EVM User's Guide: ISOW1050DWEEVM

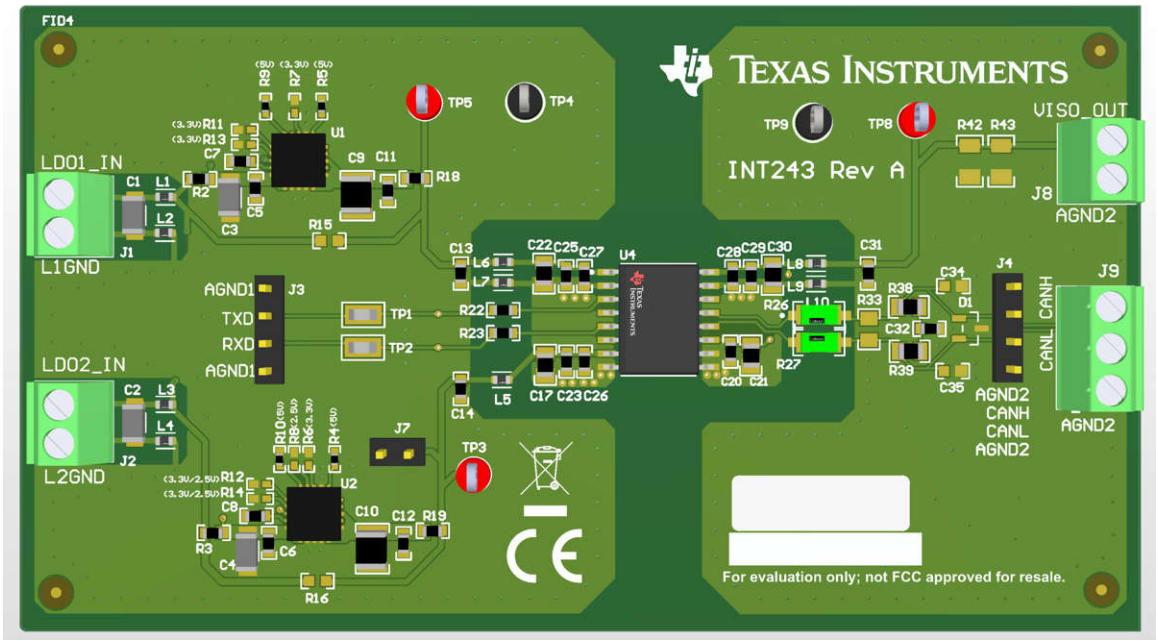
ISOW1050 Isolated CAN Transceiver With Integrated DC-DC Converter Evaluation Module

Description

The ISOW1050(V) family of devices are galvanically isolated CAN transceivers with a built-in isolated DC-DC converter, that eliminates the need for a separate isolated power supply in space constrained isolated designs. This EVM lets designers evaluate device performance for fast development and analysis of isolated systems. The EVM supports evaluation of any device variants of the ISOW1050(V) family in a 16-pin WB SOIC package (DWE-16).

Features

- Platform for complete evaluation of ISOW1050(V) family of devices.
- On-board LDOs which provide configurable voltage output for device supply.
- Two separate configurable LDOs for VDD1 pin and VDDL pin.
- On-board oscillator option for dynamic data input to input channels on primary side.
- Test points for probing data lines and supply voltage.
- Common Mode Choke option for CAN bus.
- Other resistor and jumper options to configure data rate and device supply voltages.



ISOW1050DWEEVM

1 Evaluation Module Overview

1.1 Introduction

The ISOW1050DWEEVM user's guide describes the functionality of the ISOW1050V isolated CAN transceiver with integrated DC-DC converter. This user's guide describes EVM operation for ISOW1050V device under VDD1=5V and VDDL=5V configuration. VISOOUT gets set to 5V internally for ISOW1050V. However, the EVM can be used for evaluation of both device variants, ISOW1050V and ISOW1050 in a 16-pin WB SOIC package (DWE-16) under the recommended voltage conditions. See details of each variant in Device Information. This guide also describes the EVM BOM, EVM schematic, EVM PCB layout, and typical laboratory setup.

CAUTION

This evaluation module is made available for isolator parameter performance evaluation only and is not intended for isolation voltage testing. To prevent damage to the EVM, any voltage applied as a supply or digital input/output must be maintained within the recommended operating conditions of the device.

1.2 Kit Contents

This evaluation module contains one PCB evaluation board containing one ISOW1050V device. The major components of the ISOW1050DWEEVM evaluation board are:

- ISOW1050VDWER isolated CAN transceiver with integrated power.
- TPS7A4701RGWR 36V, 1A, 4.17μVRMS, RF Low-Dropout (LDO) Voltage Regulator, RGW0020A (VQFN-20).
- Multiple test points.

