

EVM User's Guide: TUSB7340EVM

TUSB7340 Evaluation Model



Description

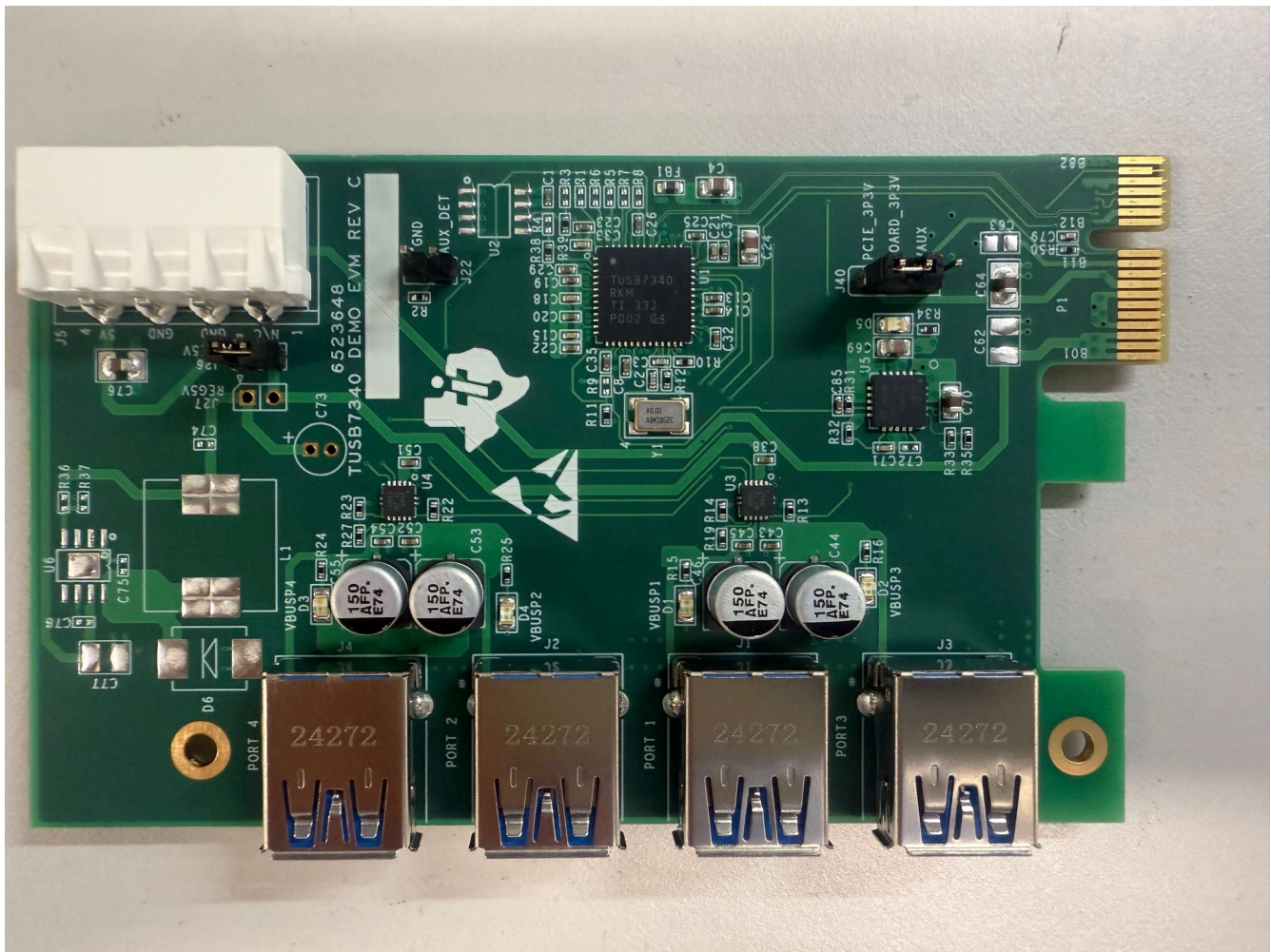
The TUSB7340 is a USB 3.0 xHCI 0.96 compliant host controller that supports up to four downstream ports. The TUSB7340 interfaces to the host system through a PCIe x1 Gen 2 interface and provides SuperSpeed, High-speed, Full-speed, or Low-speed connections on the downstream USB ports.

Features

- PCI Express Gen 2 x1 host interface
- xHCI compliant
- Four downstream ports supporting SuperSpeed, High-speed, Full-speed/Low-speed connections
- Optional serial EEPROM for custom configuration

Applications

- Desktops
- Servers



TUSB7340EVM

1 Evaluation Module Overview

1.1 Introduction

This guide is intended to describe the necessary information needed to operate TUSB7340 DEMO EVM REVC boards. This document explains how to setup and use the EVM boards. The schematics and bill of materials are also listed at the end of the document.

2 Hardware

2.1 EVM Board

2.1.1 TUSB7340 DEMO Boards

TUSB7340 DEMO boards are PCI Express X1 Standard Height cards. The dimensions of boards are 4.376 inches by 2.571 inches.

