EVM User's Guide: TPSM65630SEVM

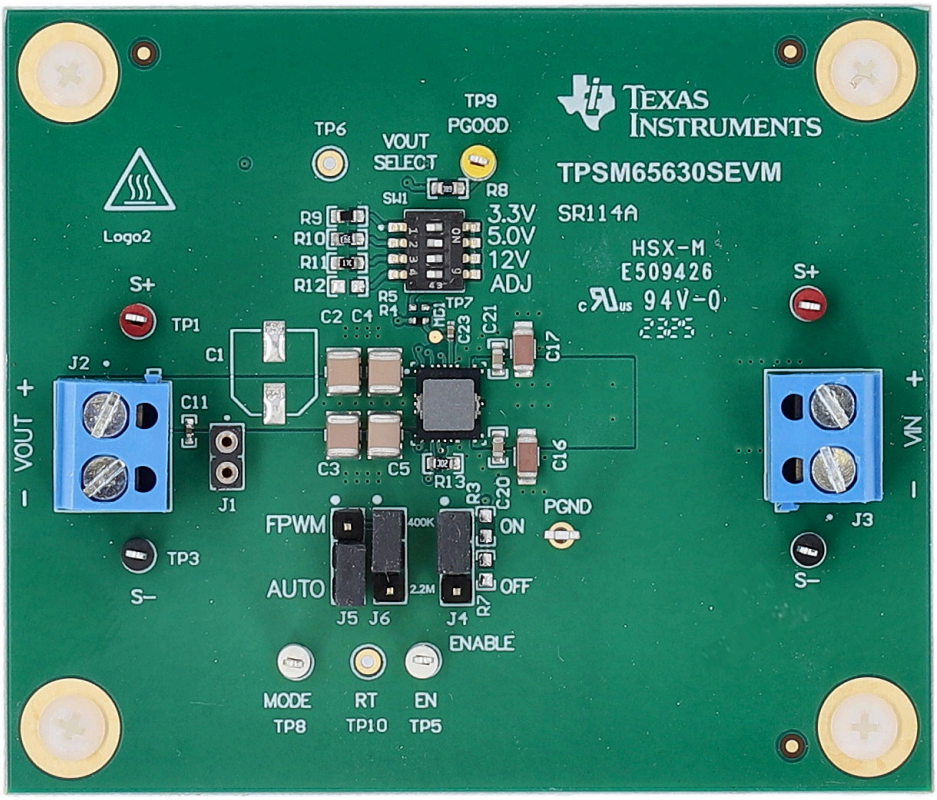
TPSM65630SEVM 评估模块

说明

德州仪器 (TI) TPSM65630SEVM 评估模块 (EVM) 可帮助设计人员评估宽输入电压降压模块 TPSM65630 系列的运行情况和性能。TPSM65630 系列是易于使用的同步降压模块，能够通过高达 65V 的输入电压提供高达 1A、2A 或 3A 的负载电流。

特性

- 3V 到 65V 的宽输入电压范围
- 3.3V、5V 固定和可调节输出电压选项
- 输出电流高达 3A
- 300kHz 至 2.2MHz 开关频率
- 超低开关节点振铃以降低电磁干扰 (EMI)
- 输入瞬态电压高达 70V



TPSM65630SEVM

1 评估模块概述

1.1 简介

TPSM65630SEVM 配置为向最高 3A 的负载提供可选的 3.3V、5V、12V 或 24V 输出。通过代替其他版本的 TPSM656x5 并重新配置电路板元件，TPSM65630SEVM 可用于许多不同的配置中。有关更多详细信息，请参阅节 1.4。

1.2 套件内容

此套件包含一个 TPSM65630SEVM。

1.3 规格

节 3.2 介绍了 TPSM65630SEVM 的性能特性。

除非另有说明：V_{IN} = 24V，V_{OUT} = 5V，T_A = 25°C。

1.4 器件信息

默认 EVM 采用 TPSM65630 器件。表 1-1 列出了可与 TPSM65630SEVM 一同使用的其他器件。要在 EVM 中使用这些器件，必须进行适当的无源器件更改。

