User's Guide
THVD1424 Evaluation Module (EVM) User Guide

TEXAS INSTRUMENTS

ABSTRACT

This document is the EVM User's guide for the THVD1424EVM which provides a quick way to evaluate TI's THVD1424, a full duplex RS-485 traceiver with selectable data rate and switchable integrated termination resistors, in the VSON (DRC) package.

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Trademarks
All trademarks are the property of their respective owners.

1 Introduction

About This Manual

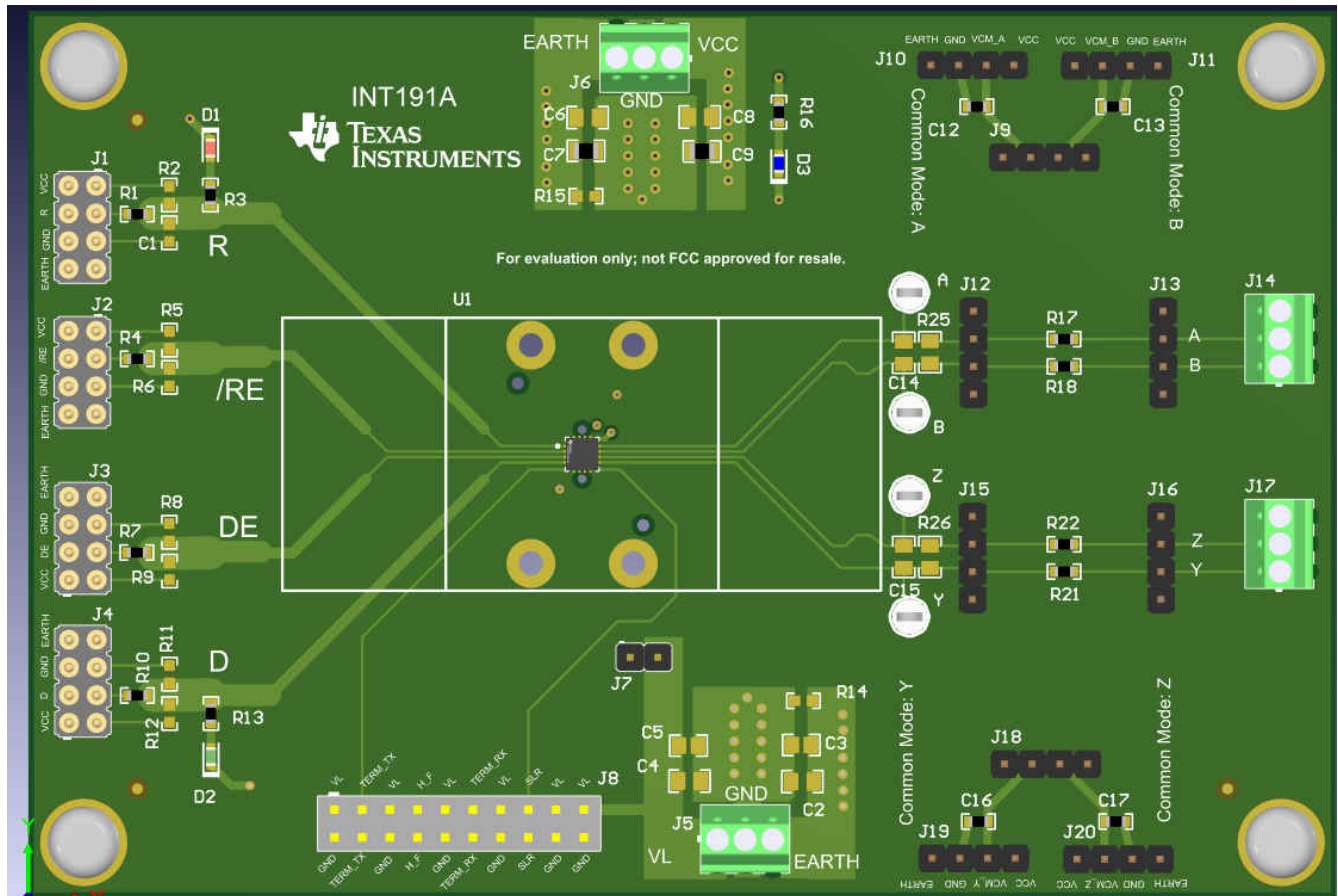This User's guide describes the THVD1424EVM and its intended use.
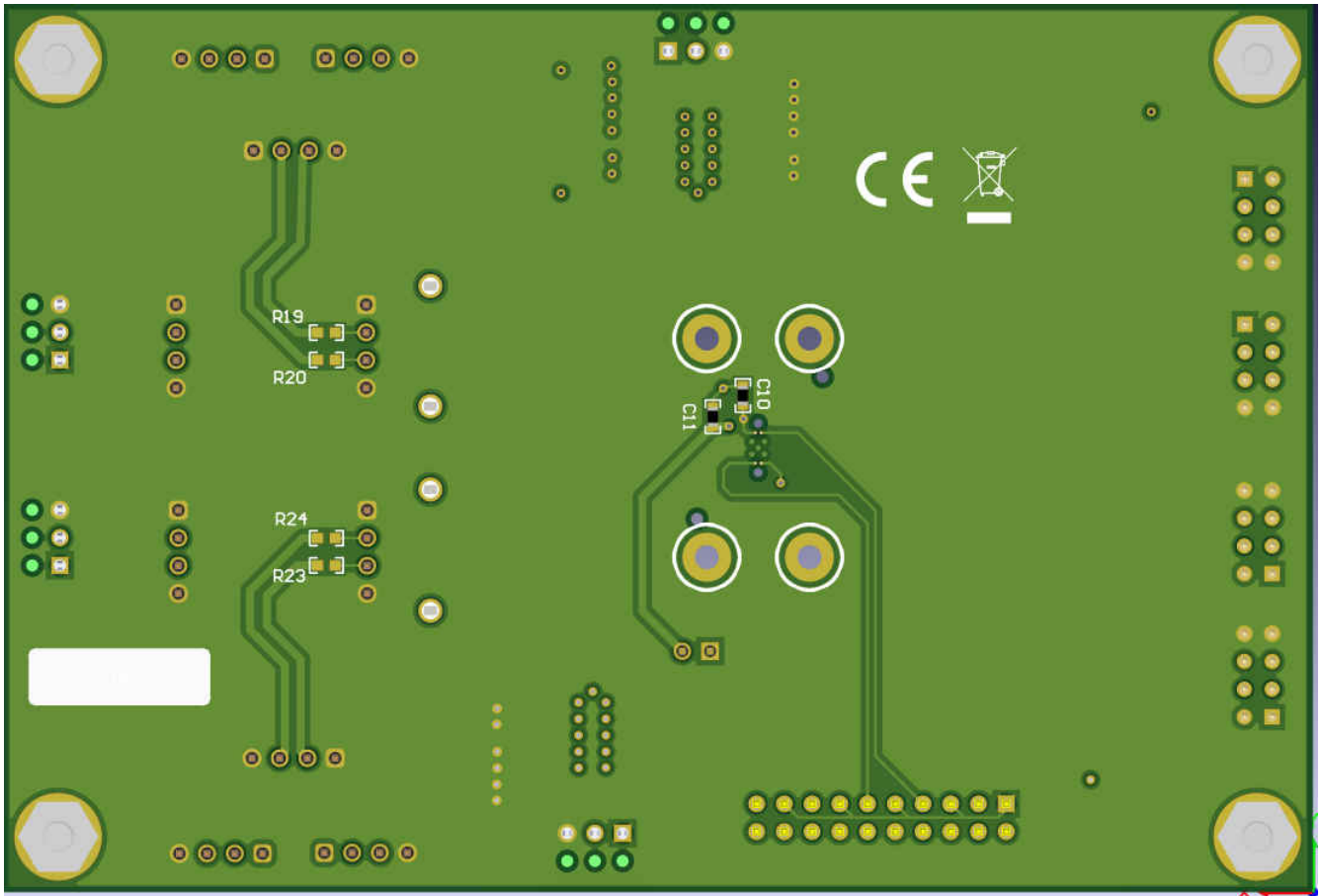

Figure 1-1. Top Side View of THVD1424EVM

Figure 1-2. Bottom Side View of THVD1424EVM

2 Information on Cautions and Warnings

The information in the warning statement is provided for personal protection and the information in the caution statement is provided to protect the equipment from damage. Read each caution and warning statement carefully.

