EVM User's Guide: ISO1228DFBEVM ISO1228
Eight-Channel Isolated Digital Input with Current Limit and Diagnostics Evaluation Module

TEXAS INSTRUMENTS

Description

ISO1228DFBEVM is an evaluation module (EVM) used to evaluate the 8-channel isolated digital input receiver ISO1228 in the 38-pin DFB SSOP package. The EVM has additional footprints that gives the user flexibility to add components to test a variety of common applications. The EVM features multiple test points and jumper options to evaluate the device with minimal external components.

Features

- Eight configurable IEC 61131-2 type 1, 2, or 3 isolated digital inputs
- VCC1 logic supply voltage range 1.71V to 5.5V
- AVCC field supply voltage range 8 V to 36 V
- Serial SPI and parallel output options
- Programmable glitch filters

Eight-Channel Isolated Digital Input with Current Limit and Diagnostics Evaluation Module
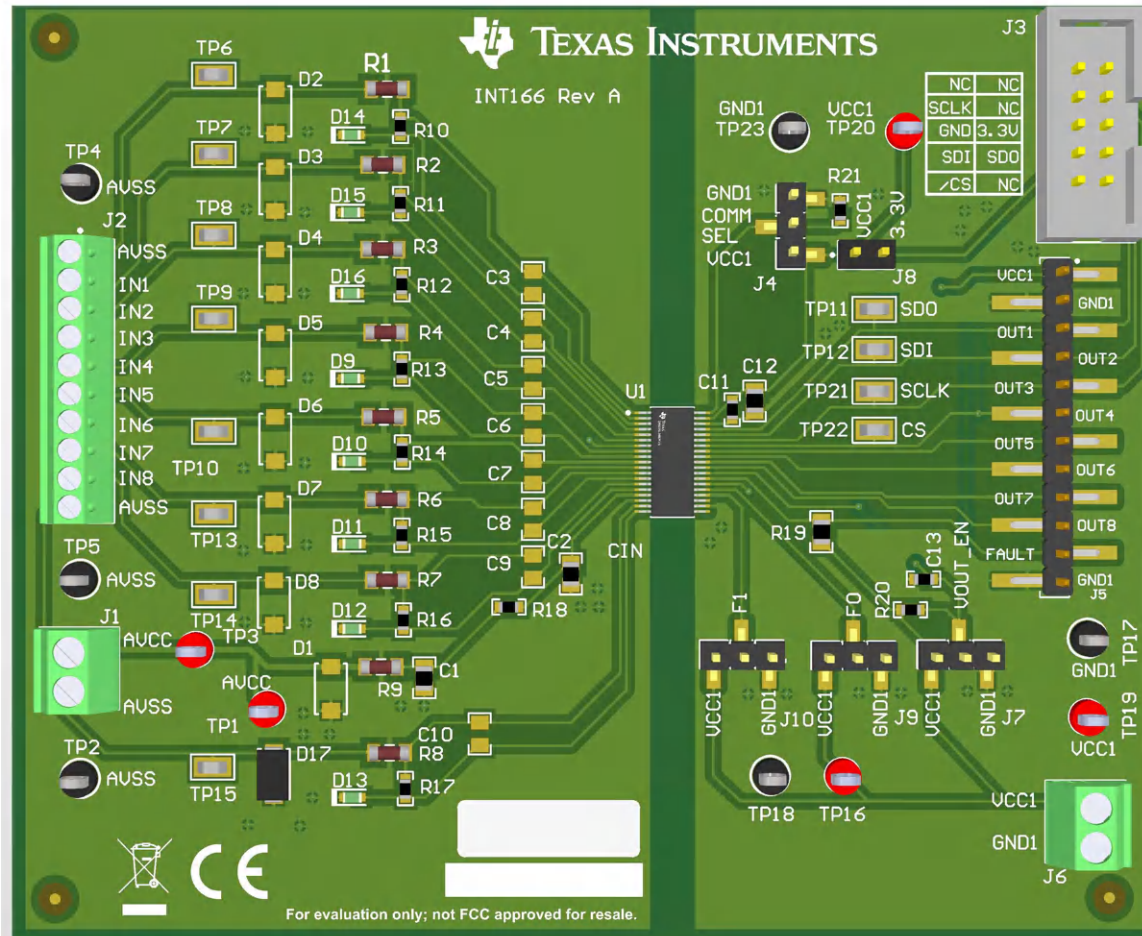
1 Evaluation Module Overview

1.1 Introduction

This user's guide describes the evaluation module (EVM) for the ISO1228 isolated digital-input receiver. This EVM allows designers to evaluate device performance for fast development and analysis of isolated systems. The EVM supports evaluation of the ISO1228 SSOP package device, which helps the user to evaluate 8 channels that can be configured for IEC 61131-2 Type 1, 2, or 3 sinking digital inputs.