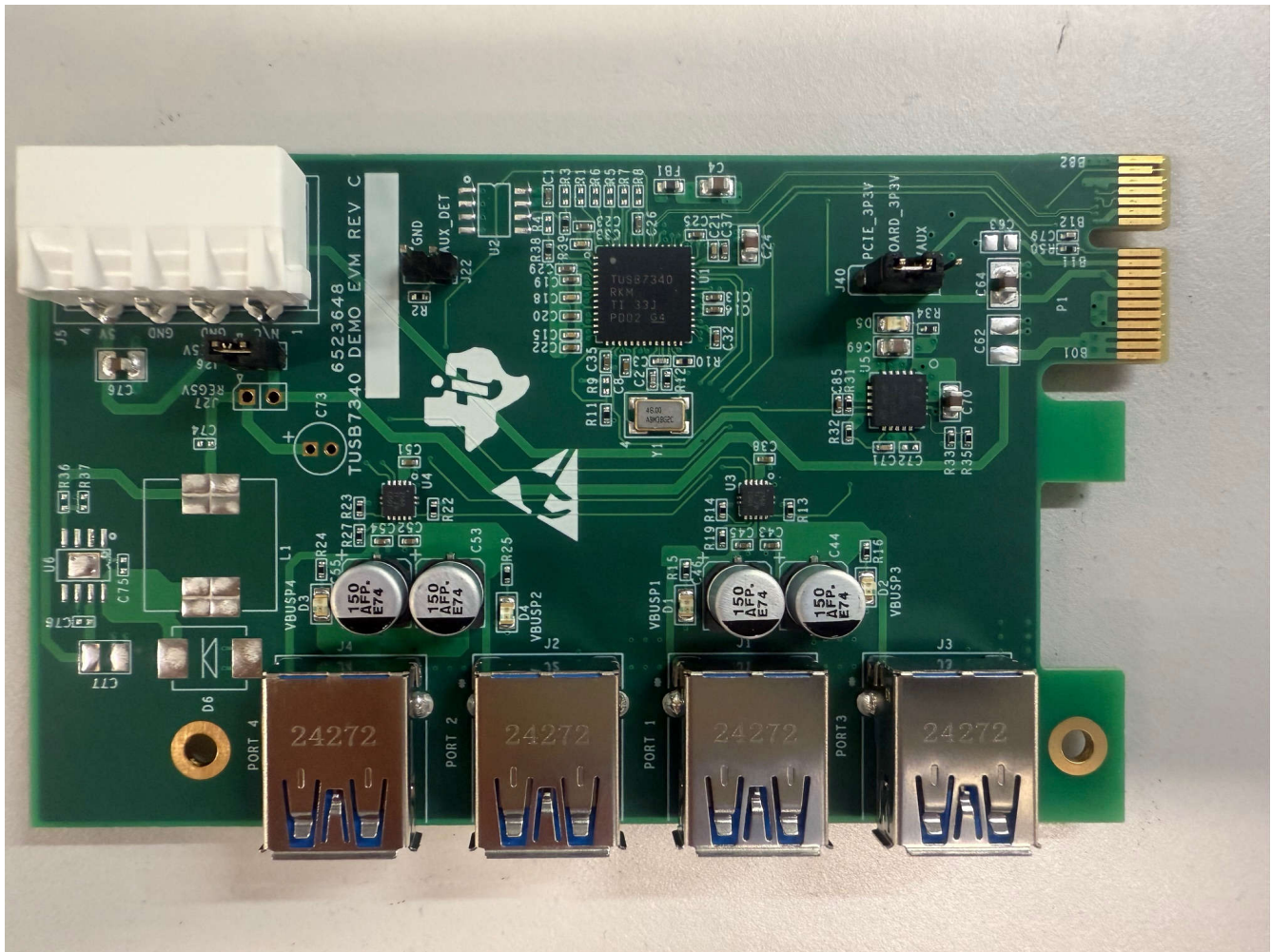


Figure 2-1. TUSB7340 DEMO EVM REVC

2.2 Hardware Setup

2.2.1 Power

The EVM boards are populated with three headers: J22, J26, and J40.

J22 header is used to change the state of AUX_DET signal to the TUSB73XX. By default, this header is not shorted and therefore AUX_DET is high. If a jumper shunt is placed over J22, the AUX_DET is low.

The J26 header is used to route 5V from the IDE Power Connector (J5) to the Texas Instruments TPS2560 USB power switch. This header is designed to always have a Jumper Shunt populated. For more information on the Texas Instruments TPS2560, go to www.ti.com.

J40 header is used to select the 3.3V power source for the TUSB7340. By default, a Jumper Shunt is populated across pins 1 and 2 of J40. When in this position, the 3.3V power from the PCI Express slot is routed to the TUSB7340. If the Jumper Shunt is moved to pins 2 and 3, then the 3.3V VAUX power from the PCI Express slot is routed to the TUSB7340. Only move the Jumper Shunt to positions 2 and 3 if wake testing is required. Otherwise, leave the jumper in the default position of 1 and 2.