表 1-1. TPSM65630SEVM 器件选项

器件 OPN	输出电流	展频
TPSM65630SVCGR	3A	Y
TPSM65630VCGR	3A	N
TPSM65620SVCGR	2A	Y
TPSM65610SVCGR	1A	Y

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，确保自身和周围人员的人身安全。如需更多信息，请联系 TI 的产品信息中心 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。*如果不满足资格，则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，根据需要将 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. 穿戴人员防护装备（例如乳胶手套或具有侧护板的安全眼镜）或者用带有互锁机构的透明塑料箱装好 EVM，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 其他图像

图 2-1 和 图 2-2 分别展示了 TPSM65630SEVM 的正面和背面。

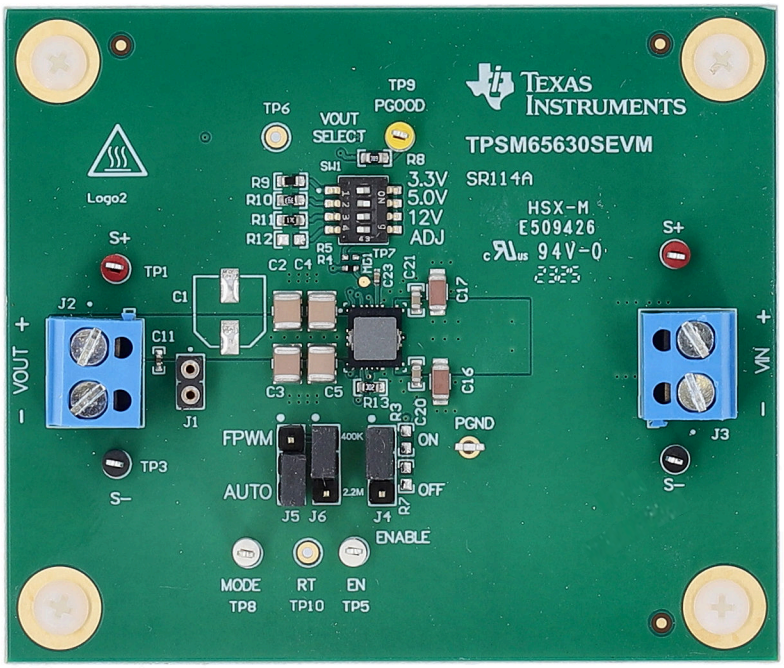


图 2-1. TPSM65630SEVM 顶面

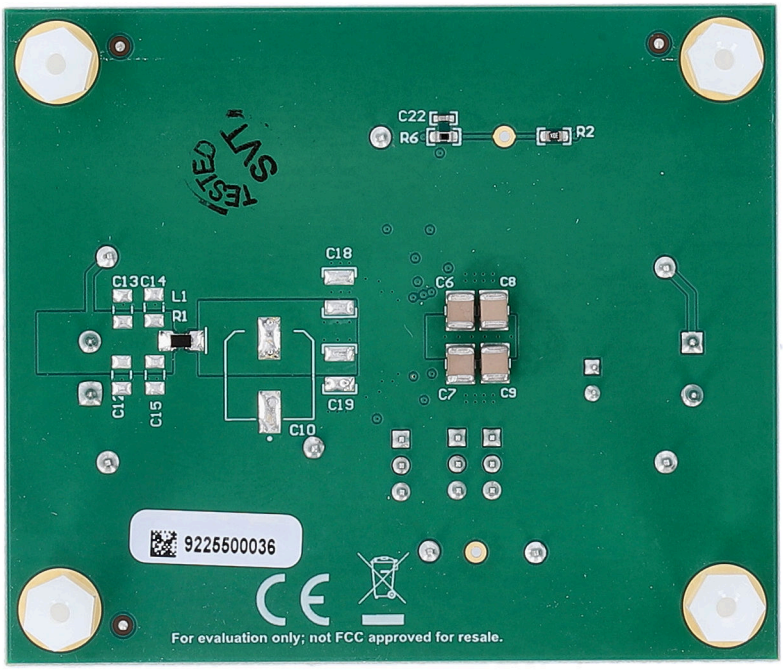


图 2-2. TPSM65630SEVM 底部

2.2 电源要求

在正常条件下，6V 至 65V 范围内且能够提供 3A 电流的任何电源均可用于评估 TPSM65630SEVM。

2.3 设置和操作

本节对 EVM 上的连接器、测试点和跳线进行了说明，并说明了如何正确地连接、设置和使用 TPSM65630SEVM。要了解连接器和跳线的位置以及典型设置，请参阅 图 2-3。要了解波德图连接，请参阅 图 2-4。

