User's Guide

ISOM8710 High-Speed Single-Channel Opto-Emulator Evaluation Module

ABSTRACT

The ISOM8710 user's guide describes the functionality of the ISOM8710 High-Speed Single-Channel Opto-Emulator Evaluation Module (EVM). The EVM lets designers evaluate device performance for fast development and analysis of an isolated system. The ISOM8710DFFEVM supports evaluation of TI's ISOM8710 Opto-Emulator in a 5-pin DFF SOIC 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 recommended operating conditions of the device.

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1 Introduction

The ISOM8710 user's guide describes the functionality of the ISOM8710 High-Speed Single-Channel Opto-Emulator Evaluation Module (EVM). The ISOM8710DFFEVM supports evaluation of TI's ISOM8710 Opto-Emulator in a 5-pin DFF SOIC package. This user's guide describes EVM operation with respect to the ISOM8710 High-Speed Single-Channel Opto-Emulator under 5 V opperation. However, the EVM may be reconfigured for evaluation with a larger suppy voltage or other applications by changing the EVM configuration and componenet values. The guide also covers the channel configuration of the ISOM8710, EVM schematic, and typical setup.

2 Overview

The ISOM8710 device is capable of being pin-compatable and drop-in replaceable with many optocoupler devices. Opto-emulators offer significant reliability and performance advantanges compared to traditional optocouplers, including high common mode transient immunity (CMTI), low propgation delay, small pulse width distortion (PWD), low power consumption, wider temperature ranges, and tight process controls result in small part-to-part skew. Since there is no aging effect or temperature variation to compensate for, the emulated-diode input-stage also consumes less power than typical optocouplers.

The ISOM8710 Opto-Emulator replicates the characteristics of traditional optocouplers without the drawbacks of aging and thermal drift by using logic input and output buffers separated by a silicon oxide (SiO_2) insulation barrier. When used with isolated power supplies, these devices block high voltages, isolate grounds, and prevent noise currents on a data bus from entering the local ground and interfering with or damaging sensitive circuitry.

3 Pin Configuration of the ISOM8710 High-Speed Single-Channel Opto-Emulator

Figure 3-1 shows the ISOM8710 High-Speed Single-Channel Opto-Emulator pin configuration.

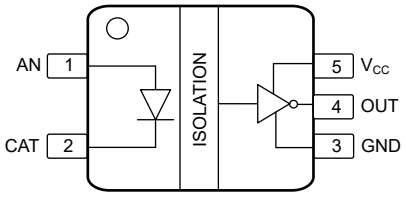

Figure 3-1. ISOM8710 High-Speed Single-Channel Opto-Emulator Pin Configuration

4 EVM Setup and Operation

Basic EVM Setup

This section describes the setup and operation of the EVM for parameter performance evaluation. Figure 4-1 shows a typical test configuration of the ISOM8710 Opto-Emulator EVM using a signal generator, oscilliscope and a 5 V power supply .

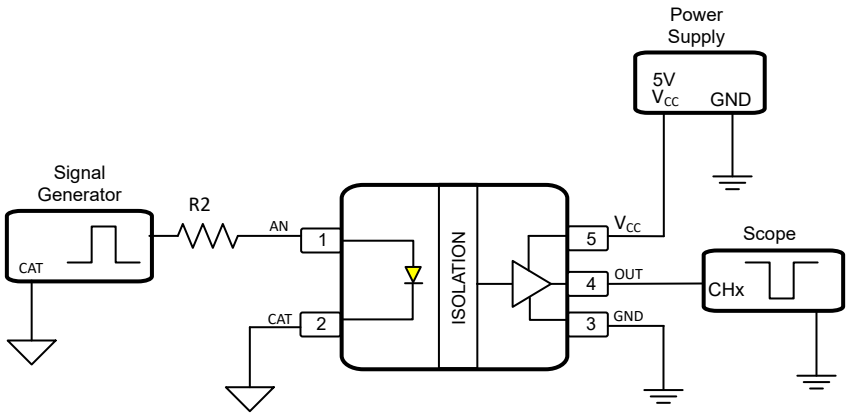

Figure 4-1. Basic EVM Operation

ISOM8710DFFEVM has many "do not populate" (DNP) footprints for components which can be populated to apply different test conditions to the device. Section 4 lists and describes all the possible test configurations that can be acheived by modifying different components on the EVM.

