BQ24392EVM User's Guide

This document is the EVM user guide for the BQ24392. The BQ24392 is a charger detection IC with an integrated USB 2.0 high-speed isolation switch for use with a micro- or mini-USB port. The device is compatible with all BC1.2 chargers and detects both Apple® and TomTom™ chargers.

NOTE: This board is not designed to support high-current charging.

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1 About this Manual

This user's guide describes the BQ24392 evaluation module (EVM) and its intended use. This guide contains the bill of materials (BOM), EVM schematics, printed-circuit-board (PCB) layout information, and an implementation guide.

1.1 Information about Cautions and Warnings



CAUTION

This EVM contains components that can potentially be damaged by electrostatic discharge. Always transport and store the EVM in its supplied ESD bag when not in use. Handle using an antistatic wristband. Operate on an antistatic work surface. For more information on proper handling, see the *Electrostatic Discharge (ESD)* application note (SSYA008).

The information in a caution or a warning is provided for your protection. Please read each caution and warning carefully.

2 Introduction

The BQ24932EVM is an evaluation module for TI's BC1.2-compatible charger detection IC with an integrated USB 2.0 high-speed isolation switch. In addition to detecting BC1.2-compliant chargers, the BQ24932 is also able to detect Apple and TomTom chargers, allowing the system containing the BQ24392 to charge from more types of chargers, enhancing the end-user experience.

The evaluation module is designed to easily demonstrate the capabilities of the BQ24392 without the need for external supplies or metering equipment through the use of status indicator LEDs. See Figure 1 for the EVM block diagram.

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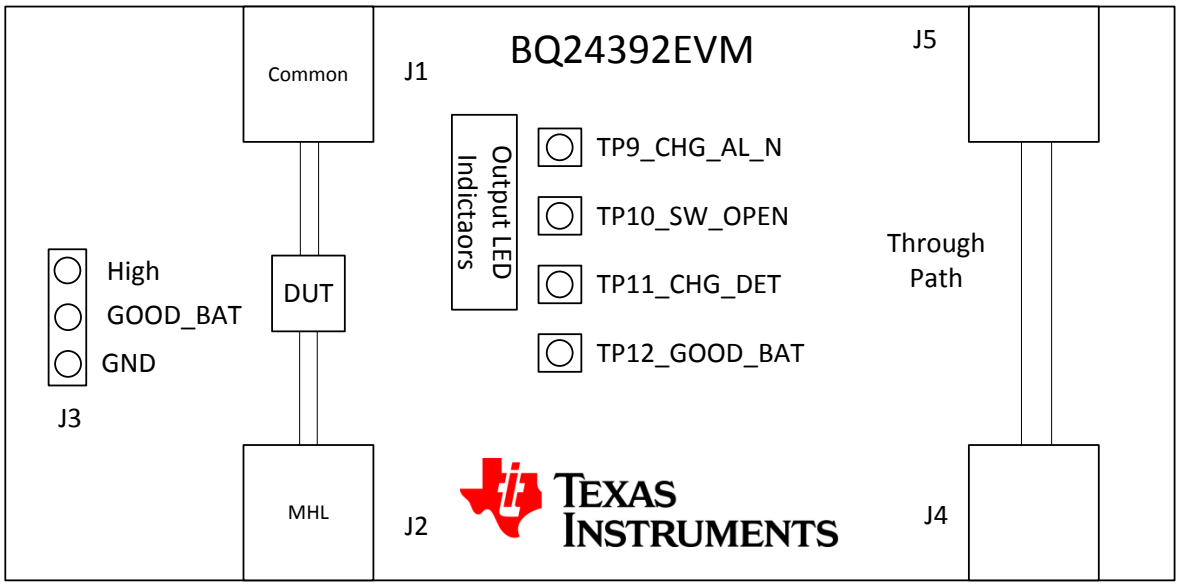


Figure 1. EVM Block Diagram

2.1 List of Hardware Items for Operation

The following items are required for EVM evaluation:

- BQ24392 EVM
- BC1.2-compliant charger
- PC with USB port
- USB cable
- USB peripheral to connect to the PC

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3 BQ24392 Implementation Guidelines

3.1 Detection Overview

After accessory insertion and once VBUS is greater than VBUS_VALID threshold, the device proceeds onto data contact detection. This state has a 600 ms timeout feature specified in the BCDv1.2 specification. If the device passes DCD, a 130 ms de-bounce period is started and the BQ24392 proceeds to primary detection and then secondary detection to determine if a DCP, SDP, or CDP is attached to the USB port. Detection time for a DCP, SDP, and CDP is – at a minimum – 130 ms, and can be as long as 600 ms, due to the slow plug in effect.

If data contact detection fails, the BQ24392 proceeds to detect whether an Apple or TomTom charger is detected. Thus, for Apple and TomTom chargers, detection time typically takes ~600 ms.

The 3 output pins change their status at the end of detection. Table 1 is the detection table with the GPIO status for each type of supported accessory. More information on how to use the GPIOs is available in Section 5.

Table 1. Detection Table

Device Type	VBUS	DP_CON (D+)	DM_CON (D–)	GOOD_BAT (Input)	CHG_AL_N (Output)	CHG_DET (Output)	SW_OPEN (Output)	Switch Status
Standard Downstream Port	> 3.5 V	Pull-down R to GND	Pull-down R to GND	HIGH	LOW	LOW	LOW	Connected
				LOW	LOW	LOW	Hi-Z	Not connected
Charging Downstream Port	> 3.5 V	Pull-down R to GND	V_{DM_SRC}	HIGH	LOW	HIGH	LOW	Connected
				LOW	LOW	HIGH	Hi-Z	Not connected
Dedicated Charging Port	> 3.5 V	Short to D–	Short to D+	HIGH	LOW	HIGH	Hi-Z	Not connected
				LOW	LOW	HIGH	Hi-Z	Not connected
Apple Charger	> 3.5 V	2.0 < V_{DP} < 2.8	2.0 < V_{DP} < 2.8	HIGH	LOW	HIGH	Hi-Z	Not connected
				LOW	LOW	HIGH	Hi-Z	Not connected
TomTom Charger	> 3.5 V	2.0 < V_{DP} < 3.1	2.0 < V_{DP} < 3.1	HIGH	LOW	HIGH	Hi-Z	Not connected
				LOW	LOW	HIGH	Hi-Z	Not connected
PS/2 Charger	> 3.5 V	Pull-up R to VBUS	Pull-up R to VBUS	X	LOW	LOW	Hi-Z	Not connected
Noncompliant USB Charger	> 3.5 V	Open	Open	X	LOW	LOW	Hi-Z	Not connected
Any Device	< 3.5 V	Open	Open	X	Hi-Z	LOW	Hi-Z	Not connected
Any Device DBP Timer Expired	> 3.5 V	x	x	LOW	Hi-Z	LOW	Hi-Z	Not connected

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3.2 Slow Plug-in Event

As you insert a charger into the USB receptacle, the pins are configured so that the VBUS and GND pins make contact first. This presents a problem as the BQ24392 (or any other charger detection IC) requires access to the D+ D– lines to run detection. This is why the BQ24392 has a standard 130 ms de-bounce time after VBUS valid to run the detection algorithm. This delay helps minimize the effects of the D+ D– lines making contact after VBUS and GND.