> **CAUTION**
> This evaluation module is made available for evaluation of isolator parameter performance 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 range.

1.2 Kit Contents

This evaluation module contains one PCB evaluation board containing one ISO1228 device with a default configuration for Type 1 or Type 3 digital inputs. The major components of the ISO1228 evaluation module are:
- ISO1228 isolator
- On-board digital input connections
- Multiple on-board test points
- On-board SPI communication connections

To demonstrate functionality of the ISO1228, TI recommends the following (not included):
- DC power supply
- Oscilloscope
- Signal Generator

1.3 Specification

The ISO1228 device is an integrated 8-channel isolated digital-input receiver configurable for IEC 61131-2 Type 1, 2, and 3 digital inputs. The device receives up to a 36 V digital input signals and provides isolated digital outputs. A VCC1 logic supply voltage and AVCC field supply voltage is required for operation. The device offers many configurable options and built in features such as LED field side indications, fault indications, and cyclic redundancy check (CRC) allowing for versatility and robustness. These features make the ISO1228 an excellent choice for numerous applications, which utilize digital inputs, such as programmable logic controllers (PLC), motor drive digital inputs, and industrial transport digital inputs.

1.4 Device Information

The evaluation module contains one ISO1228 and all other passive components required for operation. Various components included in the evaluation module directly control the operation and functionality of the ISO1228. If necessary, components can be removed, added, or replaced to modify the behavior of the ISO1228 accordingly for any given application.

The external resistor on the AVCC supply path, R_{ILIM} (R18) sets the current limit to be drawn from each digital input. This current limit must be common to all input channels. The R_{PAR} resistors (R10, R11, R12, R13, R14, R15, R16, and R17), between each INx and LEDx pin, are chosen according to the selected R_{ILIM} value. The R_{THR} resistors (R1, R2, R3, R4, R5, R6, R7, and R8), located on each input pin, can be used to increase the voltage transition thresholds as well as attenuate any surge current seen on the input pins. R_{SURGE} (R9) along with C_{SURGE} (C1) and C_{FIL} (C2) filter any surges or transients seen on the power supply.

For more information on selecting the R_{ILIM}, R_{PAR}, R_{THR}, or R_{SURGE} resistor values, see Table 1-1 or the ISO1228 data sheet. For Type 2 inputs, R_{THR} values can be same as Type 3 inputs.

Table 1-1. Sink Mode R$_{THR}$ Admissible Values (Ω)

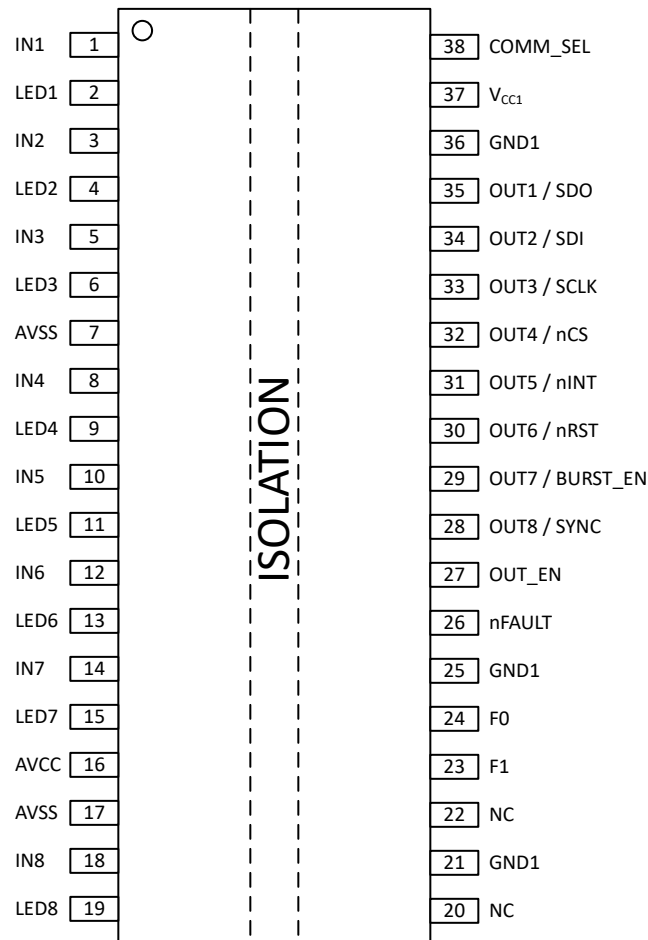| SINK MODE						
R$_{ILIM}$ = 0 Ω, R$_{PAR}$ = 16 kΩ, R$_{SURGE}$ = 1 kΩ, (I$_L$ = 2.5 mA)				R$_{ILIM}$ = 1 kΩ, R$_{PAR}$ = 10.7 kΩ, R$_{SURGE}$ = 1 kΩ, (I$_L$ = 3.5 mA)		
	Min	Typical	Max		Min	Typical	Max
Type 1	180	1000	2400	Type 1	110	910	1900
Type 3	180	1000	1300	Type 3	110	910	950

