User's Guide
SLLU269A–December 2017–Revised July 2018

ISO1042DW Isolated CAN Transceiver Evaluation Module

This user's guide describes the evaluation module (EVM) for the ISO1042DW isolated CAN transceiver. This EVM allows designers to evaluate device performance for fast development and analysis of isolated systems. The EVM supports evaluation of ISO1042 device in a 16-pin SOIC (DW) package.

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 0 V to 5.5 V recommended operating range.

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Trademarks

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1 Introduction

This user's guide describes EVM operation with respect to the ISO1042 isolated CAN transceiver. The EVM includes test points for all main points where probing is necessary for evaluation such as GND, VCC, TXD, RXD, CANH, CANL. The EVM supports many options for CAN bus configuration. It is pre-configured with a *split* termination network with a common-mode capacitance and additional caps on the bus for protection. It also includes an option to populate a 120-Ω resistor which can be used with the EVM as a terminated line end (CAN is defined for 120-Ω impedance twisted pair cable). Protection components like TVS diodes and common mode (CM) Chokes are also provided with bypass paths if necessary. Using these options, the customer is allowed installation of the desired components. This guide describes the EVM schematic, layout and typical laboratory setup. A typical input and output waveform is also presented.

2 Overview

The ISO1042 device is a galvanically-isolated controller area network (CAN) transceiver that meets the specifications of the ISO11898-2 (2016) standard. The ISO1042 device offers ±70-V DC bus fault protection and ±30-V common-mode voltage range. The device supports up to 5-Mbps data rate in CAN FD mode allowing much faster transfer of payload compared to classic CAN. This device uses a silicon dioxide (SiO2) insulation barrier with a withstand voltage of 5000 VRMS. Used in conjunction with isolated power supplies, the device prevents noise currents on a data bus or other circuits from entering the local ground and interfering with or damaging sensitive circuitry.

3 Pin Configuration of the ISO1042DW CAN Transceiver

Figure 1 shows the ISO1042 pin configuration.

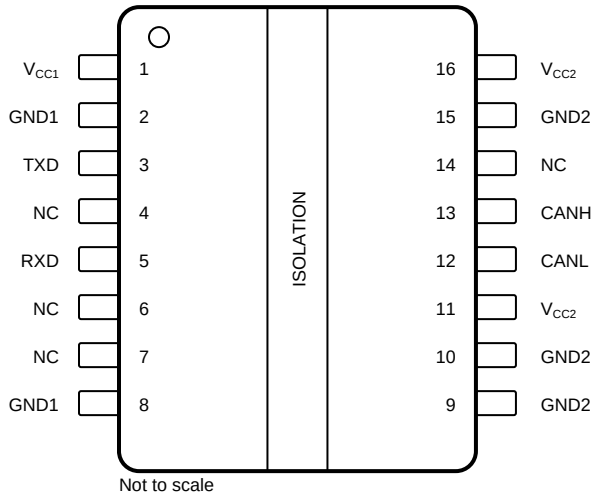

Figure 1. ISO1042DW Pin Configuration

4 ISO1042DWEVM Board Block Diagram and Image

Figure 2 shows the board configuration for evaluation of the ISO1042DW isolated CAN transceiver.

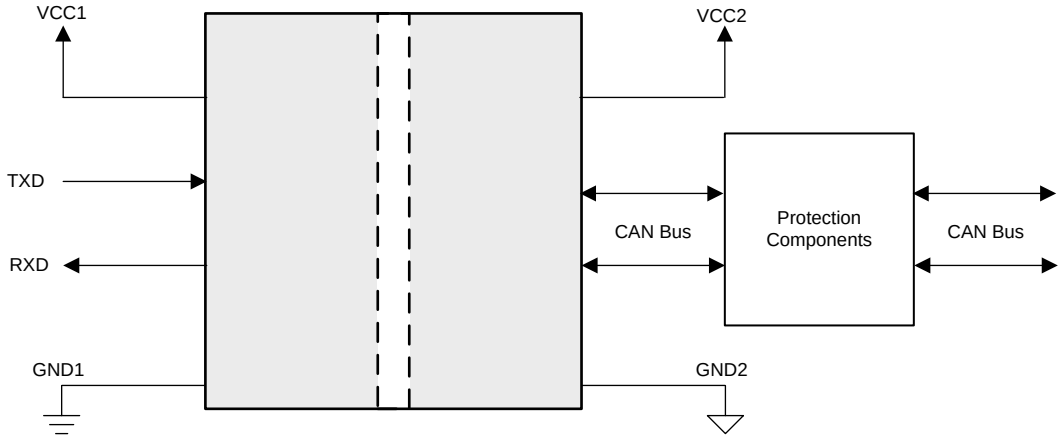

Figure 2. ISO1042DWEVM Configuration

Figure 3 shows the photograph of the EVM.

