TPS65282EVM User's Guide

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1 INTRODUCTION

This document presents the information required to operate the TPS65282 PMIC as well as the support documentation including schematic and bill of materials.

2 BACKGROUND

The TPS65282 PMIC contains a buck converter and two power switches. The buck converter is designed to provide an adjustable voltage with maximum 4-A continuous currents. The two power switches are designed to provide current limit at 75 mA - 2.7 A, while the current limit is available setting by external resistor.

As there are many possible options to set the converters, Table 1 presents the performance specification summary for the EVM.

Table 1. Summary of Performance

TEST CONDITIONS	PERFORMANCE
V_{IN} = 4.5 V to 18 V f_{SW} = 600 kHz (25°C ambient)	Buck : 5.0 V, up to 4 A Power Switch 1: 5.0 V, up to 2.7 A Power Switch 2: 5.0 V, up to 2.7 A

The evaluation module is designed to provide access to the features of the TPS65282. Some modifications can be made to this module to test performance at different input and output voltages, current and switching frequency. Please contact TI Field Applications Group for advice on these matters.

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3 BOARD LAYOUT

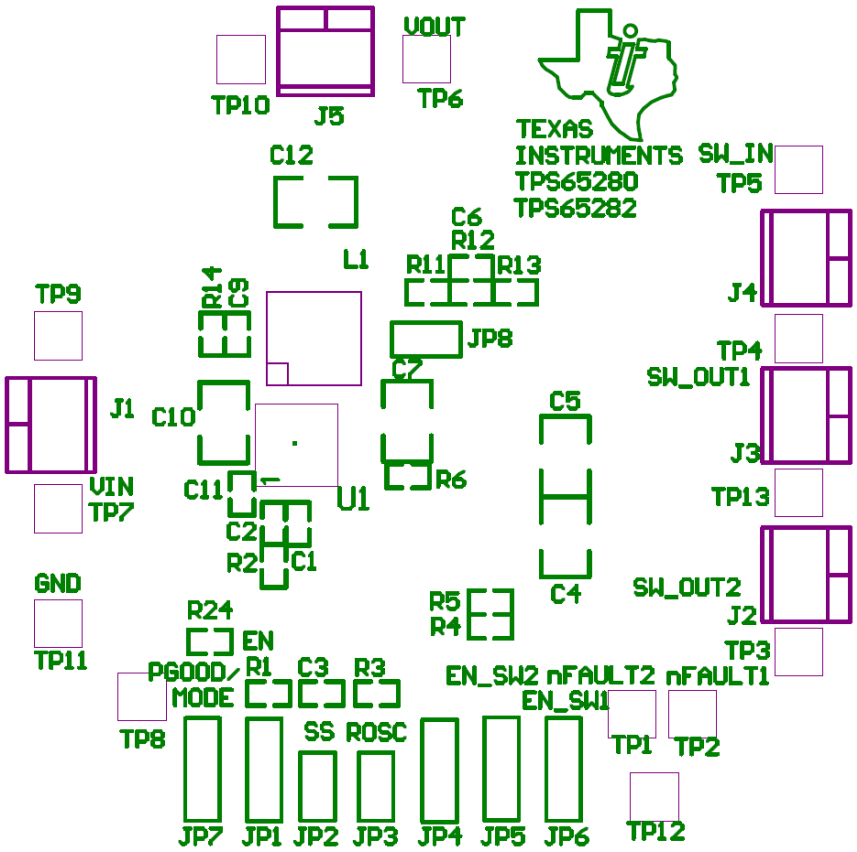


Figure 1. Placement (Top Layer)