Figure 2 is from the datasheet of a standard male micro-USB connector and shows how the data connections (red line) are slightly recessed from the power connections (blue line).

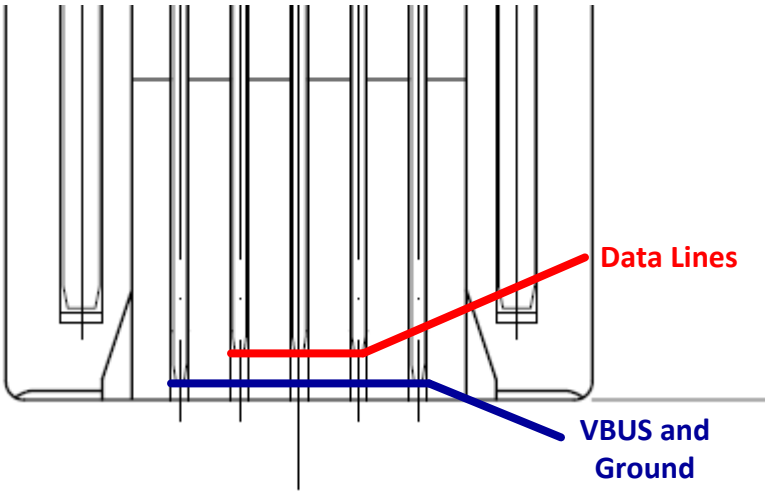


Figure 2. Data Connections Recessed from Power Connections

However, in some cases the charger is inserted very slowly, causing the VBUS and GND to make contact long before D+ D–. Due to this effect, there is no guaranteed detection time as the detection time can vary based on how long it takes to insert the charger. If longer than 600 ms is taken to insert the charger into the USB receptacle, the detection algorithm of the BQ24392 will timeout and instead of the charger being detected as a DCP, it is now detected as a nonstandard charger (D+ and D– floating).

3.3 DBP Timer

The BQ24392 features a dead battery provision timer per the BC1.2 specification. Once a charger has been detected and the GOOD_BAT pin is low, a dead battery timer is initiated. If the GOOD_BAT continues to be LOW for 30 minutes (maximum of 45 minutes), charging is disabled and CHG_AL_N goes into the High-Z state to indicate this. Toggling GOOD_BAT high after the DBP timer expires re-starts detection and the DBP timer.

3.4 Using the BQ24932 GPIOS

3.4.1 CHG_AL and CHG_DET

The BQ24392 has 2 outputs, CHG_AL_N and CHG_DET, that the host can used to determine whether it can charge and if it can charge at a low or high current. Table 2 demonstrates how these outputs should be interpreted. CHG_AL_N is an open drain output and is active when the output of the pin is low. CHG_DET is a push-pull output and is high in the active state.

Table 2. BQ24392 Outputs

CHG_AL_N	CHG_DET	
High-Z	X	Charging is not allowed
Low	Low	Low-current charging is allowed
Low	High	High-current charging is allowed

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The system must define what is meant by low- and high-current charging. If CHG_DET is high, a system could try to draw 2 A, 1.5 A, or 1.0 A. If the system is trying to support > 1.5-A chargers, then the system has to use a charger IC that is capable of monitoring the VBUS voltage as it tries to pull the higher current values. If the voltage on VBUS starts to drop because that high of a current is supported then the system has to back down on how much current it is trying to draw until it finds a stable state with VBUS not dropping.

3.4.2 SW_OPEN

SW_OPEN is an open drain output that indicates whether the USB switches are opened or closed. In the High-Z state the switches are open and in the active, or low state, the switches are closed. The host should monitor this pin to know when the switches are closed or open.

3.4.3 GOOD_BAT

GOOD_BAT is used by the host controller to indicate the status of the battery to the BQ24392. This pin affects the switch status for a SDP or CDP, and it also affects the DBP timer as discussed in the DBP timer section.

3.5 EVM Overview

The EVM for the BQ24392 is designed to be self-contained so no use of lab equipment is required to evaluate the functionality of the battery charging detection or the USB communication capabilities. However, there are test points available for more detailed analysis of the detection timings.

3.5.1 Board Power

The EVM is fully supplied by VBUS from the charger or PC connected to the board with test points for monitoring VBUS as a device is attached. The EVM also has an LED output indicating when VBUS is present as depicted in the following figure:



The EVM contains a 3.3-V output LDO for the SW_OPEN output and GOOD_BAT input as these pins must not be connected to VBUS. Figure 3 is the schematic for this portion of the design.

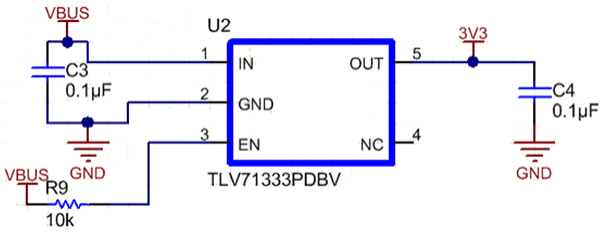


Figure 3. Schematic for 3.3-V Output LDO

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3.5.2 GOOD_BAT Selection Jumper

There is a 3-pin header (J3) on the EVM to select the GOOD_BAT input to be high or low. The jumper positioning is fully labeled on the EVM itself for ease of use. Figure 4 and Figure 5 illustrate the schematic and the EVM board labeling.

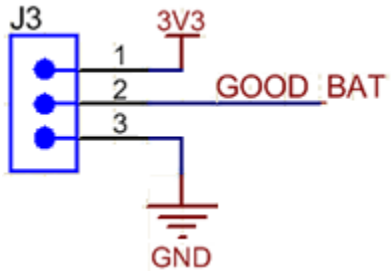


Figure 4. Schematic for GOOD_BAT Selection Header

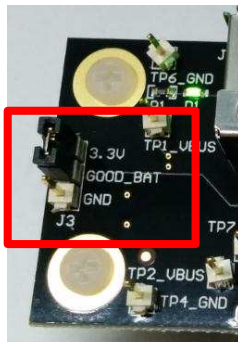


Figure 5. GOOD_BAT Selection Header on EVM

3.5.3 Test Points

The EVM also contains test point for the 3 outputs, 1 input, and the D+ D– pins. Figure 6 shows the schematic for these test points and the locations on the EVM.

