

EVM User's Guide: DP83TD530

DP83TD530EVM 用户指南



1 说明

本用户指南讨论了如何正确操作和配置 DP83TD530EVM。有关最佳布局实践、原理图文件和物料清单，请参阅相关的支持文档。

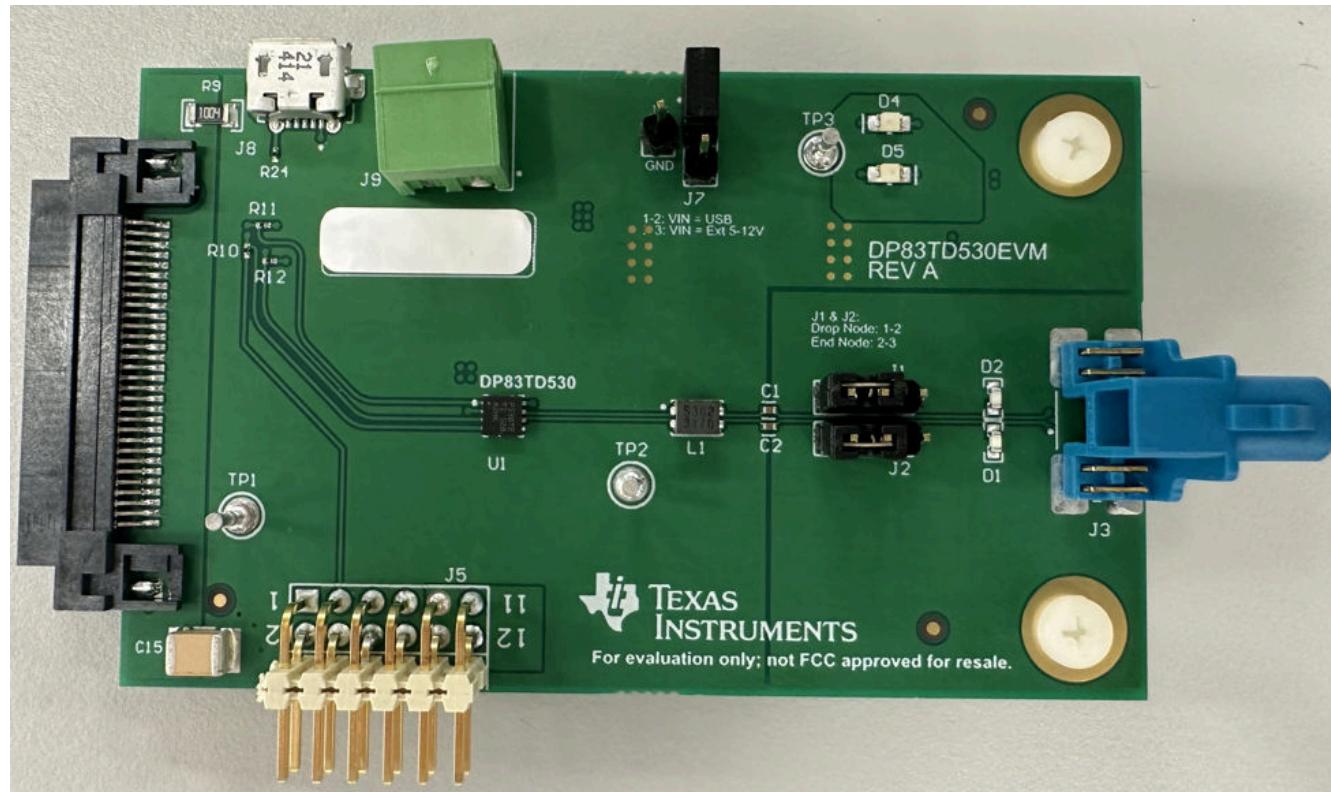
2 开始使用

1. 配置电路板接头，以实现所需的电源配置/ MDI 端接
2. 使用 3 引脚接口将 DP83TD535EVM 连接到 MCU 板

3. 如有任何问题，请在 TI E2E 论坛上与我们联系

3 特性

- DP83TD530 符合 IEEE802.3cg 和 10BASE-T1S 标准
- 10BASE-T1S 接口通过 Rosenberger 菊花链 MTD 适配器和电缆进行连接
- VBAT/VCC/VDDIO 电源轨的状态 LED
- 可变 I/O 电压范围：1.8V、2.5V 和 3.3V
- 可通过跳线配置 MDI 端接，使器件可用作终端节点或分支节点



DP83TD530EVM

4 评估模块概述

4.1 简介

DP83TD530EVM 支持 10Mbps 半双工速度，且符合 IEEE 802.3cg 和 10BASE-T1S 标准。可通过外部 5V-12V 电源或通过 microUSB 电缆为该 EVM 供电。提供了板载 OA-3 引脚接口选项，可通过兼容的 SoC 与 PHY 进行通信或访问其寄存器。

