EVM User's Guide: ISOM8610DFGEVM

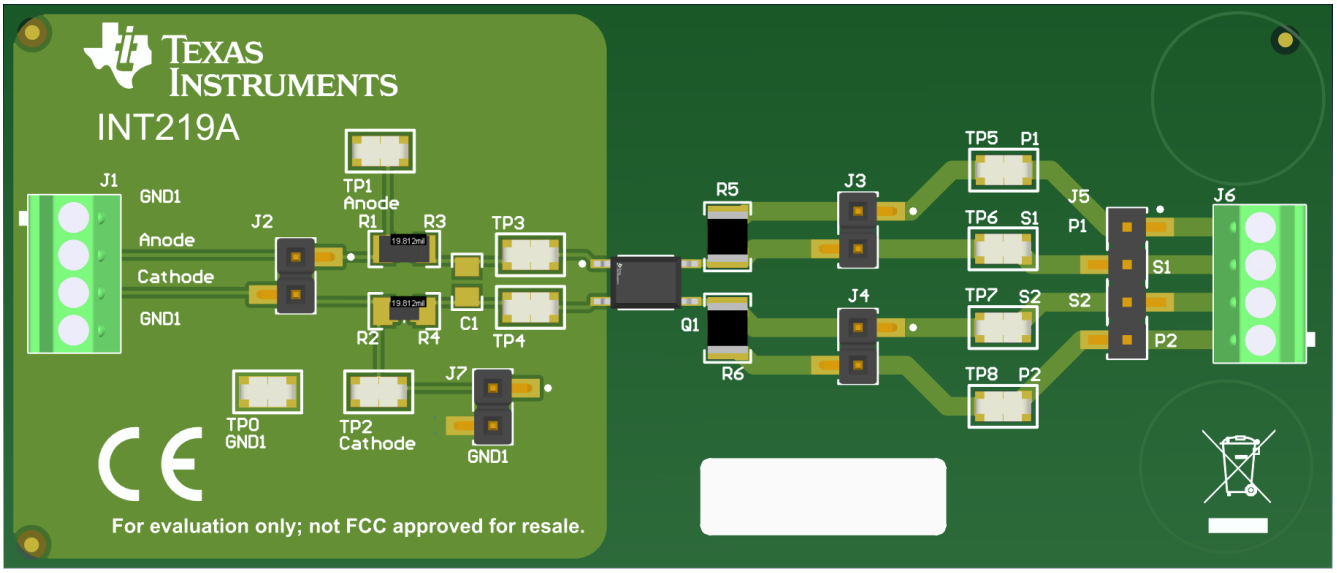
ISOM8610 Normally Open Opto-Emulator Switch with Integrated FET Output Evaluation Module

Description

The ISOM8610 opto-emulator offers significant reliability and performance advantages compared to optocouplers, including wider temperature ranges and tight process controls resulting in small part-to-part variation. Since there is no aging effect or temperature variation to compensate for, the emulated diode-input stage consumes less power than optocouplers that have LED aging and require higher bias currents over the device lifetime.

Features

- Platform for complete evaluation of the ISOM8610DFG
- Test points and jumper options
- Passives and footprints for basic modifications included
- Drop-in upgradable and pin-compatible for popular OptoMOS optocouplers and solid-state relays
- One channel diode-emulator input
- Low input ON=state forward current: at $I_{F(ON)}$ = 0.8mA - 20mA
- Output continuous load current: I_O = 150mA
- High blocking voltage: V_{OFF} = 80V
- Robust isolation barrier



ISOM8610DFGEVM

1 Evaluation Module Overview

1.1 Introduction

The ISOM8610DFGEVM user's guide describes the functionality of the ISOM8610 single-channel opto-emulator with integrated FET output evaluation module (EVM). The ISOM8610DFGEVM supports evaluation of TI's ISOM8610 Opto-Emulator in a 4-pin DFG SOIC package. This user's guide describes EVM operation with respect to the ISOM8610 under 5V operation. The EVM can be reconfigured for evaluation with a larger input signal or other applications by changing the EVM configuration and component values. The user's guide also covers the channel configuration of the ISOM8610, EVM schematic, and typical 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 ISOM8610DFG device. The major components of the ISOM8610 evaluation board are:

- ISOM8610DFG opto-emulator switch
- Multiple on-board test points

To demonstrate functionality of the ISOM8610DFG, TI recommends the following (not included):

- Oscilloscope
- Signal generator

1.3 Specification

The ISOM8610 device is capable of being pin-compatible and drop-in replaceable with many opto-coupler devices with FET outputs. Opto-emulators offer significant reliability and performance advantages compared to traditional opto-couplers, low input current, and wider temperature ranges.