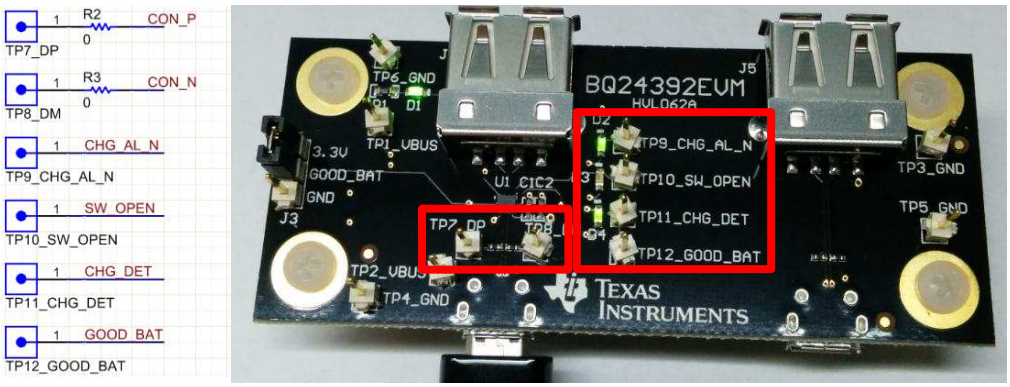


Figure 6. Test Point Locations

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These test points also feature LED indicators that turn on when the output is active. That is, for CHG_DET the LED turns on when the output is high. For CHG_AL_N and SW_OPEN, the LED turns on when the output is low. Figure 7 is the schematic section for the LED output indicators.

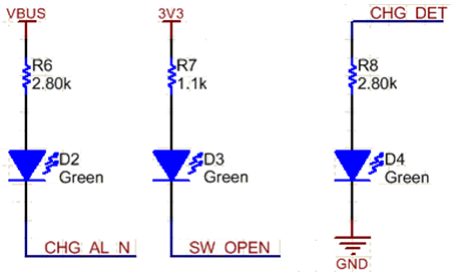


Figure 7. LED Output Schematic

3.5.4 USB Connections

The micro-USB connector (J2) is the common side of the BQ24392 and the standard-A USB connector (J1) is the host side of the BQ24392.

There is also a through path on the board that can be used for testing. The connectors for the through path are J4 and J5.

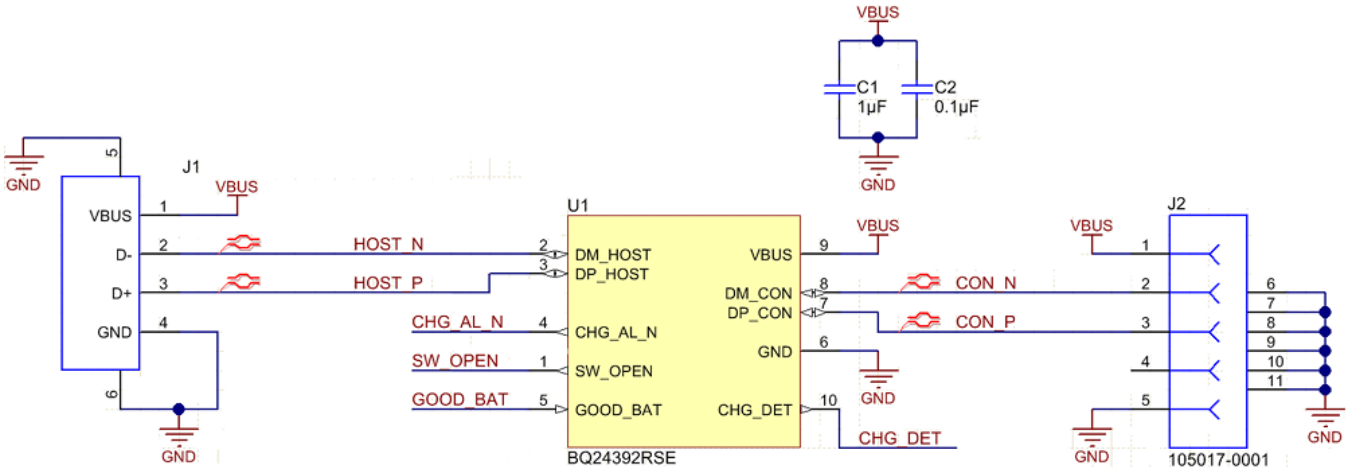


Figure 8. Device and USB Connections

3.6 BQ24392 Quick Start Evaluation

3.6.1 High-Current Chargers

High-current chargers include the following:

- BC1.2-compliant DCPs
- BC1.2-compliant CDPs
- Apple Chargers
- TomTom Chargers

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Table 3 shows the states the BQ24392 EVM has the output LEDs in after inserting any chargers from the high-current charger list.

Table 3. LED State After Inserting Charger

Output	LED Status
CH_AL_N	ON
CHG_DET	ON
SW_OPEN	OFF

Figure 9 is an image of the EVM after a high-current charger attachment.

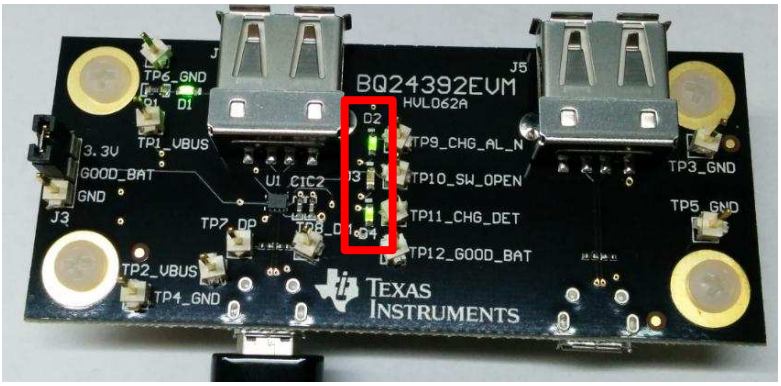


Figure 9. EVM After High-Current Charger Attached

3.6.2 Low-Current Chargers

Low-Current chargers include the following:

- SDP
- Nonstandard chargers with VBUS = 5 V and D+ D– floating

  Table 4 shows the output status for different low current charger attachments, notice that the GOOD_BAT input affects the SW_OPEN output for an SDP but not a nonstandard charger.