4.2 套件内容

DP83TD530EVM 套件包括以下项目：

- DP83TD535EVM
- 1 根非双绞线电缆 (LAQ-116-1000Z-Z)

未提供：

- Micro-USB 电缆
- Rosenberger 多点连接器 (E7C10T-900X5Z)

4.3 规格

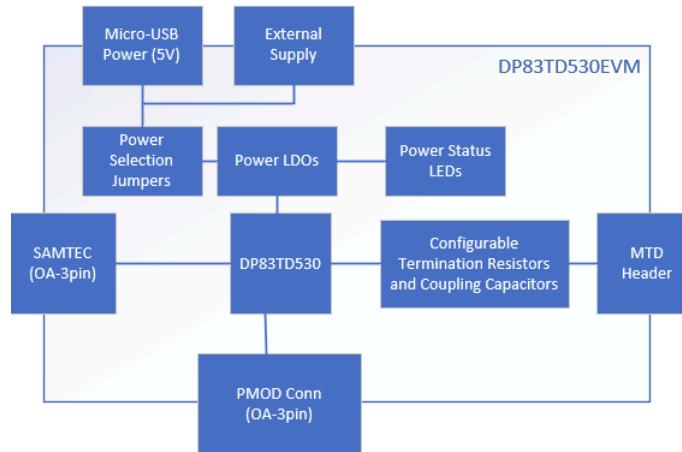


图 4-1. DP83TD530EVM 方框图

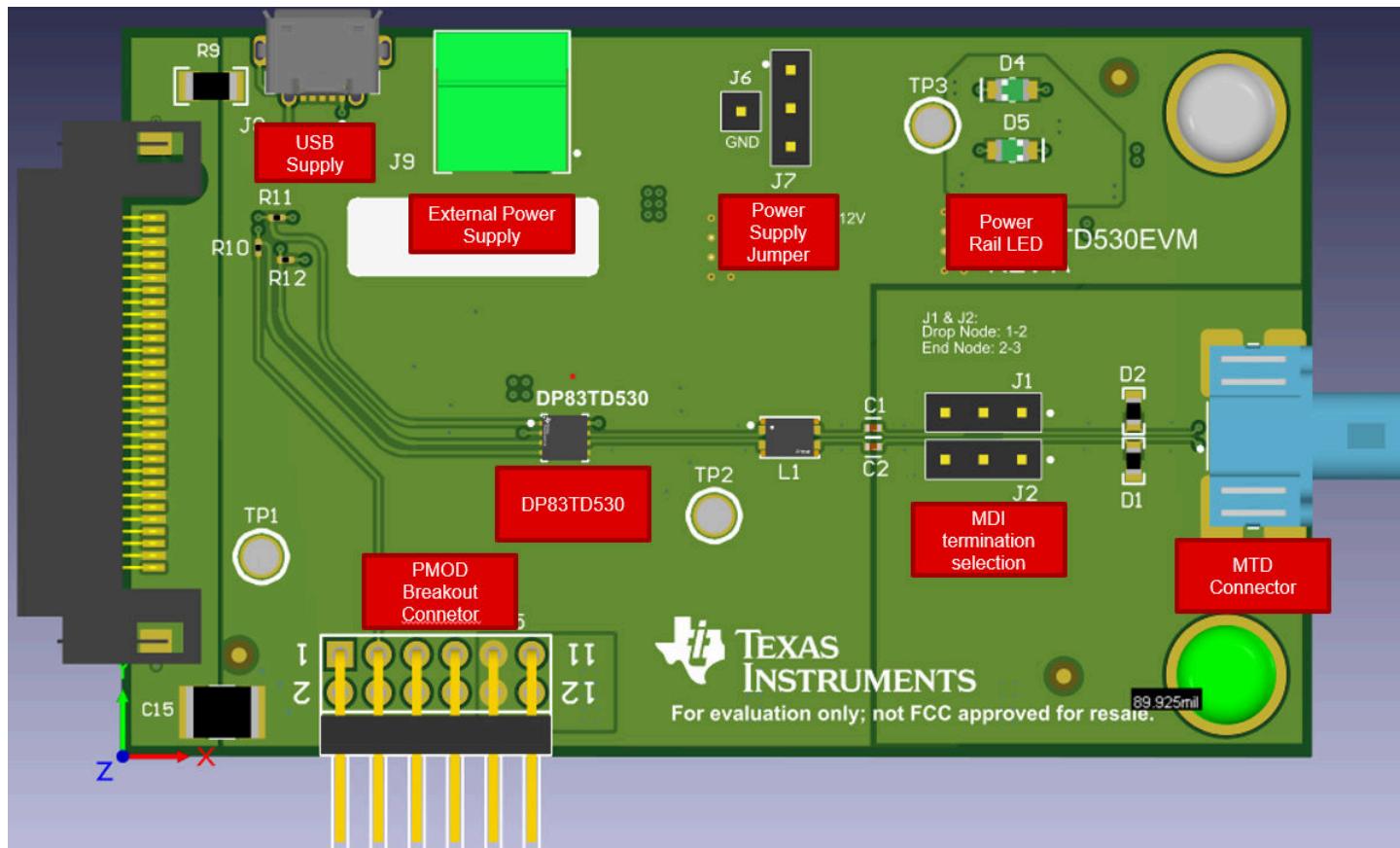


图 4-2. DP83TD530EVM 的关键接口

5 硬件

5.1 电路板设置详细信息

5.1.1 设置

请遵循 DP83TD530EVM 的以下快速设置说明：

- 在引脚 1-2 上连接跳线 J7
- 将 J2 与 J3 跳线配置为分支节点或终端节点
 - 分支节点：连接引脚 1 和 2
 - 终端节点：连接引脚 2 和 3
- 将外部主机连接到 J5 的 TX/RX/ED 引脚
- 将 micro-USB 连接到 J8，以提供 5V 电源