该 EVM 上未填充 EMI 滤波器。要评估 EMI 滤波器，必须组装元件 L1、C6，同时必须移除 R2。表 4-1 中提供了这些元件的典型值。

信号	连接器和测试点	说明
VIN	J3、TP2、TP4	端子块 J3 用作模块的输入。向该模块施加输入电压。 TP2 (S+) 用作输入电压检测的正极 DMM 连接。TP4 (S－) 用作输入电压检测的负极 DMM 连接。
VOUT	J2、TP1、TP3	端子块 J2 用作模块的输出。将输出负载连接到此端子块。 TP1 (S+) 用作 VIN 检测的正极 DMM 连接。TP3 (S－) 用作 VOUT 检测的负极 DMM 连接。
GND	TP11	转换器接地。TP111 可根据需要用作任何接地连接器。
EN	J4，TP5	EN 跳线 (J5) 用于使能或禁用 EVM。 要使用外部 UVLO 功能，请根据需要填充 R3 和 R7 并移除 EN 跳线分流器。请注意，为了准确测量关断静态电流，必须移除这些电阻器（如果使用）并将 EN 跳线分流器移至“OFF”位置。
模式	J5，TP8	MODE 跳线 (J5) 用于选择运行模式。MODE 处于 AUTO 位置时，器件根据负载电流在自动 PFM/FPWM 模式下运行。MODE 处于 FPWM 位置时，器件在所有负载情况下以固定频率运行。 MODE 引脚也是频率同步输入。要将器件与外部时钟同步，请移除 MODE 跳线分流器，并将时钟应用于 MODE 测试点 (TP8) 或 J5_pin_2。
RT	J6，TP10	RT 跳线 (J6) 用于选择开关频率。EVM 上的默认设置设计用于 400kHz。要调整开关频率，请移除 RT 跳线分流器并使用所需的值组装 R11。有关频率与 RT 电阻器阻值之间的关系，请参阅数据表。
PGOOD	TP9	PGOOD 测试点 (TP9) 用于监控电源正常状态指示器。该标志指示输出电压是否已达到调节电平。 PGOOD 是一个开漏输出端，通过 EVM 上的 49.9kΩ 电阻器 (R8) 连接到 VOUT。
FB 连接	SW1	DIP 开关 (SW1) 用于选择 EVM 输出电压设置。在出厂默认配置中，EVM 采用外部可调设置提供 5V 输出。要切换到不同的输出电压（如 3.3V、12V 或 24V），请将相应的 SW1 开关设置为“ON”，并且所有其他通道必须为“OFF”。 要将板载可调节输出电压设置更改为不在预设电压列表中的不同值，建议使用 SW1 的 ADJ 通道开关，并参阅 TPSM656x0 数据表反馈电阻器选择公式来替换 R12。 要将 EVM 设置为固定 5V 输出，请将 SW1 的所有开关通道置于“OFF”，请取消填充 R6，但填充 R5。 要将 EVM 设置为固定 3.3V 输出，建议通过将开关置于“ON”来使用 ADJ 通道，并将 SW 的所有其他通道置于“OFF”。然后，请取消填充 R5、R6，但将 R12 替换为 0Ω 电阻器。
BIAS	TP7	BIAS 引脚 (TP7) 用作内部 LDO 稳压器的辅助输入。C23 有助于绕过开关噪声。在 EVM 出厂默认配置中，BIAS 通过 R4 连接到 VCC。 要将 LDO 输入更改为从 3.3V 到 30V 可用的外部电源，请移除 R4，并将该引脚直接连接到外部电源。 如果配置为固定 3.3V 或 5V 输出，则应安装 R4 以闭合控制环路。 要了解详细信息，请参阅 TPSM65630 数据表。
环路响应图	TP1、TP3、TP6	在使用可调输出电压模式时，可以使用 图 2-4 中所示的连接来绘制波德图测量。必须填充 R2 才能进行此测试，并且探针必须与 TP3 具有接地连接。 在固定 3.3V 或 5V 输出电压配置下，无法获取波德图测量。建议运行阶跃负载响应来评估环路稳定性。