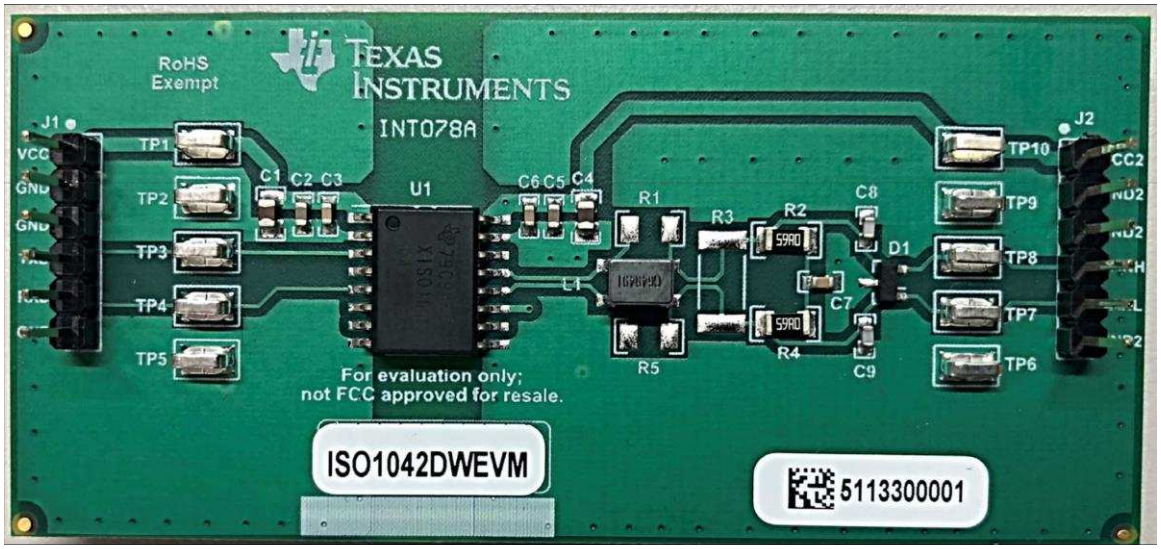

Figure 3. ISO1042DWEVM Photograph

5 EVM Schematics and Layout

Figure 4 shows the ISO1042DWEVM schematic and Figure 5 shows the printed-circuit board (PCB) layout.