Note

The 3.3V VAUX power supply has a limited current capability. According to the PCI Express Electromechanical Spec, the 3.3V VAUX has a maximum current of 375mA. Due to the limited current of 3.3V VAUX, TI recommends to only plug one device into the TUSB73X0. If the Jumper Shunt is left on pins 1 and 2 of J40, this current limitation does not exist and therefore all ports of the TUSB7340 can be used.

2.2.2 VBUS

VBUS for all of the USB ports comes from the IDE Power Connector (J5).

2.2.3 PCI Express Slot Options

The TUSB7340 EVM boards are PCI Express X1, therefore the boards can be used in any PCI Express Slot (X1, X4, X8, or X16) on a typical motherboard. The boards can be used in either a PCI Express Gen1 (2.5Gbps) or Gen2 (5Gbps) slot. Due to the speed of USB3 (5Gbps), the performance of the TUSB7340 is negatively impacted if the EVM board is used in a PCI Express Gen1 slot. For this reason, TI recommends to always insert the EVM board into a PCI Express Gen2 slot.

2.3 Bringup

To bring up the EVM board in a typical system, follow these steps:

1. Remove the power plug from the PC power supply.
2. Make sure the Jumper Shunts are populated on J26 and J40.
3. Insert the EVM board into a PCI Express slot. TI recommends to use a PCI Express Gen2 slot if one is available.
4. Insert an IDE Power Connector into J5 of the EVM board.
5. Insert the power plug into the PC power supply.
6. Turn the PC on and check to see if all of the green LEDs are ON. If LED D5 is not active, check to make sure the jumper shunt on J40 is populated. If none of the green LEDs (D1 through D4) for each USB Port are active, check to make sure the Jumper Shunt on J26 is populated and an IDE Power connector is plugged into J5.
7. When the PC has booted into Windows system, the user may need to install the TI xHCI driver. If the Windows xHCI driver has already been installed on the PC, then proceed step 8. Otherwise, the user must install the xHCI driver by running the TI xHCI driver setup utility.
8. The user can now insert devices into the USB ports.

2.4 WAKE Testing Setup

The EVM board can be used to test the WAKE functionality of the TUSB73X0. By default, the EVM is not configured to support wake testing. Configure the EVM according to the following if WAKE is required:

1. Move the Jumper Shunt on J40 to pins 2 and 3.
2. Make sure there is no Jumper Shunt on J22.
3. Use a dedicated 5V power supply for VBUS. Do NOT use the IDE Power connector provided from the system power supply. The reason for not using the IDE power from system power supply is when the system is put in a sleep or hibernate state, the power on the IDE Power connector is turned off.

Note

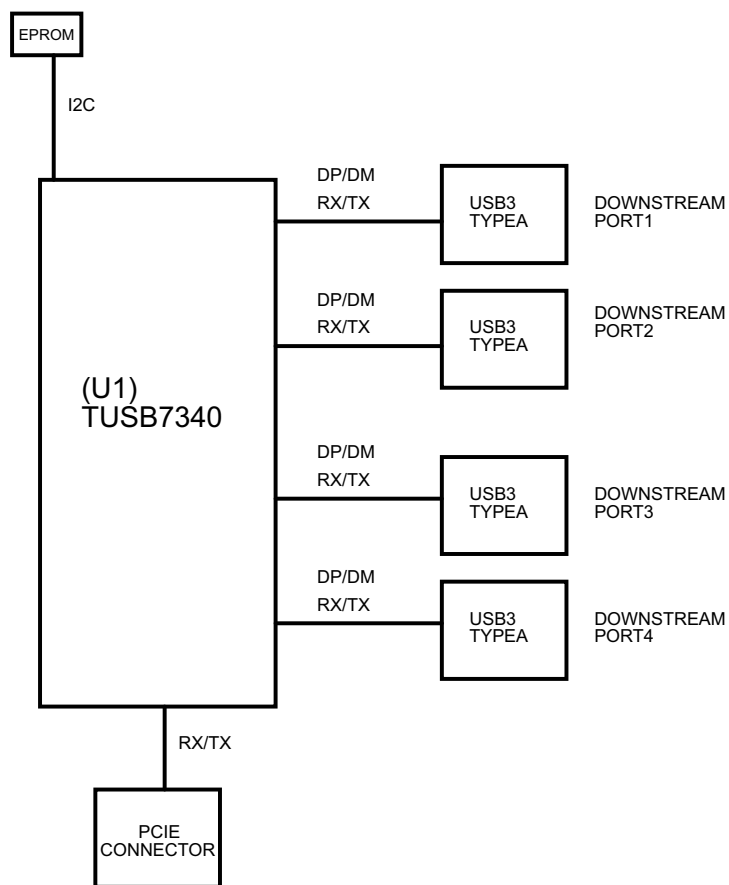
For some motherboards, WAKE from a PCIe slot is not supported or is only supported on PCIe X1 slots. Make sure to use a motherboard that supports WAKE from any PCIe slot.

3 Hardware Design Files

3.1 Schematics

The following pages contain schematics for TUSB7340EVM.