5.1.2 电源选择

5.1.2.1 USB 电源选项

- DP83TD530EVM USB 电源
 - 在引脚 1-2 上连接跳线 J7

5.1.2.2 外部电源运行

- DP83TD530EVM 外部电源
 - 在引脚 2-3 上连接跳线 J7
 - 在 J9 上提供 5-12V 电源 (引脚 2 = GND)

5.1.2.3 VDDIO 电源轨选择

DP83TD530EVM 的 VDDIO 电源轨默认工作电压为 3.3V。若需将 VDDIO 电源轨调整为 2.5V 或 1.8V 工作电压，请按以下说明修改电阻配置：

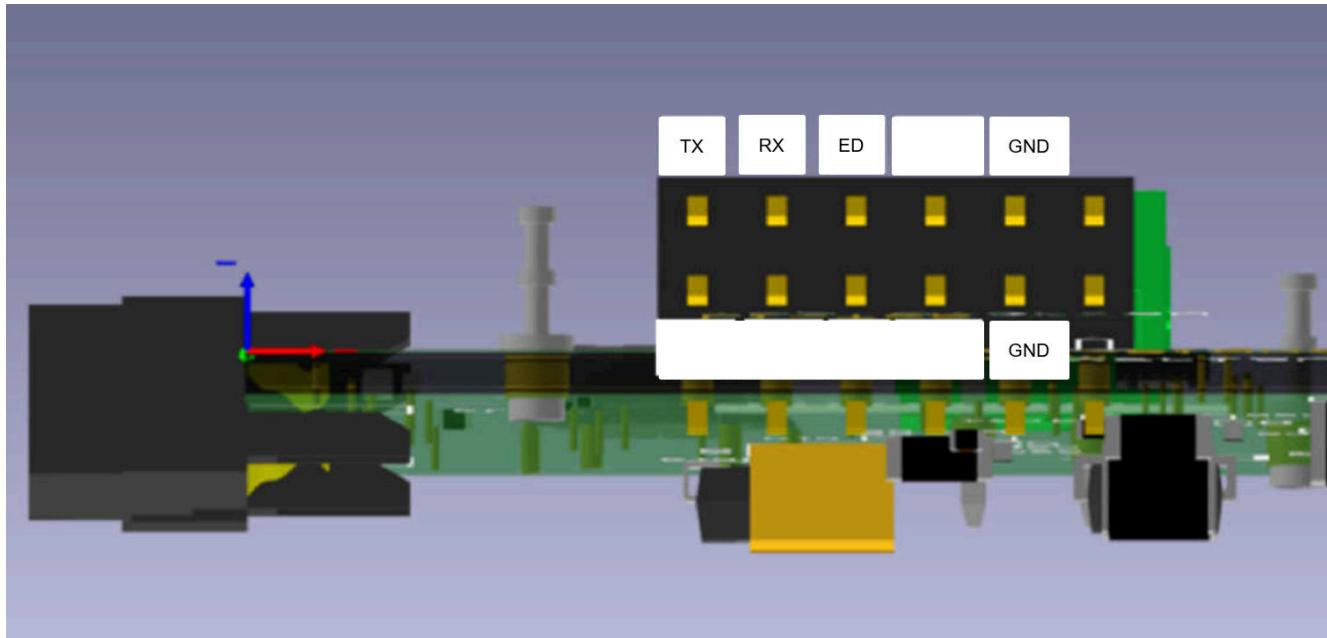
表 5-1. VDDIO 选择

VDDIO 电源轨	R13	R15	R18
3.3V	0 Ω	DNP	不适用
2.5V	DNP	0 Ω	2.87k Ω
1.8V	DNP	0 Ω	1.78k Ω

5.1.3 接口连接

5.1.3.1 PMOD 接口

通过 PMOD 分线连接器 J7 可访问 OA-3 引脚 (TX/RX/ED)



