

TUSB1064RNQ Evaluation Module

This user's guide describes the characteristics and use of the TUSB1064RNQ evaluation module. This document also describes how to power up the EVM and includes schematics that can be used as reference design for the Alternate mode implementations of the system with the TUSB1064 device.

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Trademarks

USB Type-C is a trademark of USB Implementers Forum.
 DisplayPort is a trademark of Video Electronics Standards Association.
 VESA is a registered trademark of Video Electronics Standards Association.
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1 Introduction

The TUSB1064 device is a USB Type-C™ / VESA® DisplayPort™ (DP) alternate mode redriving switch supporting data rates up to 10 Gbps for a USB Type-C upstream facing port (UFP).

2 TUSB1064RNQ EVM

Figure 1 shows the TUSB1064RNQ EVM.

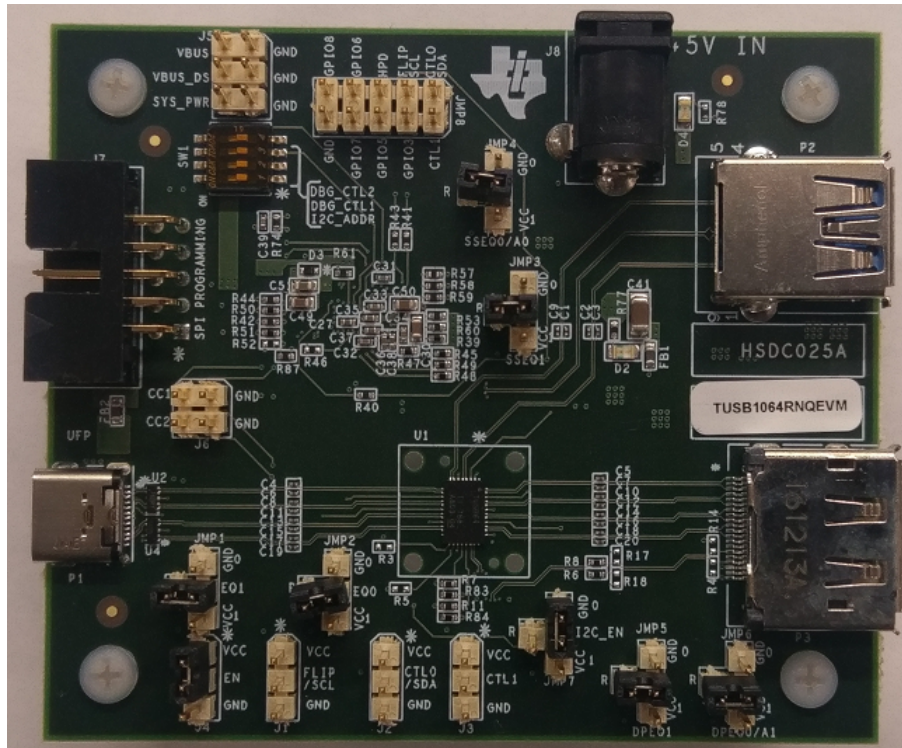


Figure 1. TUSB1064RNQ EVM

The TUSB1064RNQ EVM can be used with an Alternate mode USB Type-C source such as the TUSB1046 EVM and/or USB or DisplayPort USB Type-C Host system to evaluate the USB Type-C implementation. Figure 2 shows a typical test setup.

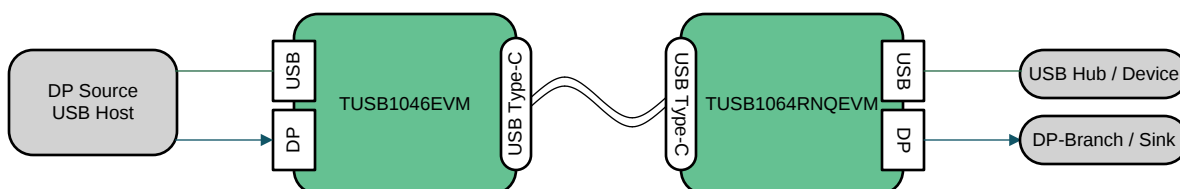


Figure 2. Test Board Setup

The TUSB1064RNQ EVM has a legacy Type-A USB receptacle to connect to a USB hub or device and a DisplayPort receptacle to connect to DisplayPort sink. The EVM uses TI's TPS65986 device for USB Type-C PD control and to configure the TUSB1064.

