试点
TP10	GND	次级侧 GND 测试点

3 实现结果

3.1 建议的测试设置

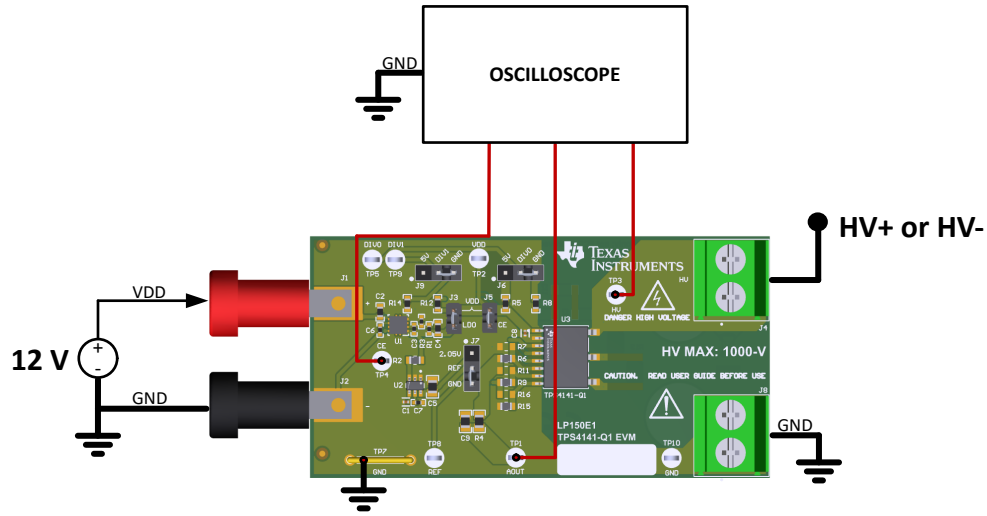


图 3-1. TPS4141Q1EVM 测试设置

验证 TPS4141Q1EVM 具有以下跳线设置：

1. J3 - 将 LDO 输出连接到 VDD 电源轨
2. J5 - 断开 VDD 电源轨和芯片使能 (CE) 的连接
3. J7 - 将 Ref 连接到 GND
4. J6 - 将 DIV0 连接到 GND
5. J9 - 将 Div1 连接到 GND

要测试 TPS4141-Q1 是否正常运行，请按照以下步骤操作：

1. 将 12V 电源连接到 J1 的香蕉插孔，并将负极引线连接到 J2，从而为 TPS4141-Q1 供电。
2. 在放入外壳或连接高压 (HV) 电源之前，请使用 TP2 (VDD)、TP5 (DVI0)、TP9 (DIV1) 和 TP8 (REF) 验证 TPS4141-Q1 初级侧的所有电压是否符合预期。
3. 将电路板放置在外壳中，将高压电源正极引线连接到 J4，将负极引线连接到 J8。
4. 将 5V 电源、函数发生器或 MCU I/O 正极引线连接到 TP4 (CE)，将负极引线连接到 TP7 (GND)。
5. 将示波器探头连接到相关电压 (CE、HV、AOUT) 后，打开高压电源，然后切换连接到 CE 的 5V 电源，观察 TP4 (CE)、TP3 (HV) 和 TP1 (AOUT) 是否显示预期电压。