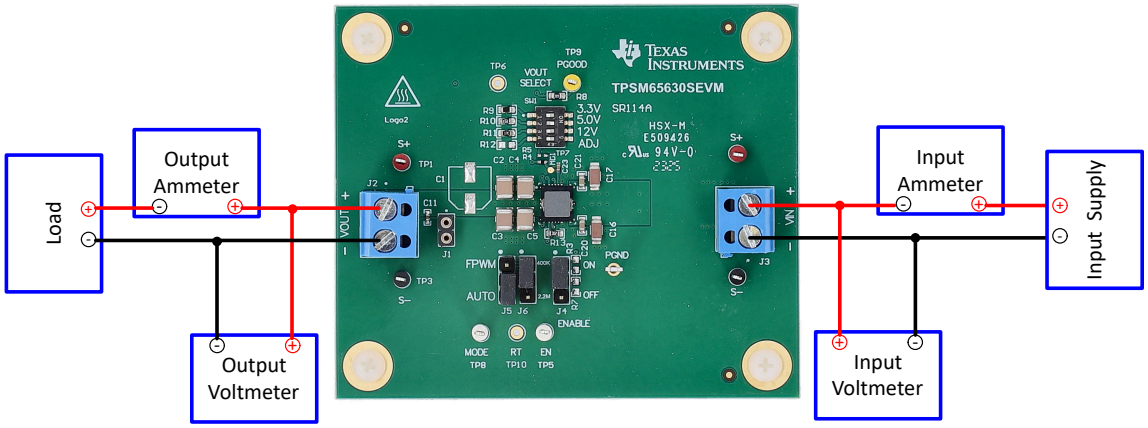


图 2-3. TPSM65630SEVM 设置

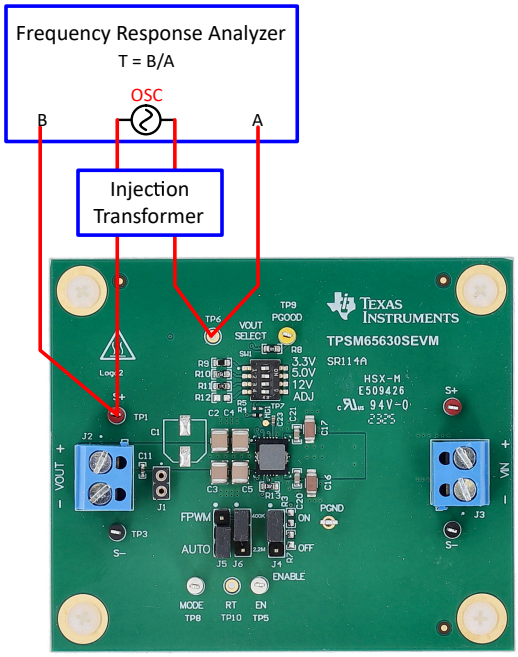


图 2-4. TPSM65630SEVM 波德连接

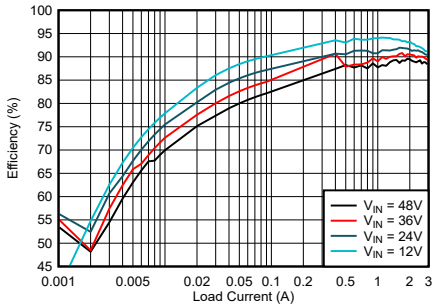
3 实现结果

3.1 评估设置

使用 LM65645VM 通过图 2-3 中所示的设置获取以下数据。

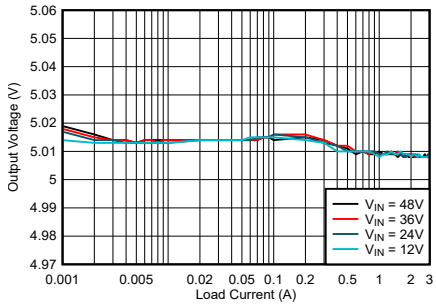
3.2 性能数据和结果

除非另有说明，否则以下条件适用：T_A = 25°C，V_{IN} = 24V，400kHz。



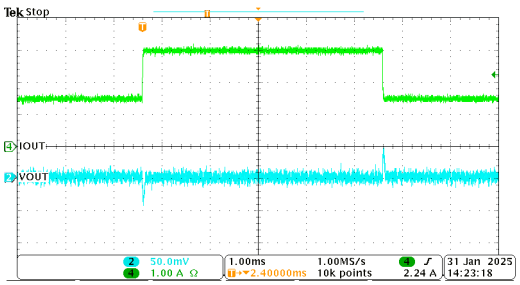