To demonstrate functionality of the ISOW1050VDWER, TI recommends the following (not included):

- 9V or 12V Battery for supply inputs.
- Signal generator for external dynamic data input.
- Oscilloscope for probing data channels.

1.3 Specification

The EVM enables a user to evaluate ISOW1050V device thoroughly before incorporating the device into a design. To facilitate the EVM to be powered from various power sources including regulated power supplies, standard DC adapters and batteries, EVM includes two adjustable output LDOs (TPS7A4701) that are connected to VDD1 and VDDL pins. Both VDD1 and VDDL are set to 5V by default on the EVM. This setup also allows the LDO inputs to be connected to a wider range of supply voltages and the optimum voltage for normal operation of the EVM is between 9V to 12V. The EVM also includes an onboard oscillator (LTC6908-1) that can be connected to the TXD input of ISOW1050V through 0Ω resistor. The oscillator helps to provide a quick test signal to verify device operation. The EVM can be configured to operate in various power supply voltages and test configurations the details of which are provided in following sections.

1.4 Device Information

The ISOW1050(V) family of devices are galvanically isolated CAN transceivers with a built-in isolated DC-DC converter, that eliminates the need for a separate isolated power supply in space constrained isolated designs. The high-efficiency of the integrate power converter allows for operation at a wide operating ambient temperature range of –55°C to 125°C. The ISOW1050(V) family of device has been designed with enhanced protection features in mind, including soft-start to limit inrush current, over-voltage and under-voltage lock out, overload and short-circuit protection, and thermal shutdown.

Two variants are available for ISOW1050(V) family of devices: ISOW1050 and ISOW1050V. See details of all variants and orderables in Table 1-1. The ISOW1050V an can operate from a single supply voltage of 4.5V to 5.5V by connecting VDDL and VDD1 together on PCB. If lower logic levels are required, 2.25V to 5.5V logic supply (VDDL) can be separated and supplied independent from the power converter supply (VDD1) of 4.5V to 5.5V.

Table 1-1. Device Comparison Table

PART NUMBER	ISOLATION	PIN-1 (DC-DC Input Supply	PIN-7 (Logic Supply)	CAN DATA RATE	VISOOUT (Set Internally)	PACKAGE	BODY SIZE (NOM)	PACKAGE SIZE
ISOW1050	Reinforced	VDD1	NC	5Mbps	5V	DWE (SOIC, 16)	10.30mm × 7.50mm	10.30mm × 10.30mm
ISOW1050V	Reinforced	VDD1	VDDL	5Mbps	5V	DWE (SOIC, 16)		

2 Hardware

2.1 Pin Configuration of the ISOW1050(V) Isolated CAN Transceiver With Integrated DC-DC Converter

Figure 2-1 and Figure 2-2 shows the pin configuration of ISOW1050 and ISOW1050V family of devices. The V variant has Pin7 as VDDL which enables user to select primary side logic supply voltage. For non-V variant, logic supply is same as VDD1. Refer Table 1-1

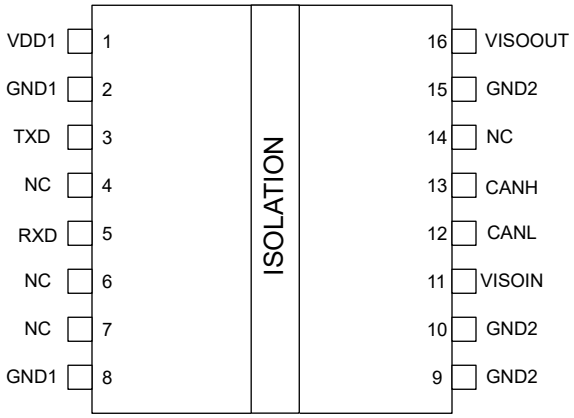


Figure 2-1. ISOW1050 Pin Configuration

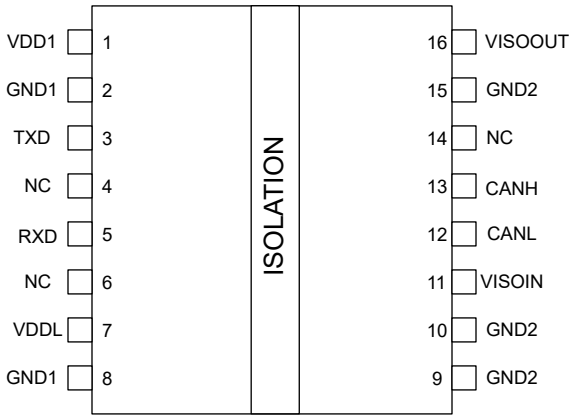


Figure 2-2. ISOW1050V Pin Configuration

2.2 EVM Setup and Operation

2.2.1 EVM Setup

This section describes the typical setup and operation of the EVM for device evaluation. Typical EVM Test Setup shows a typical test configuration for operating the ISOW1050DWEEVM using two power supplies.