支持 OA-3 引脚的外部主机连接到 TX/RX/ED 引脚，需在 PHY 上电时或上电前，通过开启复位脉冲驱动 TX 引脚，从而激活 DP83TD530 发送模式。

DP83TD530 寄存器访问：

使用 Config 命令驱动 TX 引脚，使 DP83TD530 进入配置命令，以通过 3 引脚接口访问寄存器。以下是 PHY 处于配置模式时的引脚排列：

- ED 引脚 = MDIO
- RX 引脚 = MDC

5.1.3.2 MDI 接口

Rosenberger 的菊花链适配器 (E7C10T-900X5-Y) 和 MTD 电缆用于连接 J1 上的 PHY MDI 接口。如果无法获取该电缆组件，MDI 也可直接连接任意单对以太网电缆至 J1 引脚，或连接到 J2 (Line+) 和 J3 (Line-) 的引脚 2。

6 硬件设计文件

6.1 原理图

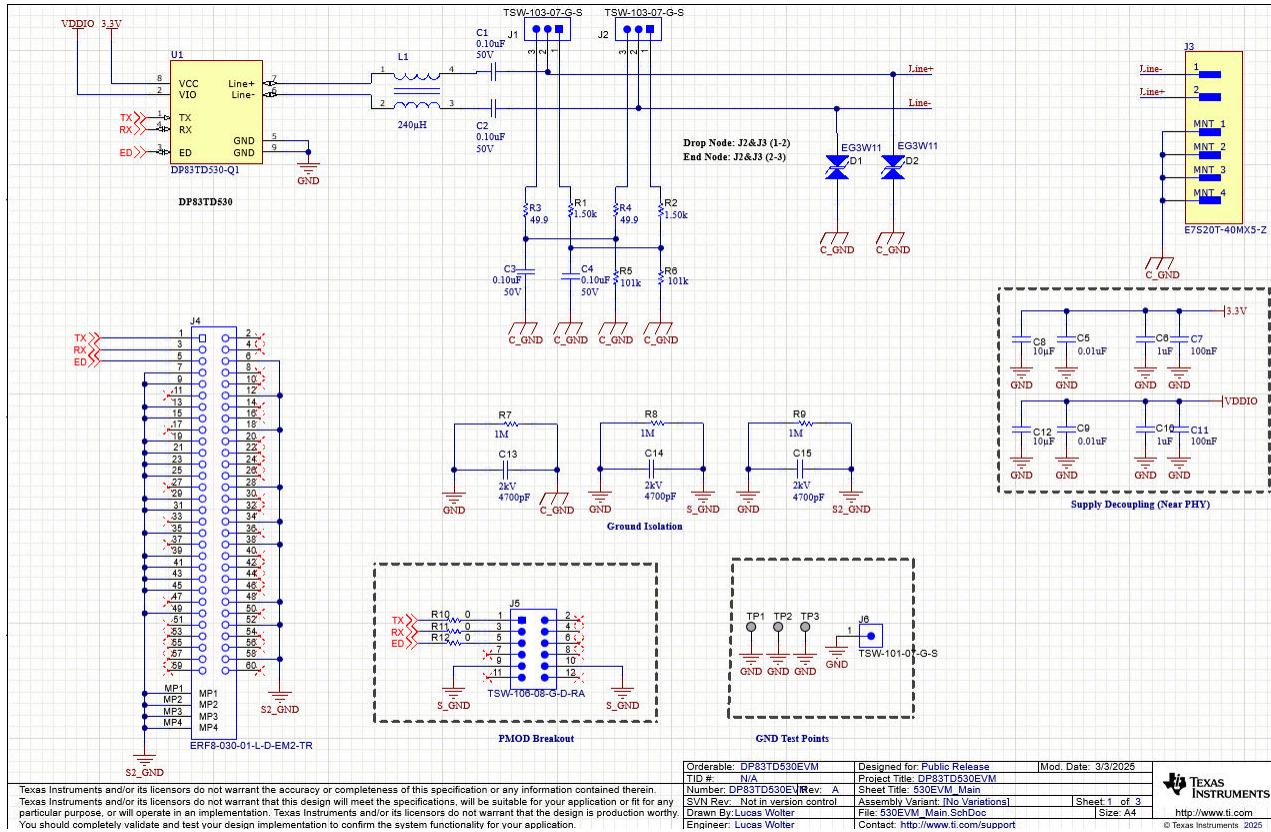


图 6-1. DP83TD530EVM 主原理图模块

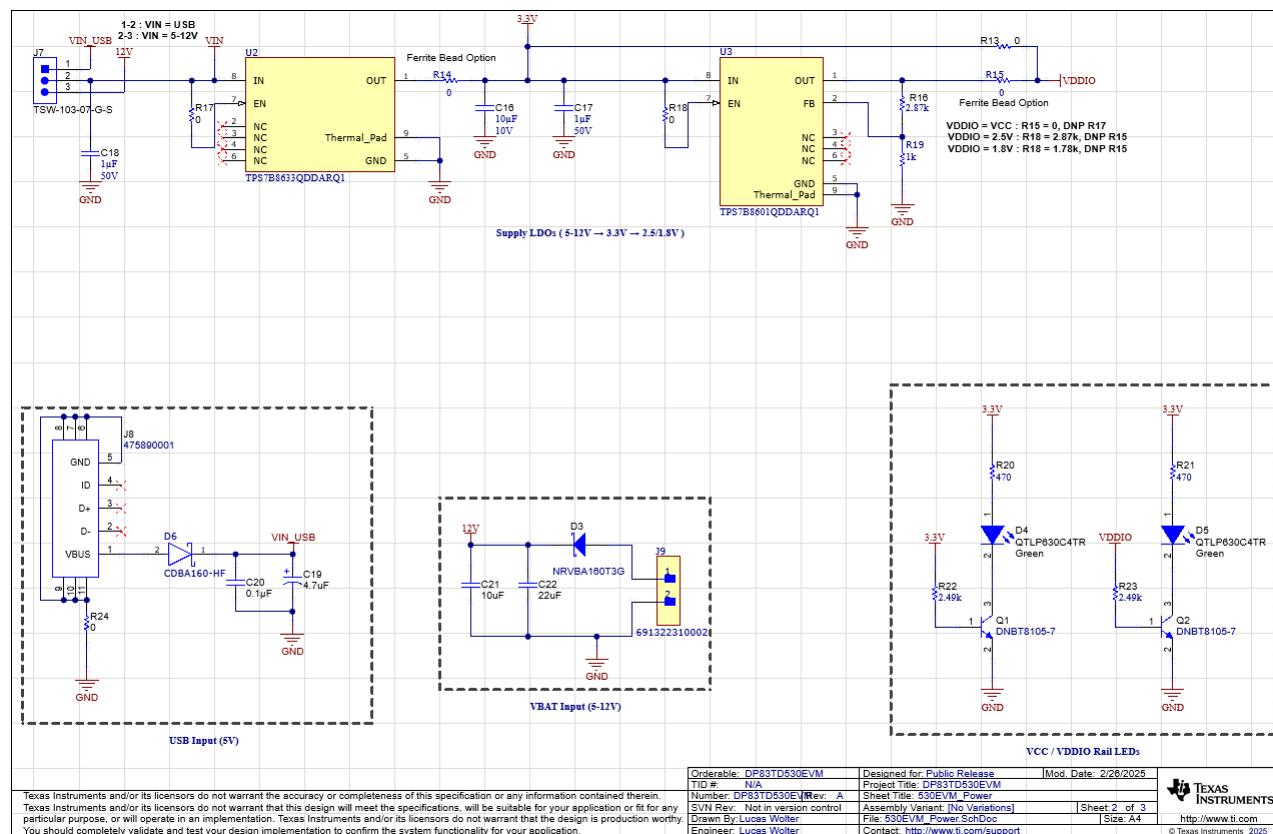


图 6-2. DP83TD530EVM 电源方框图

6.2 PCB 布局

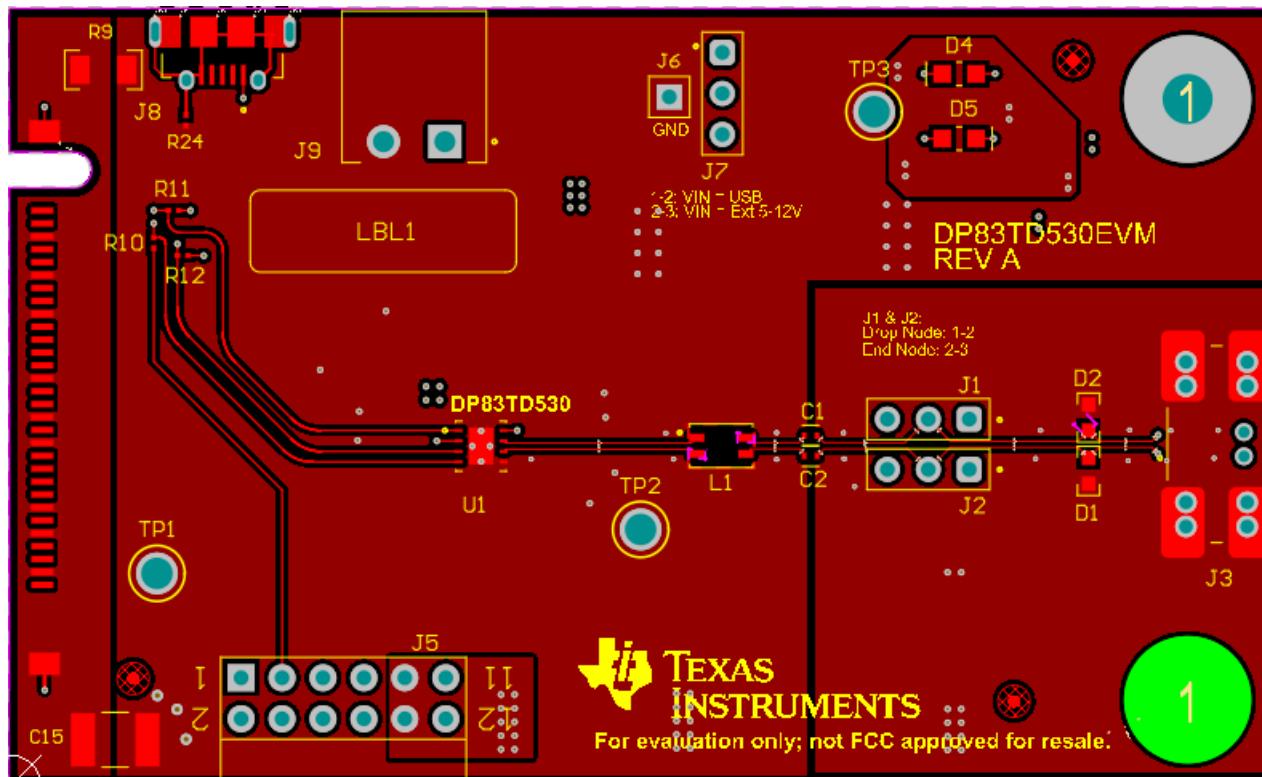


图 6-3. 顶层

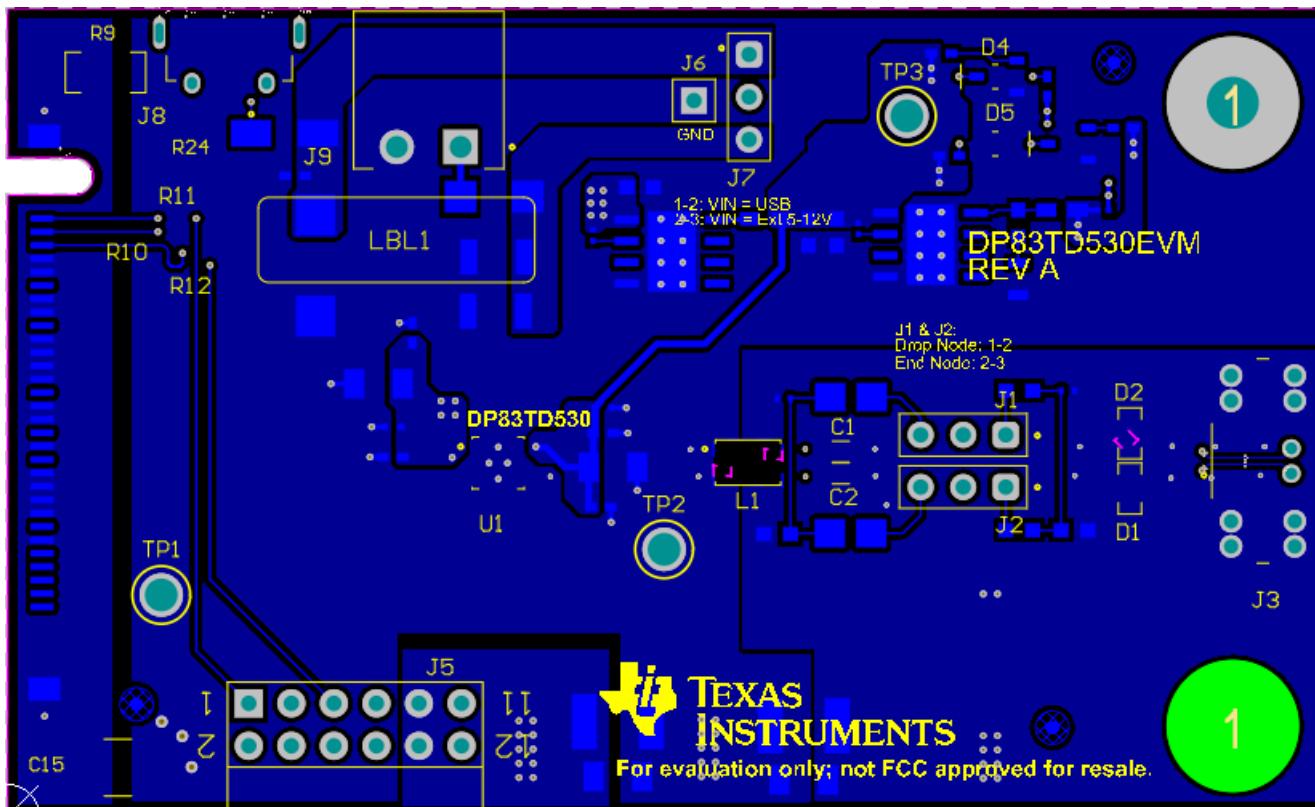


图 6-4. 底层

6.3 物料清单 (BOM)

项目编号	参考位号	说明	制造商	器件型号	数量	供应商 1	供应商器件型号 1
1	!PCB1	印刷电路板	不限	DP83TD530EV M	1		