3.1.1 TUSB7340 DEMO EVM REVC Schematics



VIA AND TRACE REQUIREMENTS:

- MIN VIA PAD SIZE 20mils
- MIN spacing between trace and pad is 5mils
- MIN spacing between VIA and pad is 5mils
- MIN width of trace is 4mils

IMPEDANCE REQUIREMENTS:

- USB_DP/M must be 90-ohm differential (+/-15%)
- USB_SSTXP/N must be 90-ohms differential (+/-15%)
- USB_SSRXP/N must be 90-ohms differential (+/-15%)
- PCI E_TXP/N must be 100-ohms differential (+/-10%)
- PCI E_RXP/N must be 100-ohms differential (+/-10%)
- PCI E_REFCLKP/N must be 100-ohms differential (+/-10%)

LENGTH MATCHING REQUIREMENTS:

- USB_DP/M within 25mils.
- USB_SSTXP/N within 5mils
- USB_SSRXP/N within 5mils
- PCI E_TXP/N within 5mils
- PCI E_RXP/N within 5mils
- PCI E_REFCLKP/N within 25mils.

Figure 3-1. TUSB7340EVM Schematic (Page 1)

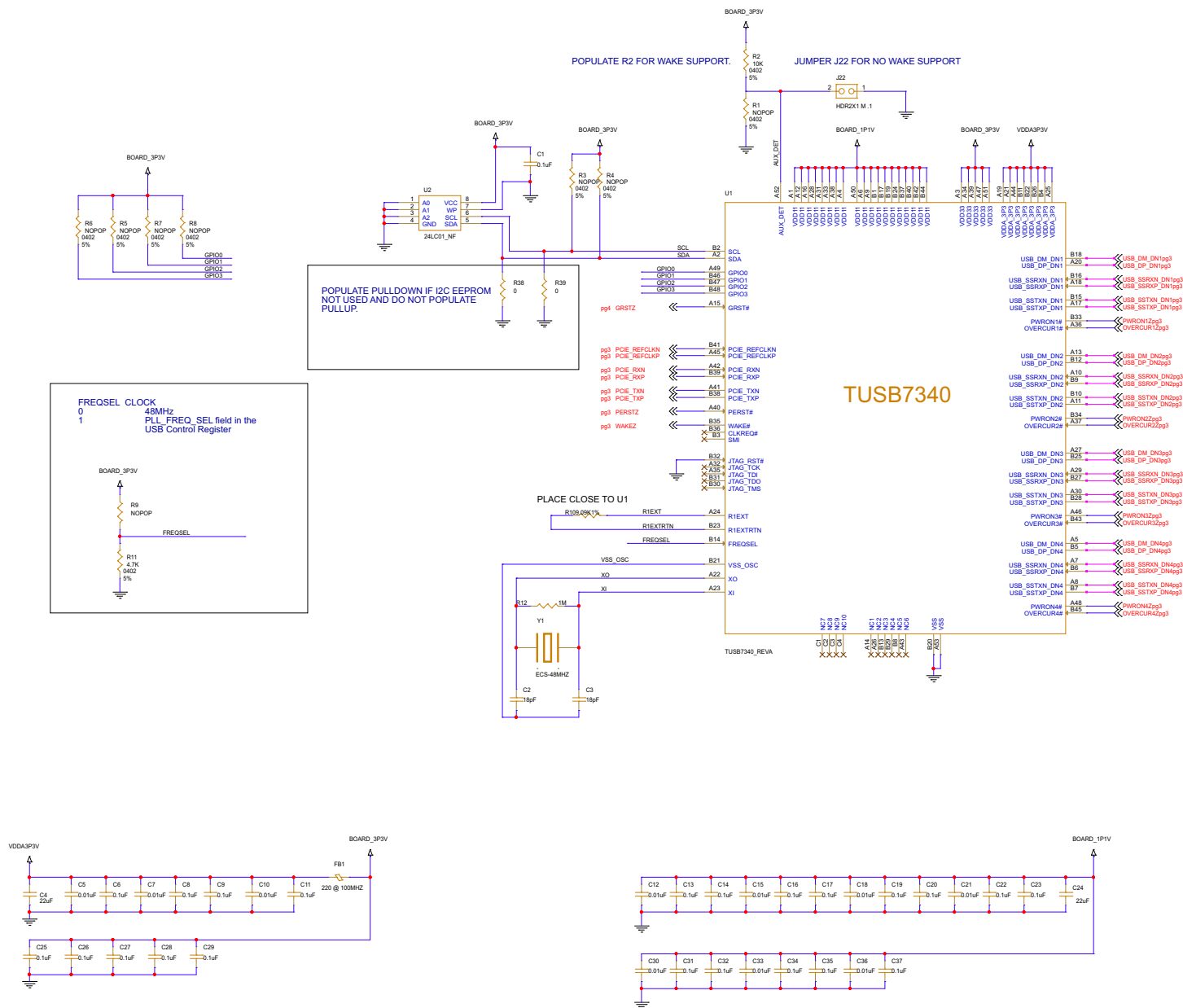


Figure 3-2. TUSB7340EV M Schematic (Page 2)