Table 4-1. Component Configurations

Component	Description
U1, C1, C2, R1	To use ISOM8710 with a logic inverter, populate U1 with a standard logic inverter in a 5-pin SOT-23 package like the SN74LVC1G14DBV. Depopulate R1 and populate C1 and C2 with the appropriate decoupling capacitors as well.
R2, R3	Current into ISOM8710 can be changed by replacing R2 with a different resistor value. The R3 footprint is also given to provide more resistor options.
R4	Can be modified to provide some resistance to ground.
C3	Can be added to test the device with additional input capacitance.
C5	Can be populated to add additional decoupling capacitance.
R5	If a pullup resistor is desired, populate R5.
R6, R7, C7	One or more of these components can be added or modified to test the device with additional output impeadance, resistive or capacitive loads.

5 EVM Schematics and Layout

The ISOM8710DFFEVM EVM has additional footprints that gives the user flexiblity to test a variety of common applications by providing additional foorprints.

To evaluate the ISOM8710 Opto-Emulator device with a standard logic buffer, populate the U1, C1 and C2 footprints and remove the 0 ohm resistor on R1.

Other positions on the board can be modified as well. For example, R2 can be changed to accmmodate different current requirements, and R7 and C7 can be added to test the device with resistive or capacitive loading. See Figure 5-1 for the EVM schematic and see Table 4-1 for more information on alternate EVM configurations.

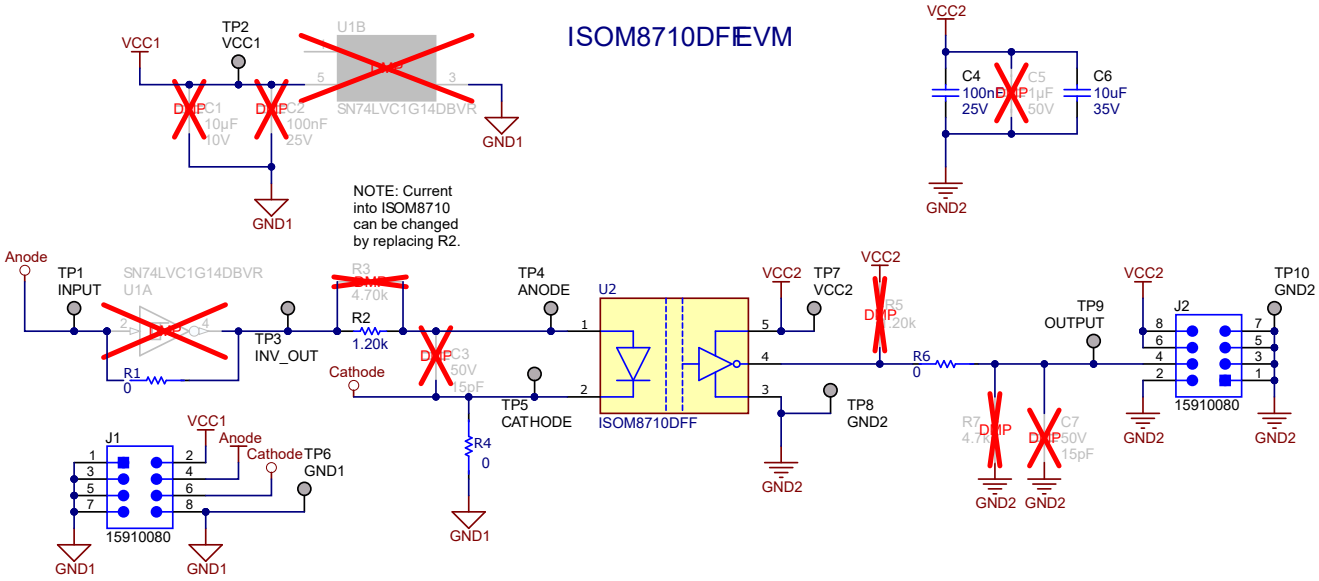

Figure 5-1. ISOM8710DFF EVM Schematic

6 PCB Layout and 3D Diagram

Figure 6-1 and Figure 6-2 show the printed-circuit board (PCB) layout top and bottom, respectively, and Figure 6-3 shows a 3D diagram of the EVM PCB.