This EVM contains components that can potentially be damaged by electrostatic discharge. Always transport and store the EVM in its supplied ESD bag when not in use. Handle using an antistatic wristband. Operate on an antistatic work surface. For more information on proper handling, see Electrostatic Discharge (ESD).

3 Board Description

Features
- Ready to Use out of Box with THVD1424DRC Pre-Installed
- Separate Logic Voltage Supply Connection (J5) with Option to Short to VCC (J6) Through Jumper J7
- Two 10uF Decoupling Caps Pre-Installed on VCC to GND and GND to EARTH Connections
- Six 0603 Capacitor Pads for additional decoupling on VCC or VL Supplies.
- Two Resistor Pads to create resistive link between GND and EARTH
- One 10x2 Header Connection for Feature Control Signals
- External Termination Resistor and Capacitor Pads on TX and RX bus.
- Common mode Voltage connections on TX and RX Bus.

3.1 Board Component Overview

The THVD1424EVM is ready to operate directly out of Box with a THVD1424EVM installed at U1. All the Signal and Power Jumpers/Inputs (J1 – J20) come pre-installed on board. See Table 3-1 for description for every pad on the board and if it comes pre-installed by default.

Table 3-1. Component Overview

Jumper ID	Function	Package	Comment	Installed?
J1	"R" Pin output	4x2 Header	N/A	Y
J2	"/RE" Pin Input	4x2 Header	N/A	Y
J3	"DE" Pin Input	4x2 Header	N/A	Y
J4	"D" Pin Input	4x2 Header	N/A	Y
J5	VL Terminal	Terminal Block	N/A	Y
J6	VCC Terminal	Terminal Block	N/A	Y
J7	VL to VCC Jumper	2x1 Header	N/A	Y
J8	Control Signal Jumper	10x2 Header	N/A	Y
J9	RX Common Mode Input	4x1 Header	N/A	Y
J10	"A" Line Common Mode Input	4x1 Header	N/A	Y
J11	"B" Line Common Mode Input	4x1 Header	N/A	Y
J12	RX Header #1	4x1 Header	Between Series Resistor and IC	Y
J13	RX Header #2	4x1 Header	Between Series Resistor and Terminal	Y
J14	RX Terminal	Terminal Block	N/A	Y
J15	TX Header #1	4x1 Header	Between Series Resistor and IC	Y
J16	TX Header #2	4x1 Header	Between Series Resistor and Terminal	Y
J17	TX Terminal	Terminal Block	N/A	Y
J18	TX Common Mode Input	4x1 Header	N/A	Y
J19	"Y" Line Common Mode Input	4x1 Header	N/A	Y
J20	"Z" Line Common Mode Input	4x1 Header	N/A	Y
Resistor ID	Function	Package	Comment	Installed?
R1	0 Ohm Series Resistor	0603	N/A	Y
R2	Pull-Up Resistor	0603	N/A	N
R3	LED Current Limiting Resistor	0603	N/A	Y
R4	0 Ohm Series Resistor	0603	N/A	Y

Table 3-1. Component Overview (continued)