The on-board LEDs demonstrate the functionality of the ISO1228's field side LED indication feature. When a digital input signal crosses the programmable input voltage threshold V$_{IH}$, current being drawn from the digital inputs is diverted to the corresponding LED. This provides a visual indication of which channels are receiving valid digital input signals at any time. Additionally, by using the current from the digital input, no additional power is required from the device or system. When the digital input voltage falls below the programmable input voltage threshold V$_{IL}$, the current bypasses the LEDs resulting in the indicators switching off.

For a full list of components included in the ISO1228 Evaluation Module, please see the Bill of Materials.

2 Hardware

2.1 Pin Configuration of the ISO1228

Figure 2-1 shows the ISO1228 pin configuration in an 38 pin SSOP package.

IN1	1		38	COMM_SEL

ISOLATION

Pin	#		#	Name
IN1	1		38	COMM_SEL
LED1	2		37	V_{CC1}
IN2	3		36	GND1
LED2	4		35	OUT1 / SDO
IN3	5		34	OUT2 / SDI
LED3	6		33	OUT3 / SCLK
AVSS	7		32	OUT4 / nCS
IN4	8		31	OUT5 / nINT
LED4	9		30	OUT6 / nRST
IN5	10		29	OUT7 / BURST_EN
LED5	11		28	OUT8 / SYNC
IN6	12		27	OUT_EN
LED6	13		26	nFAULT
IN7	14		25	GND1
LED7	15		24	F0
AVCC	16		23	F1
AVSS	17		22	NC
IN8	18		21	GND1
LED8	19		20	NC

Figure 2-1. ISO1228 Isolated Digital-Input Receiver Pin Configuration

2.2 EVM Board Block Diagram and Image

Figure 2-2 shows the top view of the EVM PCB.
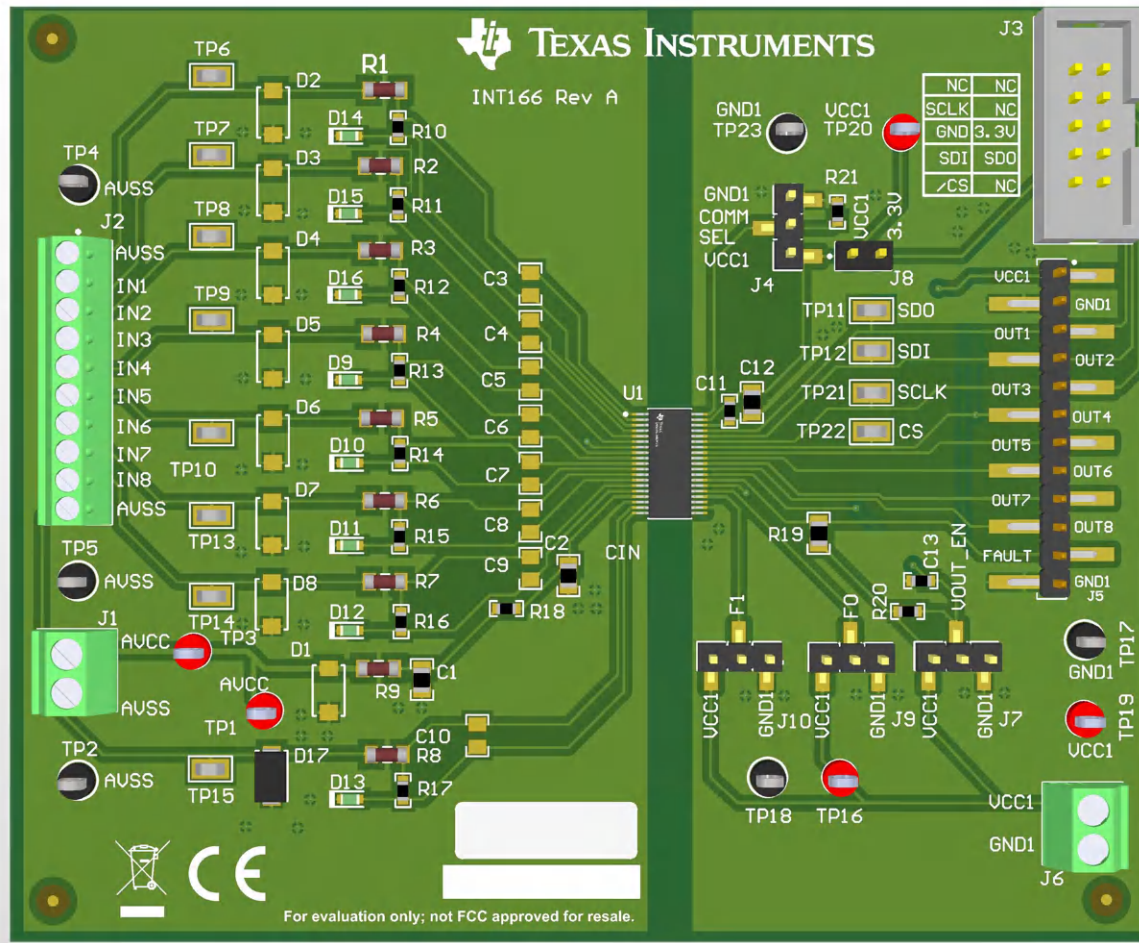
Figure 2-2. ISO1228DFBEVM PCB Diagram

