User's Guide

SLVU344–October 2009

TPS54262EVM

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PowerPAD is a trademark of Texas Instruments.

1 Introduction

The Texas Instruments TPS54262EVM evaluation module (EVM) helps designers evaluate the operation and performance of the TPS54262 Switch Mode Power Supply – Buck Regulator. The device offers configurability and can be setup to switch from 200KHz up to 2.2MHz.

The EVM contains one DC / DC converter (see Table 1).

Table 1. Device and Package Configurations

Converter	IC	Package
U1	TPS54262QPWPQ1	PWP-20

2 Setup

This section describes the jumpers and connectors on the EVM as well and how to properly connect, set up and use the TPS54262EVM.

2.1 Input/Output Connector Description

J1 – Input is the power input terminal for the converter. The terminal block provides a power (Vbat) and ground (GND) connection to allow the user to attach the EVM to a cable harness.

J2 – Output is the regulated output voltage for the converter. The terminal block provides a power (Vout) and ground (GND) connection to allow the user to attach the EVM to a cable harness.

J3 – Sync is the input terminal for an optional external input clock to the converter. The external clock can be used to synchronize the switching frequency for multiple devices. The external clock frequency must meet the Fsw<Fext<2×Fsw guideline, if used.

JP1 – LPM is the jumper used to enable Low Power Mode. The jumper allows LPM to be enabled or disabled. The "disabled with protection diode" selection should be used if the output voltage is programmed for voltages greater than 5 V. The external zener will prevent over voltage damage to the LPM input.

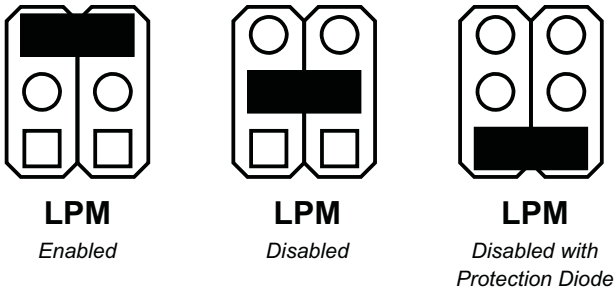

Figure 1. LPM Jumper Settings

JP2 – Enable is the jumper used to enable the converter. The converter will be enabled when the Enable is high and disabled when low. The jumper placement allows the converter to be enabled or disabled.

Under-voltage lockout can be implemented by setting the R6 and R7 resistors to transition the Enable (EN) input low as the supply voltage drops. The equation to set the values for R6 and R7 is:

$$\text{DisableVoltage} = \text{ENTHRES} \times \left(1 + \frac{R6}{R7}\right) \text{ where the ENTHRES ~ 1V.} \quad (1)$$

Resistor R7 is not populated on this EVM to reduce the quiescent supply current if this feature is not required.

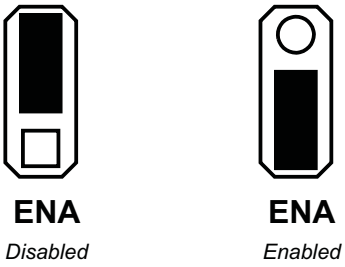

Figure 2. Enable Jumper Settings

JP3 – Slew Rate is the jumper used to set the slew rate for the switch pin. The device slew rate should be set between 15ns and 200ns. Slower slew rates can improve EMI performance, but they will increase switching losses. Jumper resistors allow the slew rate to be set to four set points. The user can set a specific slew rate by changing one of the slew rate set resistors – R8, R9 or R10. Note that the slew rate should be set to 1V/1.2ns, if the EVM is configured for a 2MHz switch in frequency.

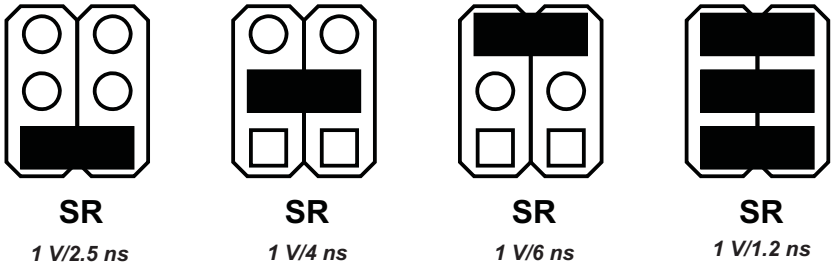

Figure 3. Slew Rate Settings

JP4 – Delay is the jumper used to set the delay time to assert the RESET pin low after the supply has exceeded the programmed Vreg_RST voltage. The delay may be programmed in the range of 2.2 ms to 200 ms. Jumper capacitors allow the reset delay to be set to four set points. The user can set a specific delay time by changing one of the delay capacitors – C13, C14 or C15.