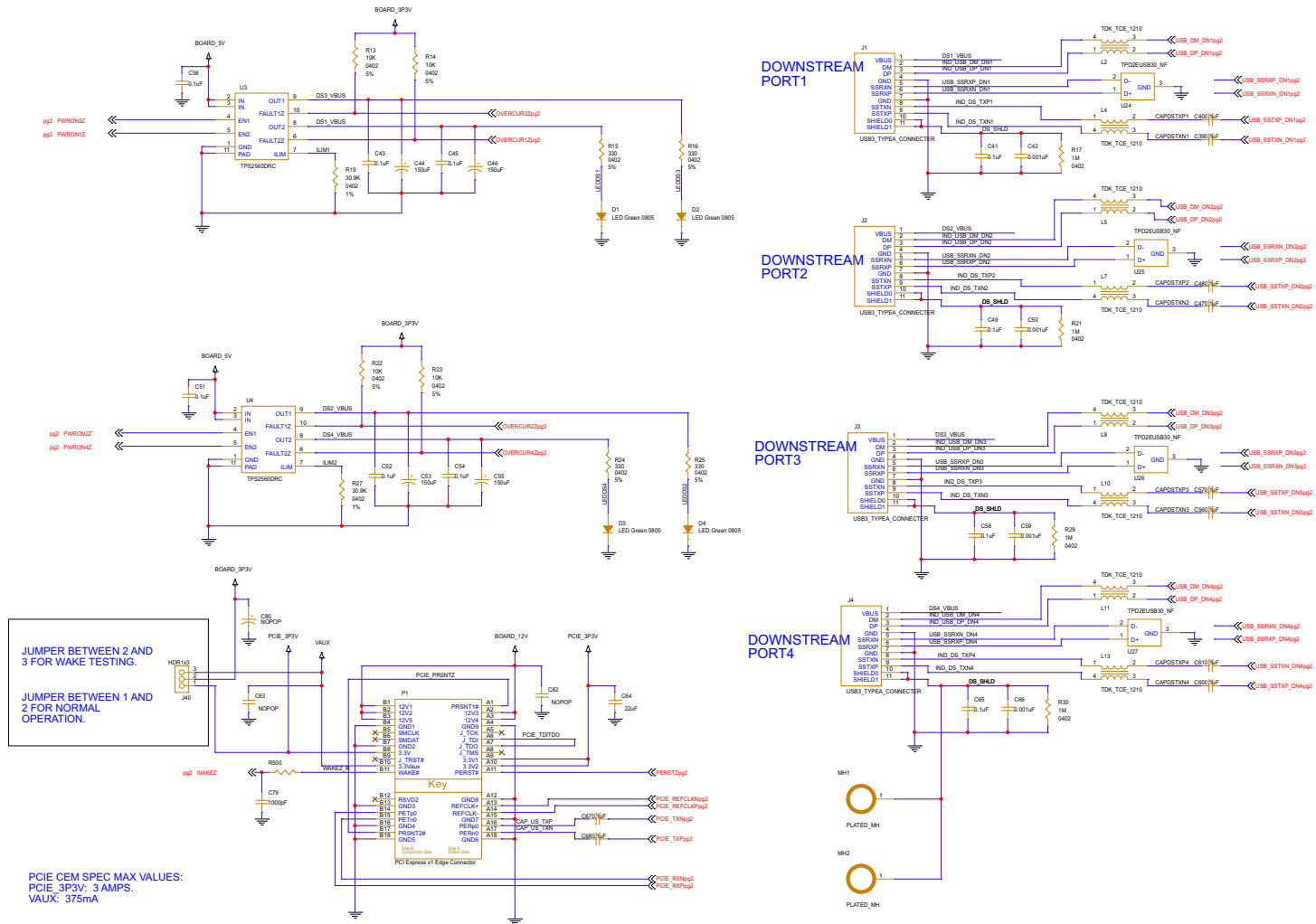
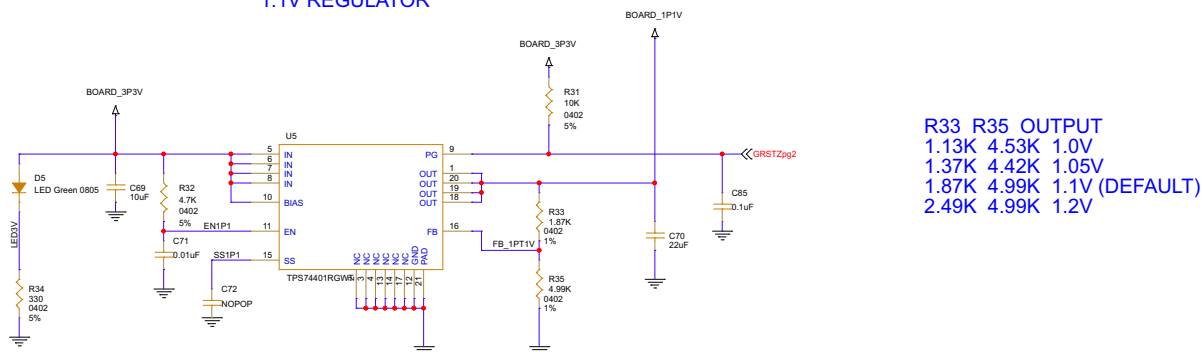


