User's Guide
SLLU243–March 2017

ISOW784x Quad-Channel Digital Isolator With Integrated DC-DC Converter Evaluation Module

This user's guide describes the evaluation module (EVM) for the ISOW784x quad-channel digital isolators with integrated DC-DC converter. This EVM allows designers to evaluate device performance for fast development and analysis of isolated systems. The EVM supports evaluation of any of the TI triple- or quad-channel digital isolators in a 16DW or 16DWE 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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1 Introduction

This user's guide describes EVM operation with respect to the ISOW784x quad-channel digital isolators. However, the EVM may be reconfigured for evaluation of any of TI's triple- or quad-channel digital isolators in a 16DW or 16DWE package. This guide also describes the available channel configurations within the ISOW784x family, the EVM schematic, and typical laboratory setup. An efficiency plot and typical input and output waveforms are also provided.

2 Overview

The ISOW784x is a family of high-performance, quad-channel reinforced digital isolators with an integrated high-efficiency power converter. The integrated DC-DC converter provides up to 650 mW of isolated power at high efficiency and can be configured for various input and output voltage configurations. Therefore these devices eliminate the need for a separate isolated power supply in space-constrained isolated designs. The ISOW784x family of devices provide high electromagnetic immunity and low emissions while isolating CMOS or LVCMOS digital I/Os. The signal-isolation channel has a logic input and output buffer separated by a silicon dioxide (SiO_2) insulation barrier, whereas, power isolation uses on-chip transformers separated by thin film polymer as insulating material. Various configurations of forward and reverse channels are available. If the input signal is lost, the default output is high for the ISOW784x devices and low for the devices with the F suffix. These devices help prevent noise currents on a data bus or other circuits from entering the local ground and interfering with or damaging sensitive circuitry. Through innovative chip design and layout techniques, electromagnetic compatibility of the ISOW784x family of devices has been significantly enhanced to ease system-level ESD, EFT, surge and emissions compliance. The high-efficiency of the power converter allows operation at a higher ambient temperature.

3 Pin Configurations of ISOW784x Quad-Channel Isolators

Figure 1 shows the ISOW784x quad-channel digital isolator pin configurations.

