



ABSTRACT

This user's guide describes the characteristics, operation, and the use of the TPS61288EVM-064 evaluation module (EVM). The EVM contains the TPS61288 device, which is a high-performance, high-efficiency synchronous boost converter which integrates two low on resistance power FETs. This user's guide includes EVM specifications, recommended test setup, test results, schematic diagram, bill of materials, and the board layout.

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Trademarks

All trademarks are the property of their respective owners.

1 Introduction

1.1 Performance Specification

Table 1-1 provides a summary of the TPS61288 EVM performance specifications. All specifications are given for an ambient temperature of 25°C.

Table 1-1. Performance Specification Summary

Parameter	Test Condition	MIN	TYP	MAX	Unit
V _{IN}		2.7	3.6	8.8	V
V _{OUT}	V _{IN} = 3.5 V, I _O < 2.3 A	12.66	12.92	13.17	V
Default Switching Frequency			500		kHz

1.2 Modification

The printed-circuit board (PCB) for this EVM is designed to accommodate some modifications by the user. The external component can be changed according to the real application.

2 Connector, Test Point and Jumper Descriptions

This section describes how to properly connect, set up, and use the TPS61288EVM-064.

2.1 Connector and Test Point Descriptions

This EVM includes I/O connectors and test points as shown in Table 2-1. The power supply must be connected to input connectors, J1 and J2. The load must be connected to output connectors, J3 and J4.

Table 2-1. Connectors and Test Points

Reference Designator	Description
J1	Input voltage positive connection
J2	Input voltage return connection
J3	Output voltage positive connection
J4	Output voltage return connection
TP1	V _{IN_S+} is for positive input voltage sensing
TP2	V _{IN_S-} is for negative input voltage sensing
TP3	V _{O_S+} is for positive output voltage sensing
TP4	V _{O_S-} is for negative output voltage sensing
TP5	Bode+ is for bode plot measurement connection
TP6	Bode- is for bode plot measurement connection
TP7	Test point to measure SW pin waveform

2.2 Jumper Configuration

JP1 (VIN Control)

The JP1 jumper connects the control VIN with power VIN. By default, this jumper is set to the ON position. Take off the jumper for a user-defined voltage.

2.2.1 JP2 (Enable)

The JP2 jumper enables the device. By default, this jumper is set to the VCC position. Put this jumper in the GND position to disable the output.

3 Schematic, Bill of Materials, and Board Layout

This section provides the TPS61288EVM-064 schematic, bill of materials (BOM), and board layout.

3.1 Schematic

Figure 3-1 shows the schematic of the TPS61288EVM-064.