3 TUSB1064RNQ EVM Configuration

This section provides the configuration options available in the TUSB1064RNQ EVM.

3.1 TUSB1064RNQ EVM Default Configuration

[Table 1](#) lists the default configuration pins for the TUSB1064 device. Configuration settings may need to be optimized depending on the amount of loss of each channel in the system. The EVM is configured to GPIO mode by default. If I2C configuration is desired, JMP7 (I2C_EN) shunt must be changed to shunt pins 2-3 (VCC).

Table 1. TUSB1064 Configuration Pins

Reference Designator	JMP Control	Configuration
JMP1	Downstream EQ1	SHUNT on pin 2-4 (R – 20k to GND)
JMP2	Downstream EQ0	SHUNT on pin 2-4 (R – 20k to GND)
JMP3	Downstream SSEQ1	SHUNT on pin 2-4 (R – 20k to GND)
JMP4	Downstream SSEQ0	SHUNT on pin 2-4 (R – 20k to GND)
JMP5	DP EQ1	SHUNT on pin 2-4 (R – 20k to GND)
JMP6	DP EQ0	SHUNT on pin 2-4 (R – 20k to GND)
JMP7	I2C_EN	SHUNT on pin 1-2 (GND)
J1	FLIP	No SHUNT
J2	CTL0	No SHUNT
J3	CTL1	No SHUNT
J4	EN	SHUNT on pin 1-2 (PU)

3.2 TUSB1064 Equalization Control

Equalization (EQ) can be controlled through I2C or pin-strapping (see [Table 2](#)). Each TUSB1064 receiver lane has individual controls for receiver equalization. [Table 3](#) and [Table 4](#) detail the gain values for each available combination for downstream, upstream, and all DisplayPort configurations.

Table 2. Configuration Pin Level Definitions

Level	Settings
0	Option 1: Tie 1 kΩ 5% to GND. Option 2: Tie directly to GND.
R	Tie 20 kΩ 5% to GND.
F	Float (leave pin open)
1	Option 1: Tie 1 kΩ 5% to VCC. Option 2: Tie directly to VCC.

Table 3. USB 3.1 EQ Settings

USB 3.1 Downstream Facing Ports			USB 3.1 Upstream Facing Ports		
EQ1 Pin Level	EQ1 Pin Level	EQ Gain at 5 GHz (dB)	SSEQ1 Pin Level	SSEQ1 Pin Level	EQ Gain at 5 GHz (dB)
0	0	–3.0	0	0	–1.5
0	R	–0.8	0	R	0.7
0	F	–0.7	0	F	2.2
0	1	2.2	0	1	3.7
R	0	3.3	R	0	4.7
R	R	4.3	R	R	5.8
R	F	5.1	R	F	6.6
R	1	6.0	R	1	7.4
F	0	6.7	F	0	8.1

Table 3. USB 3.1 EQ Settings (continued)

USB 3.1 Downstream Facing Ports			USB 3.1 Upstream Facing Ports		
EQ1 Pin Level	EQ1 Pin Level	EQ Gain at 5 GHz (dB)	SSEQ1 Pin Level	SSEQ1 Pin Level	EQ Gain at 5 GHz (dB)
F	R	7.3	F	R	8.7
F	F	7.8	F	F	9.2
F	1	8.3	F	1	9.7
1	0	8.6	1	0	10.0
1	R	9.0	1	R	10.4
1	F	9.3	1	F	10.7
1	1	9.7	1	1	11.1

Table 4. DisplayPort™ EQ Settings

All DisplayPort Lanes		
DPEQ1 Pin Level	DPEQ0 Pin Level	EQ Gain at 5 GHz (dB)
0	0	−0.3
0	R	1.6
0	F	3.0
0	1	4.4
R	0	5.4
R	R	6.5
R	F	7.3
R	1	8.1
F	0	8.9
F	R	9.5
F	F	10.0
F	1	10.6
1	0	11.0
1	R	11.4
1	F	11.8
1	1	12.1

3.3 Power

The EVM is designed to operate off of the VBUS from a USB host connected through USB Type-C (P2). A 5-V external power is applied through J8 only if stand-alone operation is desired.

If testing DisplayPort only, or if bypassing VBUS power, the EVM must be powered through J8 (a 5-V, 1-A input).

4 TUSB1064RNQ EVM Schematics and Bill of Materials

4.1 Schematics

The section provides schematics as supporting reference information.