2	C1、C2、C3、 C4	通用片状多层陶 瓷电容器， 0402， 0.10 μ F，X7R， 15%，10%， 50V	Murata	GRM155R71H1 04KE14D	4		
3	C5、C9	电容，陶瓷， 0.01 μ F，50V， +/-10%，X7R， AEC-Q200 1 级，0402	TDK	CGA2B3X7R1H 103K050BB	2	Digi-Key	445-6893-1-ND
4	C6、C10	电容，陶瓷， 1 μ F，35V， +/-10%，X5R， 0402	MuRata	GRM155R6YA1 05KE11D	2	Digi-Key	490-10019-1- ND
5	C7、C11	0402 0.1 μ F 10V ±10% 容差 X5R SMT 多层陶瓷 电容器	YAGEO	CC0402KRX5R 6BB104	2	Digikey	311-1336-1-ND
6	C8、C12	电容，陶瓷， 10 μ F，25V， +/-20%，X7R， AEC-Q200 1 级，1206	MuRata	GRM31CR71E1 06MA12L	2	Digi-Key	490-6519-1-ND
7	C13、C14、 C15	电容，陶瓷， 4700pF， 2000V， +/-10%，X7R， 1812	AVX	1812GC472KA T1A	3	Digi-Key	478-3003-1-ND
8	C16	电容，陶瓷， 10 μ F，10V， +/-20%，X7R， 0603	MuRata	GRM188Z71A1 06MA73D	1	Mouser	81- GRM188Z71A1 06MA3D
9	C17、C18	电容，陶瓷， 1 μ F，50V， +/-10%，X7R， 0603	Taiyo Yuden	UMK107AB710 5KA-T	2	Digi-Key	587-3247-1-ND