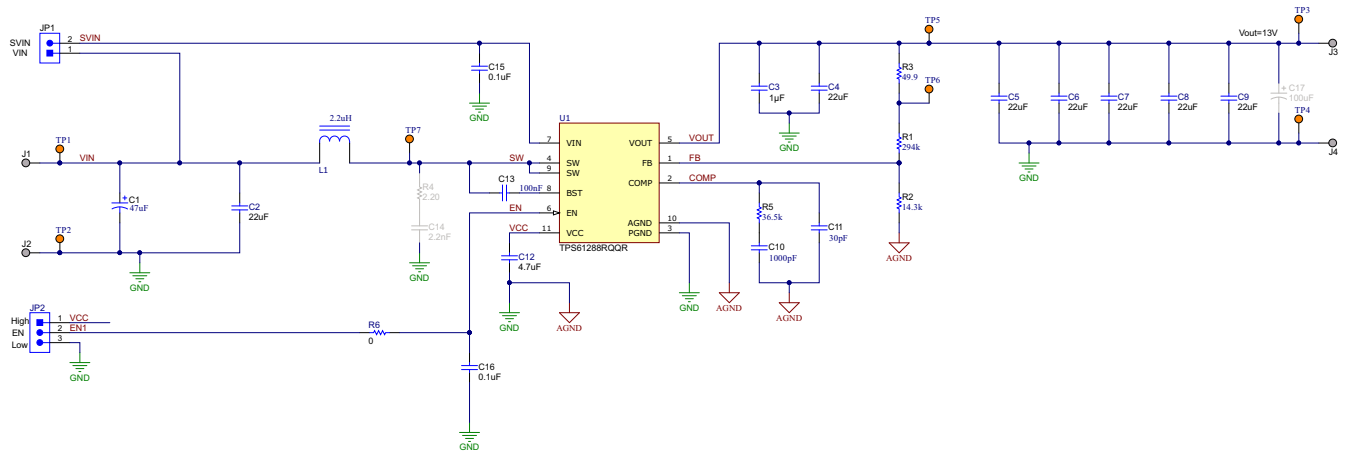


Figure 3-1. TPS61288EVM-064 Schematic

3.2 Bill of Materials

Table 3-1 lists the BOM of the TPS61288EVM-064.

Table 3-1. Bill of Materials

Designator	QTY	Value	Description	Package Reference	Part Number	Manufacturer
C1	1	47 μ F	CAP, CERM, 22 μ F, 25 V, \pm 10%, X7R, 1210	7343-31	T495D476M025ATE120	Kemet
C2, C4, C5, C6, C7, C8, C9	7	22 μ F	CAP, CERM, 22 μ F, 25 V, \pm 10%, X7R, 1210	1210	GRM32ER71E226KE15L	MuRata
C3	1	1 μ F	CAP, CERM, 1 μ F, 50 V, \pm 20%, X5R, AEC-Q200 Grade 3, 0603	0603	GRT188R61H105ME13D	MuRata
C10	1	1000 pF	CAP, CERM, 1000 pF, 50 V, \pm 10%, X5R, 0402	0402	GRM155R61H102KA01D	MuRata
C11	1	30 pF	CAP, CERM, 30 pF, 50 V, \pm 5%, C0G/NP0, 0402	0402	GRM1555C1H300JA01D	MuRata
C12	1	4.7 μ F	CAP, CERM, 4.7 μ F, 10 V, \pm 10%, X5R, 0603	0603	0603ZD475KAT2A	AVX
C13	1	0.1 μ F	CAP, CERM, 0.1 μ F, 50 V, \pm 10%, X7R, 0603	0603	GCM188R71H104KA57D	MuRata
C15, C16	2	0.1 μ F	CAP, CERM, 0.1 μ F, 50 V, \pm 10%, X7R, AEC-Q200 Grade 1, 0402	0402	CGA2B3X7R1H104K050BB	TDK
J1, J2, J3, J4	4		Terminal, Turret, TH, Double	Keystone1502-2	1502-2	Keystone
JP1	1		Header, 100 mil, 2x1, Tin, TH	Header, 2 PIN, 100mil, Tin	PEC02SAAN	Sullins Connector Solutions
JP2	1		Header, 100 mil, 3x1, Tin, TH	Header, 3 PIN, 100mil, Tin	PEC03SAAN	Sullins Connector Solutions
L1	1		Fixed Inductor 2.2 μ H 20% 100 kHz 19.5A 4.5m Ω	SMT_IND_11MM15_10MM0	CMLE105T-2R2MS	Cyntec
R1	1	294k	RES, 294 k, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW0402294KFKED	Vishay-Dale
R2	1	14.3k	RES, 14.3 k, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW040214K3FKED	Vishay-Dale
R3	1	49.9	RES, 49.9, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW040249R9FKED	Vishay-Dale
R5	1	36.5k	RES, 36.5 k, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW040236K5FKED	Vishay-Dale
R6	1	0	RES, 0, 5%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW04020000Z0ED	Vishay-Dale
SH-JP1, SH-JP2	2		Shunt, 100mil, Gold plated, Black	Shunt 2 pos. 100 mil	881545-2	TE Connectivity
TP1, TP2, TP3, TP4, TP5, TP6, TP7	7		Test Point, Miniature, Orange, TH	Orange Miniature Testpoint	5003	Keystone

Table 3-1. Bill of Materials (continued)