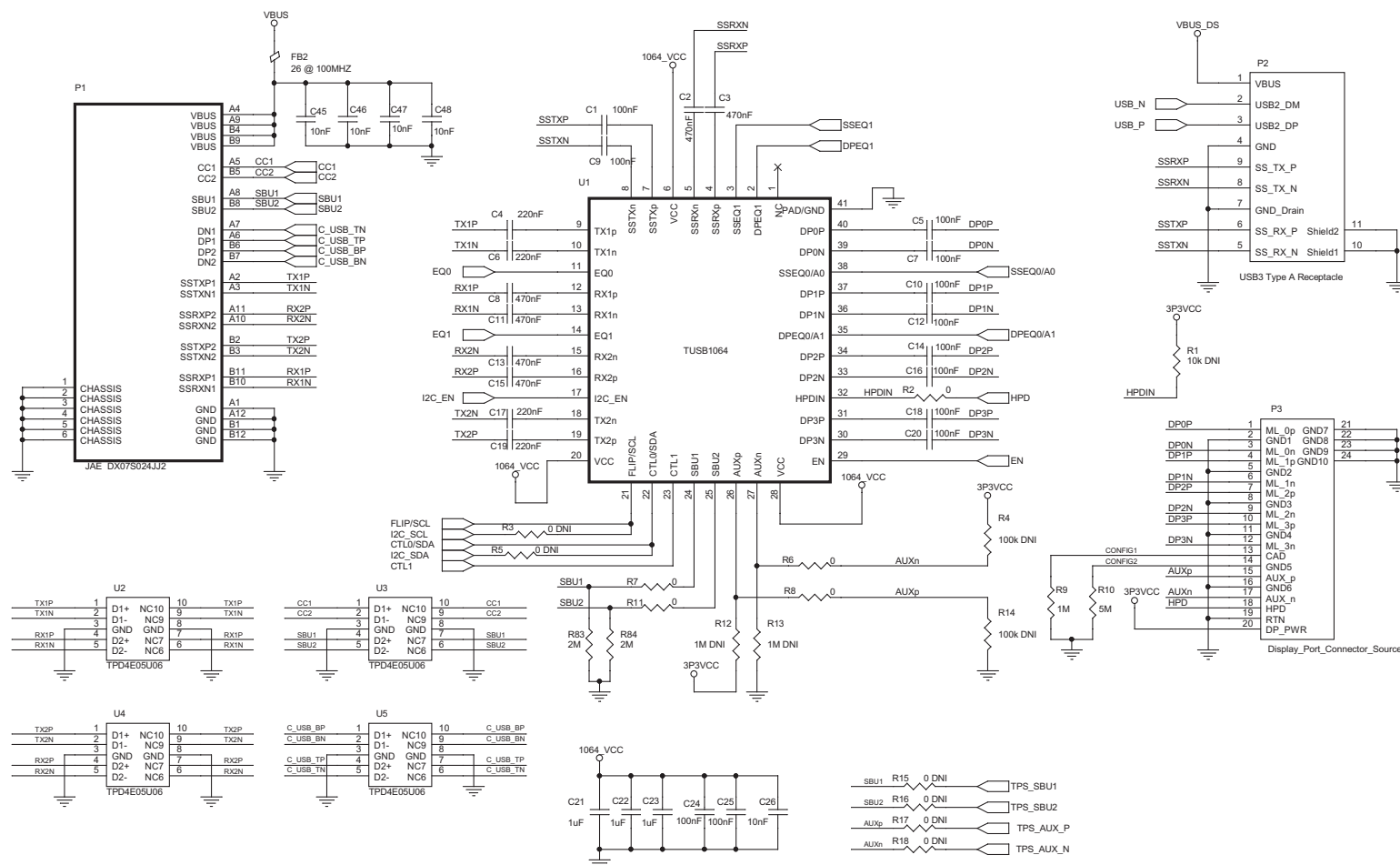


Figure 3. TUSB1064RNQ EVM