V_{OUT} = 5V　　400kHz，AUTO

图 3-1. 效率



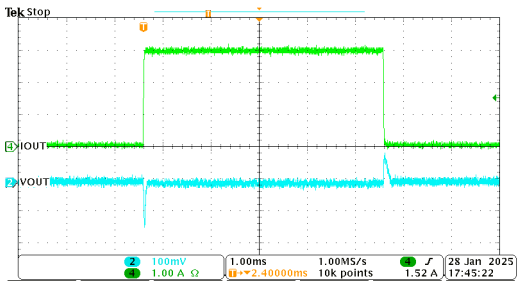
V_{OUT} = 5V　　400kHz，AUTO

图 3-2. 线性和负载调整率



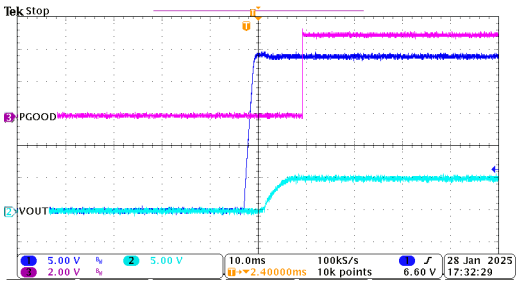
I_{OUT} = 0A 至 3A　　V_{IN} = 24V　　自动　　V_{OUT} = 5V

图 3-3. 负载瞬态（50% 至 100%）



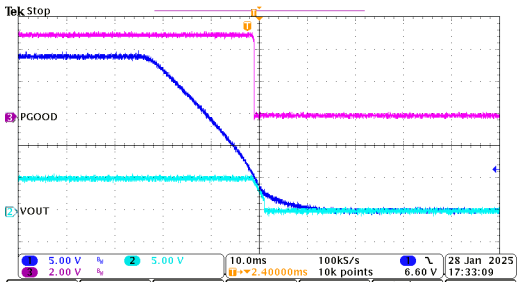
I_{OUT} = 40mA 至 3A　　V_{IN} = 24V　　自动　　V_{OUT} = 5V