The ISOM8610 Opto-Emulator replicates the characteristics of traditional opto-couplers without the drawbacks of aging and thermal drift by using a input-diode emulator and output stage separated by a silicon oxide (SiO2) insulation barrier. When used with isolated power supplies, these devices block high voltages, isolate grounds, and prevent noise currents from interfering with or damaging sensitive circuitry.

1.4 Device Information

The ISOM8610DFGEVM contains one ISOM8610 and all other passive components required for operation. The various components included in the evaluation module directly control the operation and functionality of the ISOM8610. If necessary, components can be removed, added, or replaced to modify the behavior of the ISOM8610 accordingly for any given application.

2 Hardware

2.1 EVM Setup and Operation

Basic EVM Setup

This section describes the setup and operation of the EVM for parameter performance evaluation. Figure 2-1 shows a typical test configuration of the ISOM8610 Opto-Emulator EVM.

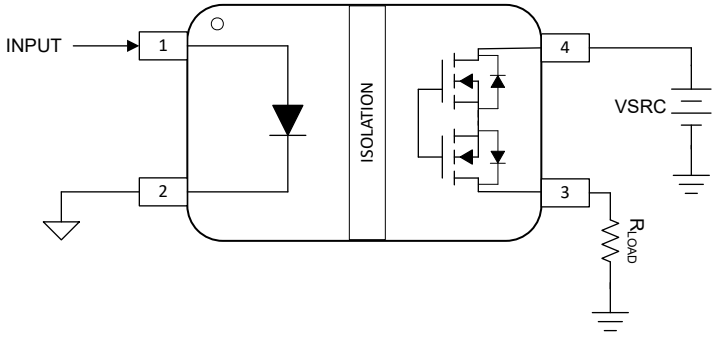


Figure 2-1. Basic EVM Operation

The simplest EVM setup is to test using a 5V input with and a $5V_{SRC}$. However, the input resistor is sized to accommodate up to 24V logic inputs. ISOM8610DFGEVM has *do not populate* (DNP) footprints for components which can be populated to apply different test conditions to the device. Section 2.1 lists and describes possible test configurations that can be achieved by modifying different components on the EVM.

Table 2-1. Component Configurations

Component	Description
R1, R2	R1 is sized for 5V - 24V operation. If a larger supply or smaller value is needed, then select a resistor that provides the desired I_F current to the anode.
R3, R4	R3 is a short for normal operation. The footprint is provided to allow versatile test configurations for the user.
J1, J7	J7 provides a place to quickly short the cathode to ground. Additional ground connections can be found on J1.
J3	Short J3 and Remove J4 to use the output as a high side switch.
J4	Remove J3 and Short J4 to use the output as a low side switch.
C1	C1 can be used to add capacitance to the input diode.

2.2 Pin Configuration of the ISOM8610 Normally Open Opto-emulator Switch with Integrated FET Output

Figure 2-2 shows the ISOM8610 normally open opto-emulator switch with integrated FETs output pin configuration.

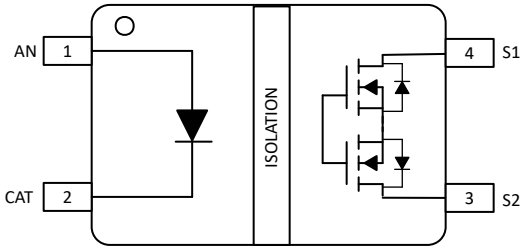


Figure 2-2. ISOM8610 Normally Open Opto-Emulator Switch with Integrated FETs Output Pin Configuration

3 Hardware Design Files

3.1 Schematics

The ISOM8110DFGEVM has additional footprints that gives the user flexibility to test a variety of common applications.

Other positions on the board can be modified as well. For example, R1 - R4 can be changed to accommodate different current requirements, and C1 can be added to test the device with resistive or capacitive loading. See ISOM8610DFGEVM for the EVM schematic and see Table 2-1 for more information on alternate EVM configurations.