Main Schematic

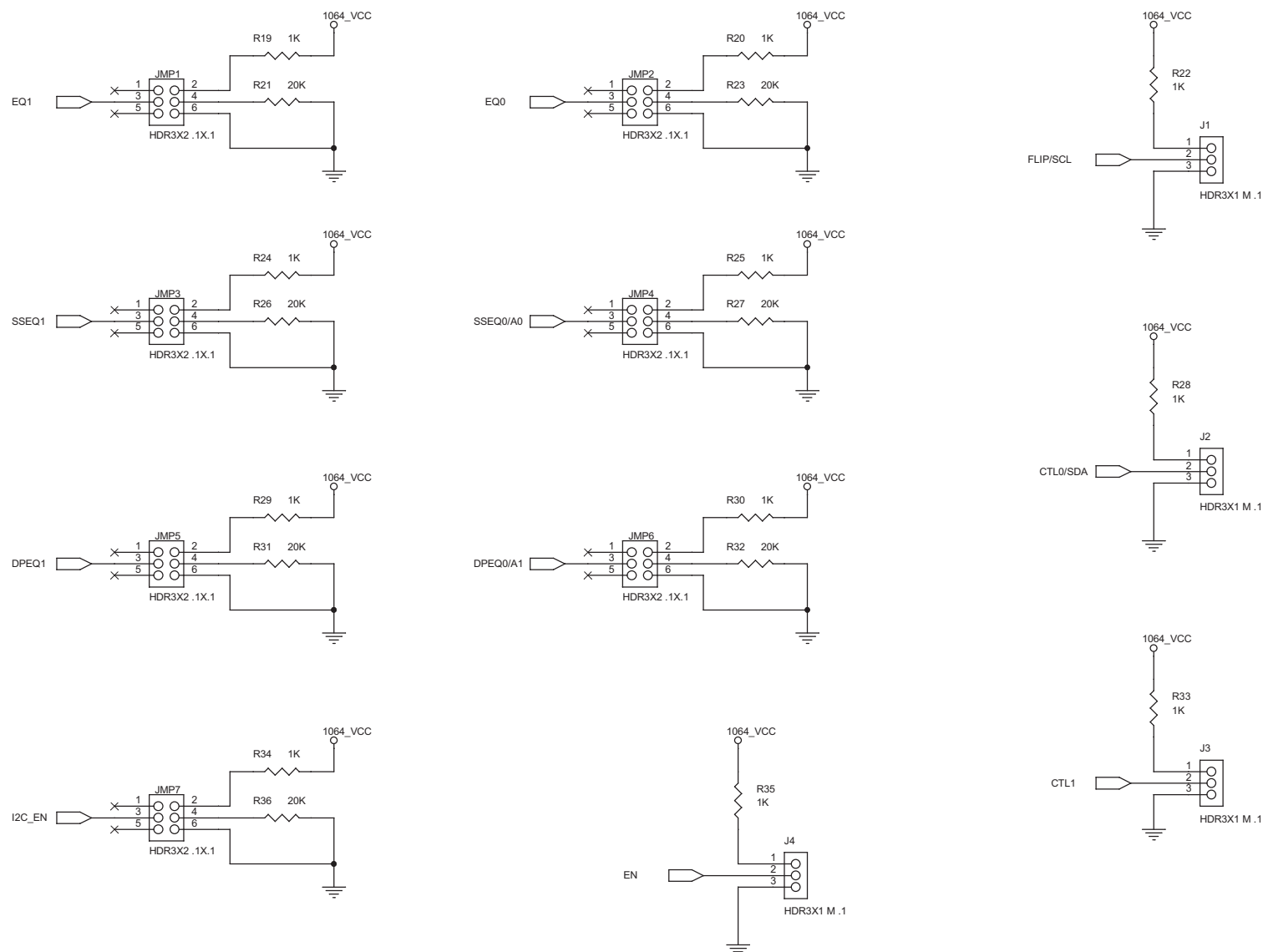