Table 4. Output Status for Different Low-Current Charger Attachments

Attachment	GOOD_BAT	LED Status
SDP	**LOW**	CHG_AL_N = ON
		CHG_DET = OFF
		SW_OPEN = OFF
SDP	**High**	CHG_AL_N = ON
		CHG_DET = OFF
		SW_OPEN = ON
Nonstandard	**X**	CHG_AL_N = ON
		CHG_DET = OFF
		SW_OPEN = OFF

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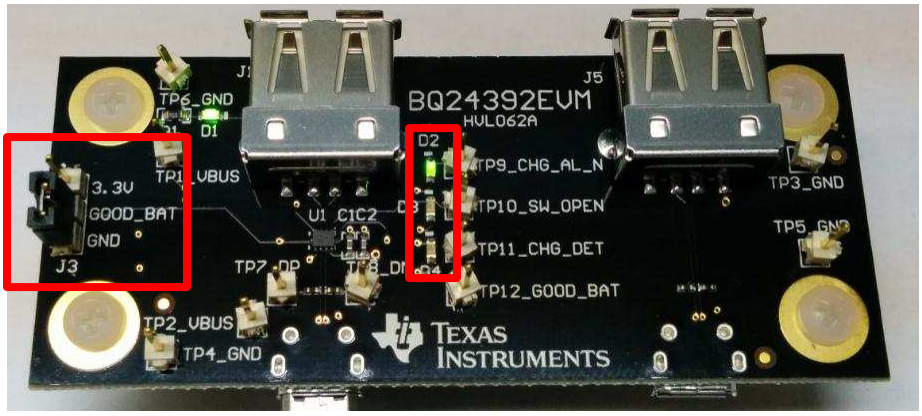


Figure 10. SDP with GOOD_BAT Low or Nonstandard Charger

Figure 11 shows how with an SDP, changing the GOOD_BAT input to high closes the switches and turns on the SW_OPEN Output.

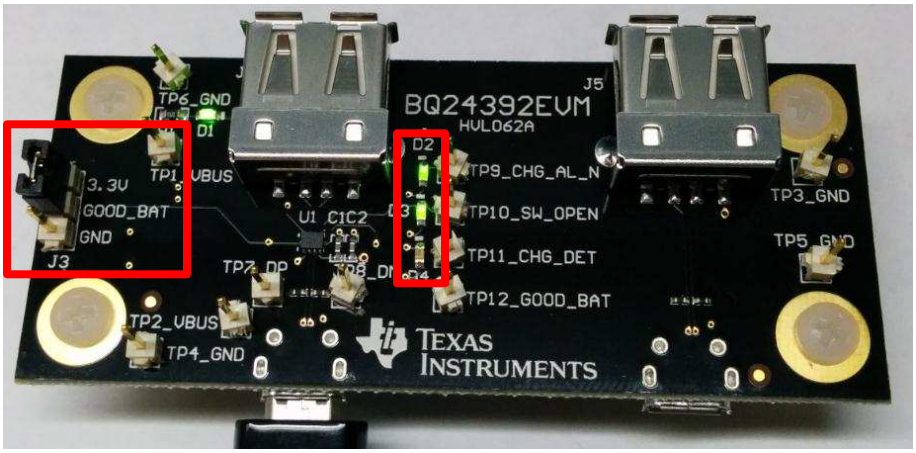


Figure 11. SDP with GOOD_BAT = High

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3.6.3 USB Communication

It is also possible to communicate over USB through the BQ24392 EVM. By attaching an SDP to the common side with GOOD_BAT = High, we can communicate to a USB thumb drive inserted into the standard-A receptacle, see Figure 12 for an example.

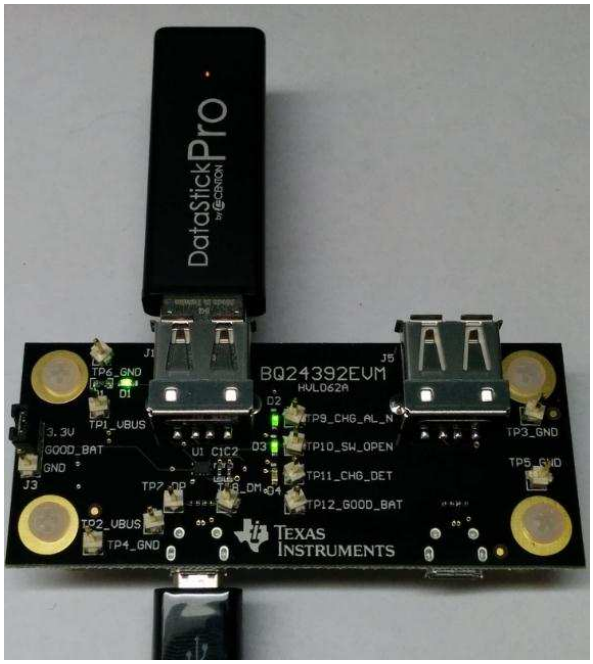


Figure 12. USB Communication with Thumb Drive Through BQ24392

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4 Board Documentation

This section contains the BOM, the EVM schematic, and the PCB layout drawings.

4.1 Bill of Materials

Table 5 lists the bill of materials for this EVM.