图 3-4. 负载瞬态（0% 至 100%）



I_{OUT} = 3A　　V_{IN} = 24V　　自动　　V_{OUT} = 5V

图 3-5. 启动



I_{OUT} = 3A　　V_{IN} = 24V　　自动　　V_{OUT} = 5V

图 3-6. 关断

4 硬件设计文件

4.1 原理图

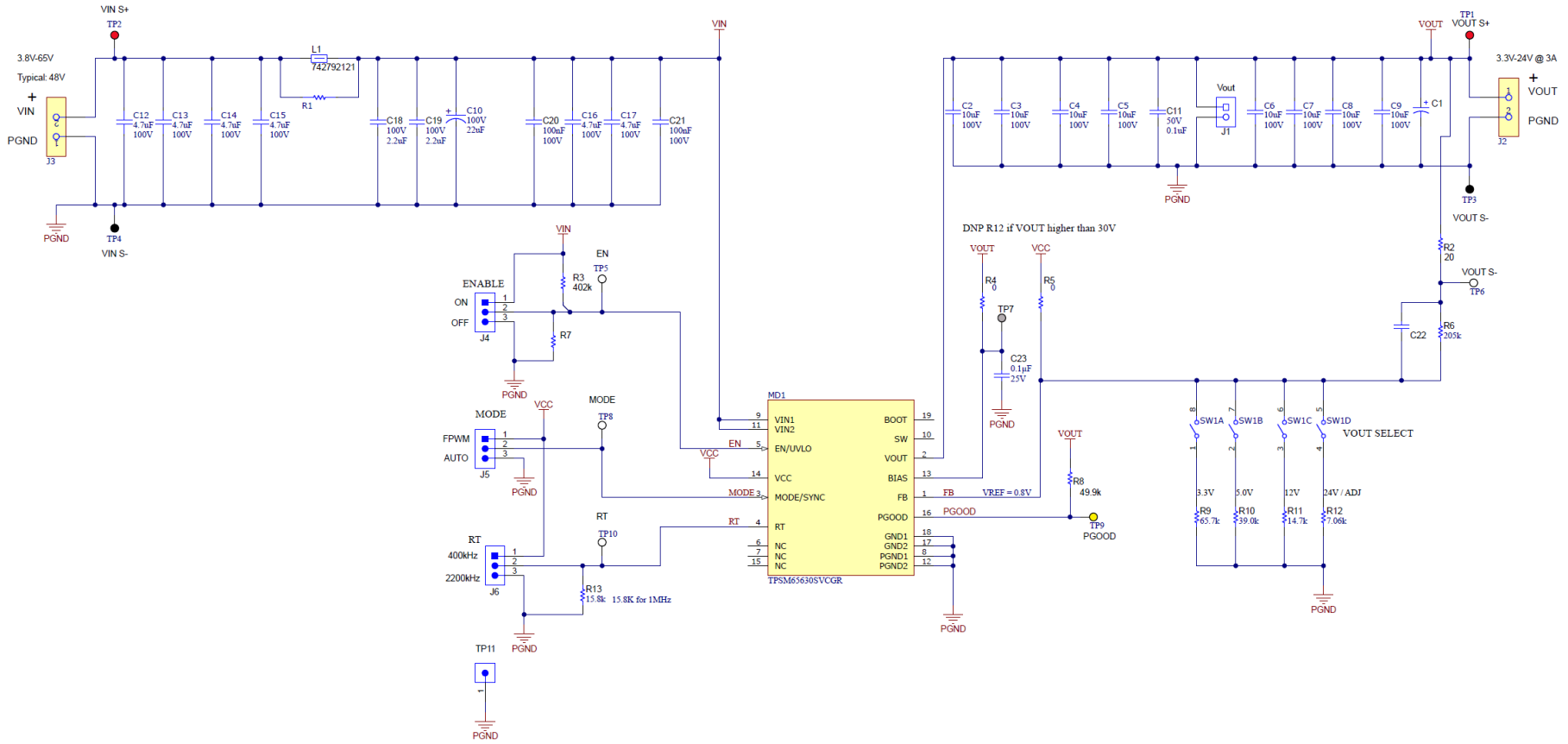


图 4-1. TPSM65630SEVM 原理图

4.2 PCB 布局

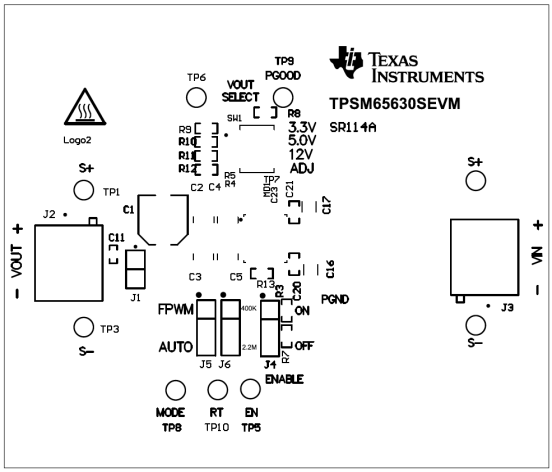


图 4-2. PCB 顶部丝印