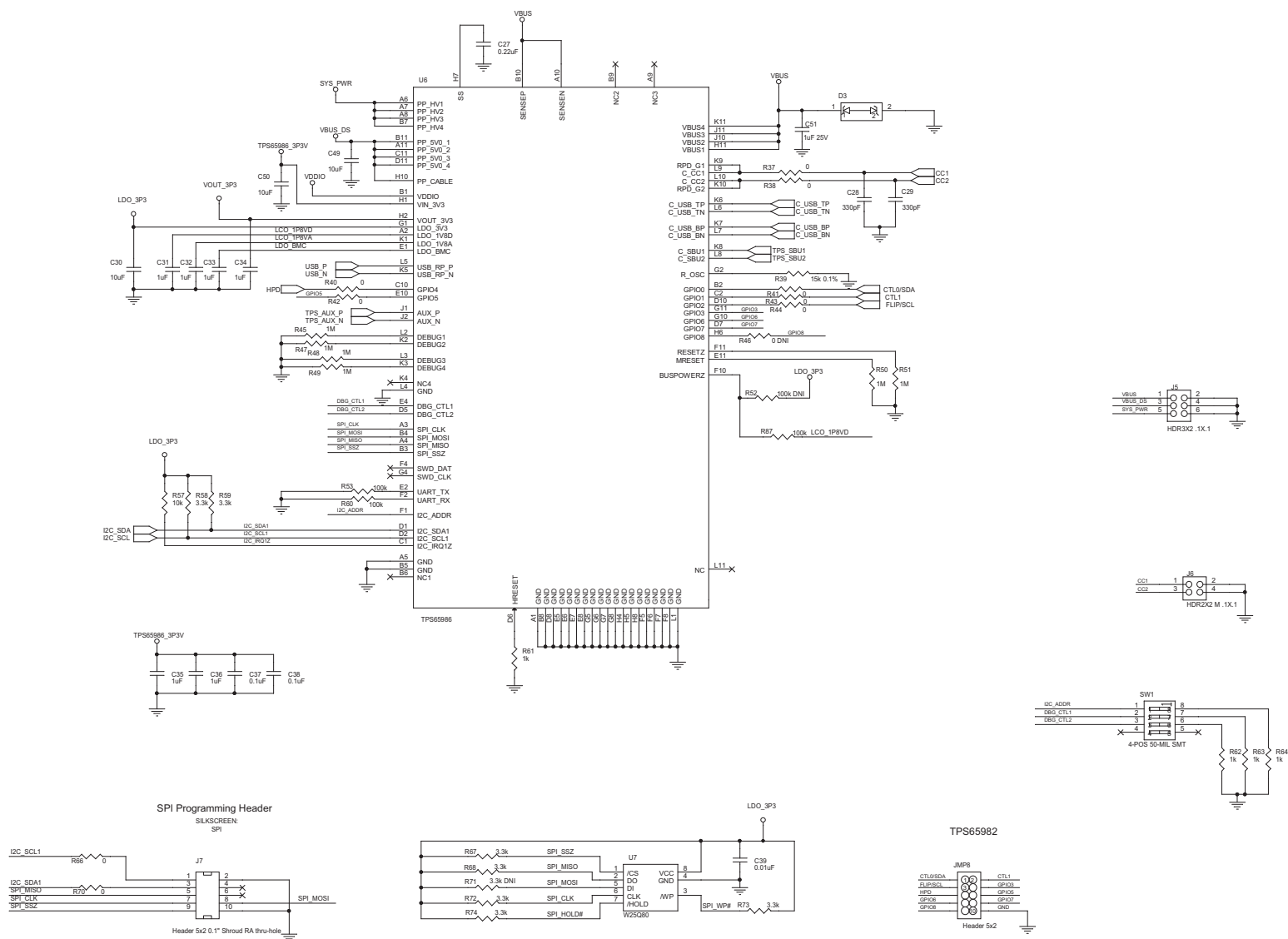
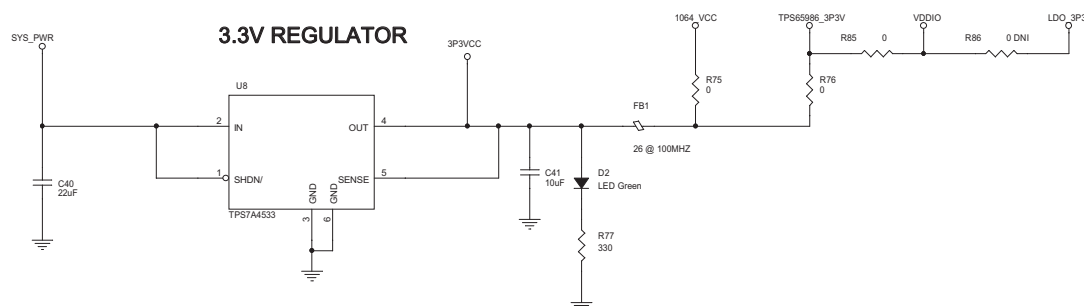