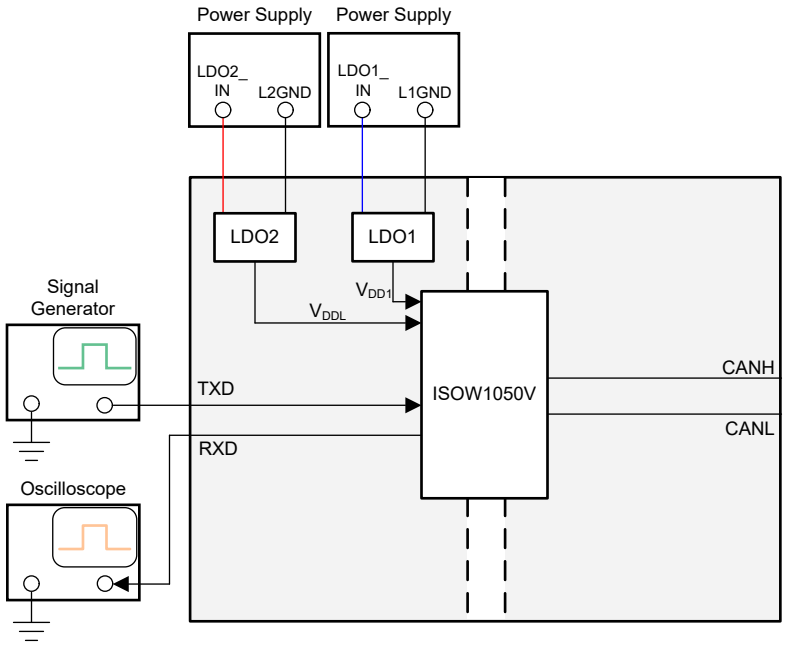


Figure 2-3. Typical EVM Test Setup

ISOW1050DWEEVM has many DNP resistors which can be populated or unpopulated with a few jumper options to setup the EVM to desired operating test conditions. Component Configurations lists and describes all the possible test configurations that can be achieved by populating various resistors and jumper options.

Table 2-1. Component Configurations

Component	Description
R1	The resistor connects LDOs U1, U2 inputs together allowing only one power supply to be used instead of two power supplies.
R2, R15, R18	Populating R15 bypasses LDO U1 allowing VDD to be powered directly from external power supply. When R15 is populated, R2 and R18 needs to be unpopulated to disconnect the LDO. When LDO is not bypassed, the recommended input voltage to LDO must be between 9V and 12V.
R5, R7, R9, R11, R13	Sets LDO U1 output voltage to 5V or 3.3V for VDD1. Populate only R5 and R9 with 0Ω resistors to set LDO U1 output voltage to 5V (Default Configuration). Populate only R7, R11 and R13 with 0Ω resistors to set LDO U1 output voltage to 3.3V.
R3, R16, R19	Populating R16 bypasses LDO U2 allowing VDDL to be powered directly from external power supply. When R16 is populated, R3 and R19 needs to be unpopulated to disconnect the LDO. When LDO is not bypassed, the recommended input voltage to LDO must be between 9V and 12V.
R4, R6, R8, R10, R12, R14	Sets LDO U2 output voltage to 5V or 3.3V or 2.5V for VDDL. Populate only R4 and R10 with 0Ω resistors to set LDO U2 output voltage to 5V (Default Configuration). Populate only R6, R12 and R14 with 0Ω resistors to set LDO U2 output voltage to 3.3V. Populate only R8, R12 and R14 with 0Ω resistors to set LDO U2 output voltage to 2.5V.
R17	The resistor connects oscillator U3 output signal to U4 input TXD of ISOW1050V, allowing EVM to be tested using a test signal without needing any external test signal input.
R20, R21	Populating R20 sets U3 output signal rate to 1Mbps (Default Configuration) and populating R21 sets the rate to 5Mbps.
L10	Common-Mode Choke(CMC) on CAN bus. If populating L10 then remove R26 and R27.
R26, R27	Populating R26 and R27 bypasses the CMC L10 on CAN bus.
R33	Optional 120Ω load resistor option. If populating R33, remove split termination resistors R38 and R39 on CAN bus.
C34, C35	Optional capacitors for additional noise filtering on CAN bus.

Table 2-1. Component Configurations (continued)

Component	Description
D1	Optional SOT-23 footprint for TVS Diode installation.
R42, R43	Optional resistors which can be populated to extract ILOAD from VISOOUT when CAN communication is not in use. Must NOT be populated when using CAN functionality.
C18, C19	Optional capacitors for noise filtering on digital signal lines on Side1.
J7	Jumper option to power ON or OFF the U3 oscillator.