3.1.1 波形

如果按照如上所述连接，则以下通道必须显示在下方的波形中：

- 通道 3 = CE
- 通道 2 = AOUT
- 通道 1 = HV

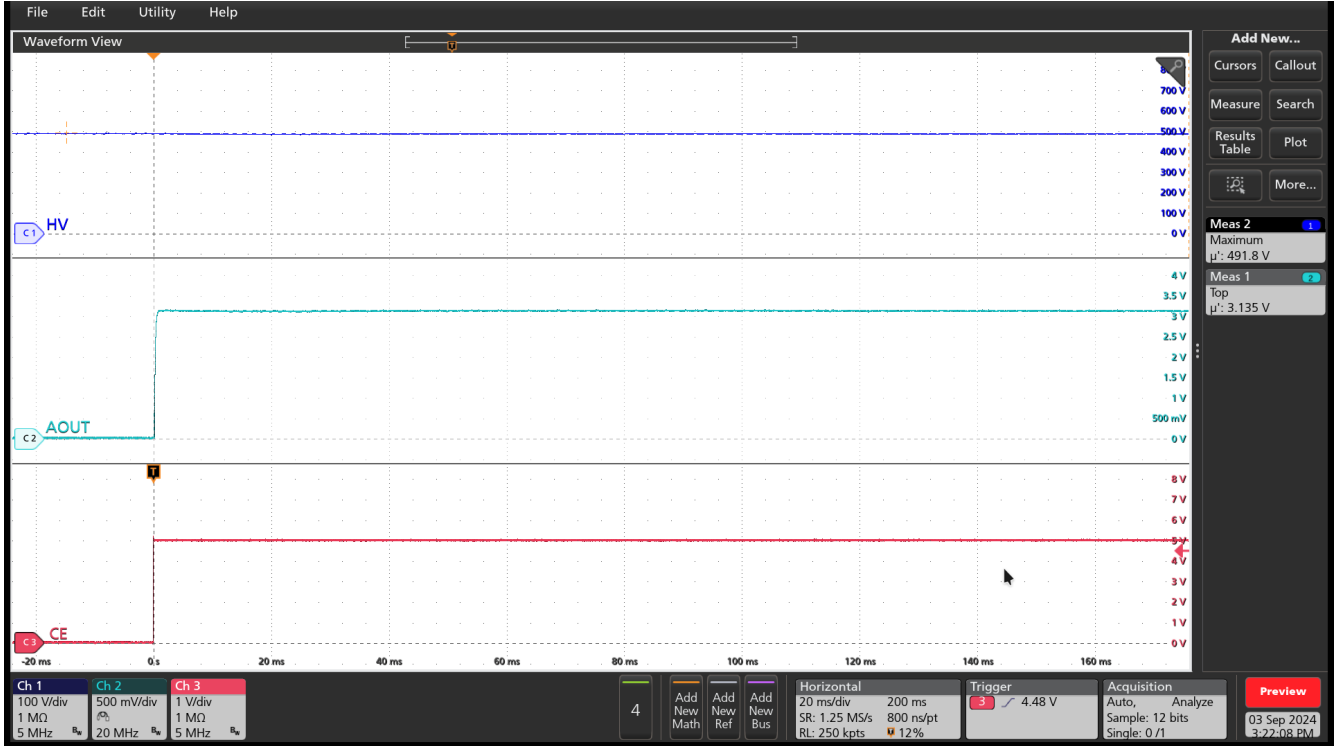


图 3-2. HV=500V 时的 AOUT 电压 (CE=5V , DIV=160)