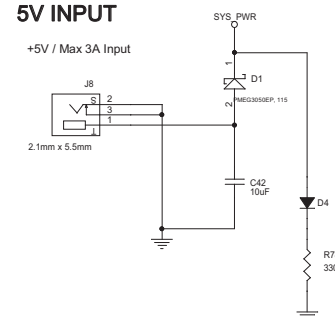
Figure 4. TUSB1064RNQ EVM Configuration Pins





5V INPUT

+5V / Max 3A Input



DOWNSTREAM PORT/PP_5V POWER SWITCH

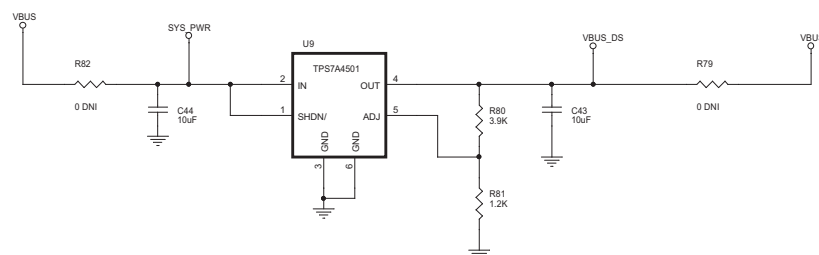


Figure 6. TUSB1064RNQ EVM Power

4.2 Bill of Materials

Table 5 lists the bill of materials.

Table 5. Bill of Materials

Item	Qty	Reference	Part	Footprint	Manufacturer	Manufacturer Part Number	Description
1	10	C1,C5,C7,C9,C10,C12,C14,C16,C18,C20	100 nF	c0201	Murata	GRM033R61A104KE15D	CAP CER, 0.1-μF, 10-V X5R 0201
2	6	C2,C3,C8,C11,C13,C15	470 nF	c0201	Murata	GRM033R60J474KE90D	CAP CER, 0.47-μF, 6.3-V X5R 0201
3	4	C4,C6,C17,C19	220 nF	c0201	Murata	GRM033R60G224ME15D	CAP CER, 0.22-μF, 4-V, X5R 0201
4	9	C21,C22,C23,C31,C32,C33,C34,C35,C36	1 μF	c0402	Murata	GRM155R60J105ME19D	CAP CER, 1-μF, 6.3-V X5R 0402
5	2	C24,C25	100 nF	c0402	Murata	GRM155R61A104KA01D	CAP CER, 0.1-μF, 10-V X5R 0402
6	5	C26,C45,C46,C47,C48	10 nF	c0402	Murata	GRM155R71C103KA01D	CAP CER, 10000-pF, 16-V X7R 0402
7	1	C27	0.22 μF	c0402	Murata	GRM152R61A224KE19D	CAP CER, 0.22-μF, 10-V X5R 0402
8	2	C28,C29	330 pF	c0402	Murata	GRM1555C1E331JA01D	CAP CER, 330-pF, 25-V C0G/NP0 0402
9	5	C30,C43,C44,C49,C50	10 μF	c0603	Murata	GRM188R61E106MA73D	CAP CER, 10-μF, 25-V X5R 0603
10	2	C37,C38	0.1 μF	c0402	Murata	GRM155R61A104KA01D	CAP CER, 0.1-μF, 10-V X5R 0402
11	1	C39	0.01	c0402	Murata	GRM155R71C103KA01D	CAP CER, 10000-pF, 16-V X7R 0402
12	1	C40	22 μF	c1206	Murata	GRT31CR61E226ME01L	CAP CER, 22-μF, 25-V X5R 1206
13	2	C41,C42	10 μF	c1206	Murata	GRM319R61E106KA12D	CAP CER, 10-μF, 25-V X5R 1206
14	1	C51	1 μF, 25 V	c0603	Murata	GRM185R61E105KA12D	CAP CER, 1-μF, 25-V X5R 0603