Jumper ID	Function	Package	Comment	Installed?
R5	Pull-Up Resistor	0603	N/A	N
R6	Pull-Down Resistor	0603	N/A	N
R7	0 Ohm Series Resistor	0603	N/A	Y
R8	Pull-Up Resistor	0603	N/A	N
R9	Pull-Down Resistor	0603	N/A	N
R10	0 Ohm Series Resistor	0603	N/A	Y
R11	Pull-Up Resistor	0603	N/A	N
R12	Pull-Down Resistor	0603	N/A	N
R13	LED Current Limiting Resistor	0603	N/A	Y
R14	GND to EARTH Resistor	0603	N/A	N
R15	GND to EARTH Resistor	0603	N/A	N
R16	LED Current Limiting Resistor	0603	N/A	Y
R17	0 Ohm Series Resistor	0603	N/A	Y
R18	0 Ohm Series Resistor	0603	N/A	Y
R19	"A" Common Mode Resistor	0603	Must be >= 375 Ohms if Installed	N
R20	"B" Common Mode Resistor	0603	Must be >= 375 Ohms if Installed	N
R21	0 Ohm Series Resistor	0603	N/A	Y
R22	0 Ohm Series Resistor	0603	N/A	Y
R23	"Y" Common Mode Resistor	0603	Must be >= 375 Ohms if Installed	N
R24	"Z" Common Mode Resistor	0603	Must be >= 375 Ohms if Installed	N
R25	External RX Termination	0805	Used for Short Bus Power Consumption Test	N
R26	External TX Termination	0805	Used for Short Bus Power Consumption Test	N
Capacitor ID	Function	Package	Comment	Installed?
C1	Capacitive Loading for "R" pin	0603	N/A	N
C2	VL Supply Decoupling Cap	0805	N/A	N
C3	VL Supply Decoupling Cap	0805	N/A	N
C4	VL Supply Decoupling Cap	0805	N/A	N
C5	VL Supply Decoupling Cap	0805	N/A	N
C6	VCC Supply Decoupling Cap	0805	N/A	N
C7	VCC Supply Decoupling Cap	0805	N/A	Y
C8	VCC Supply Decoupling Cap	0805	N/A	N
C9	VCC Supply Decoupling Cap	0805	N/A	Y
C10	VCC Supply Decoupling Cap	0603	HF Decoupling – Close to IC Package	Y

Table 3-1. Component Overview (continued)

Jumper ID	Function	Package	Comment	Installed?
C11	VL Supply Decoupling Cap	0603	HF Decoupling – Close to IC Package	Y
C12	Common Mode Decoupling Cap "A" Line	0805	N/A	N
C13	Common Mode Decoupling Cap "B" Line	0805	N/A	N
C14	Termination Capacitor RX	0805	N/A	N
C15	Termination Capacitor TX	0805	N/A	N
C16	Common Mode Decoupling Cap "Y" Line	0805	N/A	N
C17	Common Mode Decoupling Cap "Z" Line	0805	N/A	N
LED ID	Function	Package	Comment	Installed?
D1	"R" Line LED – Red	Non-Standard	N/A	Y
D2	"D" Line LED – Green	Non-Standard	N/A	Y
D3	"VCC" LED – Blue	Non-Standard	N/A	Y
IC ID	Function	Package	Comment	Installed?
U1	RS-485 Transceiver	VSON (DRC)	THVD1424	Y

The default setup is optimized to work with the THVD1424. Operating in a single supply mode without a common mode voltage. By shorting header J7 (VL = VCC), with control signals being applied externally at J2-J4 and J8 or by using the headers J2-J4 and J8 to shunt to associated pin to GND or VCC/VL. The board is ready to operate in its default state. See Single Supply Operation and Dual Supply Operation for information on power supplies and operational modes of the board respectively.

3.1.1 Powering the Boarde

3.1.1.1 Single Supply Operation

The THVD1424 has both a VCC pin (used for the RS-485 bus pins) and VL pin (Used for console facing pins). In single supply operation mode for the THVD1424 the VL pin should be shorted to VCC by shorting the J7 header pins, so that the digital logic circuits connected to the Logic supply are properly powered.

Table 3-2. Single Supply Operation Configuration Table

Component ID	Comment
J5	Leave V_L terminal Open
J6	Attach V_{CC} (3 V to 5.5 V) to Terminal
J7	Short Jumper to make sure V_L = V_{CC}
C2, C3, C4, and C5	Leave Uninstalled
C6 and C8	If More Decoupling Capacitance is Desired Attach Capacitors to C6 and C8
R15	Install Resistor if Low impedance pathway between GND and EARTH is desired

To apply power onto the board, VCC is applied through the J6 terminal. With the board oriented with J6 on the top of the board, as shown in figure 1.1, the signals are, from right to left, EARTH, GND, and V_{CC}. The EARTH and GND distinction are used to help the end user determine operational qualities w.r.t. ground potential differences. If testing methods on reducing ground loop current install a resistor on pad R15. Check data sheet for proper powering considerations as this will either recommend 3.3V, 5V or 3.3V to 5V.