4 硬件设计文件

4.1 原理图

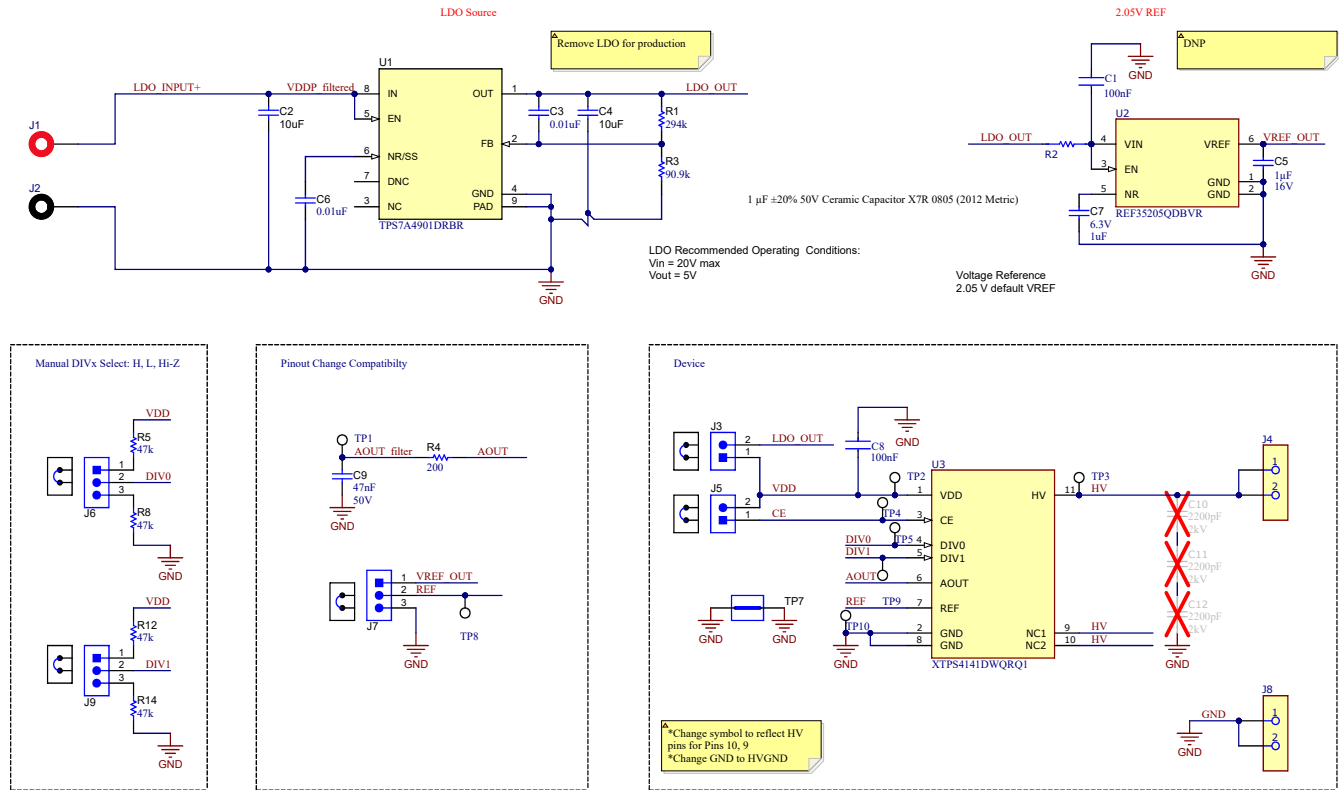


图 4-1. TPS4141Q1EVM 原理图

4.2 PCB 布局

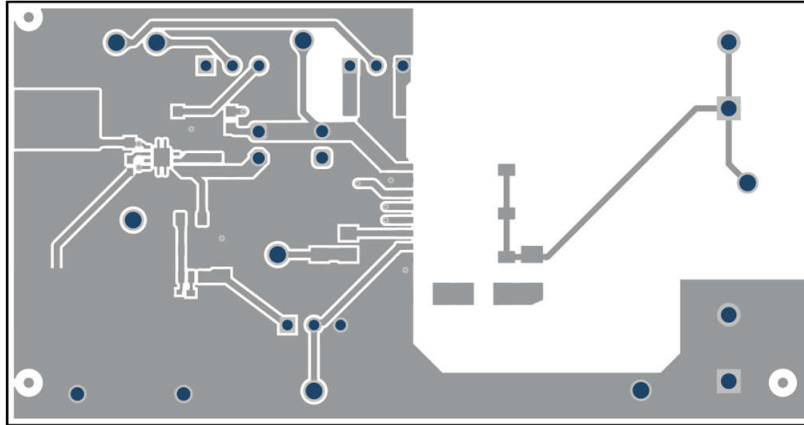


图 4-2. TPS4141-Q1 EVM - 第 1 层

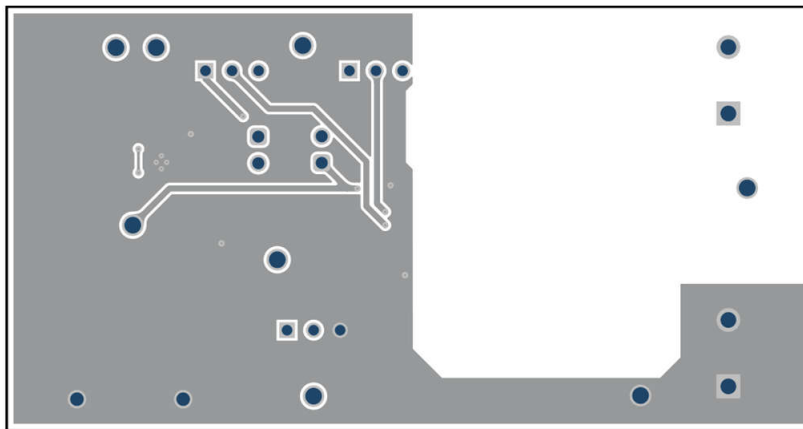


图 4-3. TPS4141-Q1 EVM - 第 2 层

4.3 物料清单

表 4-1. 物料清单

位号	数量	值	说明	封装参考	器件型号	制造商
!PCB	1		印刷电路板		LP150	不限
C1, C8	2		通用片状多层陶瓷电容器, 0402, 0.10 μ F, X7R, 15%, 10%, 25V			
C2、C4	2	10uF	电容, 陶瓷, 10 μ F, 25V, +/-20%, X5R, 0603	0603	GRT188R61E106ME13D	MuRata
C3、C6	2	0.01uF	电容, 陶瓷, 0.01 μ F, 25V, +/- 10%, X7R, 0402	0402	GRM155R71E103KA01D	MuRata
C5	1	1uF	电容, 陶瓷, 1 μ F, 16V, +/-10%, X7R, 0805	0805	C0805C105K4RACTU	Kemet