15	1	D1	SCHOTTKY	DO-214AA	NXP	PMEG3050EP,115	DIODE SCHOTTKY 30-V 5-A SOD128
16	1	D2	LED green	805	Lumex	LTST-C170KGKT	LED GREEN CLEAR 0805 SMD
17	1	D3	TPD1E10B06	DPY0002AA	Texas Instruments	TPD1E10B06DPYR	Schottky
18	1	D4	LED green 0805	805	Lumex	LTST-C170KGKT	LED GREEN CLEAR 0805 SMD
19	2	FB1,FB2	26 at 100 MHz	603	Murata	BLM18SG260TN1D	FERRITE BEAD 26 Ω 0603 1LN
20	7	JMP1A,JMP2A,JMP3A,JMP4A,JMP5A,JMP6A,JMP7A	4 Pin-T Berg Jumper	BERGSTIK II .100" SR STRAIGHT	AMP	68000-103HLF	3 Positions Header Connector 0.100" (2.54 mm) Through-Hole Gold or Gold, GXT™
21	7	JMP1B,JMP2B,JMP3B,JMP4B,JMP5B,JMP6B,JMP7B		BERGSTIK II .100" SR STRAIGHT	AMP	68000-101HLF	1 Positions Header Connector 0.100" (2.54 mm) Through-Hole Gold or Gold, GXT™
22	1	JMP8	Header 5 × 2	HDR_THVT_2x5_100	FCI	68021-210HLF	CONN HEADER 10-POS .100 R/A 15AU
23	4	J1,J2,J3,J4	HDR3X1 M .1	HDR_THVT_1x3_100_M	3M	961103-6404-AR	CONN HEADER VERT SGL 3-POS GOLD
24	1	J5	HDR3X2 .1X.1	HDR_THVT_2x3_100_M	Harwin	M20-9980345	DIL VERTICAL PC TAIL PIN HEADER
25	1	J6	HDR2X2 M .1X.1	HDR_THVT_2x2_100	Amphenol FCI	67997-404HLF	CONN HEADER 4-POS .100 STR TIN
26	1	J7	Header 5 × 2 0.1" Shroud RA through-hole	HDR_THRT_2X5_100	Amphenol FCI	67997-410HLF	CONN HEADER 10-POS .100 STR TIN
27	1	J8	2.1 mm × 5.5 mm	PJ-202AH	CUI Inc.	PJ-202AH	CONN PWR JACK 2-mm × 5.5-mm KINKED PIN
28	2	LB1,LB2	THD-47-478-10	Rectangle	Brady	THD-47-478-10	LB1 = "HSDC025A-002", LB2 = "TUSB1064RNQEVN"
29	1	P1	JAE DX07S024JJ2	USB-C_SMRT_DX07S024JJ2	JAE	DX07B024JJ2	CONN RCPT USB 3.1 USB Type-C BRD EDGE
30	1	P2	USB3 Type-A receptacle	USB3_TYPEA	AMP	GSB4111312HR	USB 3.1 Type-A Connector