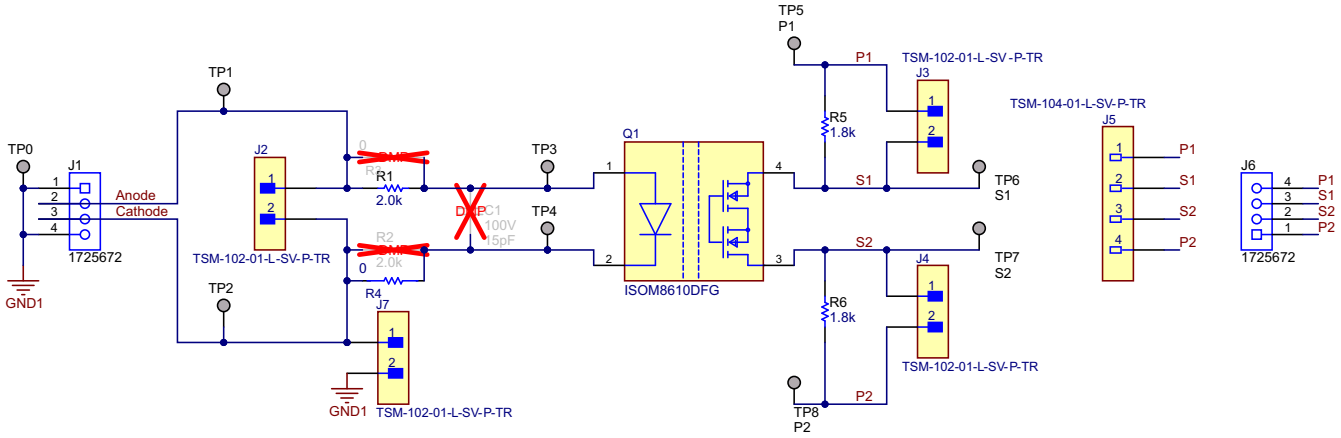


Figure 3-1. ISOM8610DFGEVM Schematic

3.2 PCB Layout and 3D Diagram

Figure 3-2 and Figure 3-3 show the printed-circuit board (PCB) layout top and bottom, respectively, and Figure 3-4 shows a 3D diagram of the EVM PCB.