10	C19	电容，钽， 4.7 μ F，35V， +/-10%， 1.3 Ω ，SMD	Vishay-Sprague	293D475X9035 D2TE3	1	Digi-Key	718-1084-1-ND
11	C20	电容，陶瓷， 0.1 μ F，10V， +/-10%，X7R， 0402	Kemet	C0402C104K8 RACTU	1	Digi-Key	399-3520-1-ND

12	C21	电容 , 陶瓷 , 10 μ F , 25V , +/-20% , X7R , AEC-Q200 1 级 , 1210	TDK	CGA6P1X7R1E 106M250AC	1	Digi-Key	445-5720-1-ND
13	C22	电容 , 陶瓷 , 22 μ F , 16V , +/-20% , X7R , AEC-Q200 1 级 , 1210	TDK	CGA6P1X7R1C 226M250AC	1	Digi-Key	445-5723-1-ND
14	D1、D2	二极管 , TVS , 双向 , AEC- Q101 , 0603	Panasonic	EZA- EG3W11AV	2		
15	D3	二极管 , 肖特 基 , 60V , 1A , AEC-Q101 , SMA	ON Semiconductor	NRVBA160T3G	1		
16	D4、D5	LED , 绿色 , SMD	Everlight	QTLP630C4TR	2		
17	D6	二极管 , 肖特 基 , 60V , 1A , 表面贴装 , DO-214AC (SMA)	Comchip Technology	CDBA160-HF	1		