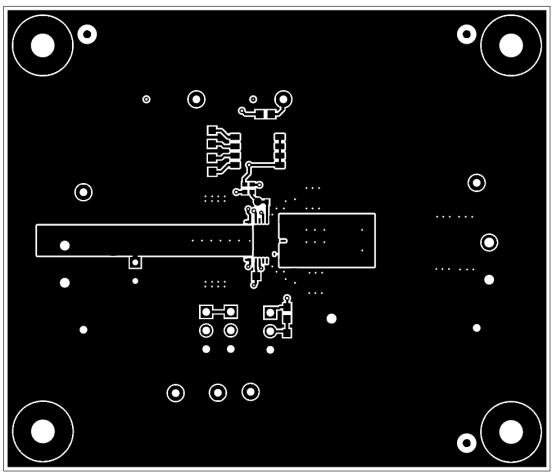


图 4-3. PCB 顶层

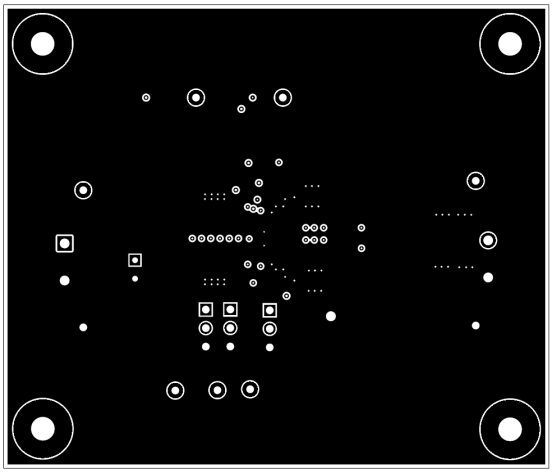


图 4-4. PCB 信号层 1

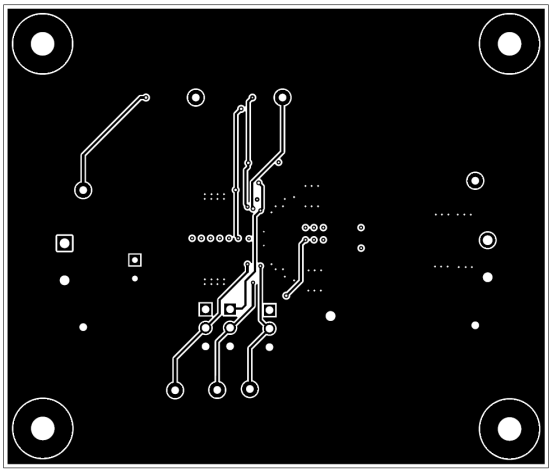


图 4-5. PCB 信号层 2

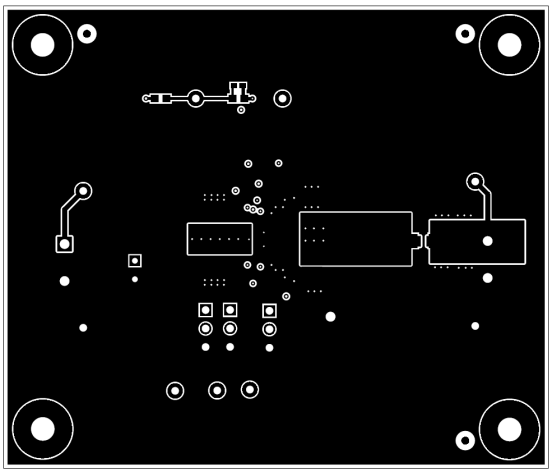


图 4-6. PCB 底层

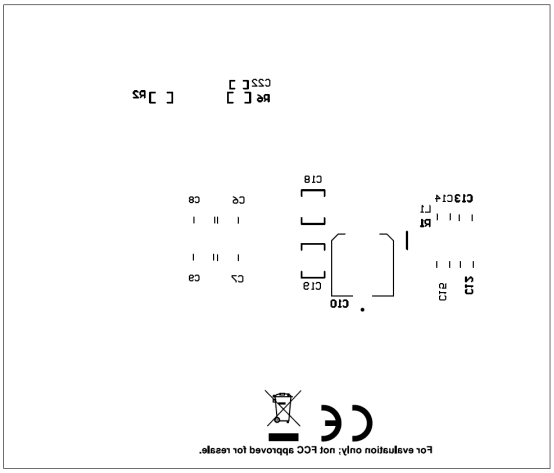


图 4-7. PCB 底部丝印

4.3 物料清单 (BOM)