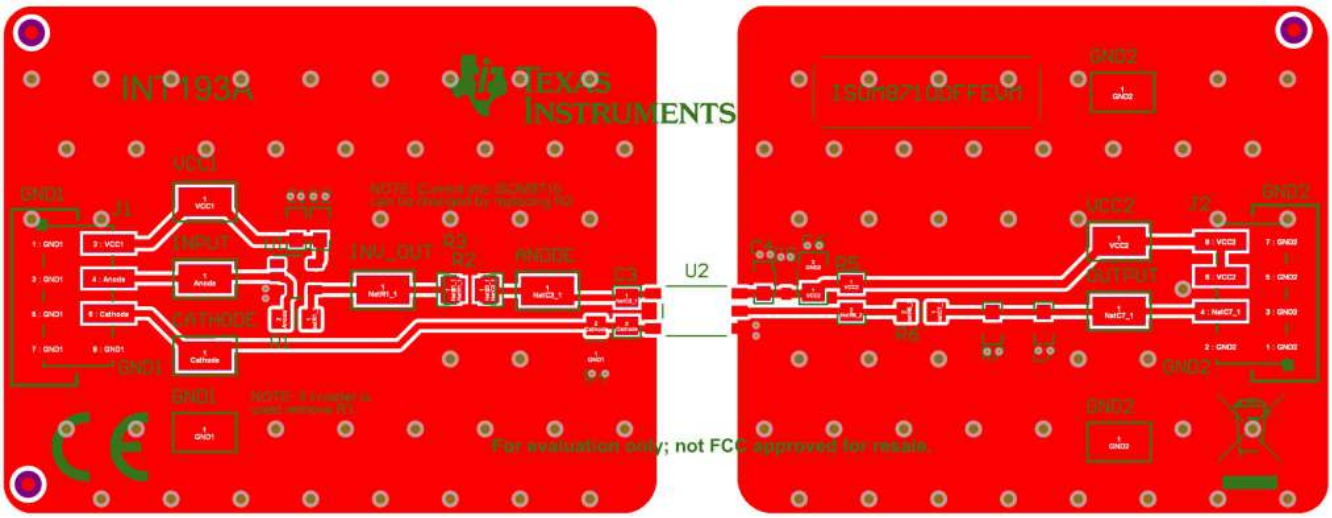

Figure 6-1. ISOM8710DFFEVM PCB Layout - Top

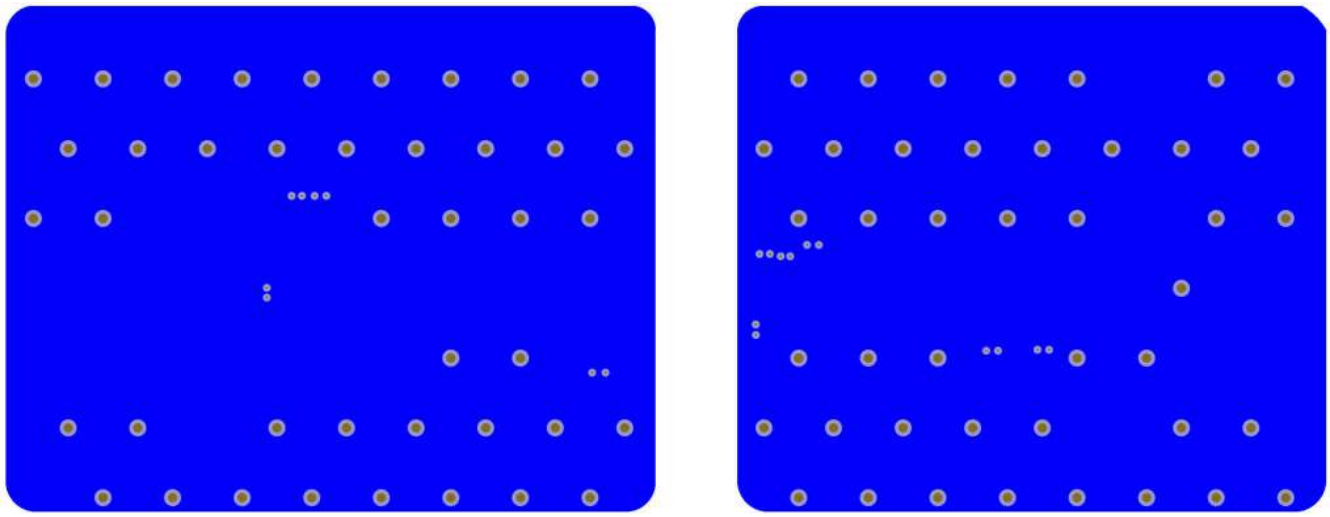

Figure 6-2. ISOM8710DFFEVM PCB Layout - Bottom

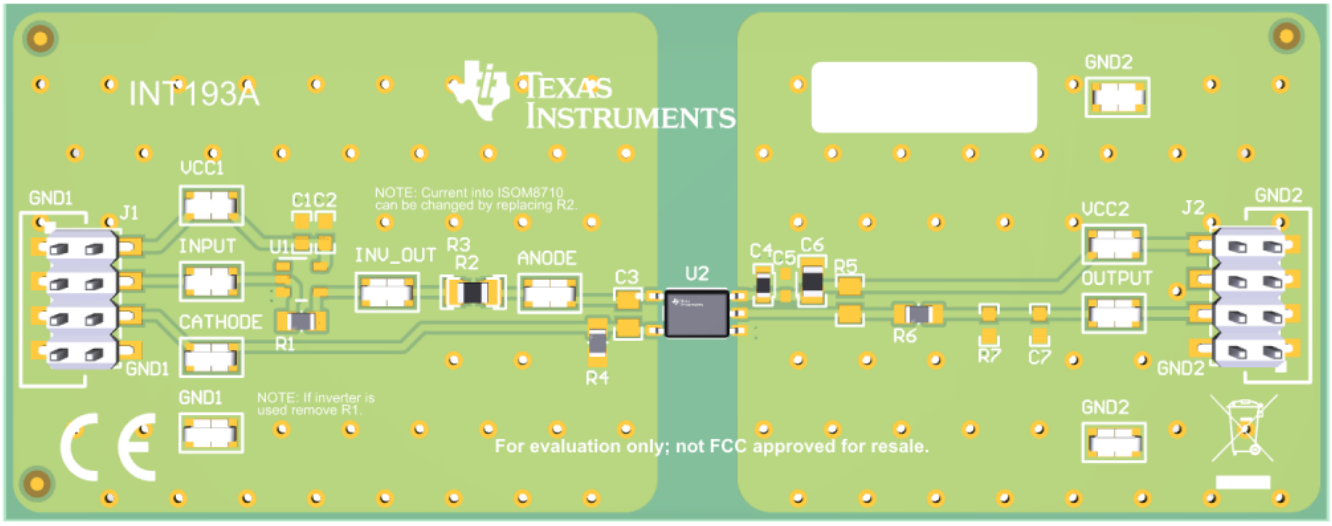

Figure 6-3. ISOM8710DFFEVM PCB 3D Diagram

7 Bill of Materials

Table 7-1 lists the bill of materials (BOM) for the ISOM8710DFFEVM.

Table 7-1. Bill of Materials

Item	Designator	Description	Manufacturer	Part Number
1	C4	CAP, CERM, 0.1 uF, 25 V, +/- 5%, X7R, 0603	AVX	06033C104JAT2A
2	C6	CAP, CERM, 10 uF, 35 V, +/- 10%, X5R, 0805	TDK	C2012X5R1V106K085AC
3	H1, H2, H3, H4	Bumpon, Hemisphere, 0.44 X 0.20, Clear	3M	SJ-5303 (CLEAR)
4	ISOM8710DFFEVM	Thermal Transfer Printable Labels, 0.650" W x 0.200" H - 10,000 per roll	Brady	THT-14-423-10
5	J1, J2	Header, 100 mil, 4x2, Gold, SMT	Molex	15910080
6	R1, R4, R6	0 Ohms Jumper 0.5W, 1/2W Chip Resistor 0805 (2012 Metric) Automotive AEC-Q200 Metal Foil	Stackpole	HCJ0805ZT0R00
7	R2	RES, 1.20 k, 1%, 0.5 W, 0805	Panasonic	ERJ-P06F1201V
8	TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10	Test Point, Miniature, SMT	Keystone	5019
9	U2	3.75-kVRMS, High-Speed Single-Channel Opto-Emulator	Texas Instruments	ISOM8710DFF

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