3 Hardware Design Files

3.1 Schematics

The ISOW1050DWEEVM is designed to accommodate any of the ISOW1050(V) devices in a 16-pin WB SOIC package (DWE-16). To evaluate the second variant, the ISOW1050, in a 16-pin WB SOIC package (DWE-16), replace the installed ISOW1050V with the ISOW1050 on the ISOW1050DWEEVM board. No other component requires any modification for ISOW1050 device since Pin-7 is NC for the Non-V device. Figure 3-1 shows the ISOW1050DWEEVM schematic connections.

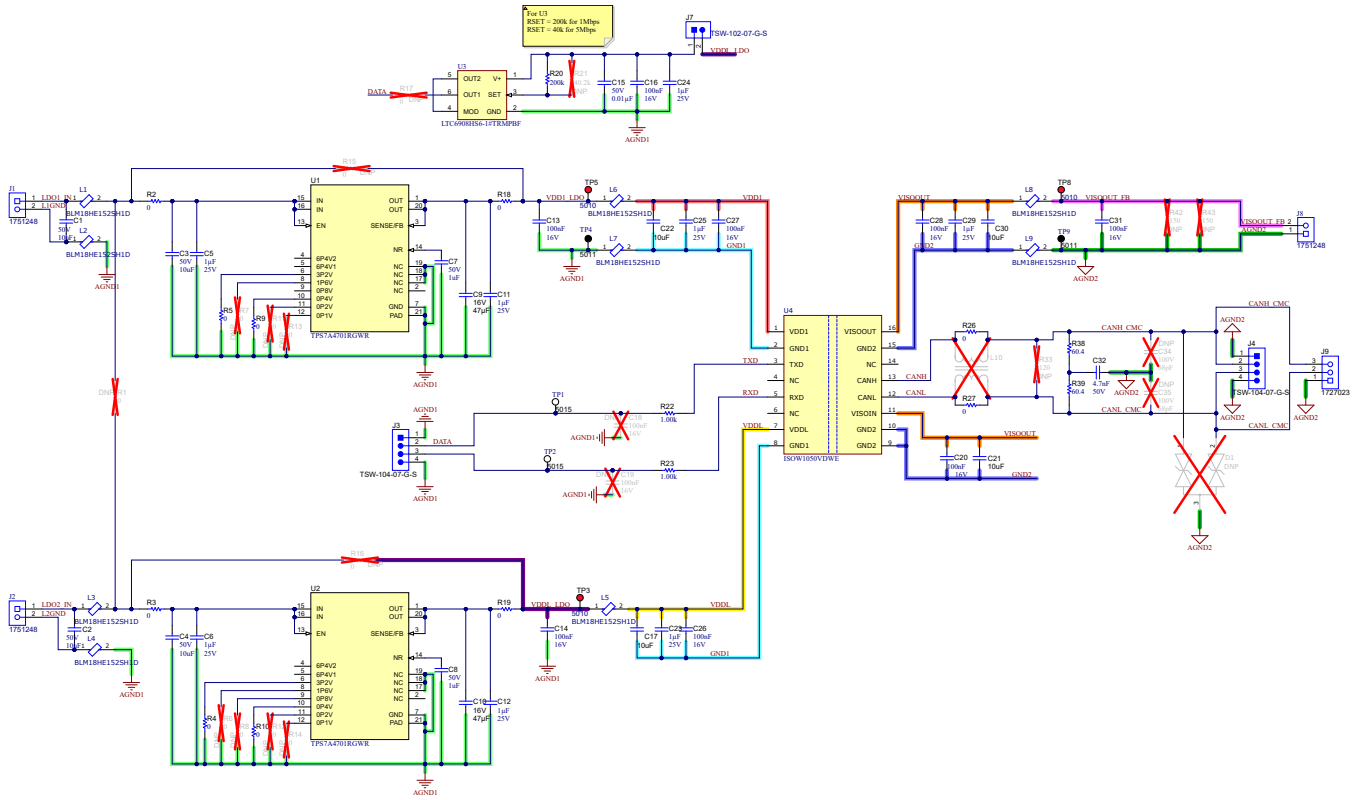


Figure 3-1. ISOW1050DWEEVM Schematic

3.2 PCB Layout and 3D Diagram

Figure 3-2 and Figure 3-3 show the printed-circuit board (PCB) layout top and bottom layers, respectively. Figure 3-4 and Figure 3-5 shows a 3D diagram of the PCB indicating how a finished board looks.

