参考文献

EVM User's Guide: TUSB7340EVM

TUSB7340 评估模块

说明

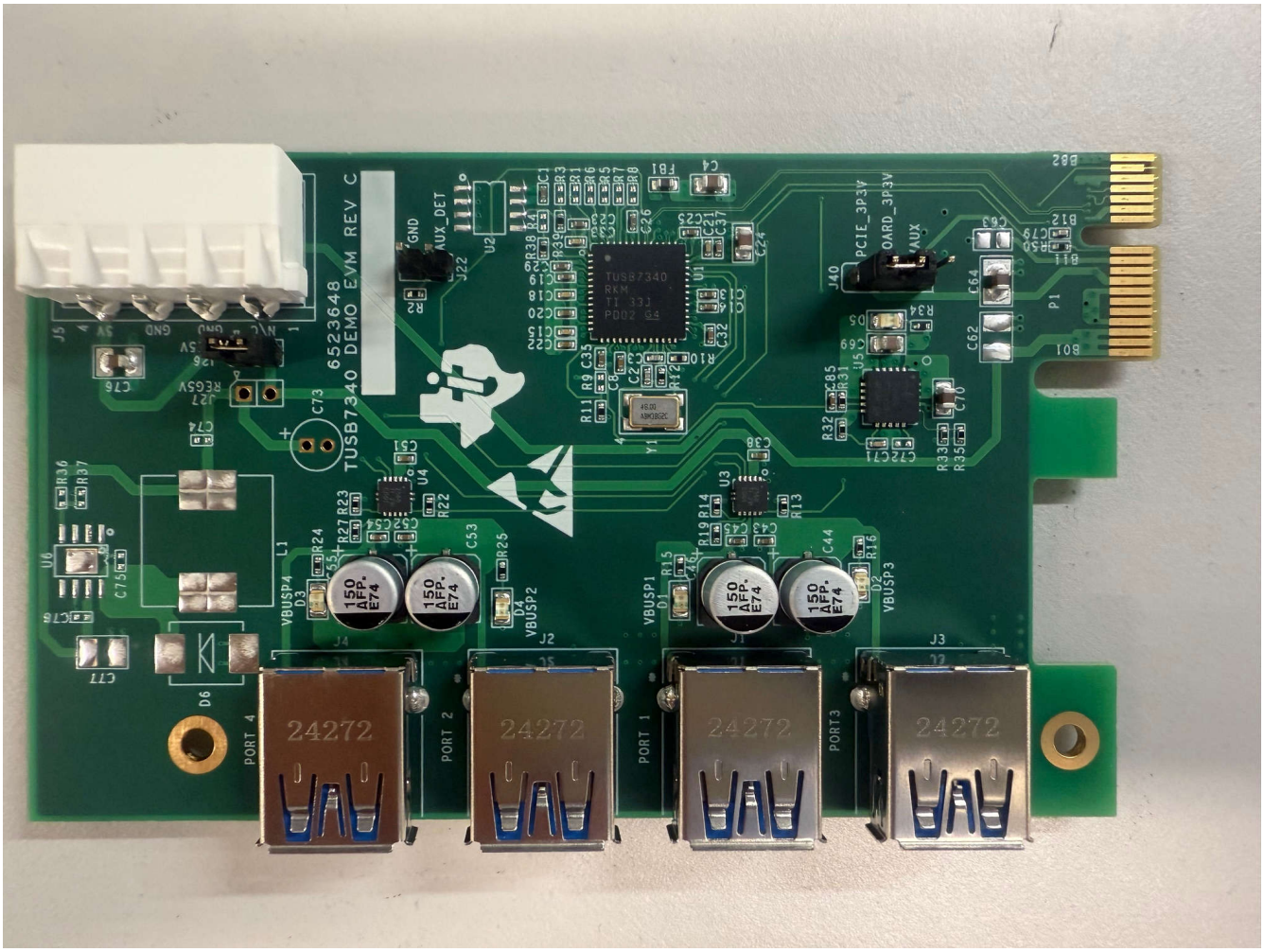
TUSB7340 是一款兼容 USB 3.0 xHCI 0.96 标准的主机控制器，最多支持四个下行端口。TUSB7340 通过 PCIe x1 Gen 2 接口与主机系统进行连接，并在下游 USB 端口上提供超高速、高速、全速或低速连接。

特性

- PCI Express 第 2 代 x1 主机接口
- xHCI 兼容
- 四个下行端口均支持超快速、高速、全速/低速连接
- 针对自定义配置的可选串行 EEPROM

应用

- 台式机
- 服务器



TUSB7340EVM

English Document: SLLU146

1 评估模块概述

1.1 简介

本指南旨在介绍运行 TUSB7340 DEMO EVM REVC 电路板所需的必要信息。本文档介绍了如何设置和使用 EVM 板。该文档末尾还列出了原理图和物料清单。