Table 5. bq24392 EVM Bill of Materials

Designator	Qty	Value	Description	Package Reference	Part Number
C1	1	1uF	CAP, CERM, 1uF, 16V, +/-10%, X5R, 0603	0603	C0603C105K4PACTU
C2	1	0.1uF	CAP, CERM, 0.1uF, 16V, +/-5%, X7R, 0603	0603	0603YC104JAT2A
C3, C4	2	0.1uF	CAP, CERM, 0.1uF, 6.3V, +/-10%, X5R, 0402	0402	C1005X5R0J104K
D1, D2, D3, D4	4	Green	LED, Green, SMD	LED, GREEN, 0603	SML-LX0603GW-TR
H3, H4, H7, H8	4		Machine Screw, Round, #4-40 x 1/4, Nylon, Philips panhead	Screw	NY PMS 440 0025 PH
J1, J5	2		Connector, Receptacle, USB TYPE A, 4POS SMD	USB TYPE A CONNECTOR RECEPTACLE 4POS SMD	896-43-004-00-000000
J2, J4	2		Receptacle, Micro-USB-B, Right Angle, SMD	Micro USB receptacle	105017-0001
J3	1		Header, TH, 100mil, 3x1, Gold plated, 230 mil above insulator	3x1 Header	TSW-103-07-G-S
R1, R7	2	1.1k	RES, 1.1k ohm, 5%, 0.1W, 0603	0603	CRCW06031K10JNEA
R2, R3, R4, R5	4	0	RES, 0 ohm, 5%, 0.063W, 0402	0402	CRCW04020000Z0ED
R6, R8	2	2.80k	RES, 2.80k ohm, 1%, 0.1W, 0603	0603	CRCW06032K80FKEA
R9	1	10k	RES, 10k ohm, 5%, 0.1W, 0603	0603	CRCW060310K0JNEA
SH-J1	1	1x2	Shunt, 100mil, Gold plated, Black	Shunt	969102-0000-DA
TP1_VBUS, TP2_VBUS, TP3_GND, TP4_GND, TP5_GND, TP6_GND, TP7_DP, TP8_DM, TP9_CHG_AL_N, TP10_SW_OPEN, TP11_CHG_DET, TP12_GOOD_BAT	12		Header, TH, 100mil, 1pos, Gold plated, 230 mil above insulator	Testpoint	TSW-101-07-G-S
U1	1		Charger Detection Device with High Speed USB Switch Battery Charger Specification v1.2, RSE0010A	RSE0010A	BQ24392RSE
U2	1	TLV7133PDBV	IC, 150mA, Low IQ, Ultra Small LDO Voltage Reg.	SOT	TLV7133PDBV

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4.2 Schematic

Figure 13 illustrates the EVM schematic.

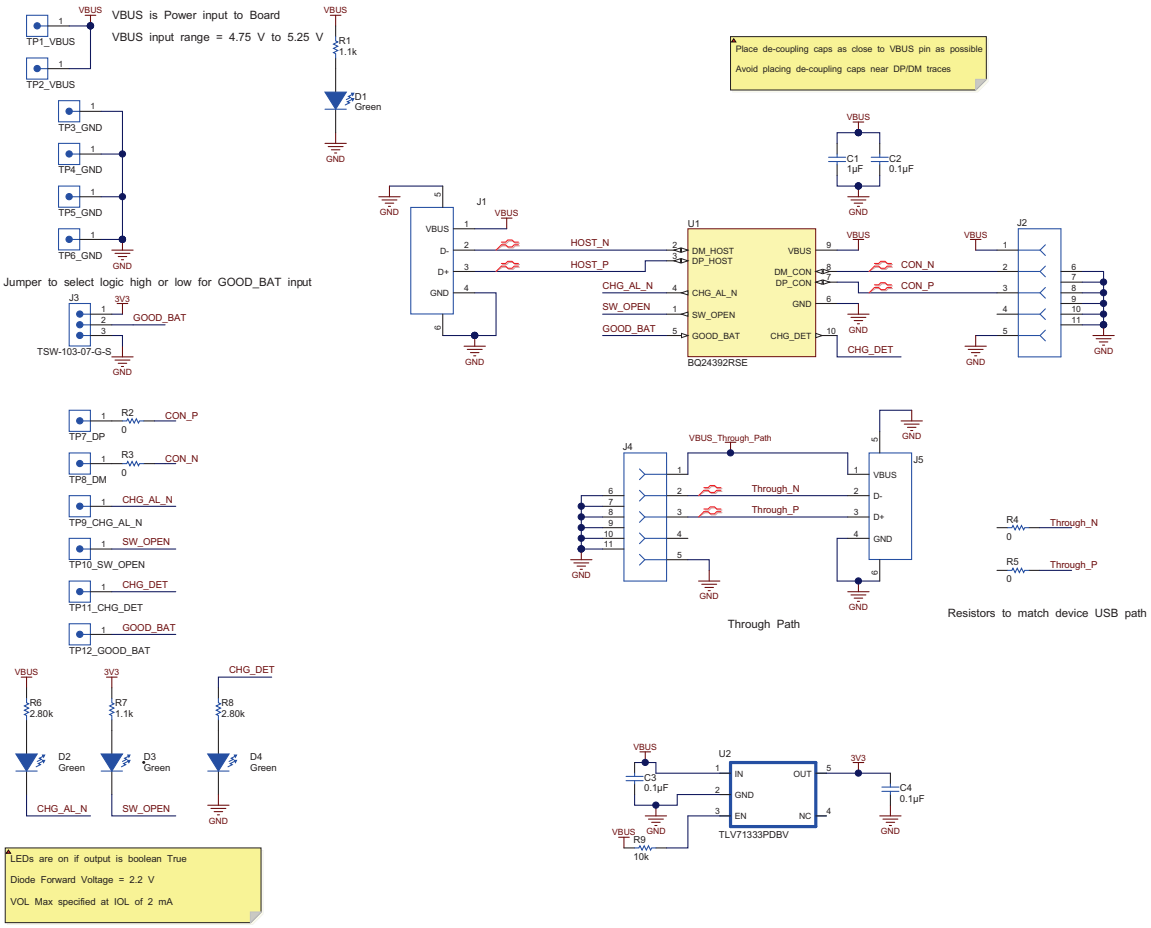


Figure 13. BQ24392EVM Schematic

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4.3 Board Layout

Figure 14 through Figure 19 illustrate the PCB layout for this EVM.