2.3 EVM Setup and Operation

This section describes the basic setup and operation of the EVM for performance evaluation. Figure 2-3 shows an example of one potential configuration for operating the ISO1228DFBEVM. In this setup, the digital input signal from the signal generator is connected between one of the INx pins and AVSS. The field side power supply is connected at AVCC and AVSS. The logic side power supply is connected at VCC1 and GND1. All output signals are monitored using an oscilloscope on the corresponding OUTx pin.
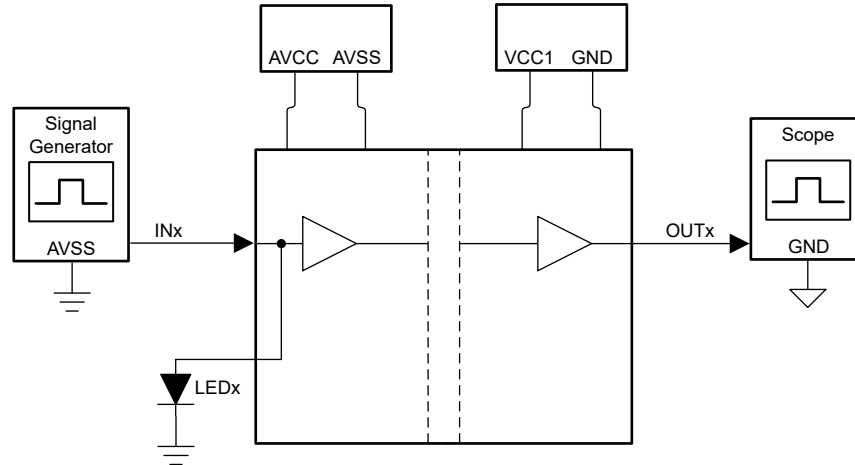
Figure 2-3. Basic EVM Operation

The ISO1228DFBEVM has many "do not populate" (DNP) footprints for components which can be populated to apply different test conditions to the device. Table 2-1 lists and describes all possible test configurations that can be achieved by modifying different components of the EVM.

Table 2-1. Component Configurations

Component	Description
D1, D2, D3, D4, D5, D6, D7, D8	Can be added for additional surge protection
C3, C4, C5, C6, C7, C8, C9, C10	Can be added for additional filtering control on the input pins
R1, R2, R3, R4, R5, R6, R7, R8	R_{THR}, Replace to modify voltage transition thresholds
R10, R11, R12, R13, R14, R15, R16, R17	R_{PAR}, Replace according to R_{ILIM} selection
R18	R_{ILIM}, Replace to modify current limit drawn from each digital input

2.3.1 EVM Jumper Settings

The ISO1228DFBEVM has several configurable jumpers that can be used to modify the behavior of the ISO1228. All jumpers are left open by default, which program the ISO1228 EVM to operate in the parallel interface mode with enabled outputs and digital filtering of 1 ms on the channels. Alternative jumper configurations and the resulting device behaviors are explained below.