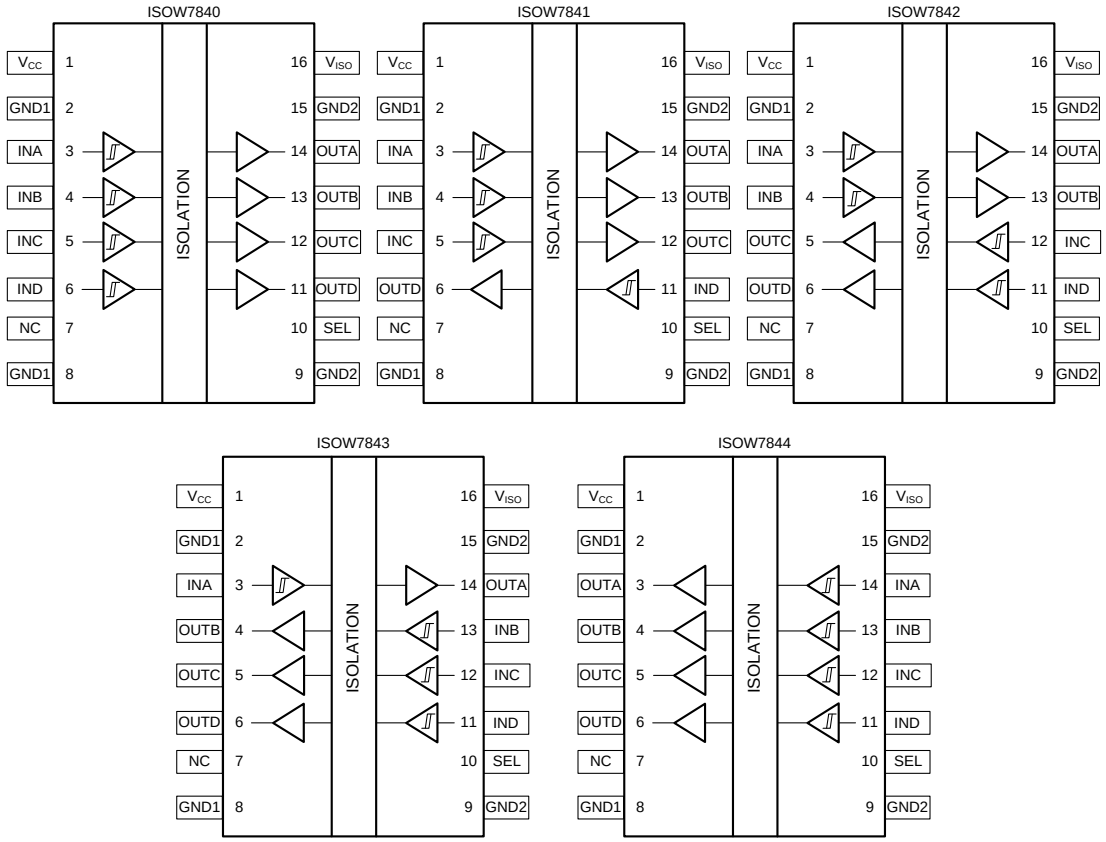

Figure 1. ISOW784x Quad-Channel Digital Isolator Pin Configurations

4 ISOW7841EVM Board Block Diagram and Image

Figure 2 shows the board configuration for evaluation of the ISOW7841 quad-channel isolator.

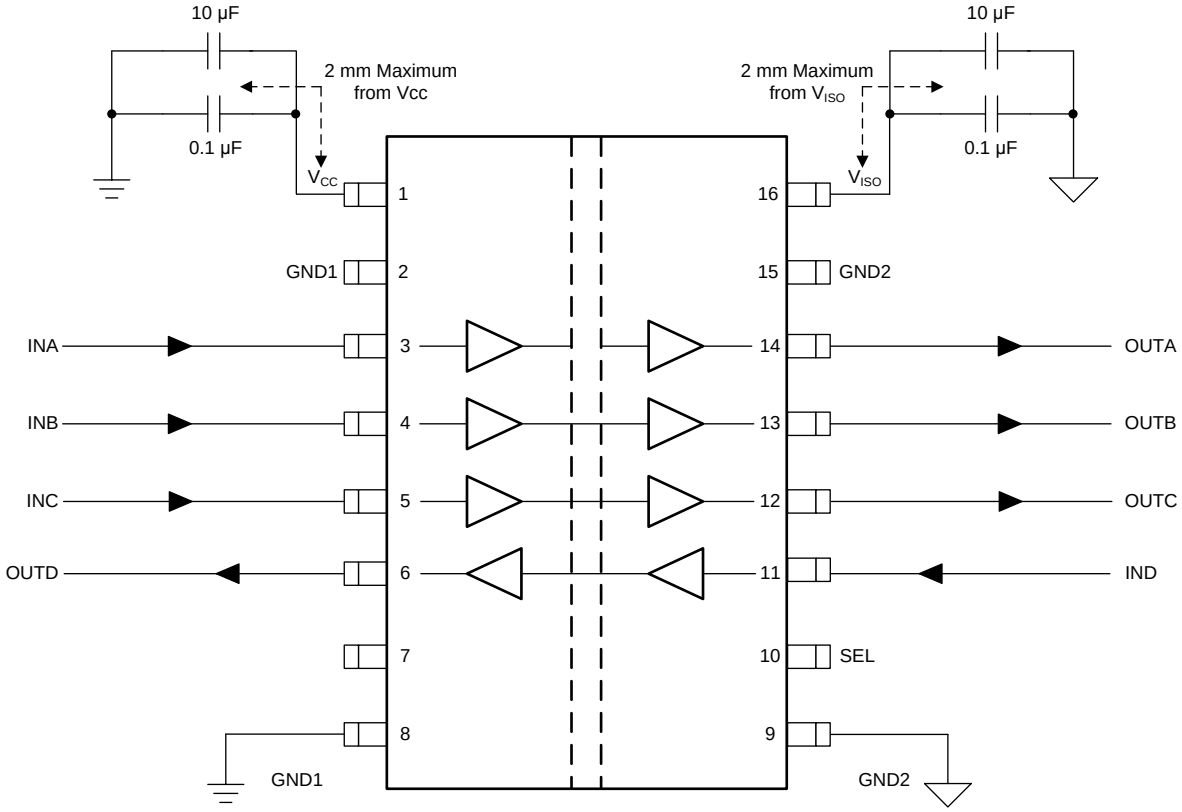

Figure 2. ISOW7841EVM Configuration

Figure 3 shows the photograph of the EVM.