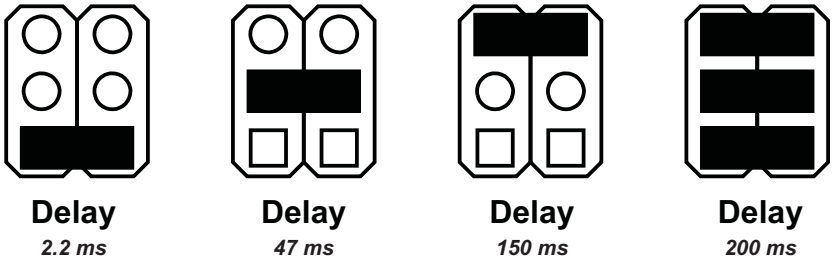

Figure 4. Reset Delay Time Settings

2.2 Setup

The input voltage range for the converter is 3.6 volts to 48 volts. A load should be applied to the Output terminal for proper operation.

2.3 Operation

For proper operation of the TPS54262, JP1, JP2, JP3 and JP4 should be properly configured. The recommended setting, using shorting blocks.

JP1 to Enabled
JP2 to Enabled
JP3 to 1V/2.5ns

JP4 to 200ms

In this configuration, the device will power up when power is applied.

JP1 LPM selects how Low Power Mode is set, Enabled or Disabled. JP2 ENA turns the device on or off. JP3 SR selects the Slew Rate for the switch pin, 1V/2.5ns, 1V/4ns, 1V/6ns or 1V/1.2ns. JP4 Delay selects the reset delay time for the device, 2.2ms, 47ms, 150ms or 200ms.

3 Board Layout

Figure 5, Figure 6 and Figure 7 show the board layout for the TPS54262EVM PWB. The EVM offers resistors, capacitors and jumpers to program the switch pin Slew Rate and regulator turn on Delay. Jumpers are also provided to Enable the device and to enable the Low Power Mode option.

The TPS54262 converter offers high efficiency, but does dissipate power. The PowerPAD™ package offers an exposed thermal pad to enhance thermal performance. This must be soldered to the copper landing on the PCB for optimal performance. The PCB provides 1 oz copper planes on the top and bottom to dissipate heat.