The COMM_SEL pin of the ISO1228 controls the output options and is configurable with jumper J4. Table 2-2 describes the available configurations of the COMM_SEL pin.

Table 2-2. Comm_Sel Pin Jumper Descriptions

Jumper	Configuration	Description
J4	All Pins Open (default)	Parallel Interface Mode Enabled (default)
	Pin 1-Pin 2 Shorted (COMM_SEL tied to Ground)	Parallel Interface Mode Enabled
	Pin 2-Pin 3 Shorted (COMM_SEL tied to VCC1)	Serial Interface Mode Enabled

The F0 and F1 pins of the ISO1228 control the digital filter settings. Since each pin has three potential states, there are 9 distinct combinations and digital low pass filters. Pin F0 can be configured with jumper J9 and pin F1 can be configured with jumper J10. Table 2-3 describes all potential combinations of pin F0 and F1. The digital filters can also be programmed through the SPI registers. If any SPI filter Enable register bit is flipped, the states of the F0 and F1 pins are ignored.

Table 2-3. F0 and F1 Pin Jumper Descriptions

Option	Jumper	Configuration	Description
1	J9	All Pins Open (default)	1 ms Filter Averaging Time (default)
	J10	All Pins Open (default)	
2	J9	Pin 1-Pin 2 Shorted (F0 tied to Ground)	0 ns Filter Averaging Time
	J10	Pin 1-Pin 2 Shorted (F1 tied to Ground)	
3	J9	All Pins Open (default)	1 µs Filter Averaging Time
	J10	Pin 1-Pin 2 Shorted (F1 tied to Ground)	
4	J9	Pin 2-Pin 3 Shorted (F0 tied to VCC1)	10 µs Filter Averaging Time
	J10	Pin 1-Pin 2 Shorted (F1 tied to Ground)	
5	J9	Pin 1-Pin 2 Shorted (F0 tied to Ground)	200 µs Filter Averaging Time
	J10	All Pins Open (default)	
6	J9	Pin 2-Pin 3 Shorted (F0 tied to VCC1)	3 ms Filter Averaging Time
	J10	All Pins Open (default)	
7	J9	Pin 1-Pin 2 Shorted (F0 tied to Ground)	10 ms Filter Averaging Time
	J10	Pin 2-Pin 3 Shorted (F1 tied to VCC1)	
8	J9	All Pins Open (default)	30 ms Filter Averaging Time
	J10	Pin 2-Pin 3 Shorted (F1 tied to VCC1)	
9	J9	Pin 2-Pin 3 Shorted (F0 tied to VCC1)	100 ms Filter Averaging Time
	J10	Pin 2-Pin 3 Shorted (F1 tied to VCC1)	

The OUT_EN/NC pin of the ISO1228 acts as the output enable control and is configurable with jumper J7. Table 2-4 describes the available configurations of the OUT_EN/NC pin.

Table 2-4. OUT_EN Pin Jumper Description

Jumper	Configuration	Description
J7	All Pins Open (default)	Output Enabled (default)
	Pin 1-Pin 2 Shorted (VOUT_EN/NC tied to Ground)	Output pins are tri-stated
	Pin 2-Pin 3 Shorted (VOUT_EN/NC tied to VCC1)	Output Enabled