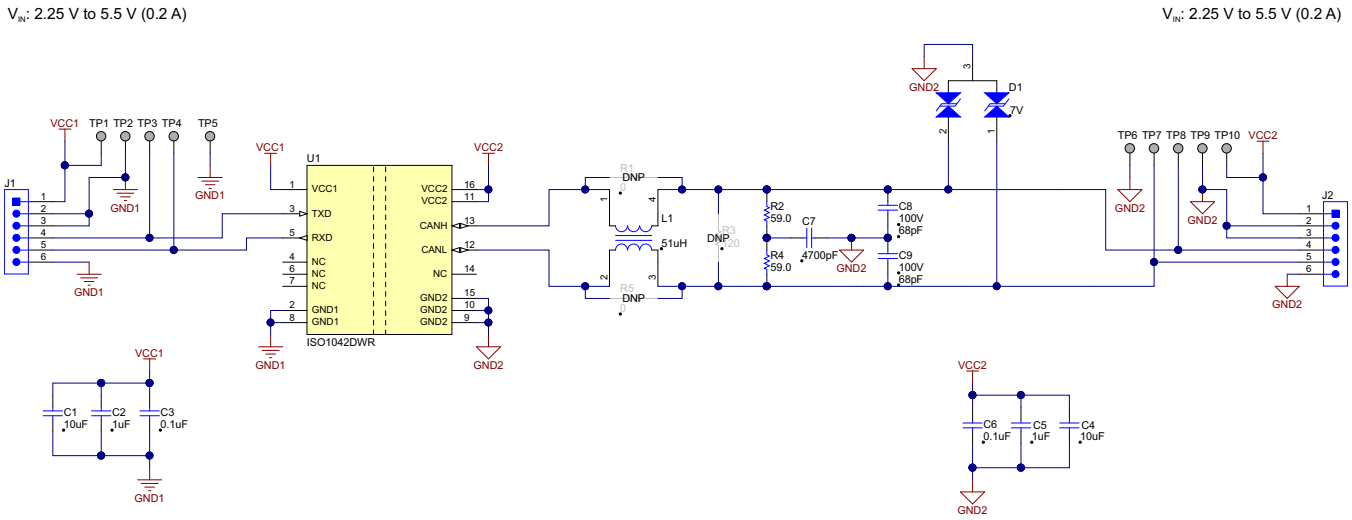

Figure 4. ISO1042DWEVM Schematic

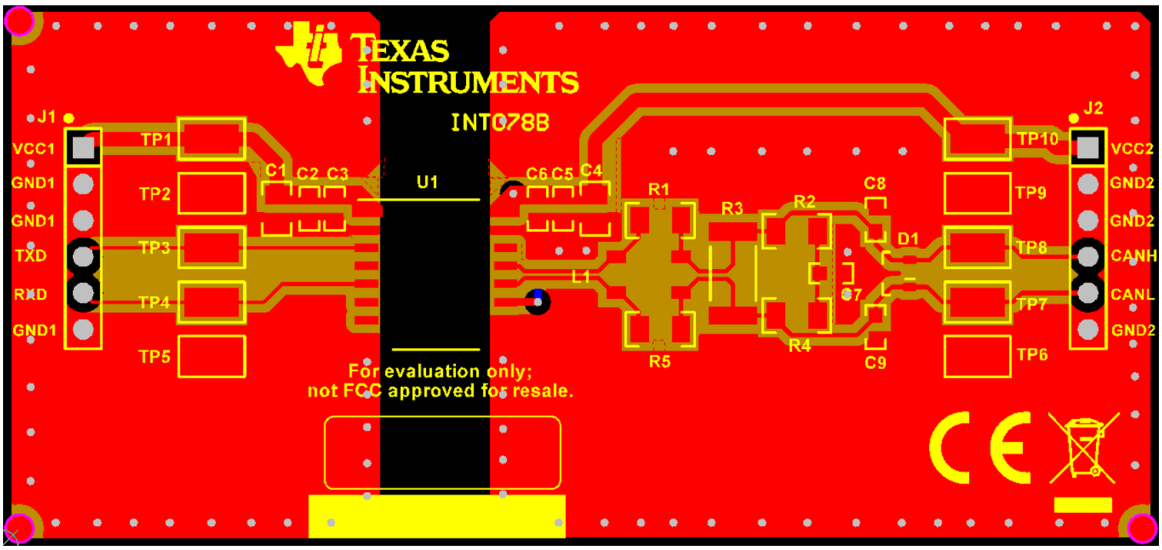

Figure 5. ISO1042DW PCB Layout

6 Bill of Materials

Table 1 shows the bill of materials (BOM) for this EVM.

Table 1. Bill of Materials

Item	Designator	Description	Manufacturer	Part Number	Quantity
1	J1, J2	Header, 100mil, 6x1, Tin, TH	Sullins Connector Solutions	PEC06SAAN	2
2	C1, C4, C10	CAP, CERM, 10 uF, 35 V, +/- 10%, X5R, 0805	MuRata	GRM21BR6YA106KE43L	3
3	C2, C5, C11	CAP, CERM, 1 uF, 50 V, +/- 10%, X5R, 0603	MuRata	GRM188R61H105KAALD	3
4	C3, C6, C12	CAP, CERM, 0.1 uF, 25 V, +/- 5%, X7R, 0603	AVX	06033C104JAT2A	3
5	C7	CAP, CERM, 4700 pF, 50 V, +/- 10%, X7R, 0603	MuRata	GRM188R71H472KA01D	1
6	C8, C9	CAP, CERM, 68 pF, 100 V, +/- 5%, C0G/NP0, 0603	MuRata	GRM1885C2A680JA01D	2
7	R1, R5	RES, 0, 5%, 0.25 W, 1206	Vishay-Dale	CRCW12060000Z0EA	0
8	R2, R4	RES, 59.0, 1%, 0.25 W, 1206	Vishay-Dale	CRCW120659R0FKEA	2
9	R3	RES, 120, 1%, 1 W, AEC-Q200 Grade 0, 2512	Vishay-Dale	CRCW2512120RFKEG	0
10	L1	Coupled inductor, 51 µH, 0.2 A, 1 ohm, AEC-Q200 Grade 0, SMD	TDK	ACT45B-510-2P-TL003	1
11	D1	Diode, TVS, Bi, 7 V, SOT-23	Bourns	CDSOT23-SM712	1
12	U1	ISO1042DW, DW0016B (SOIC-16)	Texas Instruments	ISO1042DW	1
13	TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10	Test Point, Miniature, SMT	Keystone	5019	10
14	H1, H2, H3, H4	Bumpon, Hemisphere, 0.44 X 0.20, Clear	3M	SJ-5303 (CLEAR)	4

7 EVM Setup and Operation

This section describes the setup and operation of the EVM for parameter performance evaluation. Figure 6 shows the configuration for operating the ISO1042DWEVM using two power supplies.