表 4-1. TPSM65630SEVM BOM（配有多个选项）

参考位号	数量	值	说明	器件型号	制造商
C2、C3、C4、C5、C6、C7、C8、C9	8	10µF	10µF ±10% 100V 陶瓷电容器 X7R 1210（公制 3225）	GMC32X7R106K100NT	Cal-Chip Electronics
C11	1	0.1µF	电容，陶瓷，0.1µF，50V，±10%，X7R，0402	C1005X7R1H104K050BB	TDK
C16，C17	2	4.7µF	4.7µF ±10% 100V 陶瓷电容器 X7S 1206（公制 3216）	C3216X7R2A475K160AC	TDK
C20、C21	2	0.1µF	电容，陶瓷，0.1µF，100V，±10%，X7R，AEC-Q200 1 级，0603	HMK107B7104KAHT	Taiyo Yuden
C22	1	47pF	电容，陶瓷，47pF，50V，±5%，C0G/NP0，AEC-Q200 1 级，0402	CGA2B2C0G1H470J050BA	TDK
C23	1	0.1µF	电容，陶瓷，0.1µF，25V，±10%，X8L，AEC-Q200 0 级，0402	GCM155L81E104KE02D	MuRata
J1	1		插排，2x1，100mil，黑色，锡，TH	310-43-102-41-001000	Mill-Max
J2，J3	2		2 位，线至板，端子块，与板齐平，0.200" (5.08mm)，穿孔	OSTTA024163	On Shore Technology
J4、J5、J6	3		接头，100mil，3x1，锡，TH	PEC03SAAN	Sullins Connector Solutions
MD1	1		采用增强型 HotRod™ QFN 封装，高密度、3V 至 65V 输入、0.8V 至 24V 输出、3A 同步直流/直流降压电源模块	TPSM65630SVCGR	德州仪器 (TI)
R1	1	0	0Ω，跳线，0.245W 片式电阻，0805（公制 2012）- 金属元件	JR0805X35E	Ohmite
R2	1	20	电阻，20，5%，0.1W，AEC-Q200 0 级，0603	CRCW060320R0JNEA	Vishay-Dale
R4	1	0	电阻，0，5%，0.063W，0402	RC0402JR-070RL	Yageo America
R6	1	205k	电阻，205k，1%，0.1W，AEC-Q200 0 级，0603	CRCW0603205KFKEA	Vishay-Dale
R8	1	49.9k	电阻，49.9k，1%，0.1W，AEC-Q200 0 级，0603	CRCW060349K9FKEA	Vishay-Dale
R9	1	65.7k	电阻，65.7k，0.5%，0.1W，0603	RT0603DRE0765K7L	Yageo America
R10	1	39.0k	电阻，39.0k，1%，0.1W，0603	RC0603FR-0739KL	Yageo
R11	1	14.7k	电阻，14.7k，1%，0.1W，0603	RC0603FR-0714K7L	Yageo
R13	1	15.8k	电阻，15.8k，1%，0.1W，AEC-Q200 0 级，0603	CRCW060315K8FKEA	Vishay-Dale
SW1	1		DIP 开关 SPST 4 档表面贴装滑动（标准）执行器 25mA 24VDC	97C04ST	Samtec
TP1，TP2	2		测试点，微型，红色，TH	5000	Keystone Electronics
TP3，TP4	2		测试点，微型，黑色，TH	5001	Keystone Electronics
TP5，TP8	2		测试点，微型，白色，TH	5002	Keystone Electronics
TP9	1		测试点，微型，黄色，TH	5004	Keystone
TP11	1		测试点有插槽，0.118"，TH	1040	Keystone Electronics
C1	0	47µF	电容，铝制，47µF，50V，±20%，0.68Ω，AEC-Q200 2 级，SMD	EEEFT1H470AP	Panasonic
C10	0	22µF	电容，铝制，22µF 100V ±20% (8 X 10.2mm)，SMD 1.3Ω 70mA 2000h 125 C T/R	EEE-TG2A220UP	Panasonic Electronic Components
C12、C13、C14、C15	0	4.7µF	100V 4.7µF X7R ±20% 1206 多层陶瓷电容器 MLCC - SMD/SMT ROHS	CGA1206X7R475M101NT	HRE
C18，C19	0	2.2µF	电容，陶瓷，2.2µF，100V，±10%，X7R，1210	C1210C225K1RAC7800	Kemet
L1	0	300Ω	铁氧体磁珠，300Ω @ 100MHz，3A，1206	742792121	Wurth Elektronik
R3	0	402k	电阻，402k，1%，0.1W，AEC-Q200 0 级，0603	CRCW0603402KFKEA	Vishay-Dale
R5	0	0	电阻，0，5%，0.063W，0402	RC0402JR-070RL	Yageo America
R7	0	133k	电阻，133k，1%，0.1W，AEC-Q200 0 级，0603	CRCW0603133KFKEA	Vishay-Dale
R12	0	7.06k	电阻，7.06k，0.5%，0.1W，0603	RT0603DRE077K06L	Yageo America
TP6，TP10	0		测试点，微型，白色，TH	5002	Keystone Electronics

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 * (July 2025) to Revision A (December 2025)	Page
• 更新了电路板图片	1
• 更新了板图像	4
• 向表中添加了连接器和测试点名称，并更新了一些说明	5
• 使用最终图片更新了电路板图片	5
• 添加了有关 EMI 滤波器的注释	5
• 将交叉参考从图 2-4 更新为图 2-3	7
• 更新了 EVM 原理图	8
• 添加了丝印图像	9
• 更新了 BOM 并添加了制造信息	11

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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TI 反对并拒绝您可能提出的任何其他或不同的条款。

最后更新日期：2025 年 10 月