2 硬件

2.1 EVM 板

2.1.1 TUSB7340 DEMO 板

TUSB7340 DEMO 板是 PCI Express X1 标准高度卡。电路板的尺寸为 4.376 英寸 x 2.571 英寸。

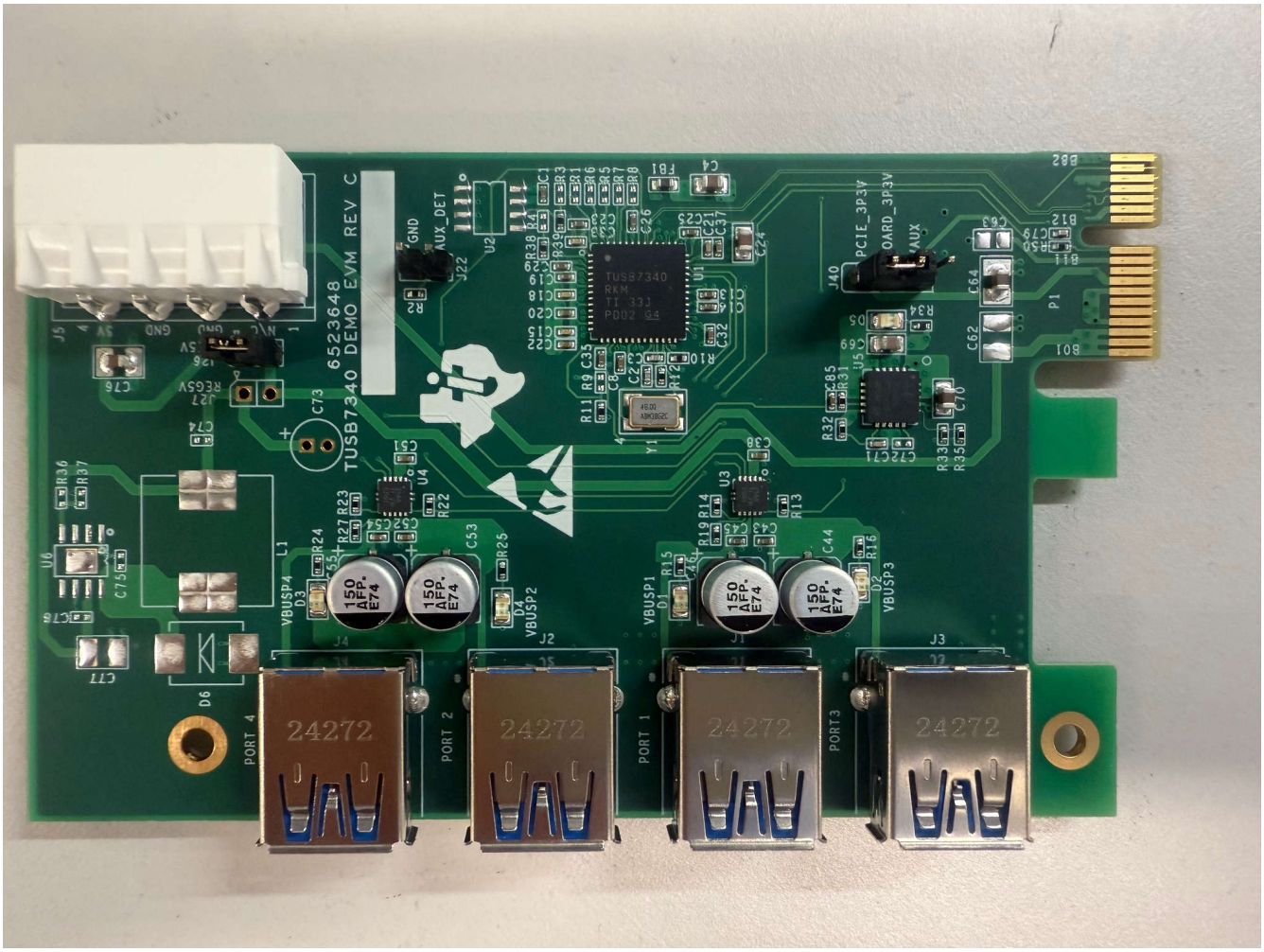


图 2-1. TUSB7340 DEMO EVM REVC

2.2 硬件设置

2.2.1 电源

EVM 板安装了三个接头：J22、J26 和 J40。

J22 接头用于将 AUX_DET 信号的状态更改为 TUSB73XX。默认情况下，此接头未短接，因此 AUX_DET 为高电平。如果在 J22 上放置跳线分流器，则 AUX_DET 为低电平。

J26 接头用于将 5V 电压从 IDE 电源连接器 (J5) 路由到德州仪器 (TI) TPS2560 USB 电源开关。该接头设计为始终安装一个跳线分流器。有关 Texas Instruments TPS2560 的更多信息，请访问 www.ti.com。

J40 接头用于为 TUSB7340 选择 3.3V 电源。默认情况下，J40 的引脚 1 和 2 之间安装了跳线分流器。在该位置时，PCI Express 插槽的 3.3V 电源路由至 TUSB7340。如果将跳线分流器移至引脚 2 和 3，则来自 PCI Express 插槽的 3.3V VAUX 电源将路由至 TUSB7340。如果需要唤醒测试，仅将跳线分流器移至位置 2 和 3。否则，将跳线保留在默认位置 1 和 2。

备注

3.3V VAUX 电源的电流能力有限。根据 PCI Express 机电规范，3.3V VAUX 的最大电流为 375mA。由于 3.3V VAUX 的电流受限，TI 建议仅将一个器件插入 TUSB73X0。如果将跳线分流器保留在 J40 的引脚 1 和 2 上，则不存在这种电流限制，因此可使用 TUSB7340 的所有端口。

2.2.2 VBUS

所有 USB 端口的 VBUS 都来自 IDE 电源连接器 (J5)。

2.2.3 PCI Express 插槽选项

TUSB7340 EVM 板是 PCI Express X1，因此该板可用于典型主板上的任何 PCI Express 插槽（X1、X4、X8 或 X16）中。该板可用于 PCI Express Gen1 (2.5Gbps) 或 Gen2 (5Gbps) 插槽中。由于 USB3 (5Gbps) 的速度，如果在 PCI Express Gen1 插槽中使用 EVM 板，TUSB7340 的性能会受到负面影响。因此，TI 建议始终将 EVM 板插入 PCI Express Gen2 插槽中。