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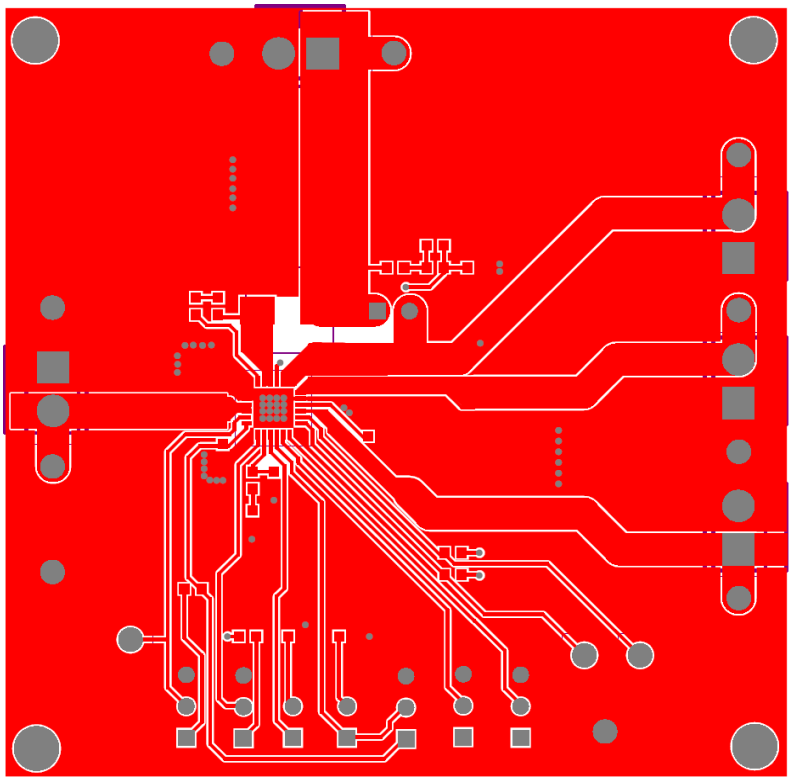


Figure 2. Board Layout (Top Layer)

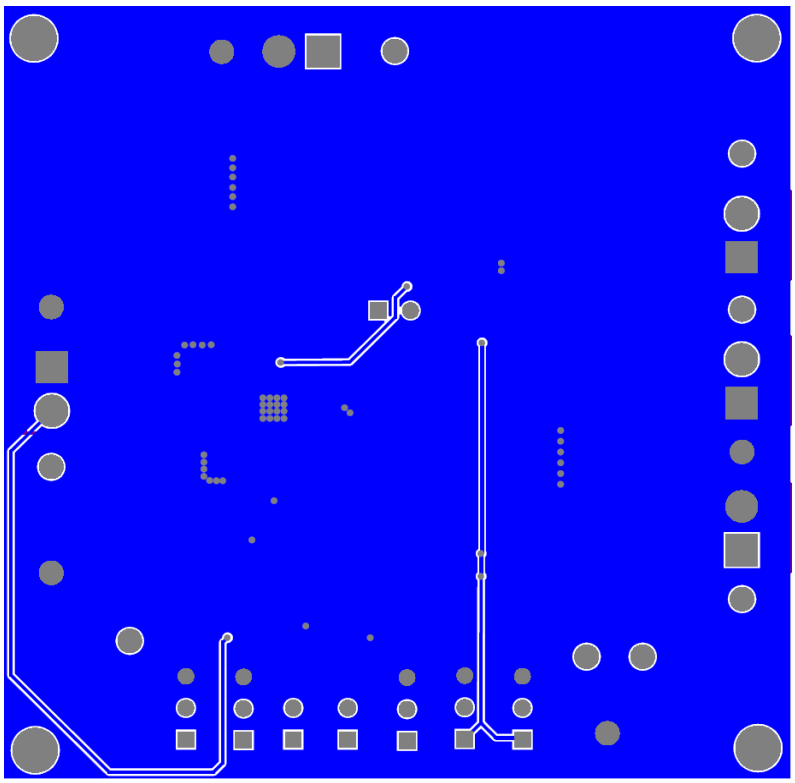


Figure 3. Board Layout (Bottom Layer – Ground Plane)

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4 BENCH TEST SETUP CONDITIONS