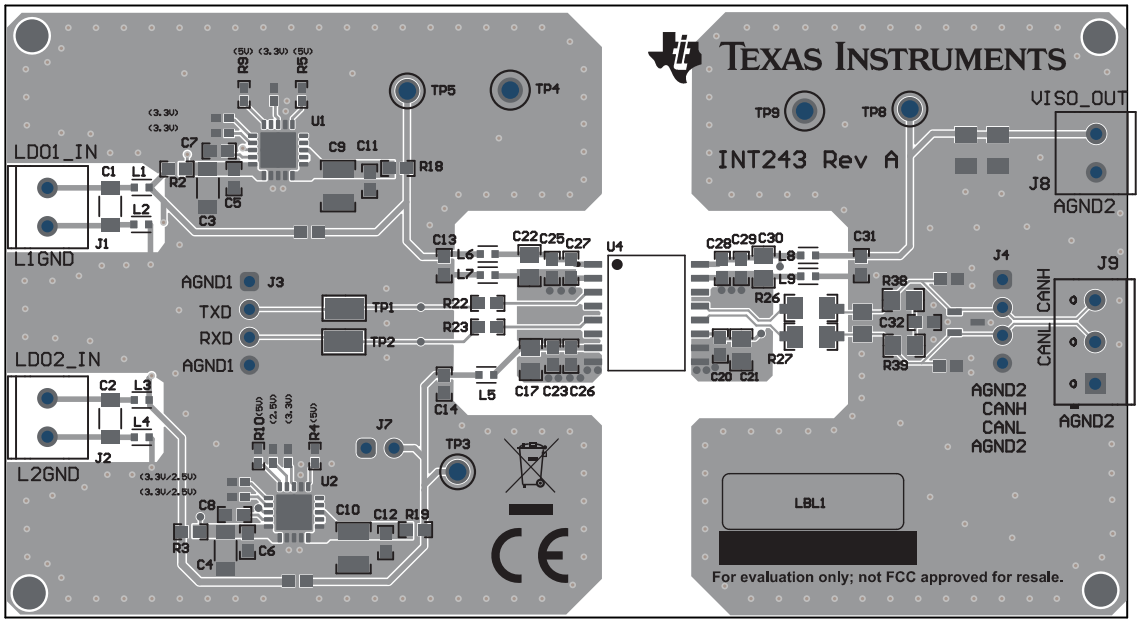


Figure 3-2. ISOW1050DWEEVM PCB Layout - Top

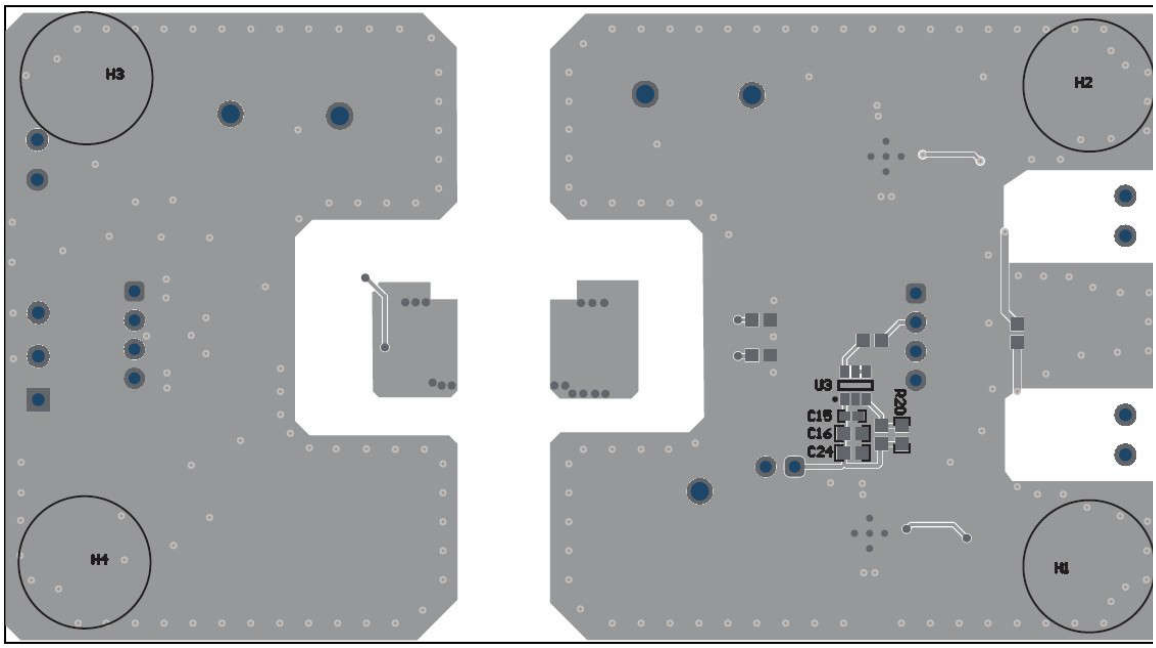


Figure 3-3. ISOW1050DWEEVM PCB Layout - Bottom

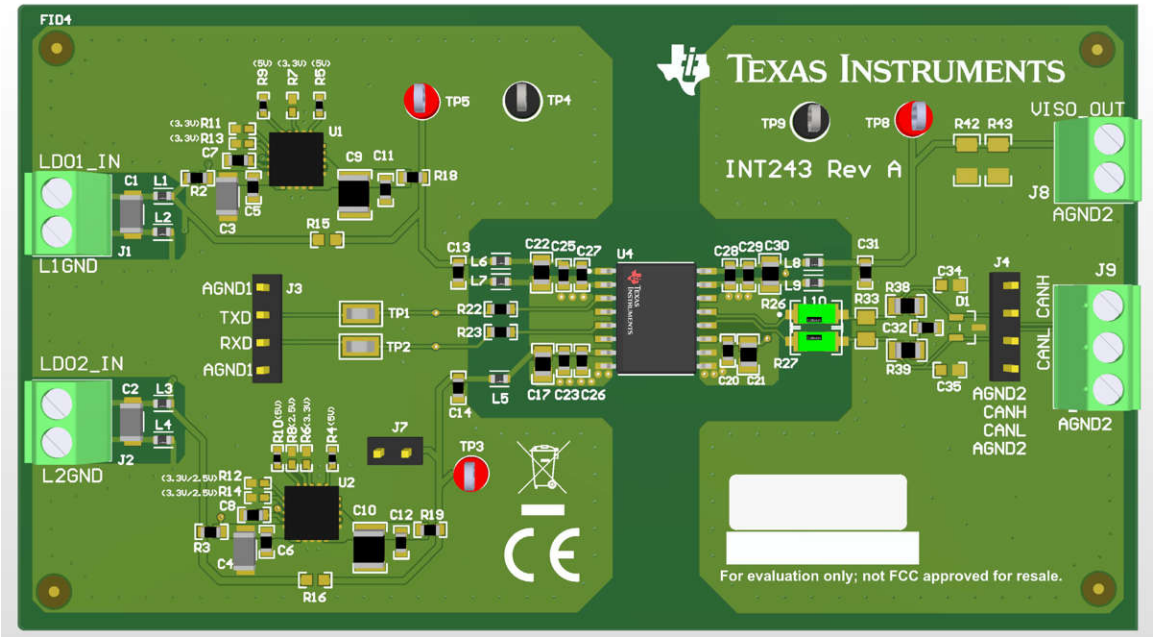