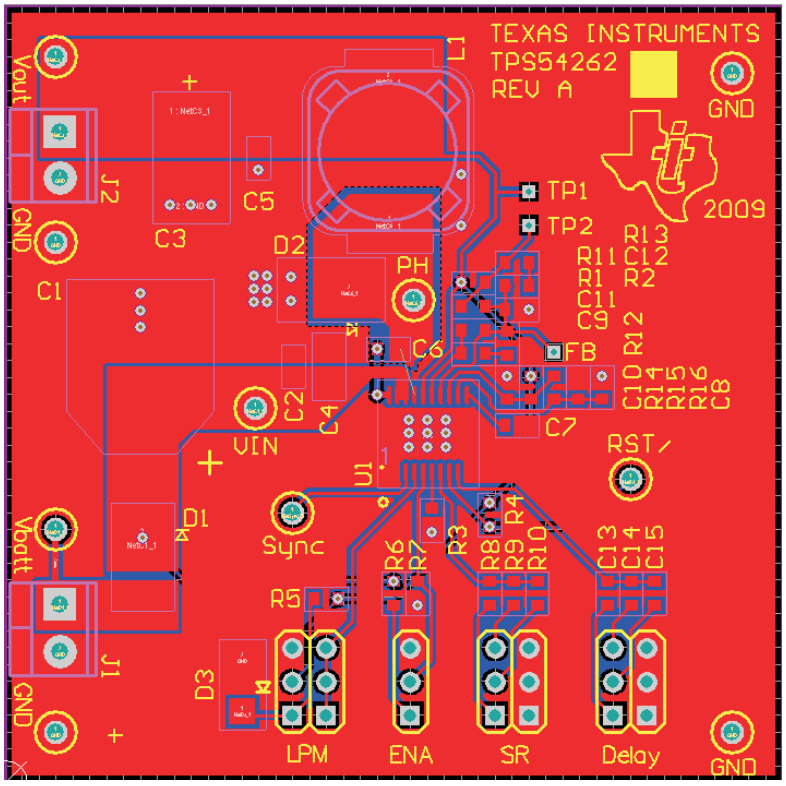

Figure 5. Top Assembly Layer

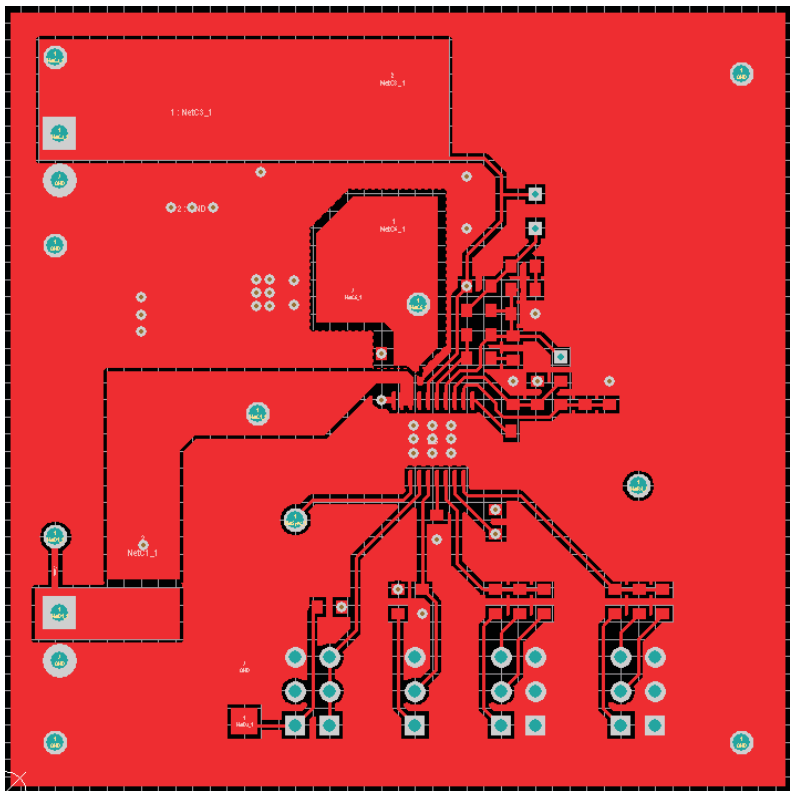

Figure 6. Top Layer Routing

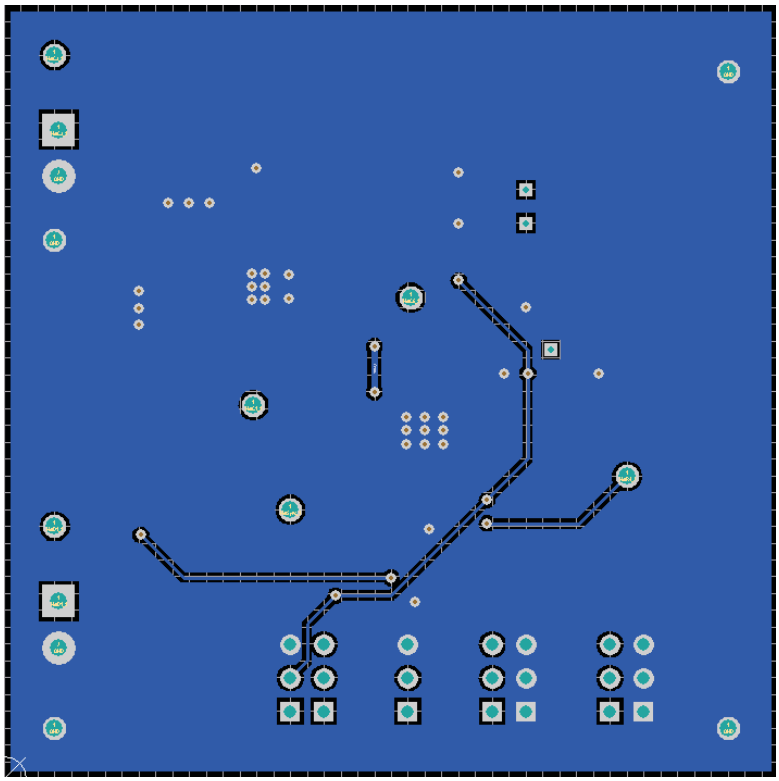

Figure 7. Bottom Layer Routing

4 Schematic and Bill of Materials

4.1 Schematic

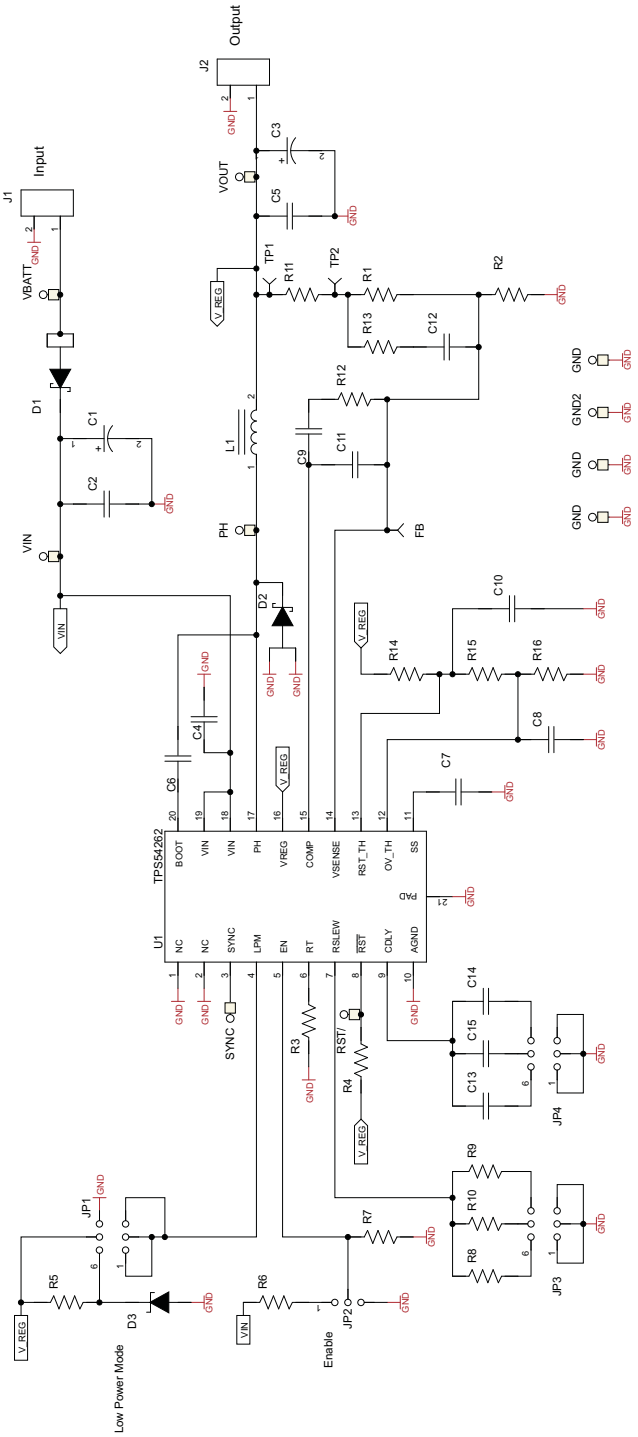

Figure 8. TPS54262EVM Schematic

4.2 Bill of Materials

Table 2. TPS54262EVM Bill of Materials for 500 kHz Configuration

Count	Ref Des	Description	Size	MFR	Part Number
1	C1	Capacitor, electrolytic, 220uF, 50V	10.3mm x 10.3mm	Panasonic	EEVFK1H221P
4	C2, C5, C6, C7	Capacitor, ceramic, 0.1uF, 50V, 10%	0603	muRata	GCM188R71H104KA57
1	C3	Capacitor, tantalum, 100uF, 16V, 10%	7343-31	AVX	TPSD107M016R0060
1	C4	Capacitor, ceramic, 1uF, 50V, 10%	1206	muRata	GCM31MR71H105KA55
2	C8, C11	Capacitor, ceramic, 22pF, 50V, 5%	0603	muRata	GCM1885C1H220JA16
1	C9	Capacitor, ceramic, 330pF, 50V, 5%	0603	muRata	GCM1885C1H331JA16
1	C10	Capacitor, ceramic, 10pF, 50V, 5%	0603	muRata	GRM1885C1H100JA01