2.3 启动

要在典型系统中启动 EVM 板，请执行以下步骤：

1. 从 PC 电源上拔下电源插头。
2. 确保跳线分流器已在 J26 和 J40 上安装。
3. 将 EVM 板插入 PCI Express 插槽。TI 建议使用 PCI Express Gen2 插槽（如果可用）。
4. 将 IDE 电源连接器插入 EVM 板的 J5。
5. 将电源插头插入 PC 电源。
6. 打开 PC，检查所有绿色 LED 指示灯是否都亮起。如果 LED D5 未激活，请检查以确保 J40 上的跳线分流器已安装。如果每个 USB 端口的绿色 LED（D1 至 D4）均未激活，请检查以确保 J26 上的跳线分流器已安装，并将 IDE 电源连接器插入 J5 中。
7. 当 PC 启动进入 Windows 系统后，用户可能需要安装 TI xHCI 驱动程序。如果 PC 上已安装 Windows xHCI 驱动程序，请继续执行步骤 8。否则，用户必须通过运行 TI xHCI 驱动程序设置实用程序来安装 xHCI 驱动程序。
8. 用户现在可以将器件插入 USB 端口。

2.4 WAKE 测试设置

EVM 板可用于测试 TUSB73X0 上的 WAKE 功能。默认情况下，EVM 未配置为支持 WAKE 测试。如果需要 WAKE，请根据以下各项配置 EVM：

1. 将 J40 上的跳线分流器移至引脚 2 和 3。
2. 确保 J22 上没有跳线分流器。
3. 为 VBUS 使用专用的 5V 电源。请勿使用系统电源提供的 IDE 电源连接器。不使用系统电源所提供 IDE 电源的原因是：当系统处于睡眠或休眠状态时，IDE 电源连接器上的电源会被切断。

备注

部分主板不支持从 PCIe 插槽 WAKE，或者仅在 PCIE X1 插槽上支持该功能。确保使用支持从任何 PCIe 插槽 WAKE 的主板。

3 硬件设计文件

3.1 原理图

以下页面包含 TUSB7340EVM 的原理图。

3.1.1 TUSB7340 DEMO EVM REVC 原理图

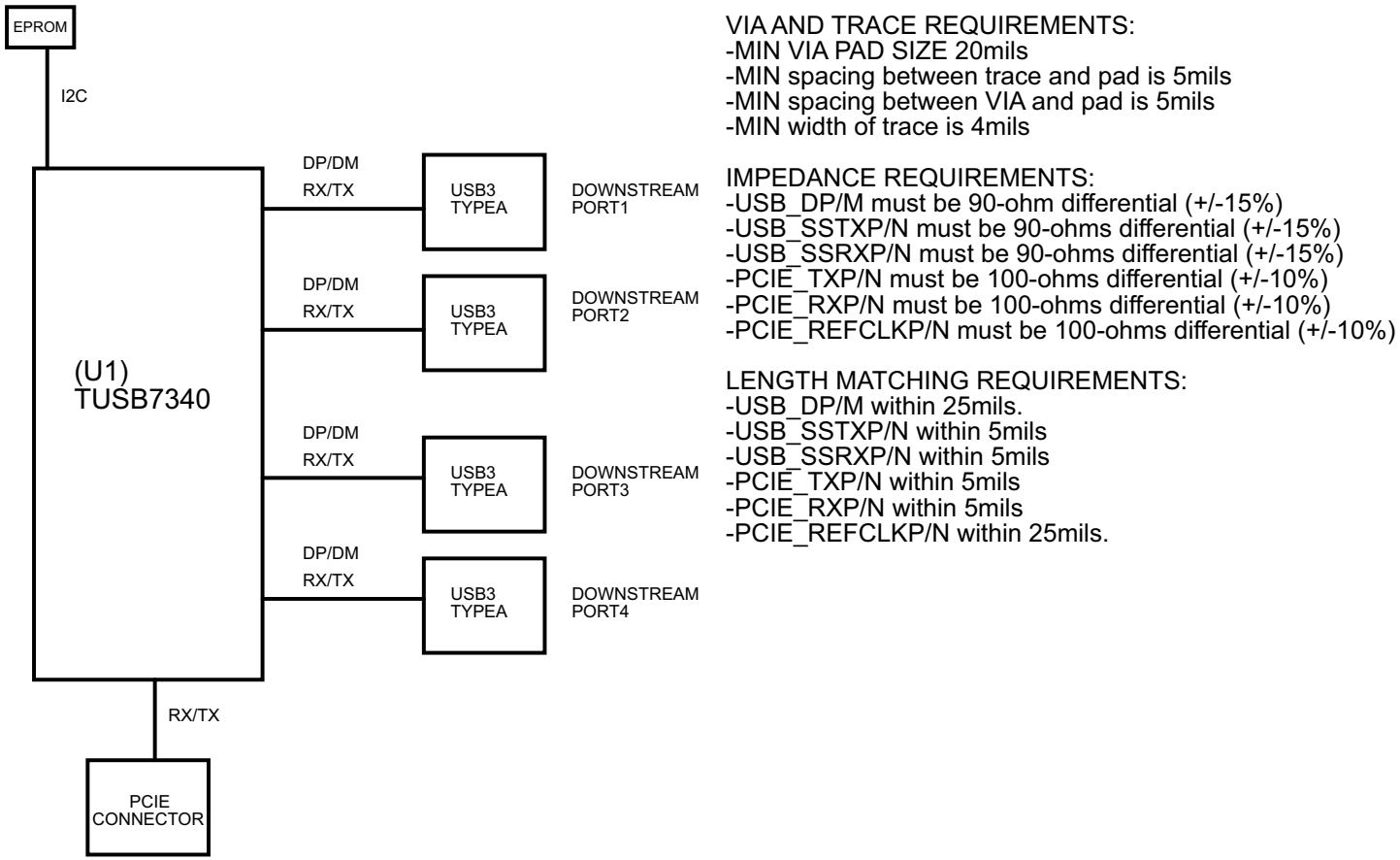


图 3-1. TUSB7340EVM 原理图 (第 1 页)