3 Hardware Design Files
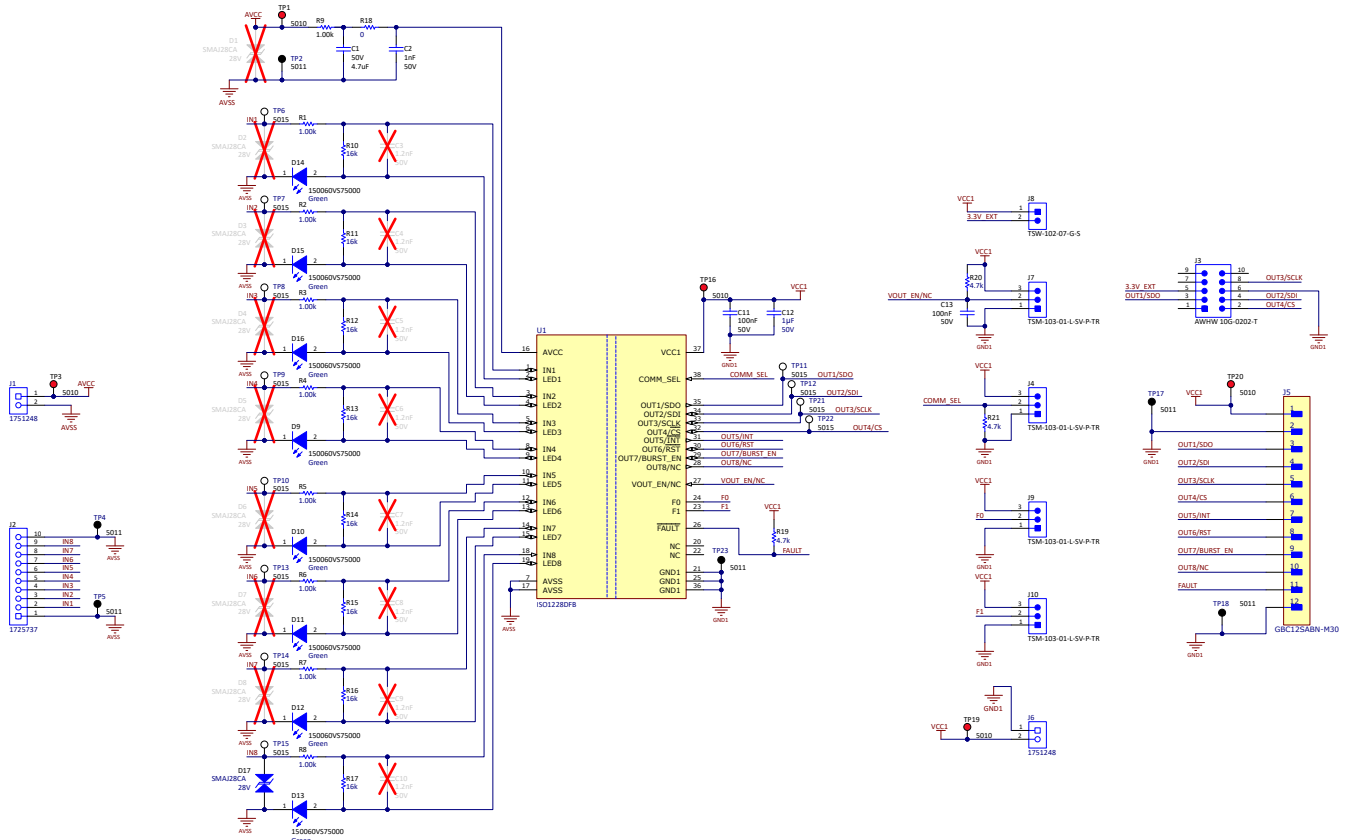## 3.1 Schematics

Figure 3-1 shows the ISO1228EVM schematic.

Figure 3-1. ISO1228DFBEVM Schematic

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3.2 PCB Layouts

Figure 3-2 and Figure 3-4 show the top and bottom views of the EVM's PCB layout. Figure 3-3 shows the top layer of the EVM.
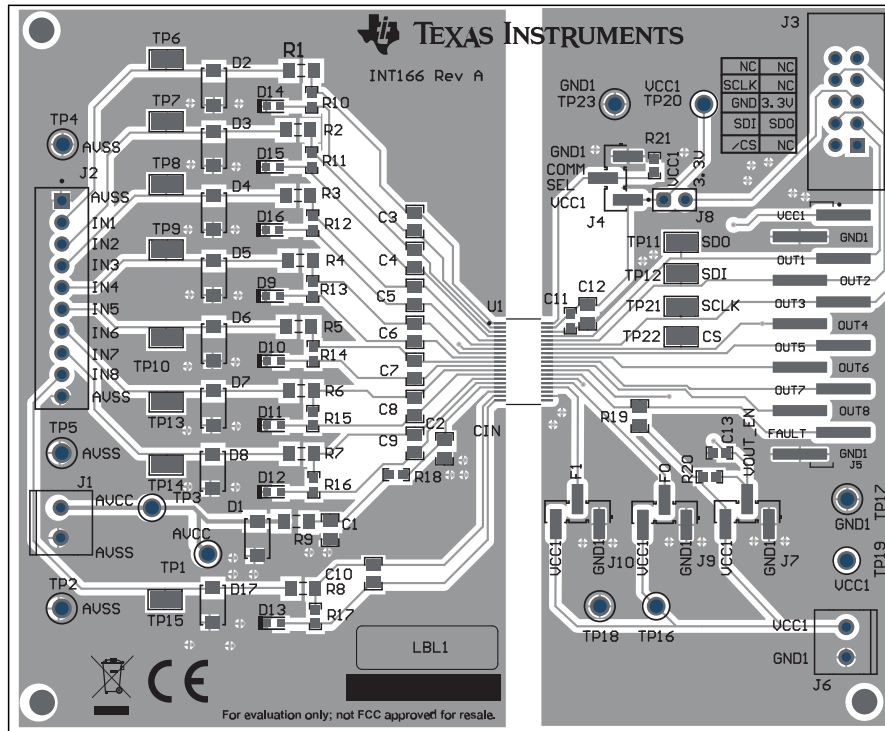