1	C12	Capacitor, ceramic, 220pF, 50V, 5%	0603	muRata	GCM1885C1H221JA16
1	C13	Capacitor, ceramic, 2.2nF, 50V, 5%	0603	muRata	GCM1885C1H222JA16
1	C14	Capacitor, ceramic, 150nF, 25V, 10%	0603	muRata	GRM188R71E154KA01
1	C15	Capacitor, ceramic, 47nF, 50V, 10%	0603	muRata	GRM188R71H473KA61
2	D1, D2	Diode, Schottky, 3A, 60V	PowerDI	Diodes	PDS360-13
1	D3	Diode, Zener, 1A, 5V	SMA	MCC	SMAZ5V1-TP
2	J1, J2	Terminal block, 2-pin, 6A, 3.5mm	0.25 x 0.27	OST	ED1514
10	Sync, GND (x4), PH, RST/, VBATT, VIN, VOUT	Test point, 52-mil	0.052	Kobiconn	151-103-RC
3	Delay, LPM, SR	Header, 6-pin, 100-mil spacing, (36-pin strip)	0.100 x 3	Sullins	PEC06DAAN
1	ENA	Header, 3-pin, 100-mil spacing, (36-pin strip)	0.100 x 3	Sullins	PEC03SAAN
6	DELAY(x3), ENA, LPM, SR	Connector jumper, shorting, 100-mil spacing	0.100	Sullins	SPC02SYAN
1	L1	Inductor, SMT, 22-uH	12.3mm x 12.3mm	Coilcraft	MSS1278T-223
1	R1	Resistor, chip, 187-kΩ, 1/10W, 1%	0603	Panasonic	ERJ-3EKF1873V