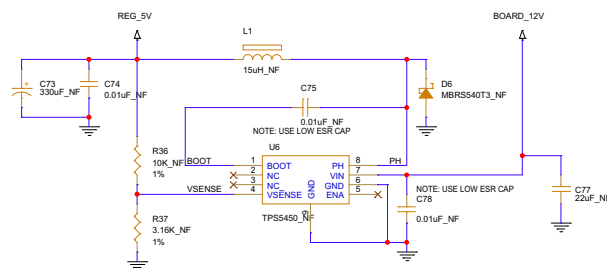
Figure 3-3. TUSB7340EVM Schematic (Page 3)

1.1V REGULATOR

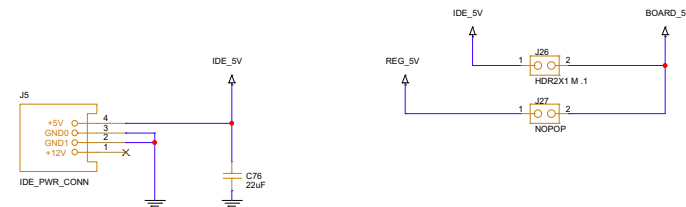


5V VBUS OPTIONS

OPTION 1: 5V REGULATOR



OPTION 2: 5V FROM IDE CONNECTOR



NOTE: ONLY POPULATE ONE OPTION

Figure 3-4. TUSB7340EVM Schematic (Page 4)