Figure 3-4. ISOW1050DWEEVM PCB 3D View - Top

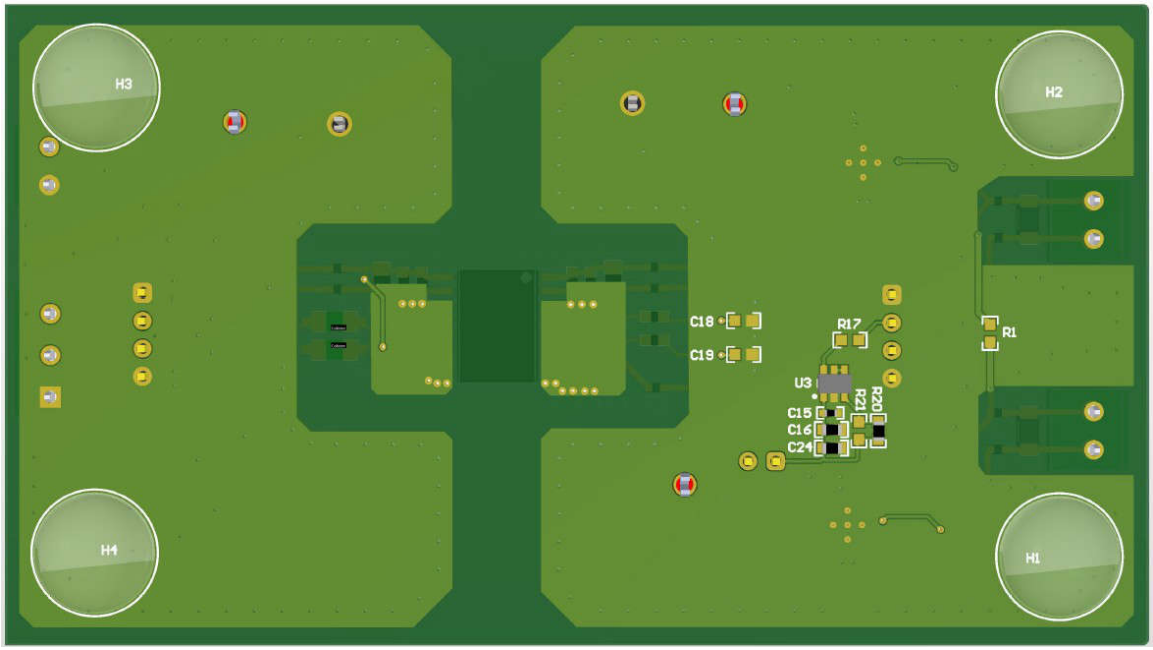


Figure 3-5. ISOW1050DWEEVM PCB 3D View - Bottom

3.3 Bill of Materials (BOM)

Table 3-1 lists the bill of materials (BOM) for this EVM.