Table 5. Bill of Materials (continued)

Item	Qty	Reference	Part	Footprint	Manufacturer	Manufacturer Part Number	Description
31	1	P3	Display_Port_Connector_Source	CON_DP_SD-47272-001	Molex Inc.	472720001	CONN RCPT 20-POS UDI R/A SMD
32	0	R1	10k DNI	r0402	Panasonic Electronic Components	ERJ-2GEJ103X	RES SMD 10 k Ω 5% 1/10W 0402
33	11	R2,R6,R7,R8,R11,R41,R43,R44,R66,R70,R85	0	r0402	Panasonic Electronic Components	ERJ-2GE0R00X	RES SMD 0- Ω JUMPER 1/10W 0402
34	0	R3,R5,R15,R16,R17,R18,R46,R86	0 DNI	r0402	Panasonic Electronic Components	ERJ-2GE0R00X	RES SMD 0- Ω JUMPER 1/10W 0402
35	0	R4,R14,R52	100k DNI	r0402	Panasonic Electronic Components	ERJ-2GEJ104X	RES SMD 100 k Ω 5% 1/10W 0402
36	7	R9,R45,R47,R48,R49,R50,R51	1M	r0402	Panasonic Electronic Components	ERJ-2GEJ105X	RES SMD 1 M Ω 5% 1/10W 0402
37	1	R10	5M	r0402	Ohmite	HVC0402T5004JET	RES SMD 5 M Ω 5% 1/20W 0402
38	0	R12,R13	1M DNI	r0402	Panasonic Electronic Components	ERJ-2GEJ105X	RES SMD 1-M Ω 5% 1/10W 0402
39	15	R19,R20,R22,R24,R25,R28,R29,R30,R33,R34,R35,R61,R62,R63,R64	1k	r0402	Panasonic Electronic Components	ERJ-2GEJ102X	RES SMD 1 k Ω 5% 1/10W 0402
40	7	R21,R23,R26,R27,R31,R32,R36	20K	r0402	Panasonic Electronic Components	ERJ-2RKF2002X	RES SMD 20 k Ω 1% 1/10W 0402
41	2	R37,R38	0	r0201	Panasonic Electronic Components	ERJ-1GN0R00C	RES SMD 0- Ω JUMPER 1/20W 0201
42	1	R39	15k 0.1%	r0402	Panasonic Electronic Components	ERA-2AEB153X	RES SMD 15 k Ω 0.1% 1/16W 0402
43	2	R40,R42	0	r0402	Panasonic Electronic Components	ERJ-2GE0R00X	RES SMD 0- Ω JUMPER 1/10W 0402
44	3	R53,R60,R87	100k	r0402	Panasonic Electronic Components	ERJ-2GEJ104X	RES SMD 100 k Ω 5% 1/10W 0402
45	1	R57	10k	r0402	Panasonic Electronic Components	ERJ-2GEJ103X	RES SMD 10 k Ω 5% 1/10W 0402
46	7	R58,R59,R67,R68,R72,R73,R74	3.3k	r0402	Panasonic Electronic Components	ERJ-2GEJ332X	RES SMD 3.3 k Ω 5% 1/10W 0402
47	0	R71	3.3k DNI	r0402	Panasonic Electronic Components	ERJ-2GEJ332X	RES SMD 3.3 k Ω 5% 1/10W 0402
48	2	R75,R76	0	r1206	Panasonic Electronic Components	ERJ-8GEY0R00V	RES SMD 0- Ω JUMPER 1/4W 1206
49	2	R77,R78	330	r0402	Panasonic Electronic Components	ERJ-2GEJ331X	RES SMD 330 Ω 5% 1/10W 0402
50	0	R79,R82	0 DNI	r0805	Panasonic Electronic Components	ERJ-6GEY0R00V	RES SMD 0- Ω JUMPER 1/8W 0805
51	1	R80	3.9K	r0402	Panasonic Electronic Components	ERA-2AEB392X	RES SMD 3.9 k Ω 0.1% 1/16W 0402
52	1	R81	1.2K	r0402	Panasonic Electronic Components	ERA-2AEB122X	RES SMD 1.2 k Ω 0.1% 1/16W 0402
53	2	R83,R84	2M	r0402	Panasonic Electronic Components	ERJ-2GEJ205X	RES SMD 2 M Ω 5% 1/10W 0402
54	4	SCRW1,SCRW2,SCRW3,SCRW4	NY PMS 440 005 PH	Screw	B&F Fastener	NY PMS 440 005 PH	40 × .5-inch nylon

Table 5. Bill of Materials (continued)

Item	Qty	Reference	Part	Footprint	Manufacturer	Manufacturer Part Number	Description
55	8	SHNT1,SHNT2,SHNT3,SHNT4,SHNT5,SHNT6,SHNT7,SHNT8	QPC02SXGN-RC	0.1	Sullins Connector Solutions	QPC02SXGN-RC	CONN JUMPER SHORTING .100" GOLD
56	4	STDOFF1,STDOFF2,STDOFF3,STDOFF4	1902E	Standoff	Keystone	1902E	1-inch nylon
57	1	SW1	4-POS 50-MIL SMT	sw_smv_t_dip_4pos_8	C&K(ITT-CANNON)	TDA04H0SB1R	SWITCH SLIDE DIP SPST 25MA 24 V
58	1	U1	TUSB1064	RN00040A	Texas Instruments	TUSB1064RNQ	
59	4	U2,U3,U4,U5	TPD4E05U06	DQA	Texas Instruments	TPD4E05U06DQAR	TVS DIODE 5.5 VWM 14VC 10SON
60	1	U6	TPS65986	ZQZ_BGA_96	Texas Instruments	TPS65986ABZQZR	IC PD CTLR USB Type-C 96 BGA
61	1	U7	W25Q80	SOIC_8_197x157_50	WINBOND	W25Q80DVSNI	IC FLASH 8Mb 104-MHz 8SOIC
62	1	U8	TPS7A4533	DCQ_PDSO_6	Texas Instruments	TPS7A4533DCQR	IC REG LINEAR 3.3-V 1.5-A SOT223-6
63	1	U9	TPS7A4501	DCQ_PDSO_6	Texas Instruments	TPS7A4501DCQT	IC REG LINEAR ADJ SOT223-6

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.

- 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。
http://www.tij.co.jp/lstds/ti_ja/general/eStore/notice_01.page

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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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。

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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.

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