C7	1	1uF	电容, 陶瓷, 1 μ F, 6.3V, +/-10%, X7R, 0402	0402	GRM155R70J105KA12D	MuRata
C9	1	0.047uF	电容, 陶瓷, 0.047 μ F, 50V, +/-10%, X7R, 0805	0805	C0805C473K5RACTU	Kemet
H9、H10、H11、H12	4		Bumpon, 半球形, 0.44 X 0.20, 透明	透明 Bumpon	SJ-5303 (CLEAR)	3M
J1	1		香蕉插头, 红色绝缘尼龙, TH	香蕉插头, 红色绝缘尼龙, TH	108-0902-001	Cinch Connectivity
J2	1		香蕉插头, 黑色绝缘尼龙, TH	香蕉插头, 黑色绝缘尼龙, TH	108-0903-001	Cinch Connectivity
J3、J5	2		接头, 2.54mm, 2x1, 金, TH	接头, 2.54mm, 2x1, TH	61300211121	Würth Elektronik
J4、J8	2			CONN_TERM_BLOCK2	6.91251E+11	Würth Electronics
J6、J7、J9	3		接头, 100mil, 3x1, 锡, TH	接头, 3 引脚, 100mil, 锡	PEC03SAAN	Sullins Connector Solutions

表 4-1. 物料清单 (续)