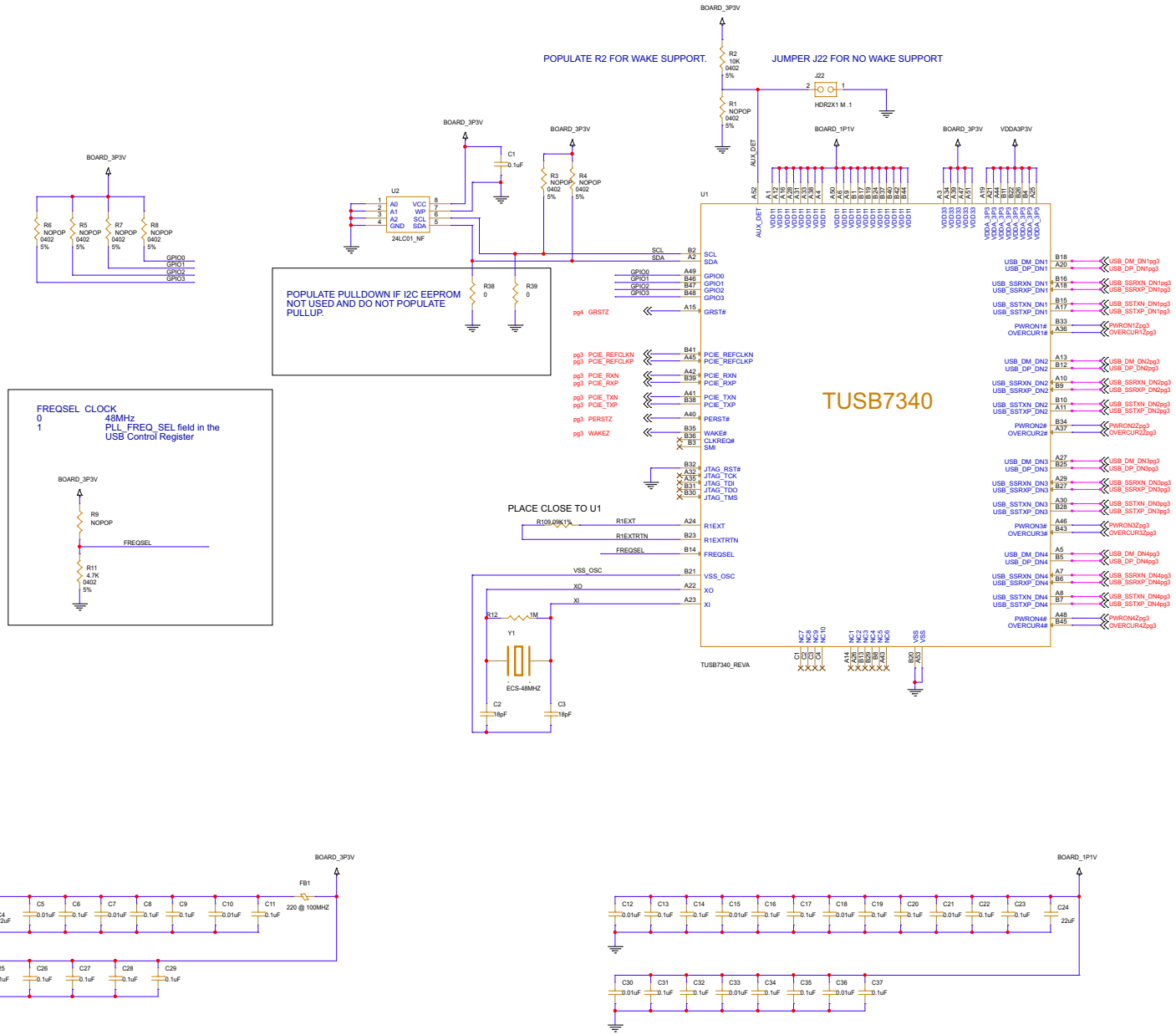


图 3-2. TUSB7340EVM 原理图（第 2 页）

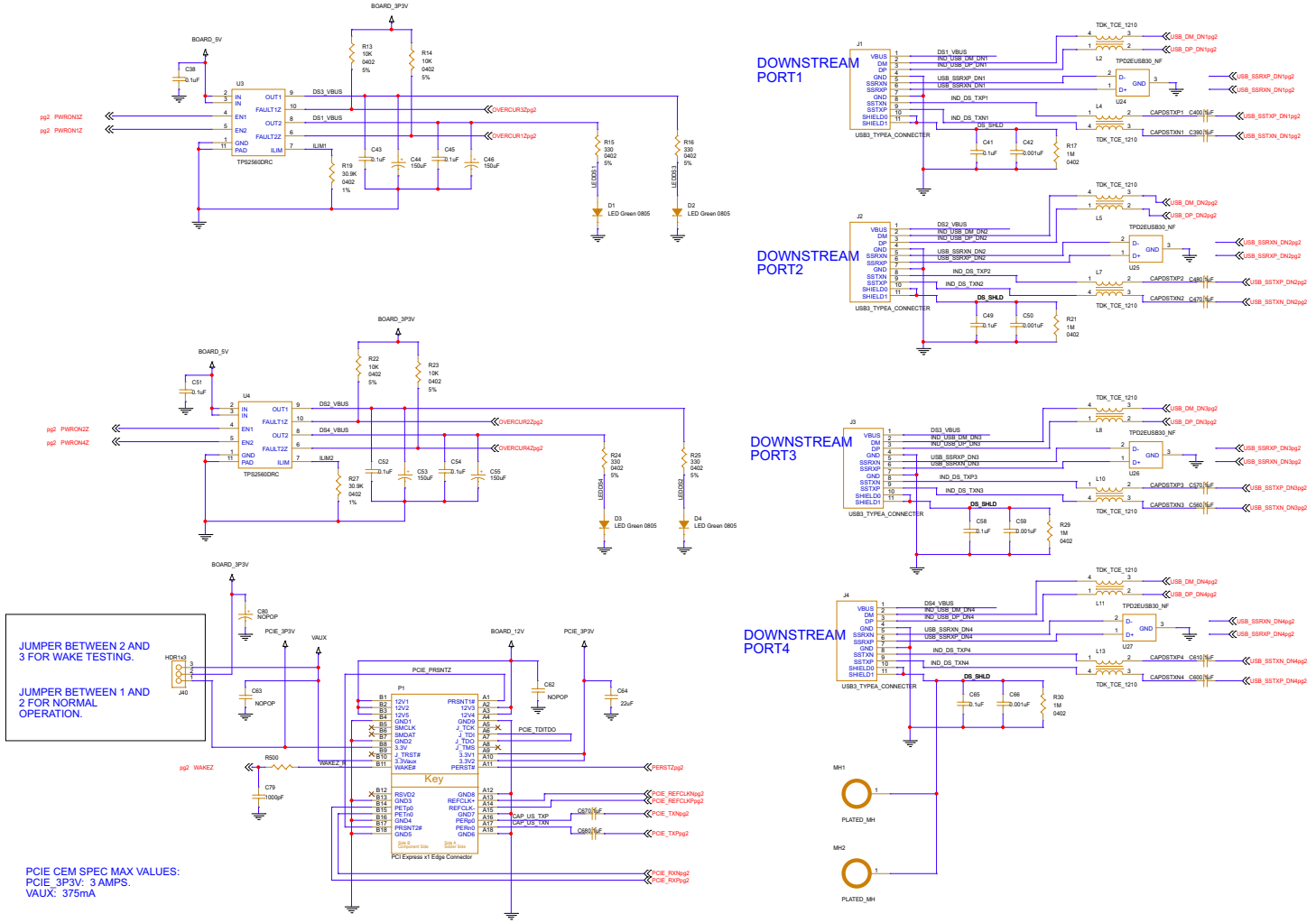