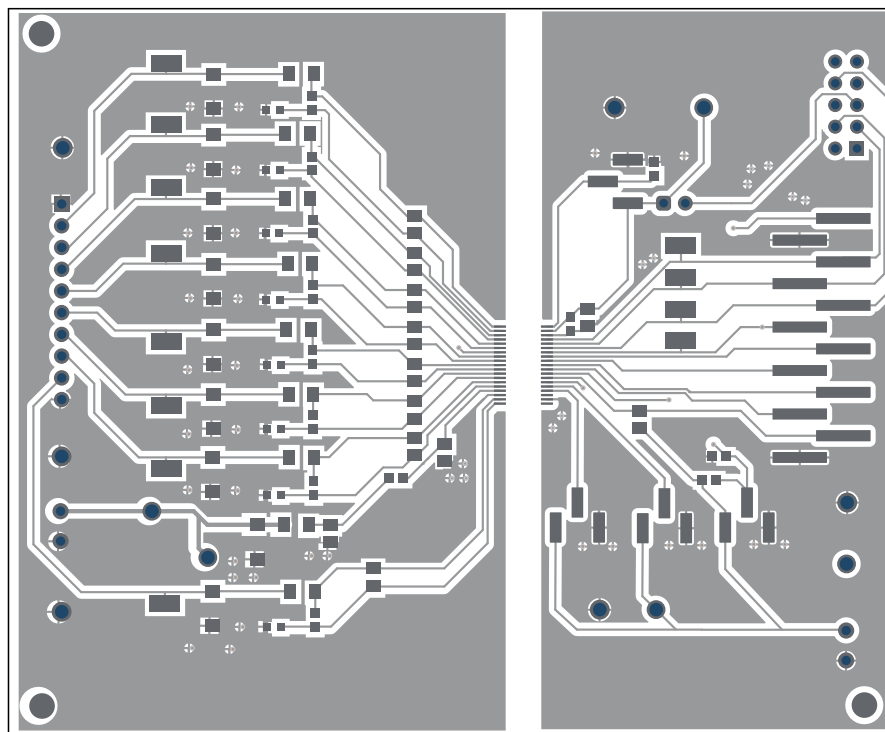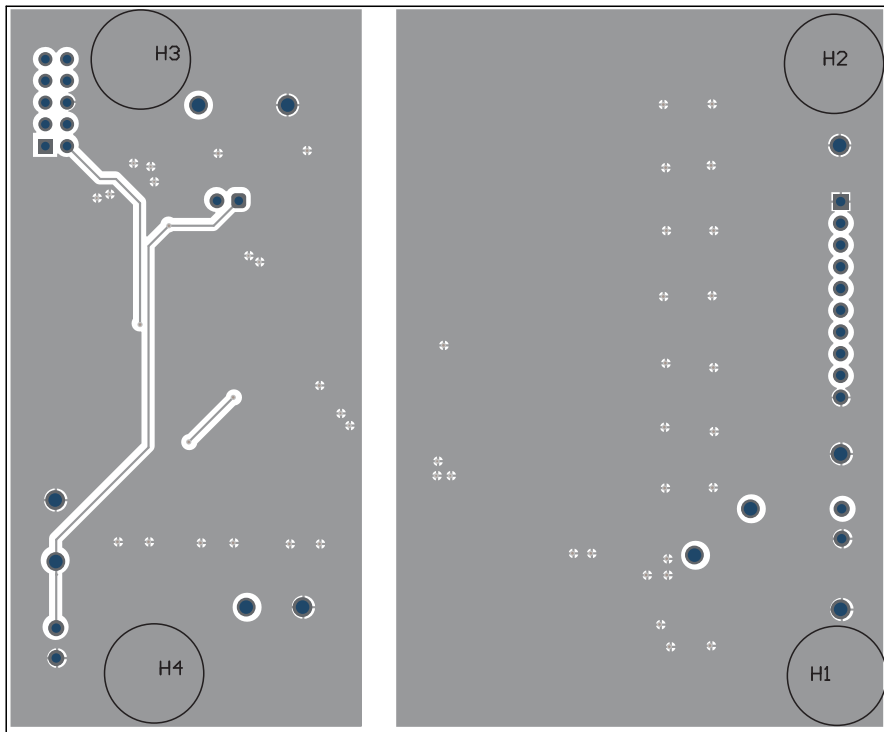**Figure 3-2. ISO1228DFBEVM PCB Layout - Composite Top View**

Figure 3-3. ISO1228DFBEVM PCB Layout - Top Layer

Figure 3-4. ISO1228DFBEVM PCB Layout - Composite Bottom View

3.3 Bill of Materials

lists the bill of materials (BOM) for this EVM.