LBL1	1		热转印打印标签, 0.650" (宽) x 0.200" (高) - 10,000/卷	PCB 标签, 0.650 x 0.200 英寸	THT-14-423-10	Brady
R1	1	294k	电阻, 294k, 1%, 0.1W, AEC-Q200 0 级, 0402	0402	ERJ-2RKF2943X	Panasonic
R2	1	0	电阻, SMD, 0Ω, 跳 线, 1/8W, 0805	0805	RC0805FR-070RL	Yageo
R3	1	90.9k	电阻, 90.9k, 1%, 0.1W, AEC-Q200 0 级, 0402	0402	ERJ-2RKF9092X	Panasonic
R4	1	200	电阻, 200, 5%, 0.125W, AEC-Q200 0 级, 0805	0805	ERJ-6GEYJ201V	Panasonic
R5、R8、R12、R14	4	47k	电阻, 47k, 5%, 0.1W, 0603	0603	RC0603JR-0747KL	Yageo
SH-J1、SH-J2、SH-J3、 SH-J4、SH-J5	5		分流器, 2.54mm, 金, 黑色	分流器, 2.54mm, 黑色	60900213421	Würth Elektronik
TP1、TP2、TP3、TP4、 TP5、TP8、TP9、TP10	8		测试点, 白色, 穿孔, RoHS, 大容量	5012		Keystone
TP7	1		1mm 非绝缘短路插头, 10.16mm 间距, TH	短路插头, 10.16mm 间 距, TH	D3082-05	Harwin
U1	1		3V 至 36V 输入电压、 150mA、超低噪声、高 PSRR、低压降 (LDO) 线 性稳压器 DRB0008A (VSON-8)	DRB0008A	TPS7A4901DRBR	德州仪器 (TI)
U2	1		650nA 静态电流、 12ppm/°C 温漂、超低功 耗精密电压基准 6- SOT-23 -40 至 125	SOT23-6	REF35205QDBVR	德州仪器 (TI)
U3	1		具有集成开关的汽车级 1000V 可配置精密电阻分 压器	SOIC11	XTPS4141DWQRQ1	德州仪器 (TI)

表 4-1. 物料清单 (续)

C10、C11、C12	0	2.2nF	2,200pF ±10% 2,000V (2kV) 陶瓷电容器 X7R 1,808 (公制 4520)	1808	C1808X222K202T	禾伸堂
FID1、FID2、FID3	0		基准标记。没有需要购买 或安装的元件。	不适用	不适用	不适用

5 其他信息

5.1 商标

所有商标均为其各自所有者的财产。

6 修订历史记录

注：以前版本的页码可能与当前版本的页码不同

Changes from Revision * (November 2024) to Revision A (April 2026)	Page
• 更新了 TPS4141Q1EVM 图.....	1
• 更新了 TPS4141-Q1 功能方框图.....	3
• 更新了 TPS4141Q1EVM 原理图.....	8
• 更新了 TPS4141-Q1 EVM - 第 1 层.....	9
• 更新了 TPS4141-Q1 EVM - 第 2 层.....	9

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 DEGRADATION 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/lstds/ti_ja/general/eStore/notice_01.page 日本国内に輸入される評価用キット、ボードについては、次のところをご覧ください。

<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/lstds/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, INDEMNITY 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
Copyright © 2023, Texas Instruments Incorporated

重要通知和免责声明

TI“按原样”提供技术和可靠性数据（包括数据表）、设计资源（包括参考设计）、应用或其他设计建议、网络工具、安全信息和其他资源，不保证没有瑕疵且不做任何明示或暗示的担保，包括但不限于对适销性、与某特定用途的适用性或不侵犯任何第三方知识产权的暗示担保。

这些资源可供使用 TI 产品进行设计的熟练开发人员使用。您将自行承担以下全部责任：(1) 针对您的应用选择合适的 TI 产品，(2) 设计、验证并测试您的应用，(3) 确保您的应用满足相应标准以及任何其他安全、安保法规或其他要求。

这些资源如有变更，恕不另行通知。TI 授权您仅可将这些资源用于研发本资源所述的 TI 产品的相关应用。严禁以其他方式对这些资源进行复制或展示。您无权使用任何其他 TI 知识产权或任何第三方知识产权。对于因您对这些资源的使用而对 TI 及其代表造成的任何索赔、损害、成本、损失和债务，您将全额赔偿，TI 对此概不负责。

TI 提供的产品受 [TI 销售条款](#)、[TI 通用质量指南](#) 或 [ti.com](#) 上其他适用条款或 TI 产品随附的其他适用条款的约束。TI 提供这些资源并不会扩展或以其他方式更改 TI 针对 TI 产品发布的适用的担保或担保免责声明。除非德州仪器 (TI) 明确将某产品指定为定制产品或客户特定产品，否则其产品均为按确定价格收入目录的标准通用器件。

TI 反对并拒绝您可能提出的任何其他或不同的条款。

版权所有 © 2026，德州仪器 (TI) 公司

最后更新日期：2025 年 10 月