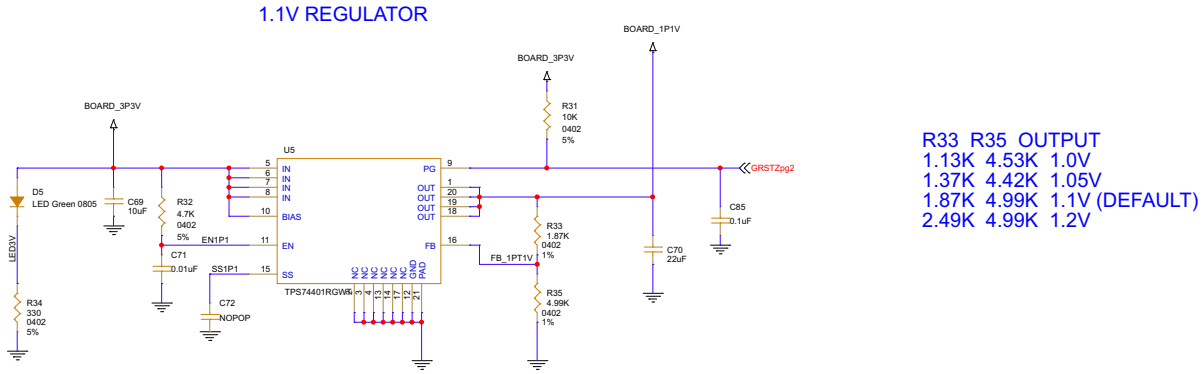
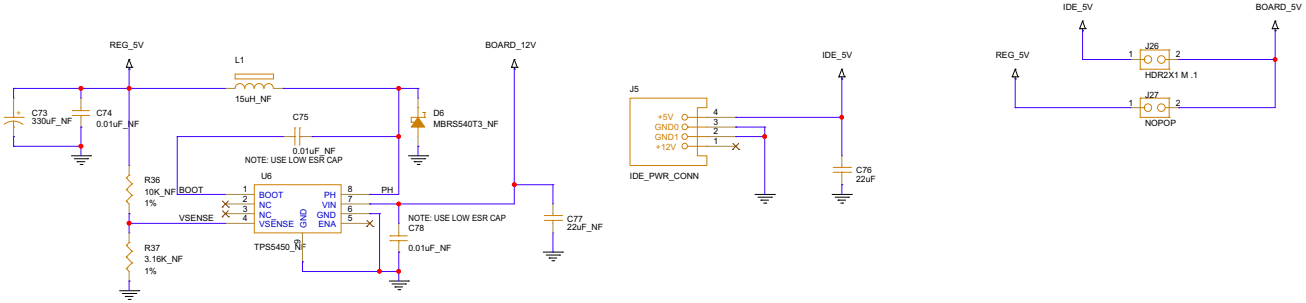