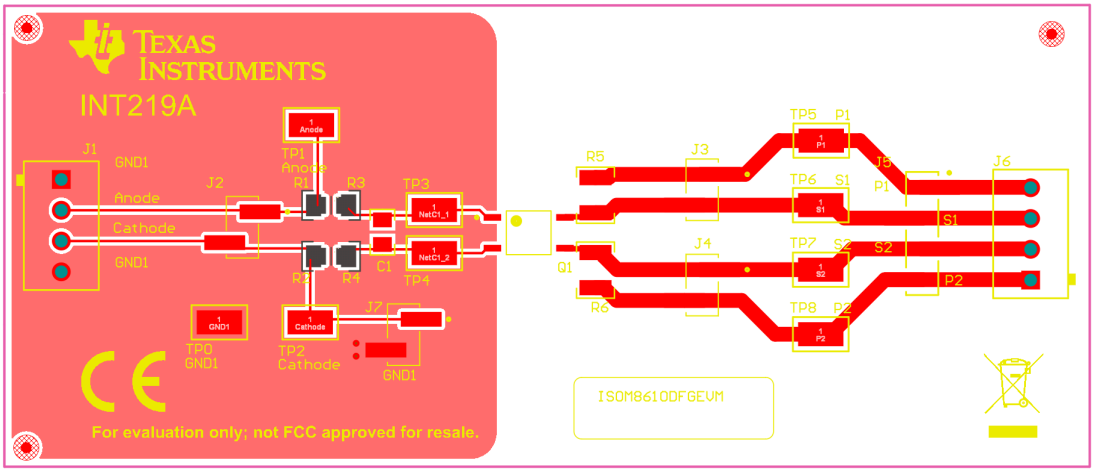


Figure 3-2. ISOM8610DFGEVM PCB Layout - Top

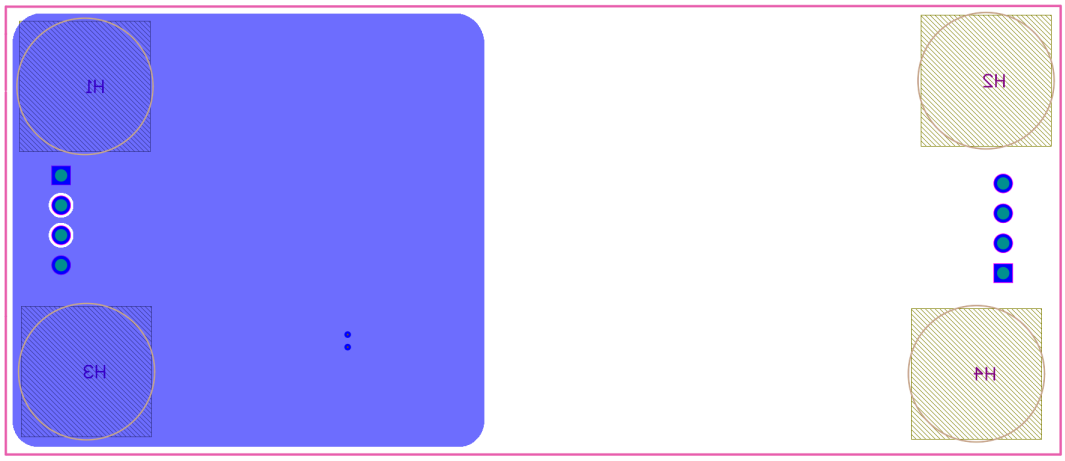


Figure 3-3. ISOM8610DFGEVM PCB Layout - Bottom

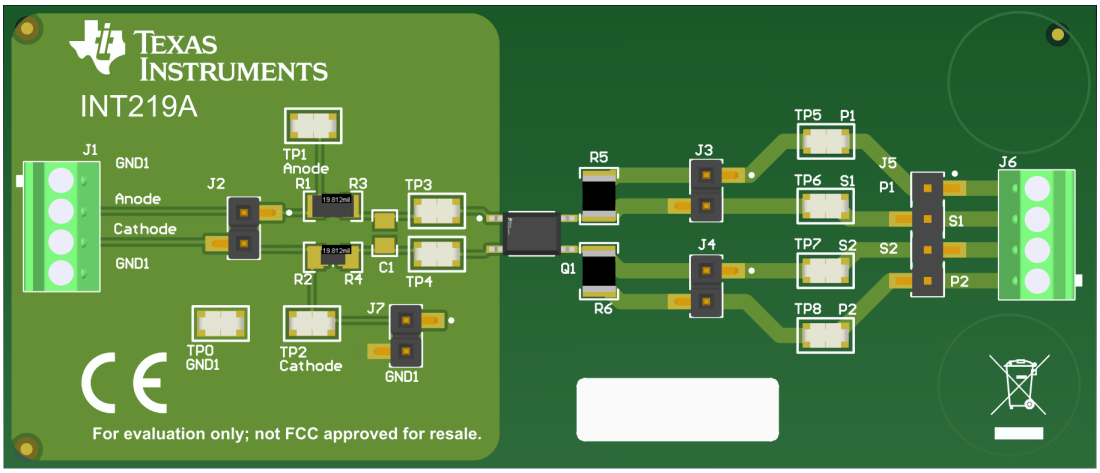


Figure 3-4. ISOM8610DFGEVM PCB 3D Diagram

3.3 Bill of Materials

Table 3-1 lists the bill of materials (BOM) for the ISOM8610DFGEVM.

Table 3-1. Bill of Materials

Item #	Designator	Manufacturer	Description
1	Q1	Texas Instruments	ISOM8610DFG, 80V, 150mA, 3kVRMS Normally Open Opto-emulator switch with integrated FETs
2	J1, J6	Phoenix Contact	Terminal Block, 4x1, 2.54mm, Green, TH
3	J2, J3, J4, J7	Samtec	Connector Header Surface Mount 2 position 0.100" (2.54mm)
4	J5	Samtec	Connector Header Surface Mount 4 position 0.100" (2.54mm)
5	R1, R2	Vishay-Dale	RES, 2.0 k, 5%, 0.25 W, AEC-Q200 Grade 0, 1206
6	R3, R4	Stackpole	0 Ohms Jumper 0.5W, 1/2W Chip Resistor 0805 (2012 Metric) Automotive AEC-Q200 Metal Foil
7	R5, R6	Yageo	RES, 1.8 k, 5%, 0.5 W, 1210
8	TP0, TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8	Keystone	Test Point, Miniature, SMT
9	C1	AVX	CAP, CERM, 15pF, 100V, +/- 5%, C0G/NP0, 0805
10	H1, H2, H3, H4	3M	Bumpon, Hemisphere, 0.44 X 0.20, Clear

4 Additional Information

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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

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https://www.ti.com/ja-jp/legal/notice-for-evaluation-kits-delivered-in-japan.html

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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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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.

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