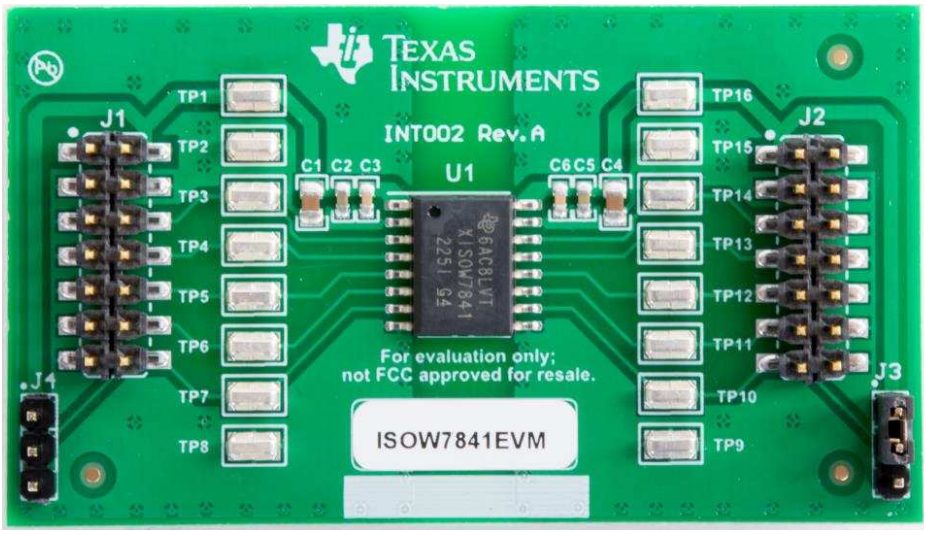

Figure 3. ISOW7841EVM Photograph

5 EVM Setup and Operation

This section describes the setup and operation of the EVM for parameter performance evaluation. Figure 4 shows the configuration for operating the ISOW784x quad-channel isolator EVM using an integrated DC-DC converter to generate output power supply.

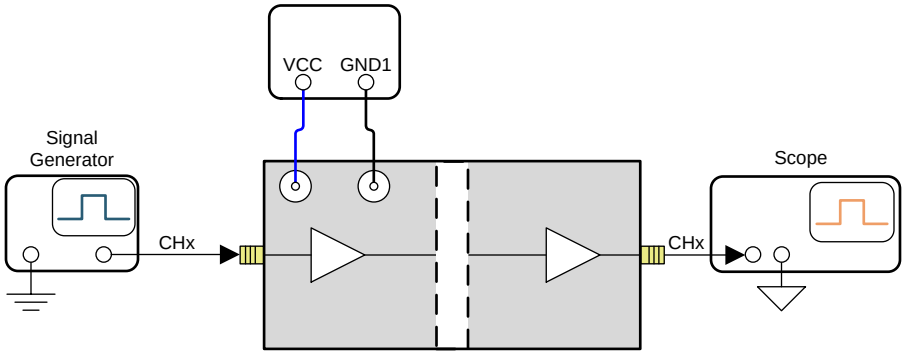

Figure 4. Basic EVM Operation

Figure 5 shows typical input and output waveforms of the EVM for a 1-MHz clock. The input is shown as channel 1, and the output is shown as channel 2.

Figure 5. Typical Input and Output Waveforms

Figure 6 shows typical efficiency vs load current plot of ISOW7841EVM for 3.3-V and 5-V output voltage configurations with input at 3.3-V and 5-V input voltages.

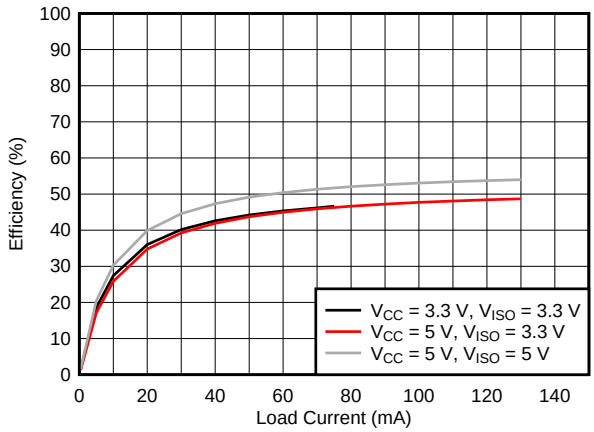

Figure 6. ISOW7841EVM Efficiency vs Load Current (I_{ISO})

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	C1, C4	CAP, CERM, 10 µF, 35 V, ±10%, X5R, 0805	MuRata	GRM21BR6YA106KE43L	2
2	C2, C5	CAP, CERM, 1 µF, 50 V, ±10%, X5R, 0603	MuRata	GRM188R61H105KAALD	2
3	C3, C6	CAP, CERM, 0.1 µF, 25 V, ±5%, X7R, 0603	AVX	06033C104JAT2A	2
4	H1, H2, H3, H4	Bumpon, Hemisphere, 0.44 X 0.20, Clear	3M	SJ-5303 (CLEAR)	4
5	J1, J2	Header, 100mil, 7x2, SMT	Molex	0015912140	2
6	J3, J4	Header, 100mil, 3x1, Gold, TH	Samtec	HTSW-103-07-G-S	2
7	SH-J1	Shunt, 100mil, Gold plated, Black	Samtec	SNT-100-BK-G	1
8	TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10, TP11, TP12, TP13, TP14, TP15, TP16	Test Point, Miniature, SMT	Keystone	5019	16
9	U1	ISOW7841DWE	Texas Instruments	ISOW7841DWER	1