图 3-3. TUSB7340EVM 原理图（第 3 页）



5V VBUS OPTIONS



NOTE: ONLY POPULATE ONE OPTION

图 3-4. TUSB7340EVM 原理图（第 4 页）

3.2 PCB 布局

3.2.1 TUSB7340 PCB 布局

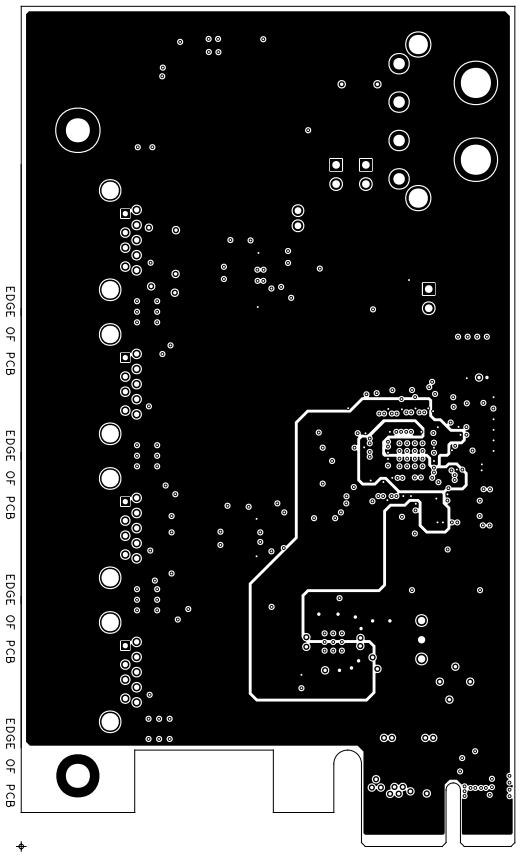


图 3-5. PWR

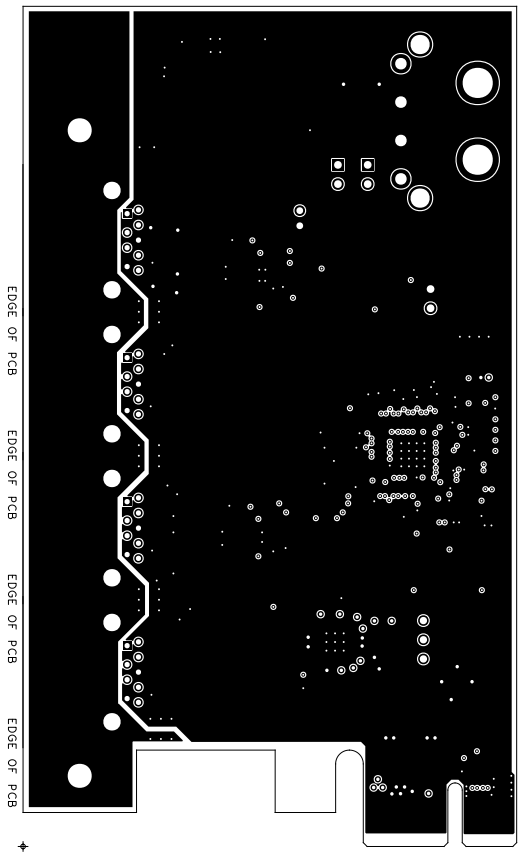


图 3-6. GND

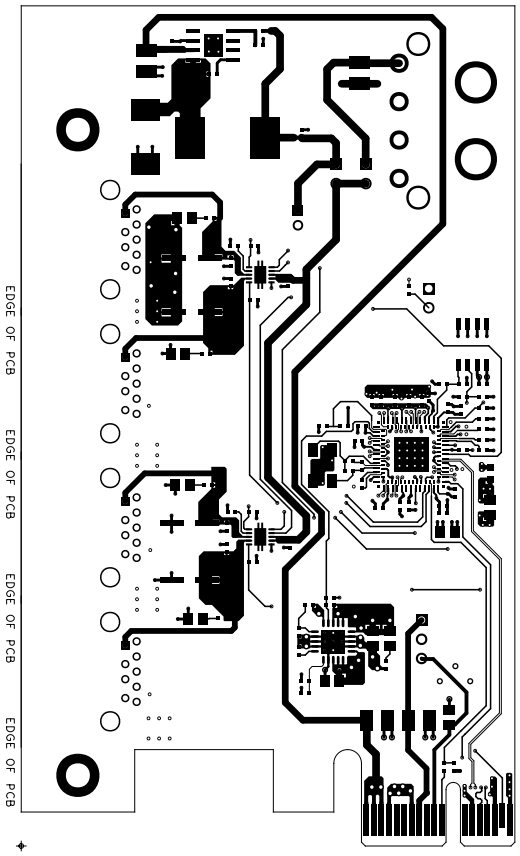


图 3-7. 补偿侧

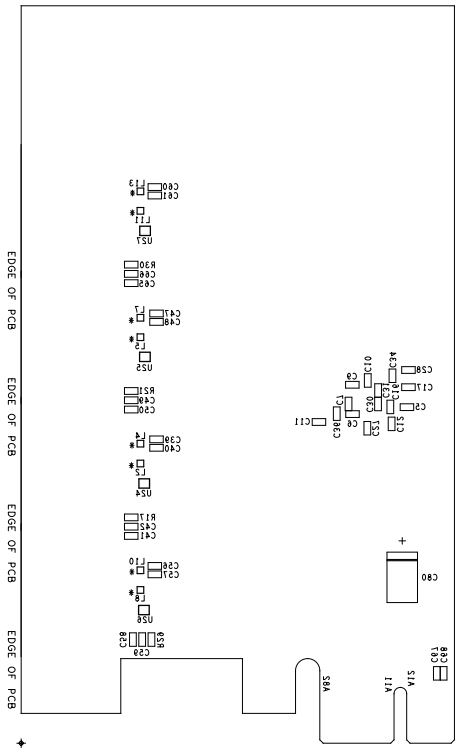