3.2 PCB Layouts

3.2.1 TUSB7340 PCB Layouts

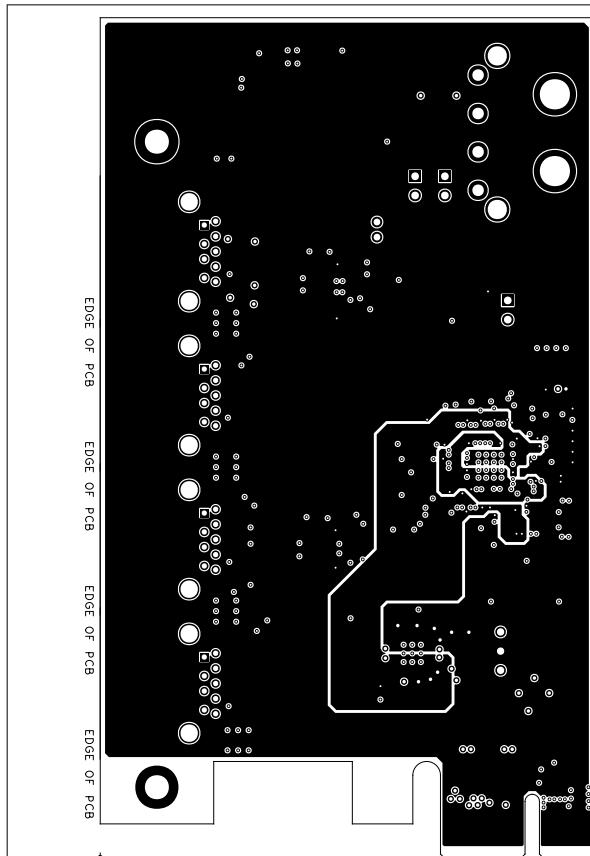


Figure 3-5. PWR

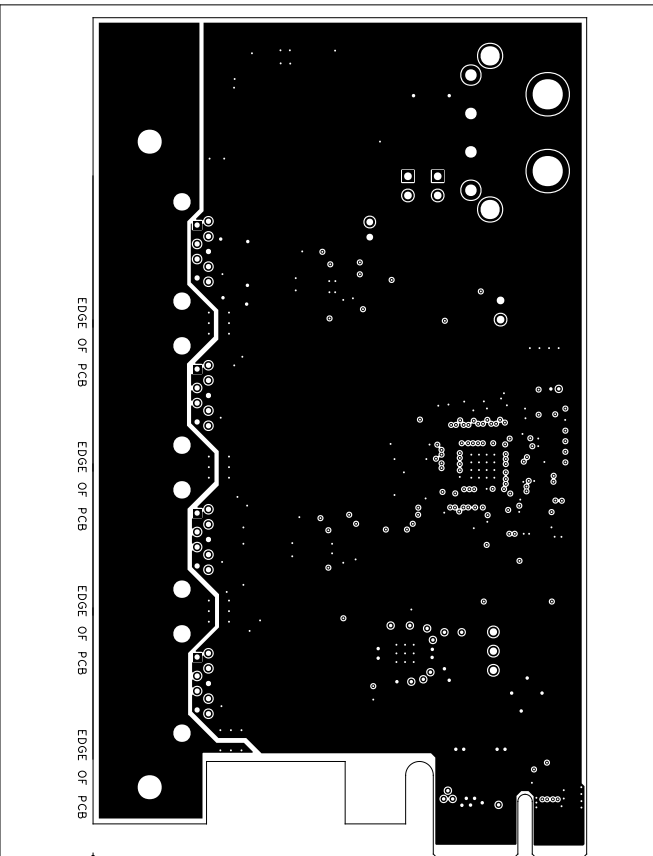


Figure 3-6. GND

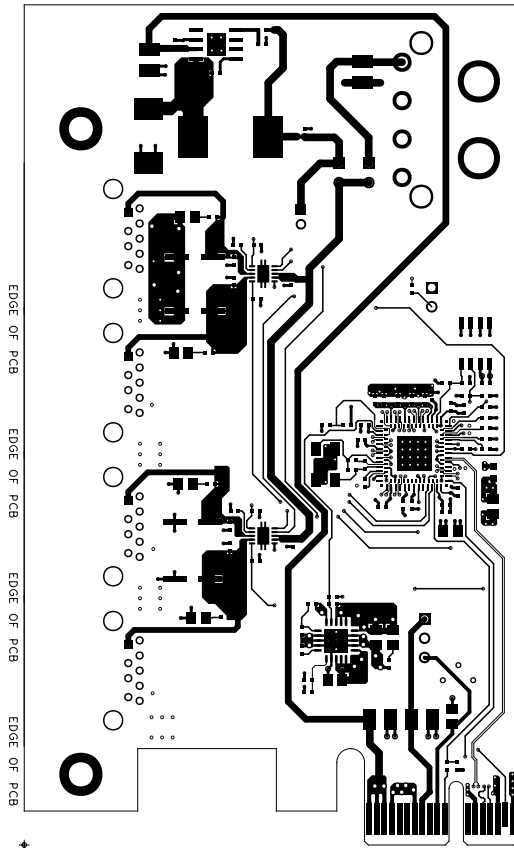


Figure 3-7. Comp Side

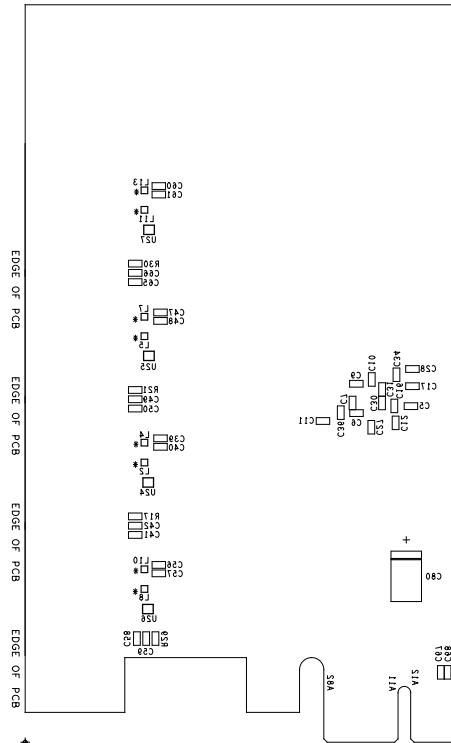


Figure 3-8. Silkscreen Bottom

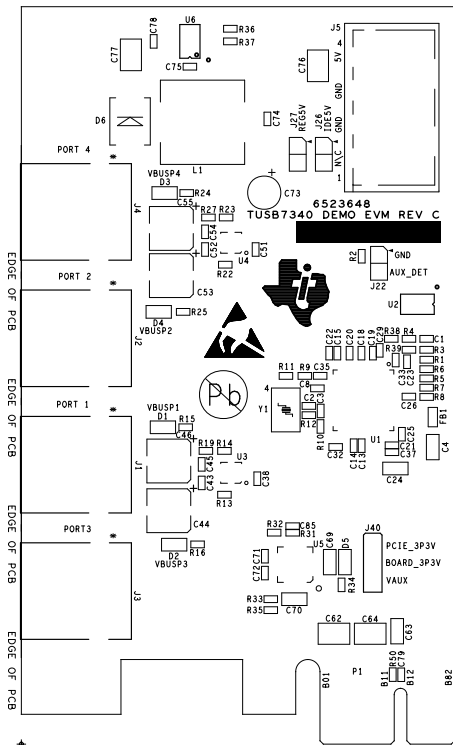


Figure 3-9. Silkscreen Top

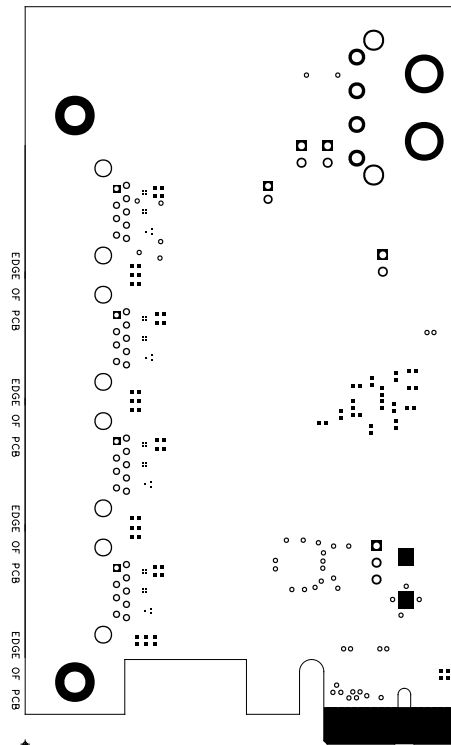


Figure 3-10. Soldermask Bottom

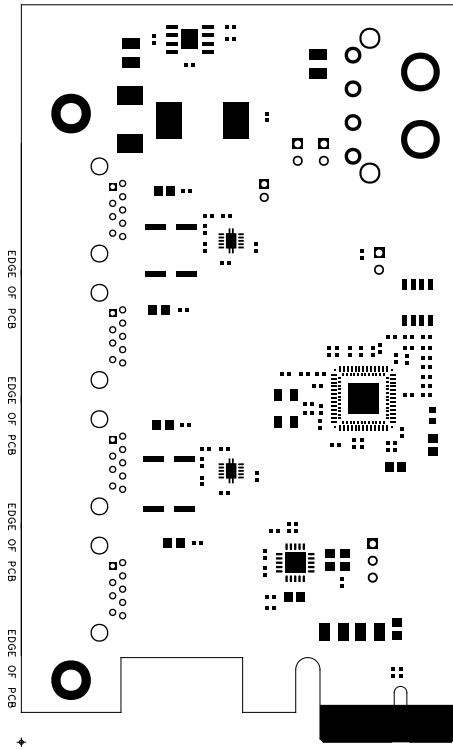


Figure 3-11. Soldermask Top

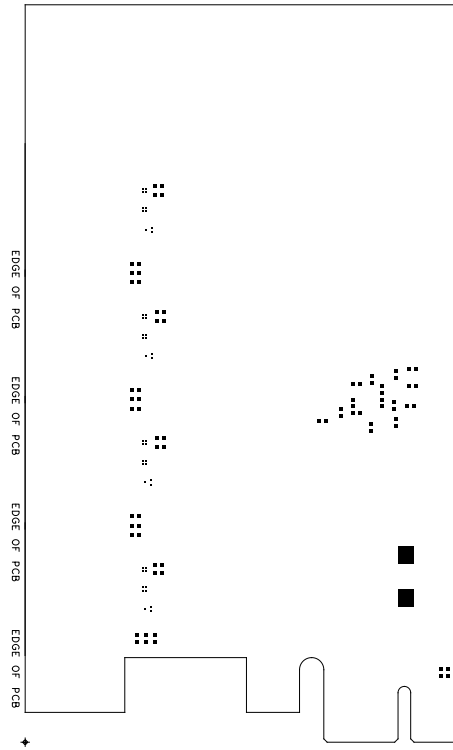


Figure 3-12. Pastemask Bottom

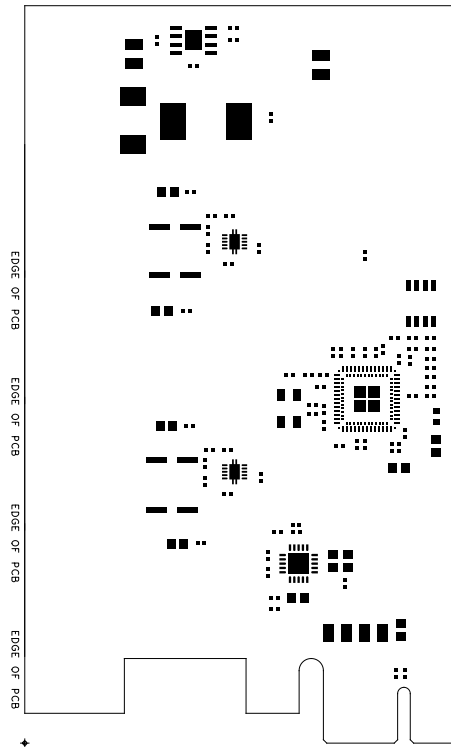


Figure 3-13. Pastemask Top

3.3 Bill of Materials (BOM)

3.3.1 TUSB7340 DEMO REVC BOM

The below table is the bill of materials for the TUSB7340 DEMO EVM REVC board. The rows marked in yellow are components that are not populated on the EVM board.

Table 3-1. TUSB7340 DEMO REVC BOM

Item	Quantity	Reference	Part	Footprint	Tolerance	Manufacturer	Manufacturer 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	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	EEF1P1A151AP
7	11	R1,R3,R4,R5,R6,R7,R8,R9,C62,C63,C72	NOPOP	1210		DNI	DNI
8	1	C69	10μF	805		TAIYO YUDEN	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 Green 0805	805		Lumex	SML-LX0805GC-TR
15	1	D6	MBRS540T3_NF	DIODE_SMC		On Semiconductor	MBRS540T3G
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

Table 3-1. TUSB7340 DEMO REVC BOM (continued)

Item	Quantity	Reference	Part	Footprint	Tolerance	Manufacturer	Manufacturer PN
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 Additional Information

4.1 Trademarks

All trademarks are the property of their respective owners.

5 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Revision C (May 2014) to Revision D (June 2025)	Page
• Deleted device TUSB7320 from the user's guide.....	1
• Changed the TUSB7340 schematic.....	5
• Updated the TUSB7340 PCB Layouts.....	9

Changes from Revision B (August 2012) to Revision C (May 2014)	Page
• Changed entire contents of Chapter 6: Schematics with Rev. B_48	4

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 - 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.

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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.

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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

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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.

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- 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.
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