Designator	QTY	Value	Description	Package Reference	Part Number	Manufacturer
U1	1		Fully Integrated Synchronous Boost Converter	VQFN-HR11	TPS61288RQQR	Texas Instruments
C14	0	2200 pF	CAP, CERM, 2200 pF, 250 V, $\pm 10\%$, X7R, 0805	0805	GRM21AR72E222KW01D	MuRata
C17	0	100 μ F	CAP, Polymer Hybrid, 100 μ F, 25 V, $\pm 20\%$, 30 Ω , 6.3x7.7 SMD	6.3x7.7	EEHZA1E101XP	Panasonic
FID1, FID2, FID3	0		Fiducial mark. There is nothing to buy or mount.	N/A	N/A	N/A
R4	0	2.20	RES, 2.20, 1%, 0.25 W, AEC-Q200 Grade 0, 1206	1206	ERJ-8RQF2R2V	Panasonic

3.3 Board Layout

The TPS61288EVM board is a 4-layer PCB. The top and bottom layers copper thickness is 2-oz. The two inner layers copper thickness is 1-oz. [Figure 3-2](#) and [Figure 3-5](#) show the top view and bottom view, respectively. [Figure 3-3](#) and [Figure 3-4](#) show the inner layer 1 and inner layer 2, respectively.