图 3-8. 底部丝印层

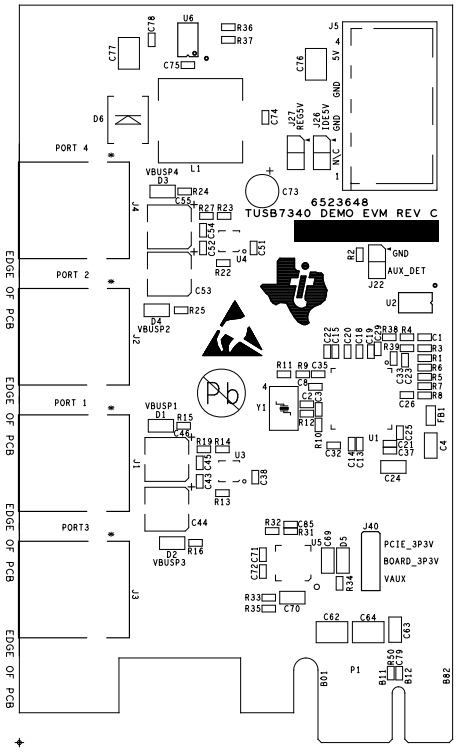


图 3-9. 顶部丝印层

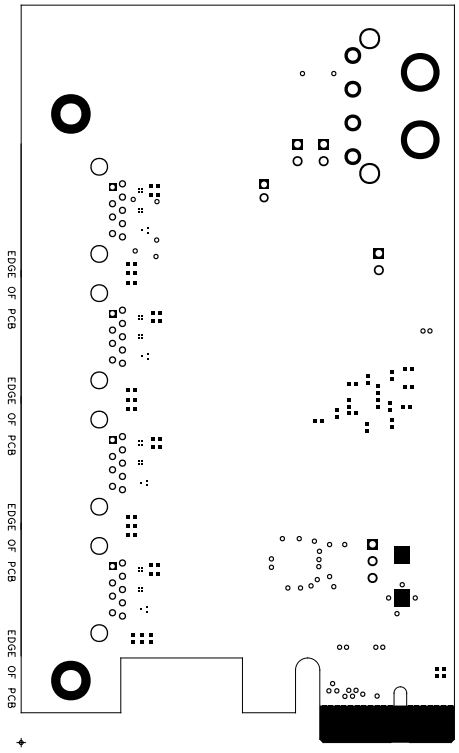


图 3-10. 底部阻焊层

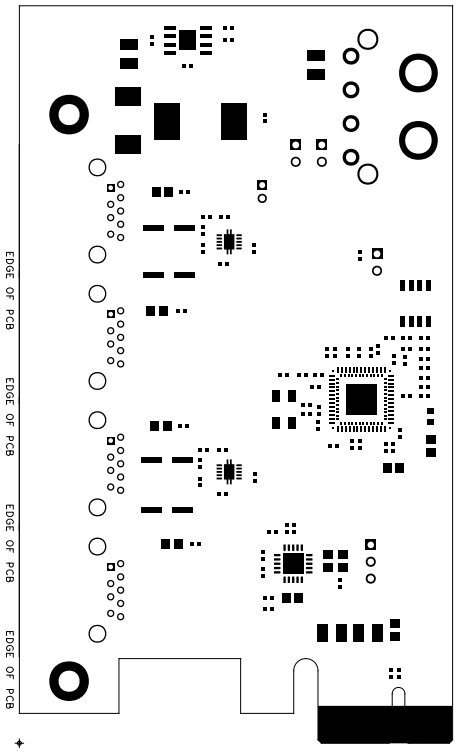


图 3-11. 顶部阻焊层

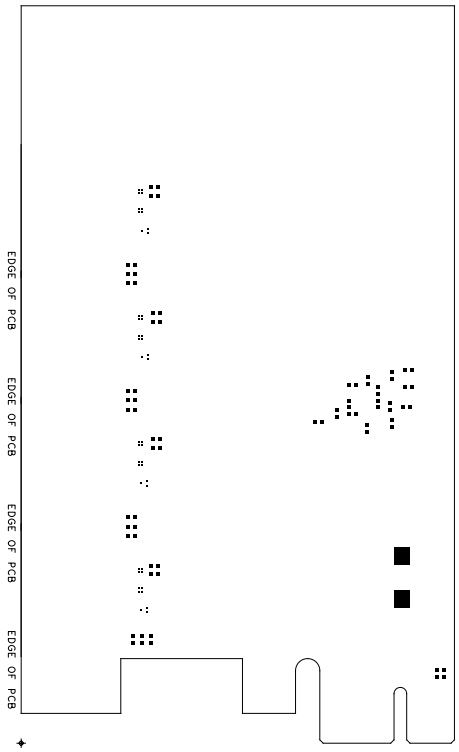


图 3-12. 底部焊锡膏层

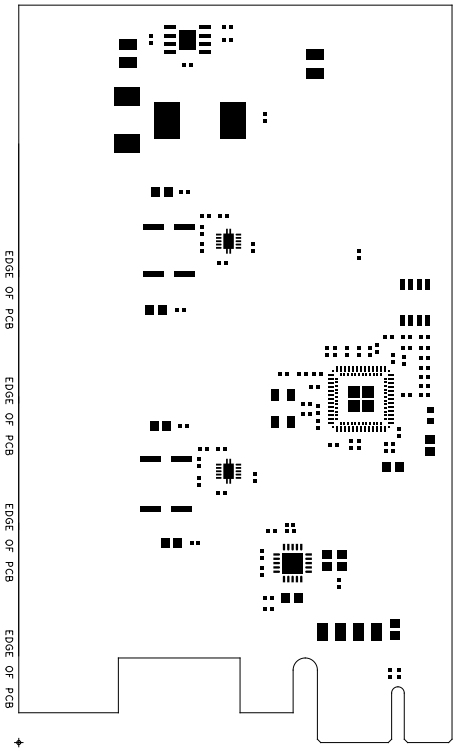


图 3-13. 顶部焊锡膏

3.3 物料清单 (BOM)