4.1 Headers Description and Jumper Placement

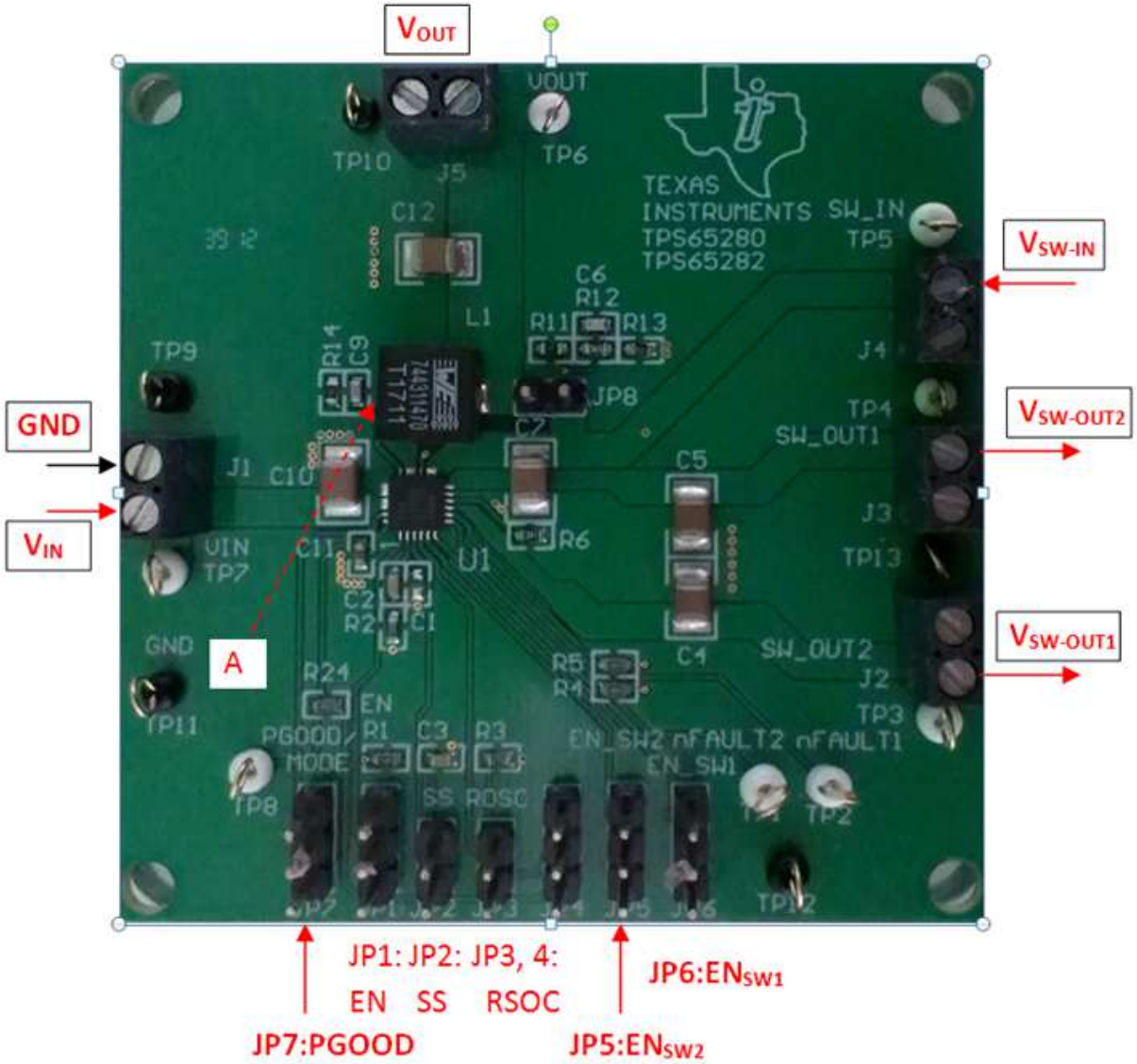


Figure 4. Headers Description and Jumper Placement

Test points:

(A) LX of V_{OUT}

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4.2 Jumpers and Switches

Table 2. Jumpers and Switches

NO.	FUNCTION	PLACEMENT	COMMENT
JP1	Buck Enable (EN)	Connect EN1 to GND to disable V_{OUT1}, connect EN1 to V_{IN} through a resistor to enable V_{OUT1}; Leave open to enable V_{OUT1}.	
JP2	Soft Start (SS)	Connect a external cap to this pin to program the soft start time of the buck converter; leave this pin open to have default 1-ms soft start time.	
JP3, 4	Switching Frequency	Connect a resistor to this pin to set the switching frequency; leave it open to set F_{SW} to 600 kHz; connect it to ground to set F_{SW} to 300 kHz.	
JP5	Switch 2 Enable	Connect this pin to high enable power switch 2; connect it to ground to disable power switch 2; Leave it open to enable power switch through internal 1.25-MΩ pull up resistor.	Not recommend to leave open
JP6	Switch 1 Enable	Connect this pin to high enable power switch 1; connect it to ground to disable power switch 1; Leave it open to enable power switch through internal 1.25-MΩ pull up resistor.	Not recommend to leave open
JP7	PGOOD Pull Up	Connect this pin to V7V force the PGOOD pull up. Connect this pin to GND there's no need to use this feature.	Not recommend to leave open

5 POWER-UP PROCEDURE

1. Apply 4.5 V - 18 V to JP7.
2. Toggle JP1 to enable V_{OUT1}.
3. Toggle JP6 and JP5 to enable switch 1 and switch 2.
4. Apply load to the output connectors.

6 SCHEMATIC AND BILL OF MATERIALS

The following pages contain the schematic and BOM.

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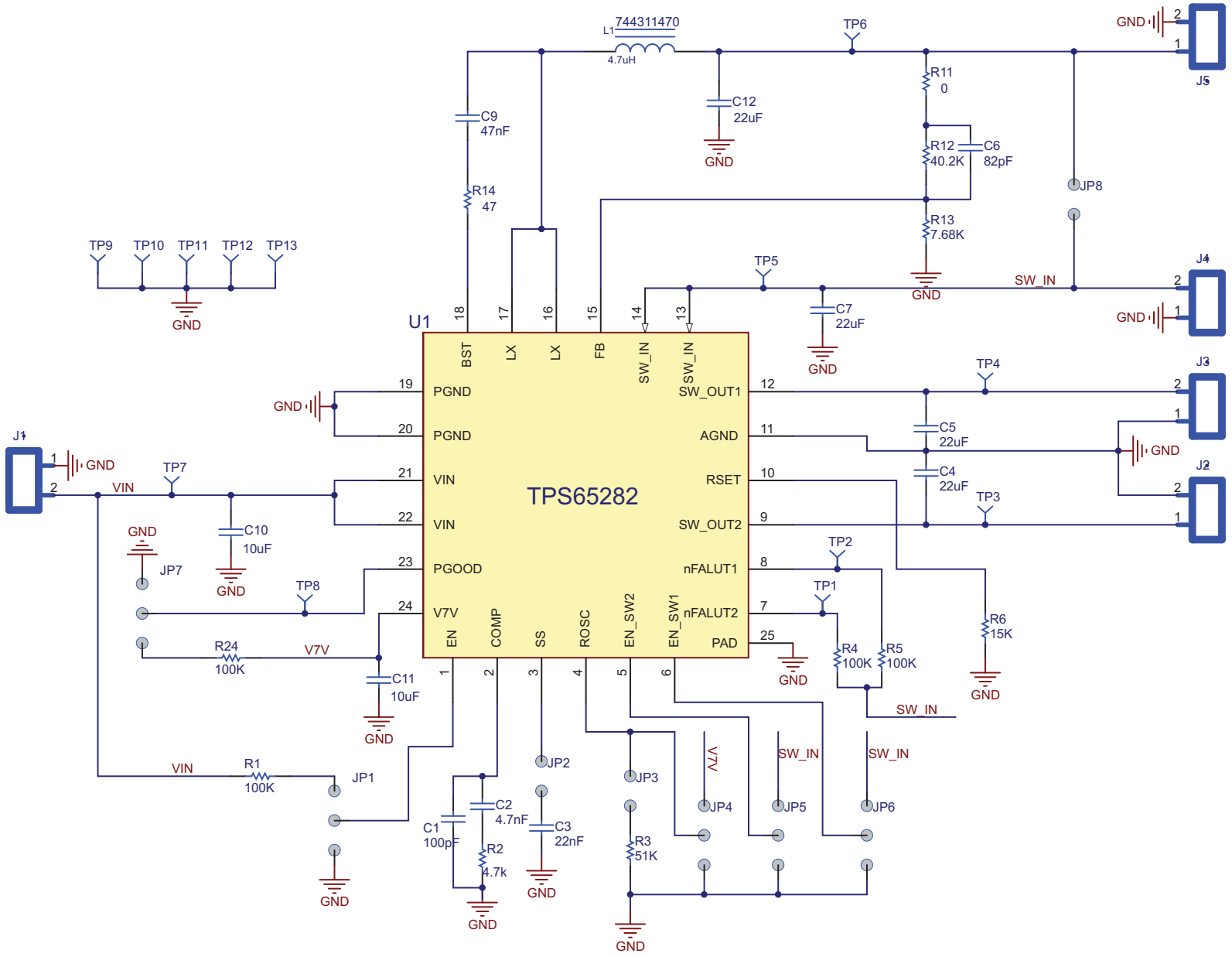