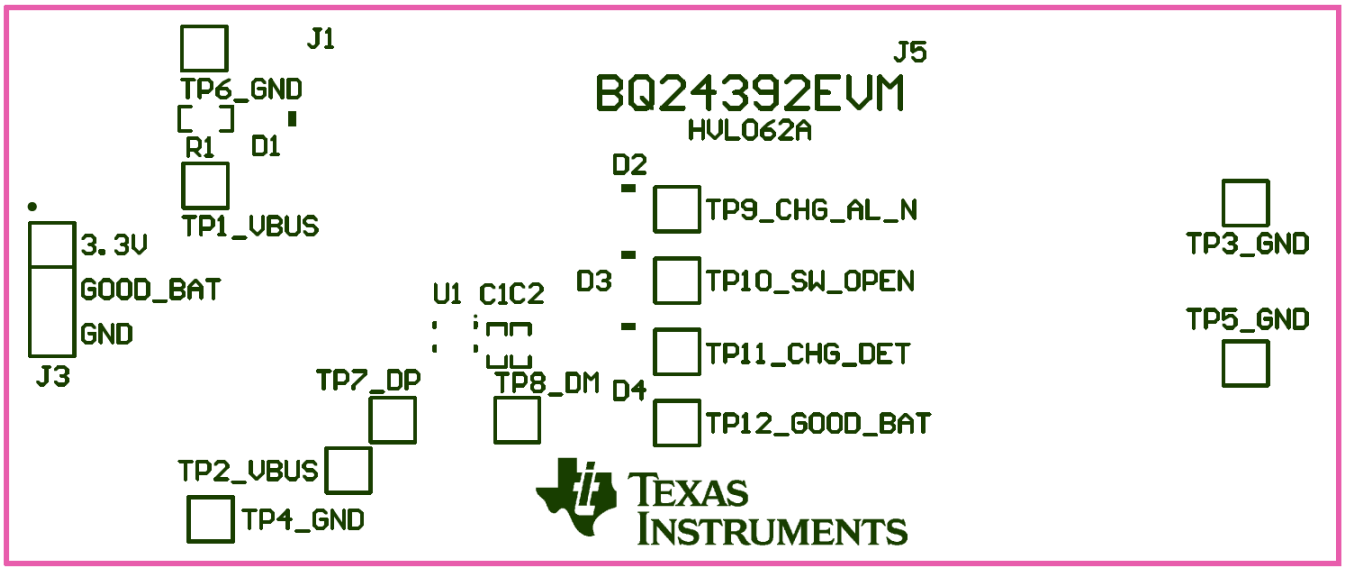


Figure 14. Top Overlay

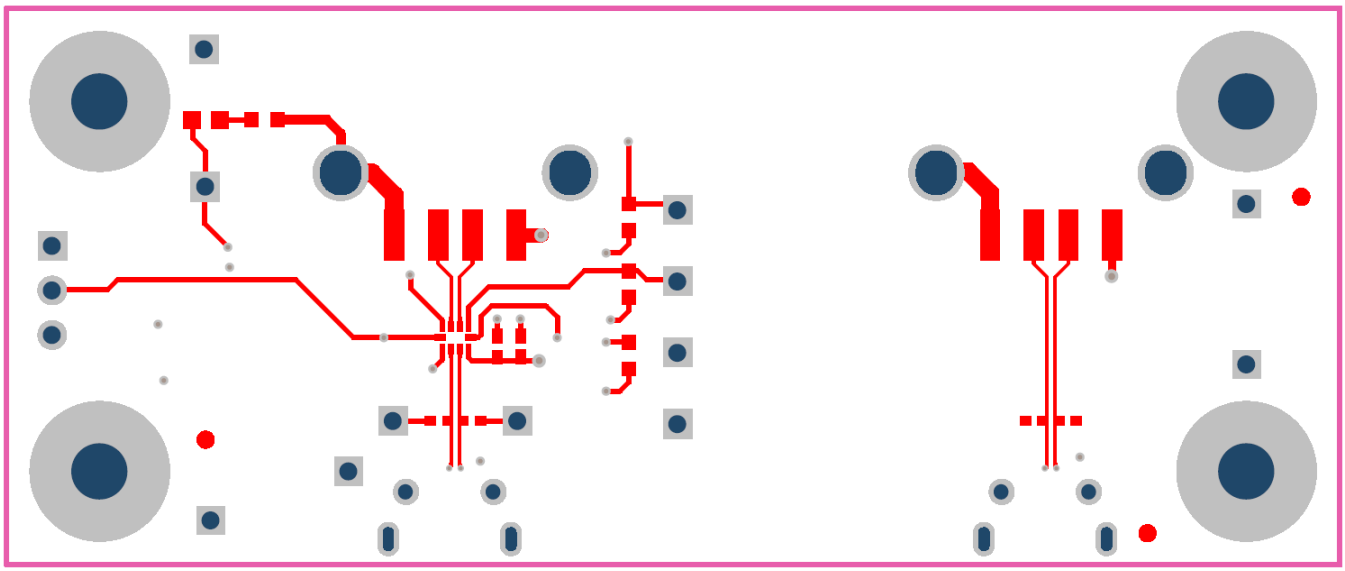


Figure 15. Top Layer

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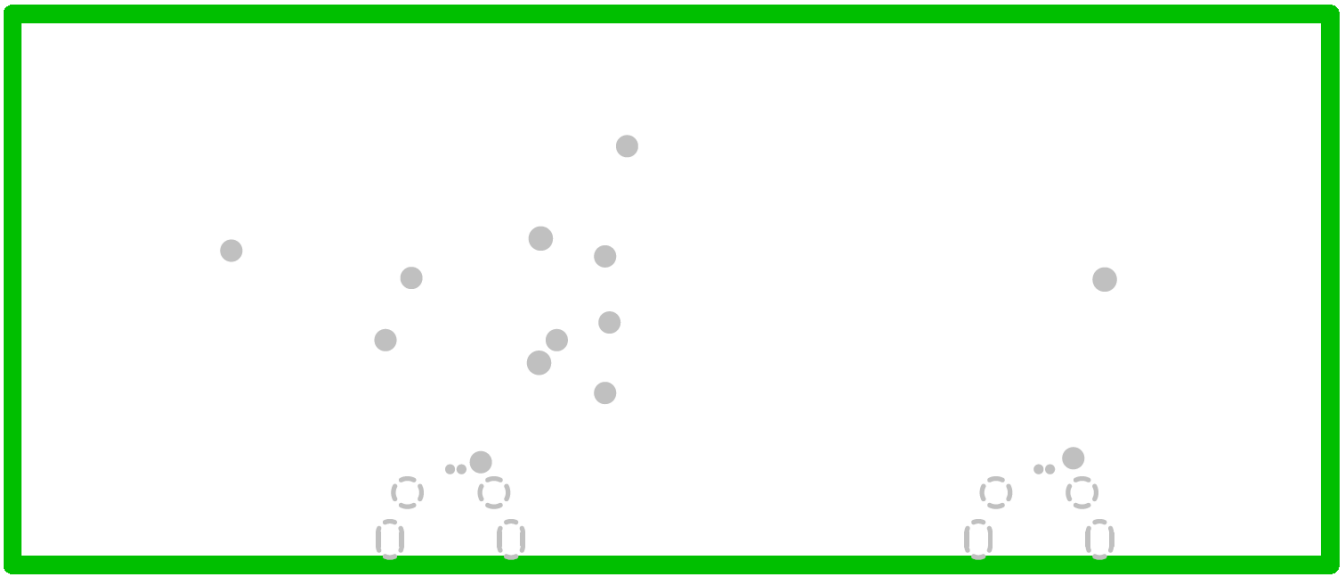