7 EVM Schematics and Layout

The ISOW7841EVM is designed to accommodate any of the ISO784x quad-channel devices in a 16-pin DWE package. To evaluate any of the ISOW784x quad-channel devices in a 16-pin DWE package, replace ISOW7841DW with the device of interest on the ISOW7841EVM PCB. No other component requires any modification. Figure 7 shows the ISOW784x EVM schematic and Figure 8 shows the printed-circuit board (PCB) layout.

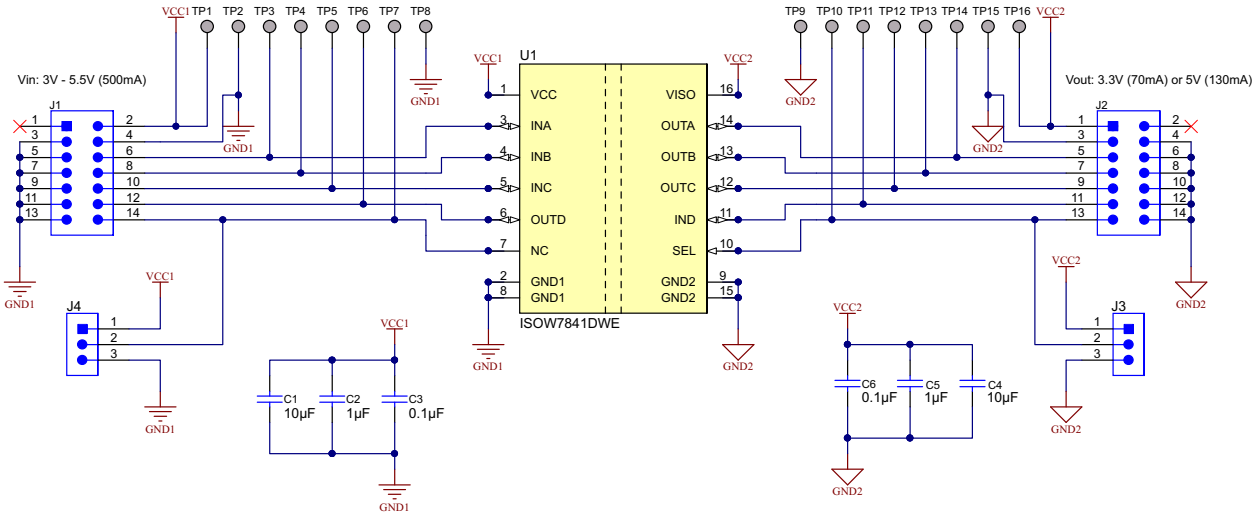

Figure 7. ISOW7841EVM Schematic

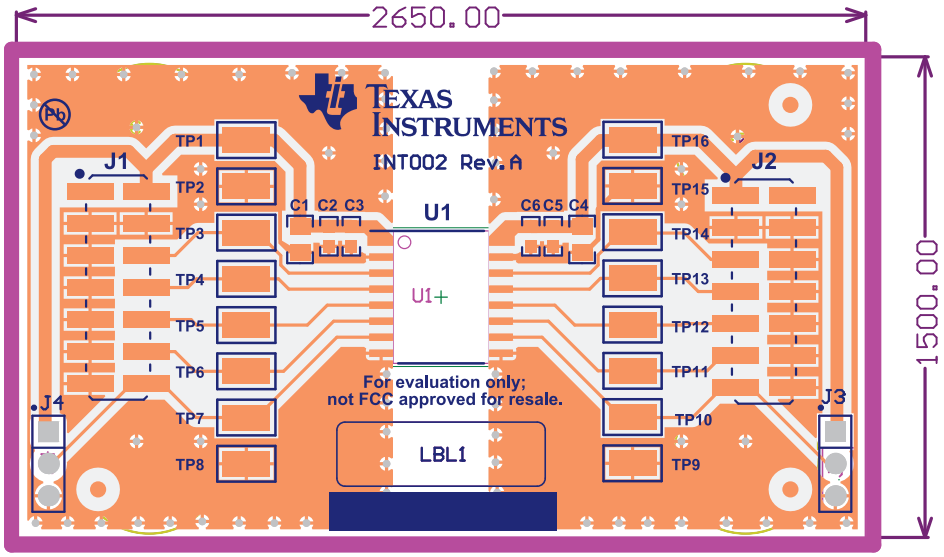

Figure 8. ISOW7841EVM PCB Layout

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