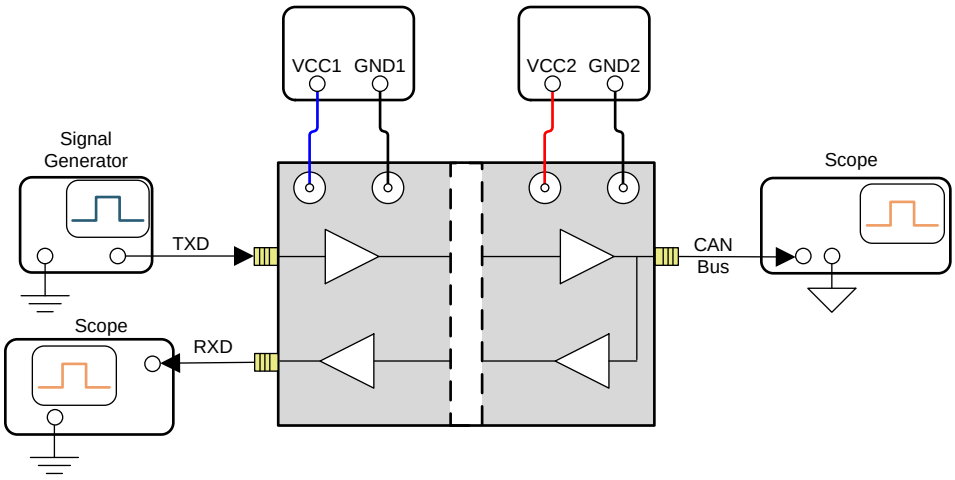

Figure 6. Basic EVM Operation

7.1 Protection Configurations

The EVM also has footprints for various protection schemes to enhance robustness for extreme system level EMC requirements. Figure 7 summarizes these options

Figure 7 shows typical input and output waveforms of the EVM for a 5-Mbps signal. TXD is shown as Channel 1, the CAN bus is shown as Channel 2, Channel 3 and RXD is shown as Channel 4.

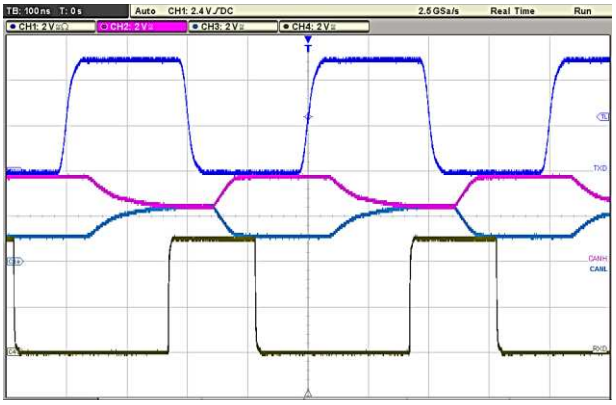

Figure 7. Typical Input and Output Waveforms

Configuration	Footprint Reference	Use Case	Population and Description
Series resistors or common mode choke	R1/R5 or L1	Direct CAN transceiver to bus connection	R1 and R5 populated with 0Ω
		Series resistance protection, CAN transceiver to bus connection	R1 and R14 populated with MELF resistor as necessary for harsh EMC environment
		CM choke (bus filter)	L1 populated with CM choke to filter noise as necessary for harsh EMC environment (Default Population)
Bus filtering caps and transient protection	C8/C9	Bus Filter	Filter noise as necessary for harsh EMC environment. Use filter caps in combination with L1 CM choke
	C8/C9 or D1	Transient and ESD protection	To add extra protection for system level transients and ESD protection. TVS diode population option via D1 footprint or varistor population through C2/C7 footprint.

Revision History

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

Changes from Original (December 2017) to A Revision	Page
• Changed pin 10 from NC to GND2 in the *ISO1042DW Pin Configuration*	2
• Changed the *ISO1042DWEVM Schematic* and *ISO1042DW PCB Layout*	4

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      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.

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      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.*

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(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/lsds/ti_ja/general/eStore/notice_01.page

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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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