Table 3-1. Bill of Materials

Item	Designator	Description	Part Number	Manufacturer	Quantity
1	C1	CAP, CERM, 4.7 uF, 50 V, +/- 10%, X6S, 0805	C2012X6S1H475K125AC	TDK	1
2	C2	CAP, CERM, 1000 pF, 50 V, +/- 10%, X7R, 0805	C0805C102K5RAC7800	Kemet	1
3	C11, C13	CAP, CERM, 0.1 uF, 50 V, +/- 10%, X7R, 0603	C0603C104K5RAC7867	Kemet	2
4	C12	CAP, CERM, 1 µF, 50 V,+/- 10%, X7R, 0805	CL21B105KBFNFNE	Samsung	1
5	D9, D10, D11, D12, D13, D14, D15, D16	LED, Green, SMD	150060VS75000	Wurth Elektronik	8
6	D17	Diode, TVS, Bi, 28 V, 45.4 Vc, 400 W, 8.8 A, SMA (non-polarized)	SMAJ28CA	Littelfuse	1
7	H1, H2, H3, H4	Bumpon, Hemisphere, 0.44 X 0.20, Clear	SJ-5303 (CLEAR)	3M	4
8	J1, J6	Conn Term Block, 2POS, 3.5mm, TH	1751248	Phoenix Contact	2
9	J2	Terminal Block,10x1, 2.54mm, TH	1725737	Phoenix Contact	1
10	J3	Header(Shrouded), 2.54mm, 5x2, Gold, TH	AWHW 10G-0202-T	Assman WSW Components	1
11	J4, J7, J9, J10	Header, 2.54mm, 3x1, Gold, SMT	TSM-103-01-L-SV-P-TR	Samtec	4
12	J5	Connector Header Surface Mount 12 position 0.100" (2.54mm)	GBC12SABN-M30	Sullins	1
13	J8	Header, 100mil, 2x1, Gold, TH	TSW-102-07-G-S	Samtec	1
14	LBL1	Thermal Transfer Printable Labels, 0.650" W x 0.200" H - 10,000 per roll	THT-14-423-10	Brady	1
15	R1, R2, R3, R4, R5, R6, R7, R8, R9	RES, 1.00 k, 1%, 0.25 W, AEC-Q200 Grade 1, 1.4x3.6mm	SMM02040C1001FB300	Vishay Draloric	9
16	R10, R11, R12, R13, R14, R15, R16, R17	RES, 16 k, 5%, 0.1 W, 0603	RC0603JR-0716KL	Yageo	8
17	R18	RES, 0, 5%, 0.1 W, 0603	RC0603JR-070RL	Yageo	1
18	R19	RES, 4.7 k, 5%, 0.125 W, AEC-Q200 Grade 0, 0805	ERJ-6GEYJ472V	Panasonic	1
19	R20, R21	RES, 4.7 k, 5%, 0.1 W, 0603	CR0603-JW-472ELF	Bourns	2
20	TP1, TP3, TP16, TP19, TP20	Test Point, Red, Through Hole, RoHS, Bulk	5010	Keystone	5
21	TP2, TP4, TP5, TP17, TP18, TP23	Test Point, Multipurpose, Black, TH	5011	Keystone Electronics	6
22	TP6, TP7, TP8, TP9, TP10, TP11, TP12, TP13, TP14, TP15, TP21, TP22	Test Point, Miniature, SMT	5015	Keystone Electronics	12
23	U1	Eight-Channel Isolated Digital Input with Current Limit and Diagnostics	ISO1228DFB	Texas Instruments	1
24	C3, C4, C5, C6, C7, C8, C9, C10	CAP, CERM, 1200 pF, 50 V, +/- 10%, X7R, 0805	08055C122KAT2A	AVX	0
25	D1, D2, D3, D4, D5, D6, D7, D8	Diode, TVS, Bi, 28 V, 45.4 Vc, 400 W, 8.8 A, SMA (non-polarized)	SMAJ28CA	Littelfuse	0

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WARNING

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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*

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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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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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