Figure 16. Ground Layer

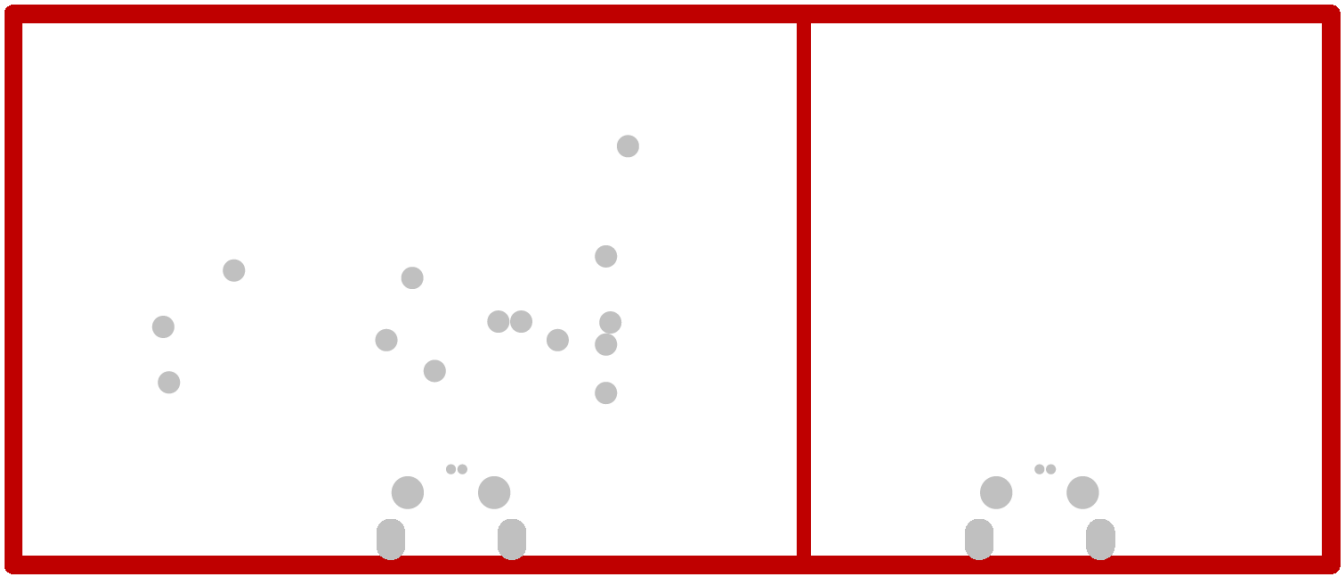


Figure 17. Power Layer

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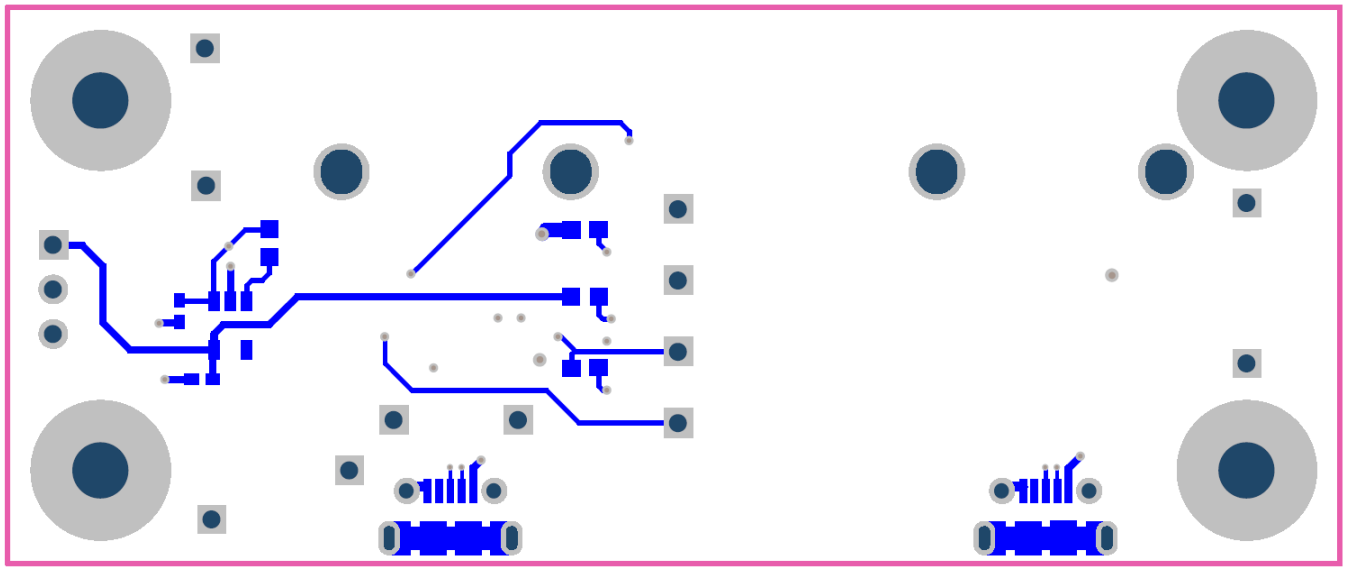


Figure 18. Bottom Layer

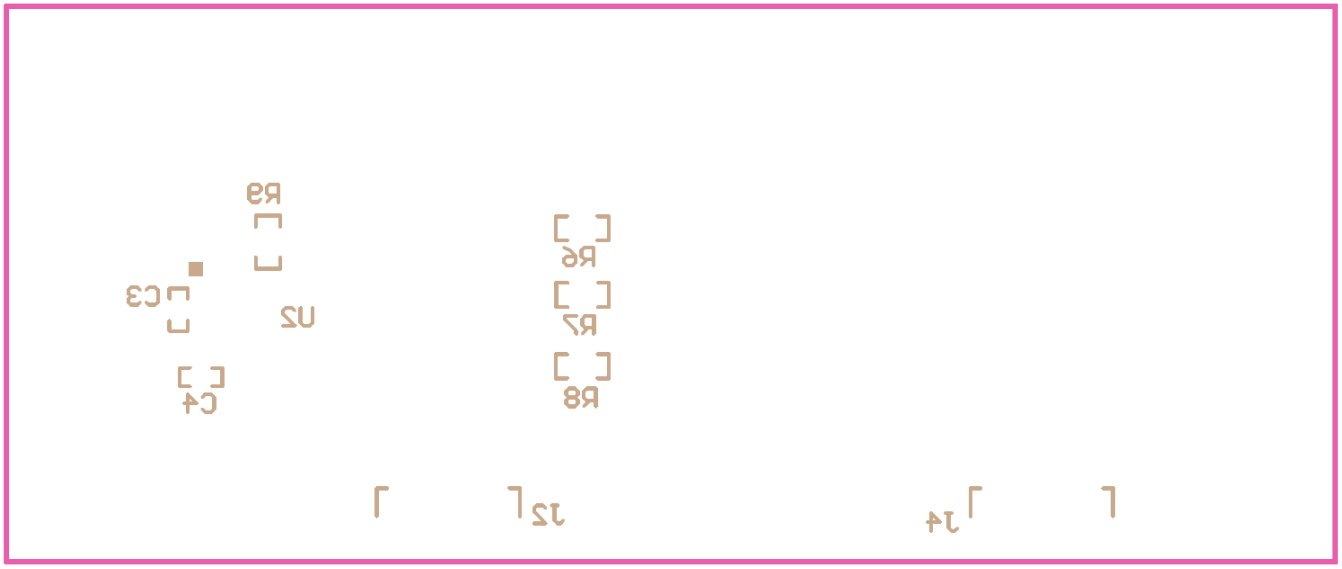


Figure 19. Bottom Overlay

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5 Board Stackup and Layout Guidelines