Table 3-1. Bill of Materials

Item	Designator	Description	Manufacturer	PartNumber
1	C1, C2, C3, C4	CAP, CERM, 10uF, 50V, +/- 10%, X5R, 1206	TDK	C3216X5R1H106K160AB
1	C1, C2, C3, C4	CAP, CERM, 10uF, 50V, +/- 10%, X5R, 1206	TDK	C3216X5R1H106K160AB
2	C5, C6, C11, C12, C23, C24, C25, C29	CAP, CERM, 1uF, 25V, +/- 10%, X7R, AEC-Q200 Grade 1, 0603	MuRata	GCM188R71E105KA64D
3	C7, C8	CAP, CERM, 1uF, 50V, +/- 10%, X5R, 0603	TDK	C1608X5R1H105K080AB
4	C9, C10	CAP, CERM, 47 µF, 16V,+/- 10%, X5R, 1210	Samsung Electro-Mechanics	CL32A476KOJNNNE
5	C13, C14, C16, C20, C26, C27, C28, C31	CAP, CERM, 0.1uF, 16V, +/- 10%, X7R, 0603	Samsung Electro-Mechanics	CL10B104KO8NNNC
6	C15	CAP, CERM, 0.01 µF, 50V,+/- 10%, X7R, 0402	Walsin	0402B103K500CT
7	C17, C21, C22, C30	CAP, CERM, 10uF, 35V, +/- 10%, X5R, 0805	MuRata	GRM21BR6YA106KE43L
8	C32	CAP, CERM, 4700pF, 50V, +/- 10%, X7R, 0603	Kemet	C0603C472K5RACTU
9	H1, H2, H3, H4	Bumpon, Hemisphere, 0.44X 0.20, Clear	3M	SJ-5303 (CLEAR)
10	J1, J2, J8	Conn Term Block, 2POS, 3.5mm, TH	Phoenix Contact	1751248
11	J3, J4	Header, 100mil, 4x1, Gold, TH	Samtec	TSW-104-07G-S
12	J7	Header, 100mil, 2x1, Gold, TH	Samtec	TSW-102-07G-S
13	J9	Terminal Block Receptacle, 3x1, 3.81mm, R/A, TH	Phoenix Contact	1727023
14	L1, L2, L3, L4, L5, L6, L7, L8, L9	Chip Ferrite Bead, 0603, 1500Ω @ 100MHz, 0.5Ω, 25%, 500mA	Murata	BLM18HE152SH1D
15	LBL1	Thermal Transfer Printable Labels, 0.650" W x 0.200" H - 10,000 per roll	Brady	THT-14-423-10
16	R2, R3, R18, R19	RES, 0, 5%, 0.1W, 0603	Yageo	RC0603JR-070RL
17	R4, R5, R9, R10	RES, 0, 5%, 0.063W, 0402	Vishay-Dale	CRCW04020000Z0ED
18	R20	RES, 200k, 1%, 0.1W, 0603	Yageo	RC0603FR-07200KL
19	R22, R23	RES, 1.00k, 1%, 0.1W, 0603	Yageo	RC0603FR-071KL
20	R26, R27	RES, 0, 5%, 0.25W, 1206	Vishay-Dale	CRCW12060000Z0EA
21	R38, R39	RES, 60.4, 1%, 0.125W, AEC-Q200 Grade 0, 0805	Vishay-Dale	CRCW080560R4FKEA
22	TP1, TP2	Test Point, Miniature, SMT	Keystone	5015
23	TP3, TP5, TP8	Test Point, Red, Through Hole, RoHS, Bulk	Keystone	5010
24	TP4, TP9	Test Point, Multipurpose, Black, TH	Keystone	5011
25	U1, U2	36V, 1A, 4.17µVRMS, RF Low-Dropout (LDO) Voltage Regulator, RGW0020A (VQFN-20)	Texas Instruments	TPS7A4701RGWR
26	U3	Resistor Set SOT-23 Oscillator, 2.7 to 5.5 V, 6-pin SOT23 (S6-6), -40 to 85 degC, Pb-Free	Linear Technology	LTC6908HS6-1#TRMPBF

Table 3-1. Bill of Materials (continued)