1	R2	Resistor, chip, 35.7-kΩ, 1/10W, 1%	0603	Panasonic	ERJ-3EKF3572V
1	R3	Resistor, chip, 221-kΩ, 1/10W, 1%	0603	Panasonic	ERJ-3EKF2213V
2	R4	Resistor, chip, 2-kΩ, 1/10W, 1%	0603	Panasonic	ERJ-3EKF2001V
3	R5, R6, R8	Resistor, chip, 30.1-kΩ, 1/10W, 1%	0603	Panasonic	ERJ-3EKF3012V
1	R7	Do not populate	0603	Panasonic	
1	R9	Resistor, chip, 68.1-kΩ, 1/10W, 1%	0603	Panasonic	ERJ-3EKF6812V
1	R10	Resistor, chip, 47.5-kΩ, 1/10W, 1%	0603	Panasonic	ERJ-3EKF4752V
1	R11	Resistor, chip, 49.9-Ω, 1/10W, 1%	0603	Panasonic	ERJ-3EKF49R9V
1	R12	Resistor, chip, 274-kΩ, 1/10W, 1%	0603	Panasonic	ERJ-3EKF2743V
1	R13	Resistor, chip, 2.55-kΩ, 1/10W, 1%	0603	Panasonic	ERJ-3EKF2551V
1	R14	Resistor, chip, 82.5-kΩ, 1/10W, 1%	0603	Panasonic	ERJ-3EKF8252V
1	R15	Resistor, chip, 2.32-kΩ, 1/10W, 1%	0603	Panasonic	ERJ-3EKF2321V
1	R16	Resistor, chip, 15-kΩ, 1/10W, 1%	0603	Panasonic	ERJ-3EKF1502V
1	U1	IC, TPS54262QPWPRQ1		TI	TPS54262QPWP
	-	PCB, 2.3-inch x 2.3-inch x 0.062		Any	TPS54262, REV A