Figure 5. TPS65282EVM Schematic

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Table 3. TPS65282EVM Bill of Materials

Item No.	Qty	Designator	Value	Footprint	Manufacturer	Part No.	Description
1	1	U1	NA	QFN24 RGE	Texas Instruments	TPS65282RGET	IC
2	4	R1,R4,R5,R24	100k	603	Generic		RES 100k 1/10W 0603 SMD
3	1	R2	4.7k	603	Generic		RES 10k 1/10W 0603 SMD
4	1	R3	51k	603	Generic		RES 51k 1/10W 0603 SMD
5	1	R6	15k	603	Generic		RES 51k 1/10W 0603 SMD
6	1	R11	0	603	Generic		RES 0.0 OHM 1/10W 5% 0603 SMD
7	1	R12	40.2K	603	Generic		RES 40.2K OHM 1/10W 1% 0603 SMD
8	1	R13	7.68k	603	Generic		RES 7.68k 1/10W 0603 SMD
9	1	R14	47	603	Generic		RES 47 1/10W 0603 SMD
10	DNI	C1	100pF	603	Generic		CAP CERAMIC 100PF 50V 0603 SMD
11	1	C2	4.7nF	603	Generic		CAP 4700PF 50V CERAMIC X7R 0603
12	1	C3	22nF	603	Generic		CAP 22nF 50V CERAMIC X7R 0603
13	2	C4,C5	22uF	1210	Generic		CAP CERAMIC 22UF 16V X5R 1210
14	1	C6	300pF	1210	Generic		CAP CERAMIC 22UF 16V X5R 1210
15	2	C7,C12	22uF	1210	Generic		CAP CERAMIC 22UF 16V X5R 1210
16	1	C9	47nF	603	Generic		CAP 47000PF 25V CERM X7R 0603
17	1	C10	10uF	1210	Generic		CAP CER 10UF 35V X7R 10% 1210
18	1	C11	10uF	603	Generic		CAP CERAMIC 10UF 10V 0603 X5R
19	5	J1,J2,J3,J4,J5	ED555/2DS	TB_2X3.5MM	On Shore Technology	ED555/2DS	TERMINAL BLOCK 3.5MM 2POS PCB
20 (1)	2	JP2,JP3	NA	JMP0.2	Mil-Max	800-10-064-10-001000	SIP HEADER 64 POS STRAIGHT PCB
21 (2)	5	JP1,JP4,JP5, JP6,JP7	NA	JMP0.3	Mil-Max	800-10-064-10-001000	SIP HEADER 64 POS STRAIGHT PCB
22	1	L1	4.7uH	7mmX7mm	Wurth Electronics	744311470	INDUCTOR POWER 4.7UH 6A SMD
23	8	TP1,TP2,TP3, TP4,TP5,TP6, TP7,TP8	NA	TEST POINT 0.042	Keystone Electronics	5002	TEST POINT PC MINI .040"D WHITE
24	5	TP9,TP10, TP11,TP12, TP13	NA	TEST POINT 0.042	Keystone Electronics	5001	TEST POINT PC MINI .040"D BLACK
25 (3)	4		NA		3M	SJ-5303 (CLEAR)	BUMPON HEMISPHERE .44X.20 CLEAR
26 (4)	NA	6	NA	NA	Sullins Connector Solutions	NA	SPC02SYAN, CONN JUMPER SHORTING GOLD FLASH