3.3.1 TUSB7340 DEMO REVC BOM

下表是 TUSB7340 DEMO EVM REVC 板的物料清单。黄色标记的行是 EVM 板上未安装的元件。

表 3-1. TUSB7340 DEMO REVC BOM

条目	数量	参考	器件	封装	容差	制造商	制造商 PN
1	44	C1、C6、C8、C9、C11、C13、C14、C16、C17、C19、C20、C22、C23、C25、C26、C27、C28、C29、C31、C32、C34、C35、C37、C38、C39、C40、C41、C43、C45、C47、C48、C49、C51、C52、C54、C56、C57、C58、C60、C61、C65、C67、C68、C85	0.1µF	402		Multicomp	MC0402B104K160CT
2	2	C2、C3	18pF	402		Multicomp	MC0402N180J500CT
3	5	C4、C24、C70、C24、C76	22µF	805		TAIYO YUDEN（太阳诱电）	LMK212BJ226MG-T
4	11	C5、C7、C10、C12、C15、C18、C21、C30、C33、C36、C71	0.01µF	402		YAGEO	CC0402KRX7R9BB103
5	4	C42、C50、C59、C66	0.001µF	402		KEMET	C0402C102K5RACTU
6	4	C44、C46、C53、C55	150µF	CASE_D		Panasonic	EEEFP1A151AP
7	11	R1、R3、R4、R5、R6、R7、R8、R9、C62、C63、C72	NOPOP	1210		DNI	DNI
8	1	C69	10µF	805		TAIYO YUDEN（太阳诱电）	EMK212BJ106KG-T
9	1	C73	330µF_NF	1210		DNI	DNI
10	3	C74、C75、C78	0.01µF_NF	402		DNI	DNI
11	1	C77	22µF_NF	1210		DNI	DNI
12	1	C79	1000pF	402		KEMET	C0402C102K5RACTU
13	1	C80	NOPOP	7343		DNI	DNI
14	5	D1、D2、D3、D4、D5	LED 绿色 0805	805		Lumex	SML-LX0805GC-TR
15	1	D6	MBRS540T3_NF	DIODE_SMC		On Semiconductor	MBRS540T3G

表 3-1. TUSB7340 DEMO REVC BOM（续）

条目	数量	参考	器件	封装	容差	制造商	制造商 PN
16	1	FB1	220 @ 100MHZ	603		MuRata	BLM18EG221SN1D
17	4	J1、J2、J3、J4	USB3_TYPEA	USB3_TYPEA		Molex	484050003
18	1	J5	IDE_PWR_CONN	IDEPWR		Molex	15-24-4441
19	2	J22、J26	HDR2X1 M .1	HDR_2X1		Molex	22-28-4022
20	1	J27	NOPOP	HDR_2X1		DNI	DNI
21	1	J40	HDR1x3	berg1x3		FCI	69190-103HLF
22	1	L1	15µH_NF	DR127		DNI	DNI
23	8	L2、L4、L5、L7、L8、L10、L11、L13	DLM0QSB120HY2D	TDK_TCE_1210		Murata	DLM0QSB350HY2#
24	2	MH1、MH2	PLATED_MH	MH_125mil		DNI	DNI
25	1	P1	PCI Express x1 Edge	PCIe_X1		DNI	DNI
26	6	R2、R13、R14、R22、R23、R31	10K	402	5%	Vishay	CRCW040210K0JNED
27	1	R10	9.09K	402	1%	Vishay	CRCW04029K09FKED
28	2	R11、R32	4.7K	402	5%	Vishay	CRCW04024K70JNED
29	5	R12、R17、R21、R29、R30	1M	402	5%	Vishay	CRCW04021M00JNED
30	5	R15、R16、R24、R25、R34	330	402	5%	Vishay	CRCW0402330RJNED
31	2	R19、R27	30.9K	402	1%	Vishay	CRCW040230K9FKED
32	1	R33	1.87K	402	1%	Vishay	CRCW04021K87FKED
33	1	R35	4.99K	402	1%	Vishay	CRCW04024K99FKED
34	1	R36	10K_NF	402	1%	DNI	DNI
35	1	R37	3.16K_NF	402	1%	DNI	DNI
36	3	R38、R39、R50	0	402	5%	Vishay	CRCW04020000Z0ED
37	1	U1	TUSB7340QFN	100_QFN		TI	TUSB7340QFN
38	1	U2	24LC01_NF	8_SOIC		MicroChip Tech	24LC01BT-I/SN
39	2	U3、U4	TPS2560DRC	10_DRC		TI	TPS2560DRC
40	1	U5	TPS74401RGWT	20_RGW		TI	TPS74401RGWT
41	1	U6	TPS5450_NF	DDA		TI	TPS5450DDAR
42	4	U24、U25、U26、U27	TPD2EUSB30	DRT_sot23		TI	TPD2EUSB30DRT
43	1	Y1	ECS-48MHZ	ECX-53B		Abracon	ABM3B-48.000MHZ-B2-T

4 其他信息

4.1 商标

所有商标均为其各自所有者的财产。

5 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 C (May 2014) to Revision D (June 2025)	Page
• 从用户指南中删除了器件 TUSB7320	1
• 更改了 TUSB7340 原理图。	5
• 更新了 TUSB7340 PCB 布局	9

Changes from Revision B (August 2012) to Revision C (May 2014)	Page
• 更改了第 6 章的全部内容：原理图采用版本 B_48	4

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.

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最后更新日期：2025 年 10 月