Item	Designator	Description	Manufacturer	PartNumber
27	U4	ISOW1050VDWE	Texas Instruments	ISOW1050VDWE
28	C18, C19	CAP, CERM, 0.1uF, 16V, +/- 10%, X7R, 0603	Samsung Electro-Mechanics	CL10B104KO8NNNC
29	C34, C35	CAP, CERM, 68pF, 100V, +/- 5%, C0G/NP0, 0603	MuRata	GRM1885C2A680JA01D
30	D1	Two-channel bidirectional 24V ESD and Surge protection diode 3-SOT-23		Any 2-channel SOT-23 package TVS of choice
31	L10	100µH @ 100kHz 2 Line Common Mode Choke Surface Mount 5.8 kOhms @ 10MHz 150mA DCR 2Ohm	TDK	ACT45B-101-2P-TL003
32	R1, R15, R16, R17	RES, 0, 5%, 0.1W, 0603	Yageo	RC0603JR-070RL
33	R6, R7, R8, R11, R12, R13, R14	RES, 0, 5%, 0.063W, 0402	Vishay-Dale	CRCW04020000Z0ED
34	R21	RES, 40.2k, 1%, 0.1W, 0603	Yageo	RC0603FR-0740K2L
35	R33	RES, 120, 1%, 0.4W, 0805	Rohm	ESR10EZPF1200
36	R42, R43	RES, 0, 5%, 0.25W, 1206	Yageo America	RC1206JR-070RL

4 Additional Information

4.1 Trademarks

All trademarks are the property of their respective owners.

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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.

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   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。

上記を遵守頂けない場合は、電波法の罰則が適用される可能性があることをご留意ください。 日本テキサス・インスツルメンツ株式会社

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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

電力線搬送波通信についての開発キットをお使いになる際の注意事項については、次のところをご覧ください。https://www.ti.com/ja-jp/legal/notice-for-evaluation-kits-for-power-line-communication.html

3.4 *European Union*

3.4.1 *For EVMs subject to EU Directive 2014/30/EU (Electromagnetic Compatibility Directive)*:

This is a class A product intended for use in environments other than domestic environments that are connected to a low-voltage power-supply network that supplies buildings used for domestic purposes. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

4 *EVM Use Restrictions and Warnings:*

4.1 EVMS ARE NOT FOR USE IN FUNCTIONAL SAFETY AND/OR SAFETY CRITICAL EVALUATIONS, INCLUDING BUT NOT LIMITED TO EVALUATIONS OF LIFE SUPPORT APPLICATIONS.

4.2 User must read and apply the user guide and other available documentation provided by TI regarding the EVM prior to handling or using the EVM, including without limitation any warning or restriction notices. The notices contain important safety information related to, for example, temperatures and voltages.

4.3 *Safety-Related Warnings and Restrictions:*

4.3.1 User shall operate the EVM within TI's recommended specifications and environmental considerations stated in the user guide, other available documentation provided by TI, and any other applicable requirements and employ reasonable and customary safeguards. Exceeding the specified performance ratings and specifications (including but not limited to input and output voltage, current, power, and environmental ranges) for the EVM may cause personal injury or death, or property damage. If there are questions concerning performance ratings and specifications, User should contact a TI field representative prior to connecting interface electronics including input power and intended loads. Any loads applied outside of the specified output range may also result in unintended and/or inaccurate operation and/or possible permanent damage to the EVM and/or interface electronics. Please consult the EVM user guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative. During normal operation, even with the inputs and outputs kept within the specified allowable ranges, some circuit components may have elevated case temperatures. These components include but are not limited to linear regulators, switching transistors, pass transistors, current sense resistors, and heat sinks, which can be identified using the information in the associated documentation. When working with the EVM, please be aware that the EVM may become very warm.

4.3.2 EVMs are intended solely for use by technically qualified, professional electronics experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems, and subsystems. User assumes all responsibility and liability for proper and safe handling and use of the EVM by User or its employees, affiliates, contractors or designees. User assumes all responsibility and liability to ensure that any interfaces (electronic and/or mechanical) between the EVM and any human body are designed with suitable isolation and means to safely limit accessible leakage currents to minimize the risk of electrical shock hazard. User assumes all responsibility and liability for any improper or unsafe handling or use of the EVM by User or its employees, affiliates, contractors or designees.

4.4 User assumes all responsibility and liability to determine whether the EVM is subject to any applicable international, federal, state, or local laws and regulations related to User's handling and use of the EVM and, if applicable, User assumes all responsibility and liability for compliance in all respects with such laws and regulations. User assumes all responsibility and liability for proper disposal and recycling of the EVM consistent with all applicable international, federal, state, and local requirements.

5. *Accuracy of Information:* To the extent TI provides information on the availability and function of EVMs, TI attempts to be as accurate as possible. However, TI does not warrant the accuracy of EVM descriptions, EVM availability or other information on its websites as accurate, complete, reliable, current, or error-free.

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