(1) Item 20: split into 2 pins
(2) Item 21: split into 3 pins
(3) Install item 25 on bottom at corners
(4) Install item 26 on item 20, 21 - no order, be consistent

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Should this evaluation board/kit not meet the specifications indicated in the User's Guide, the board/kit may be returned within 30 days from the date of delivery for a full refund. THE FOREGOING LIMITED WARRANTY IS THE EXCLUSIVE WARRANTY MADE BY SELLER TO BUYER AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. EXCEPT TO THE EXTENT OF THE INDEMNITY SET FORTH ABOVE, NEITHER PARTY SHALL BE LIABLE TO THE OTHER FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.

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As noted in the EVM User's Guide and/or EVM itself, this EVM and/or accompanying hardware may or may not be subject to the Federal Communications Commission (FCC) and Industry Canada (IC) rules.

For EVMs **not** subject to the above rules, this evaluation board/kit/module is intended for use for ENGINEERING DEVELOPMENT, DEMONSTRATION OR EVALUATION PURPOSES ONLY and is not considered by TI to be a finished end product fit for general consumer use. It generates, uses, and can radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to part 15 of FCC or ICES-003 rules, which are designed to provide reasonable protection against radio frequency interference. Operation of the equipment may cause interference with radio communications, in which case the user at his own expense will be required to take whatever measures may be required to correct this interference.

General Statement for EVMs including a radio

User Power/Frequency Use Obligations: This radio is intended for development/professional use only in legally allocated frequency and power limits. Any use of radio frequencies and/or power availability of this EVM and its development application(s) must comply with local laws governing radio spectrum allocation and power limits for this evaluation module. It is the user's sole responsibility to only operate this radio in legally acceptable frequency space and within legally mandated power limitations. Any exceptions to this are strictly prohibited and unauthorized by Texas Instruments unless user has obtained appropriate experimental/development licenses from local regulatory authorities, which is responsibility of user including its acceptable authorization.

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

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

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.

For EVMs annotated as IC – INDUSTRY CANADA Compliant

This Class A or B digital apparatus complies with Canadian ICES-003.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Concerning EVMs including radio transmitters

This device complies with Industry Canada licence-exempt RSS standard(s). 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.

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.

Cet appareil numérique de la classe A ou B est conforme à la norme NMB-003 du Canada.

Les changements ou les modifications pas expressément approuvés par la partie responsable de la conformité ont pu vider l'autorité de l'utilisateur pour actionner l'équipement.

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.

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.

【Important Notice for Users of this Product in Japan】

This development kit is NOT certified as Confirming to Technical Regulations of Radio Law of Japan

If you use this product in Japan, you are required by Radio Law of Japan to follow the instructions below with respect to this product:

1. Use this product 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 this product only after you obtained the license of Test Radio Station as provided in Radio Law of Japan with respect to this product, or
3. Use of this product only after you obtained the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to this product. Also, please do not transfer this product, unless you give the same notice above to the transferee. Please note that if you could not follow the instructions above, you will be subject to penalties of Radio Law of Japan.

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Your Sole Responsibility and Risk. You acknowledge, represent and agree that:

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2. You have full and exclusive responsibility to assure the safety and compliance of your products with all such laws and other applicable regulatory requirements, and also to assure the safety of any activities to be conducted by you and/or your employees, affiliates, contractors or designees, using the EVM. Further, you are responsible to assure 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.
3. You will employ reasonable safeguards to ensure that your use of the EVM will not result in any property damage, injury or death, even if the EVM should fail to perform as described or expected.
4. You will take care of proper disposal and recycling of the EVM's electronic components and packing materials.

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