3.1.1.2 Dual Supply Operation (Separate Digital Logic and Driver supplies)

In Dual Supply operation the digital circuit supply, the supply which supplies the R, D, /RE, DE, H/F, SLR, TERM_RX, and TERM_TX, can be held at a lower level than the VCC voltage of 3 V to 5.5 V as it can go down to 1.65V. Allowing a 3.3V - 5V RS-485 bus to interface with devices operating at 1.8 V or 2.5 V logic. See Table 3-3 for information on power supply components in dual operation mode.

The VL supply is located at J6 on the bottom of the board and VCC is J5 located at the top of the board.

Table 3-3. Dual Supply Operation Configuration Table

Component ID	Comment
J5	Connect to VL source (1.65V to 5.5V) for Logic Supply
J6	Connect to VCC Source (3V to 5.5V)
J7	Leave Open
C2, C3, C4, and/or C5	Have Minimum of 1uF of Decoupling Capacitance on VL
C6 and/or C8	If More Decoupling Capacitance is Desired Attach Capacitors to C6 and C8
R14 and/or R15	Install Resistor if Low impedance pathway between GND and EARTH is desired

3.1.1.3 Default Operation Mode

With an understanding of how the board is setup and how to power the board for both supply situations the next topic is how to operate the board. Out of the box the board, when powered, can operate the THVD1424 as a full or half duplex RS-485 transceiver. The devices pins can be broken down into 4 distinct groups: single ended communication pins, differential communication pins, power pins, and control pins. Power pins are discussed above in the previous section, section 3.3, details below for the other 3 categories.

The single ended communication pins are to be connected directly, through their respective jumpers, to a single ended bus – these pins are the "R" and "D" pins and represent RX and TX single ended data respectively. R is connected to J1 and D is connected to J4 – these are the console side signal connection points for the EVM.

The THVD1424 has six control pins that vary in function. Two signals are enable signals for the driver (DE – active high) and receiver (/RE – active low) that are accessed through J3 and J2 respectively. The other four control signals are TERM_TX, H/F, TERM_RX, and the SLR pins which can be accessed through J8 and have internal pull-downs leaving a default state as logic low on these four pins. A jumper configuration for J1 – J4 and J8 are shown in Figure 3-1 with board orientation having jumper J1 at the top left corner of the board. A function table for the control signals are shown in Table 3-4
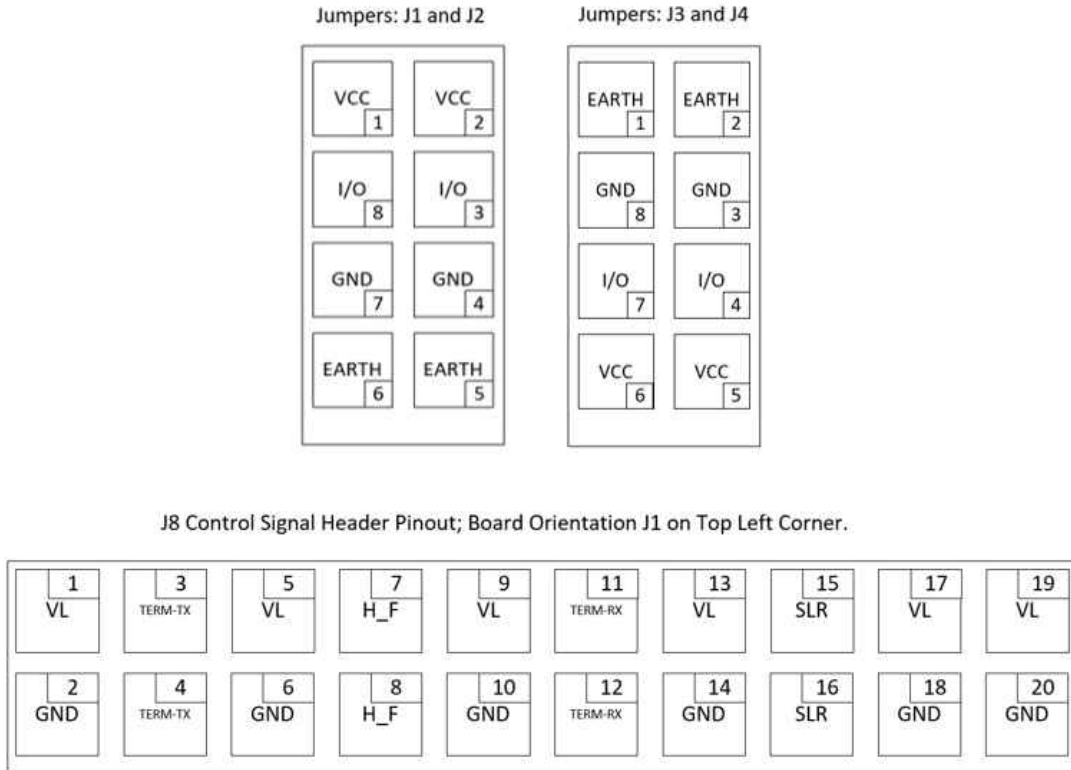
Figure 3-1. Control Signal Jumper Configuration