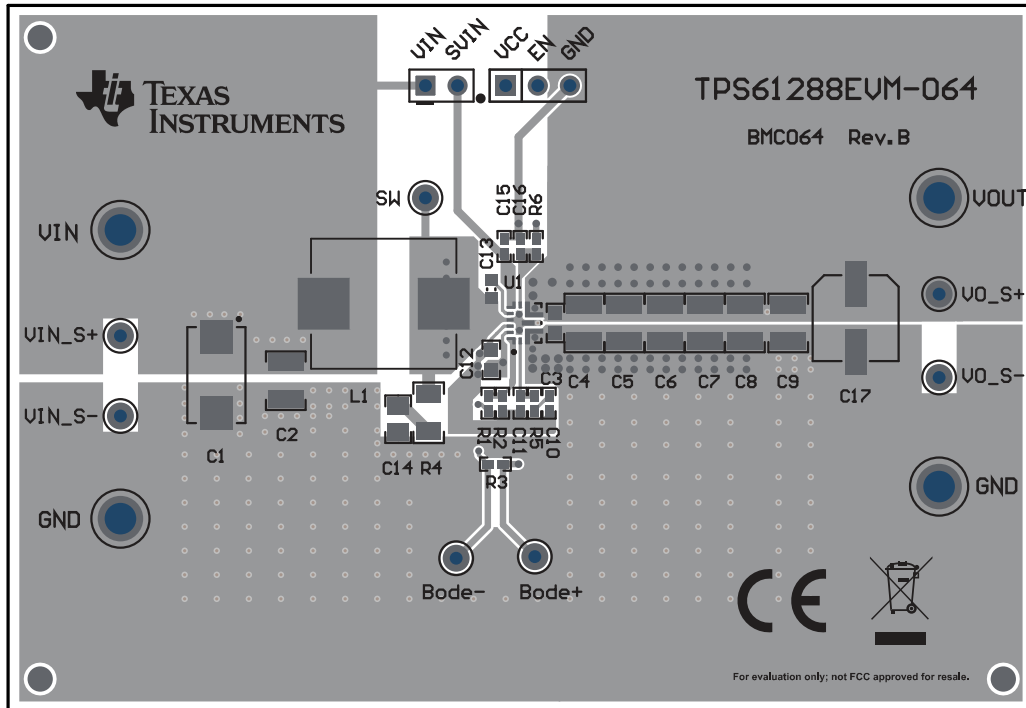


Figure 3-2. TPS61288EVM-064 Top-Side Layout

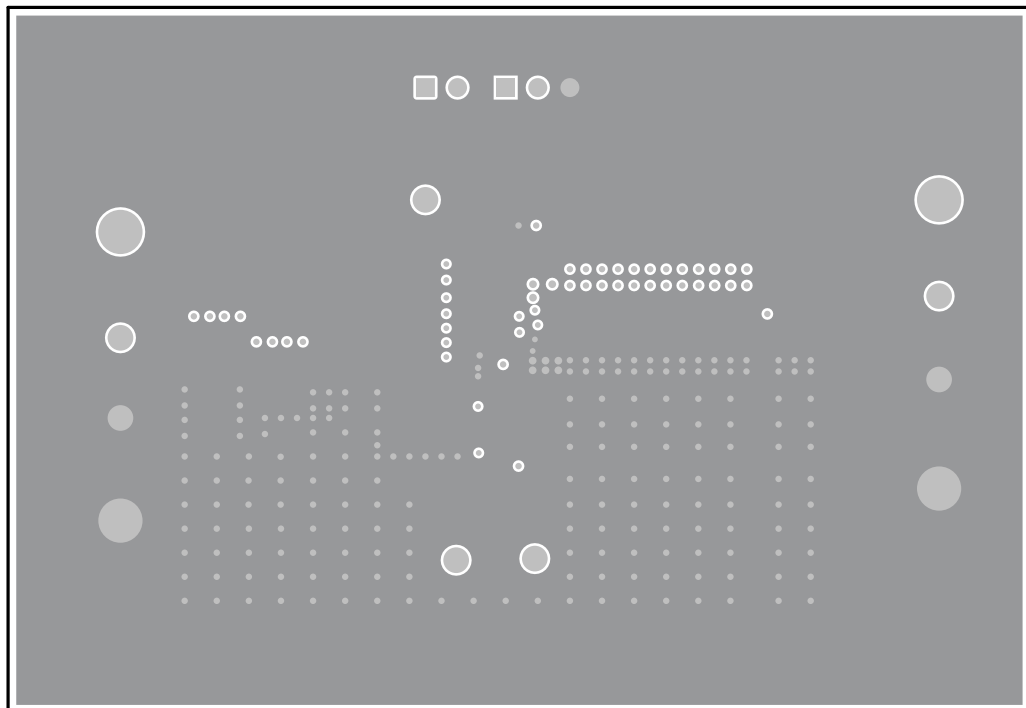


Figure 3-3. TPS61288EVM-064 Inner Layer1 Layout

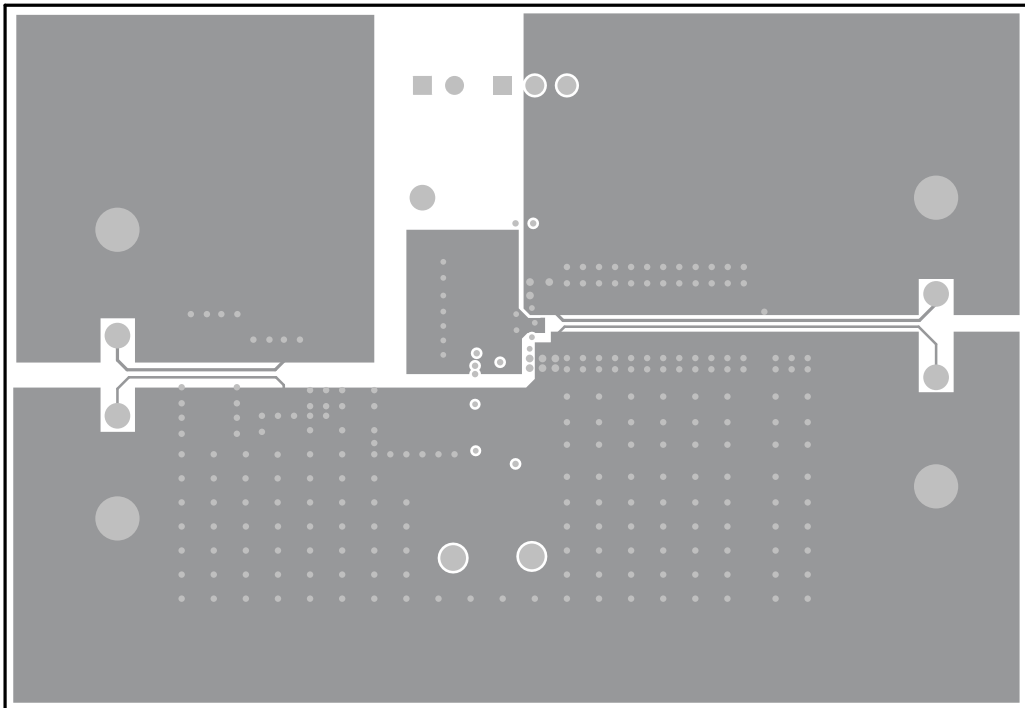


Figure 3-4. TPS61288EVM-064 Inner Layer2 Layout

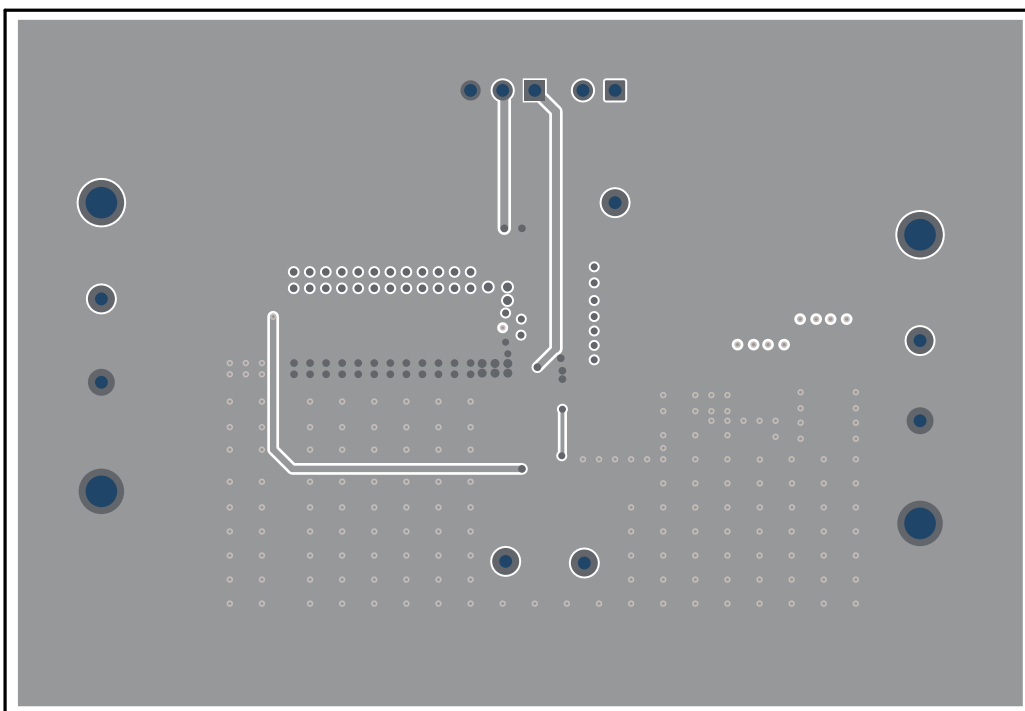


Figure 3-5. TPS61288EVM-064 Bottom-Side Layout

4 Revision History

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

Changes from Revision * (July 2020) to Revision A (December 2020)	Page
• Updated the numbering format for tables, figures and cross-references throughout the document.....	2
• Update was made in Section 3.1	3
• Update was made in Section 3.2	4
• Update was made in Section 3.3	6

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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.

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

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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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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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 - 4.1 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.
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 - 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.
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9. *Return Policy.* Except as otherwise provided, TI does not offer any refunds, returns, or exchanges. Furthermore, no return of EVM(s) will be accepted if the package has been opened and no return of the EVM(s) will be accepted if they are damaged or otherwise not in a resalable condition. If User feels it has been incorrectly charged for the EVM(s) it ordered or that delivery violates the applicable order, User should contact TI. All refunds will be made in full within thirty (30) working days from the return of the components(s), excluding any postage or packaging costs.

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