19	H1、H2	机械螺钉 , 圆 头 , #4-40 x 1/4 , 尼龙 , 飞 利浦盘形头	B&F Fastener Supply	NY PMS 440 0025 PH	2	Digi-Key	H542-ND
20	H3、H4	螺柱 , 六角 , 0.5	Keystone	1902C	2	Digi-Key	36-1902C-ND
21	J1、J2、J7	接头 , 100mil , 3x1 , 金 , TH	Samtec	TSW-103-07-G- S	3	Digi-Key	SAM1029-03- ND
23	J4	插座 , 0.8mm , 30x2 , 金 , 边缘 安装	Samtec	ERF8-030-01-L- D-EM2-TR	1	Digi-Key	ERF8-030-01-L- D-EM2-TR-ND
24	J5	接头 , 100mil , 6x2 , 金 , R/A , TH	Samtec	TSW-106-08-G- D-RA	1	Digi-Key	SAM1037-06- ND
25	J6	接头 , 100mil , 1pos , 金 , TH	Samtec	TSW-101-07-G- S	1	Digi-Key	SAM1029-01- ND
27	J9		Wurth Electronics	691322310002	1	Digikey	732-2088-ND
28	L1	共模滤波器/扼 流圈 , L=240nH , 长 x 宽 x 厚 :	TDK	ACT1210E-241- 2P-TL00	1	Digikey	445- ACT1210E-241- 2P-TL00CT-ND
29	LBL1	热转印打印标 签 , 0.650	Brady	THT-14-423-10	1	Newark	97C5133