Table 3. TPS54262EVM Bill of Materials for 2 MHz Configuration

Count	Ref Des	Description	Size	MFR	Part Number
1	C1	Capacitor, electrolytic, 220uF, 50V	10.3mm x 10.3mm	Panasonic	EEVFK1H221P
4	C2, C5, C6, C7	Capacitor, ceramic, 0.1uF, 50V, 10%	0603	muRata	GCM188R71H104KA57
1	C3	Capacitor, tantalum, 100uF, 16V, 10%	7343-31	AVX	TPSD107M016R0060
1	C4	Capacitor, ceramic, 1uF, 50V, 10%	1206	muRata	GCM31MR71H105KA55
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1	C12	Capacitor, ceramic, 120pF, 50V, 5%	0603	muRata	GRM1885C1H121JA01
2	C10, C11	Capacitor, ceramic, 10pF, 50V, 5%	0603	muRata	GRM1885C1H100JA01
1	C9	Capacitor, ceramic, 82pF, 50V, 5%	0603	muRata	GRM1885C1H820JA01
1	C13	Capacitor, ceramic, 2.2nF, 50V, 5%	0603	muRata	GCM1885C1H222JA16
1	C14	Capacitor, ceramic, 150nF, 25V, 10%	0603	muRata	GRM188R71E154KA01
1	C15	Capacitor, ceramic, 47nF, 50V, 10%	0603	muRata	GRM188R71H473KA61
2	D1, D2	Diode, Schottky, 3A, 60V	PowerDI	Diodes	PDS360-13
1	D3	Diode, Zener, 1A, 5V	SMA	MCC	SMAZ5V1-TP
2	J1, J2	Terminal block, 2-pin, 6A, 3.5mm	0.25 x 0.27	OST	ED1514
10	Sync, GND (x4), PH, RST/, VBATT, VIN, VOUT	Test point, 52-mil	0.052	Kobiconn	151-103-RC
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1	ENA	Header, 3-pin, 100-mil spacing, (36-pin strip)	0.100 x 3	Sullins	PEC03SAAN
6	DELAY(x3), ENA, LPM, SR	Connector jumper, shorting, 100-mil spacing	0.100	Sullins	SPC02SYAN
1	L1	Inductor, SMT, 4.7-µH	12.3mm x 12.3mm	Coilcraft	MSS1278T-223
1	R1	Resistor, chip, 187-kΩ, 1/10W, 1%	0603	Panasonic	ERJ-3EKF1873V
1	R2	Resistor, chip, 35.7-kΩ, 1/10W, 1%	0603	Panasonic	ERJ-3EKF3572V
1	R3	Resistor, chip, 51.1-kΩ, 1/10W, 1%	0603	Panasonic	ERJ-3EKF5112V
2	R4	Resistor, chip, 2-kΩ, 1/10W, 1%	0603	Panasonic	ERJ-3EKF2001V
3	R5, R6	Resistor, chip, 30.1-kΩ, 1/10W, 1%	0603	Panasonic	ERJ-3EKF3012V
1	R7	Do not populate	0603	Panasonic	
1	R8, R16	Resistor, chip, 15-kΩ, 1/10W, 1%	0603	Panasonic	ERJ-3EKF1502V
1	R9	Resistor, chip, 68.1-kΩ, 1/10W, 1%	0603	Panasonic	ERJ-3EKF6812V
1	R10	Resistor, chip, 47.5-kΩ, 1/10W, 1%	0603	Panasonic	ERJ-3EKF4752V
1	R11	Resistor, chip, 49.9-Ω, 1/10W, 1%	0603	Panasonic	ERJ-3EKF49R9V
1	R12	Resistor, chip, 511-kΩ, 1/10W, 1%	0603	Panasonic	ERJ-3EKF5113V
1	R13	Resistor, chip, 1.37-kΩ, 1/10W, 1%	0603	Panasonic	ERJ-3EKF1371V
1	R14	Resistor, chip, 82.5-kΩ, 1/10W, 1%	0603	Panasonic	ERJ-3EKF8252V
1	R15	Resistor, chip, 2.32-kΩ, 1/10W, 1%	0603	Panasonic	ERJ-3EKF2321V
1	U1	IC, TPS54262QPWPRQ1		TI	TPS54262QPWP
	-	PCB, 2.3-inch x 2.3-inch x 0.062		Any	TPS54262, REV A

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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 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.

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EVM Warnings and Restrictions

It is important to operate this EVM within the input voltage range of –0.3 V to 48 V and the output voltage range of 0.9 V to 18 V .

Exceeding the specified input range may cause unexpected operation and/or irreversible damage to the EVM. If there are questions concerning the input range, please contact a TI field representative prior to connecting the input power.

Applying loads outside of the specified output range may result in unintended operation and/or possible permanent damage to the EVM. Please consult the EVM User's 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, some circuit components may have case temperatures greater than 85° C. The EVM is designed to operate properly with certain components above 60° C as long as the input and output ranges are maintained. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors. These types of devices can be identified using the EVM schematic located in the EVM User's Guide. When placing measurement probes near these devices during operation, please be aware that these devices may be very warm to the touch.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265

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.

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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。

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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

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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.

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.

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