Figure 20 depicts the board stackup. All signal and plane layers are 1.4-mil thick.

- Core: FR-4
- Prepreg: FR-4

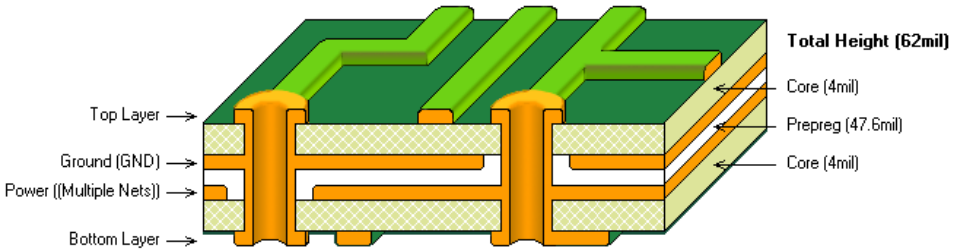


Figure 20. Board Stackup

6 Related Documentation

BQ24392 *Charger Detection Device with High Speed USB Switch Battery Charger Specification* v1.2 (SLIS146)

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7. Should any EVM not meet the specifications indicated in the user's guide or other documentation accompanying such EVM, the EVM may be returned to TI within 30 days from the date of delivery for a full refund. THE FOREGOING LIMITED WARRANTY IS THE EXCLUSIVE WARRANTY MADE BY TI TO USER AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. TI SHALL NOT BE LIABLE TO USER FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES RELATED TO THE HANDLING OR USE OF ANY EVM.
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9. User assumes sole responsibility to determine whether EVMs may be subject to any applicable federal, state, or local laws and regulatory requirements (including but not limited to U.S. Food and Drug Administration regulations, if applicable) related to its handling and use of EVMs and, if applicable, compliance in all respects with such laws and regulations.
10. User has sole responsibility to ensure the safety of any activities to be conducted by it and its employees, affiliates, contractors or designees, with respect to handling and using EVMs. Further, user is responsible to ensure that any interfaces (electronic and/or mechanical) between EVMs 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.
11. User shall employ reasonable safeguards to ensure that user's use of EVMs will not result in any property damage, injury or death, even if EVMs should fail to perform as described or expected.
12. User shall be solely responsible for proper disposal and recycling of EVMs consistent with all applicable federal, state, and local requirements.

Certain Instructions. User shall operate EVMs within TI's recommended specifications and environmental considerations per the user's guide, accompanying documentation, and any other applicable requirements. Exceeding the specified ratings (including but not limited to input and output voltage, current, power, and environmental ranges) for EVMs may cause property damage, personal injury or death. If there are questions concerning these ratings, 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 result in unintended and/or inaccurate operation and/or possible permanent damage to the EVM and/or interface electronics. Please consult the applicable 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 60°C as long as the input and output are maintained at a normal ambient operating temperature. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors which can be identified using EVMs' schematics located in the applicable EVM user's guide. When placing measurement probes near EVMs during normal operation, please be aware that EVMs may become very warm. As with all electronic evaluation tools, only qualified personnel knowledgeable in electronic measurement and diagnostics normally found in development environments should use EVMs.

Agreement to Defend, Indemnify and Hold Harmless. User agrees to defend, indemnify, and hold TI, its directors, officers, employees, agents, representatives, affiliates, 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 and/or use of EVMs. User's indemnity shall apply whether Claims arise under law of tort or contract or any other legal theory, and even if EVMs fail to perform as described or expected.

Safety-Critical or Life-Critical Applications. If user intends to use EVMs in evaluations of safety critical applications (such as life support), and a failure of a TI product considered for purchase by user for use in user's product would reasonably be expected to cause severe personal injury or death such as devices which are classified as FDA Class III or similar classification, then user must specifically notify TI of such intent and enter into a separate Assurance and Indemnity Agreement.

RADIO FREQUENCY REGULATORY COMPLIANCE INFORMATION FOR EVALUATION MODULES

Texas Instruments Incorporated (TI) evaluation boards, kits, and/or modules (EVMs) and/or accompanying hardware that is marketed, sold, or loaned to users may or may not be subject to radio frequency regulations in specific countries.

General Statement for EVMs Not Including a Radio

For EVMs not including a radio and not subject to the U.S. Federal Communications Commission (FCC) or Industry Canada (IC) regulations, TI intends EVMs to be used only for engineering development, demonstration, or evaluation purposes. EVMs are not finished products typically fit for general consumer use. EVMs may nonetheless generate, use, or radiate radio frequency energy, but have not been tested for compliance with the limits of computing devices pursuant to part 15 of FCC or the ICES-003 rules. Operation of such EVMs 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: For EVMs including a radio, the radio included in such EVMs is intended for development and/or professional use only in legally allocated frequency and power limits. Any use of radio frequencies and/or power availability in such EVMs and their development application(s) must comply with local laws governing radio spectrum allocation and power limits for such EVMs. 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 TI unless user has obtained appropriate experimental and/or development licenses from local regulatory authorities, which is the sole responsibility of the user, including its acceptable authorization.

U.S. Federal Communications Commission Compliance

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 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 its 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.

Industry Canada Compliance (English)

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.

Canada Industry Canada Compliance (French)

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.

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Important Notice for Users of EVMs Considered "Radio Frequency Products" in Japan

EVMs entering Japan are NOT certified by TI as conforming to Technical Regulations of Radio Law of Japan.

If user uses EVMs in Japan, user is required by Radio Law of Japan to follow the instructions below with respect to EVMs:

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.

http://www.tij.co.jp

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In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI’s goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or “enhanced plastic” are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have ***not*** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

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