30	Q1、Q2	晶体管 , NPN , 60V , 1A , AEC-Q101 , SOT-23	Diodes Inc.	DNBT8105-7	2	Digi-Key	DNBT8105DIC T-ND
31	R1、R2	电阻 , 1.50k , 0.1% , 0.1W , 0603	Yageo America	RT0603BRD07 1K5L	2		
32	R3、R4	电阻薄膜 , 1206 , 49.9Ω , 0.1% , 1W , ±25ppm/°C , 模 制 SMD , T/R	Vishay 薄膜	PHP01206E49 R9BST5	2	Digikey	PHP49.9ACT- ND
33	R5、R6	电阻器 , 101k , 0.5% , 0.1W , 0603	Yageo America	RT0603DRE07 101KL	2		
34	R7、R8、R9	电阻器 , 1MΩ , 1% , 1/4W , 1206	Yageo America	RC1206FR-071 ML	3	Digi-Key	311-1.10MFRC T-ND
35	R10、R11、 R12、R13、 R17、R18、 R24	电阻 , 0 , 5% , 0.05W , 0201	Vishay-Dale	CRCW0201000 0Z0ED	7	Newark	72M6743
36	R14	电阻 0Ω 跳线 1/4W 0603	Stackpole Electronics	HCJ0603ZT0R0 0	1	Digikey	HCJ0603ZT0R0 0CT-ND
37	R16	电阻 , 2.87k , 0.1% , 0.1W , 0603	Susumu Co Ltd	RG1608P-2871 -B-T5	1	Digi-Key	RG16P2.87KB CT-ND
38	R19	1kΩ ±0.1% 0.125W , 1/8W 片上电阻 0805 (公制 2012) , 抗硫 化 , 汽车 AEC- Q200 , 防潮薄 膜	Vishay Dale	TNPU08051K0 0BZEN00	1		
39	R20、R21	电阻 , 470 , 5% , 0.063W , AEC-Q200 0 级 , 0402	Vishay-Dale	CRCW0402470 RJNED	2	Digi-Key	541-470JCT-ND
40	R22、R23	电阻 , 2.49k , 1% , 0.063W , AEC-Q200 0 级 , 0402	Vishay-Dale	CRCW04022K4 9FKED	2	Digi-Key	541-2.49KLCT- ND
41	TP1、TP2、 TP3	引脚 , 双转塔 , TH	Keystone	1573-2	3	Digi-Key	36-1573-2-ND
42	U1	DP83TD530-Q1	德州仪器 (TI)	DP83TD530-Q1	1		

43	U2	汽车级 500mA、40V 超 低 IQ 低压降 (LDO) 线性稳压 器，具有电源正 常指示功能，8- SO PowerPAD 封装，工作温度 范围 -40°C 至 150°C	德州仪器 (TI)	TPS7B8633QD DARQ1	1		
44	U3	450mA、宽 VIN、低 IQ、可 调节输出、低压 降稳压器	德州仪器 (TI)	TPS7B8601QD DARQ1	1		

7 其他信息

7.1 术语

首字母缩写词	定义
PHY	物理层收发器
MAC	介质访问控制器
SMI	串行管理接口
MDIO	管理数据 I/O
MDC	管理数据时钟
ED	能量检测
VBAT	电池供电电源轨
VCC	模拟供电电源轨
VDDIO	数字电源轨
OA-3pin	Open Alliance 3 引脚接口

8 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

日期	修订版本	注释
2025 年 12 月	*	初始发行版

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 isotope 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/lsts/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24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/lsts/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/LICENSENSORS 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出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