Table 3-4. THVD1424EVM Control Signal Function Table

Pin	Associated Jumper - Pin	Input Level	Function
$\overline{RE}$	J2-3 and J2-8	Hi	Receiver Disabled
$\overline{RE}$	J2-3 and J2-8	Low	Receiver Enabled
DE	J3-4 and J3-7	Hi	Driver Enabled
DE	J3-4 and J3-7	Low	Driver Disabled
TERM-TX	J8-3 and J8-4	Hi	Y-Z Termination Enabled
TERM-TX	J8-3 and J8-4	Low	Y-Z Termination Disabled
H/F	J8-7 and J8-8	Hi	Half Duplex Mode
H/F	J8-7 and J8-8	Low	Full Duplex Mode
TERM-RX	J8-11 and J8-12	Hi	A-B Termination Enabled
TERM-RX	J8-11 and J8-12	Low	A-B Termination Disabled
SLR	J8-15 and J8-16	Hi	500Kbps Mode
SLR	J8-15 and J8-16	Low	20Mbps Mode

Finally, the last group of signals are the differential bus pins A, B, Y, and Z. A and B are connected at terminal J14 with Y and Z at terminal J17. In Half Duplex Mode Y and Z are both the TX and RX connections, in full duplex mode A and B are receiver pins and Y and Z are transmission pins.

3.1.1.4 Single Ended Bus Modification Operational Modes

There are a few options with respect to the single ended data and control signals for modification on this EVM. Jumpers J1 through J4 all contain pads that are blank by default. For D, DE, and /RE signals there are 0603 sized pads for either pull-up or pull-down resistors to have a default logic on these pins with the added benefit of still being able to external signals to this pin. The R pin also contains a pull-up resistor 0603 sized, as is common in UART based applications, as well as a 0603 sized pad to ground for a capacitive load in case testing requires capacitive loading on the R pin. A summary of possible single ended signal pathway modifications on the EVM are in Table 3-5.

Table 3-5. Single Ended Pins Modification Table

Associated Jumper / Signal	Pad ID	Comment
J1 / R	R2	Pull Up Resistor Pad
J1 / R	C1	Capacitive Load Pad
J2 / /RE	R5	Pull Up Resistor Pad
J2 / /RE	R6	Pull Down Resistor Pad
J3 / DE	R8	Pull Up Resistor Pad
J3 / DE	R9	Pull Down Resistor Pad
J4 / D	R11	Pull Up Resistor Pad
J4 / D	R12	Pull Down Resistor Pad

4 Design Documents
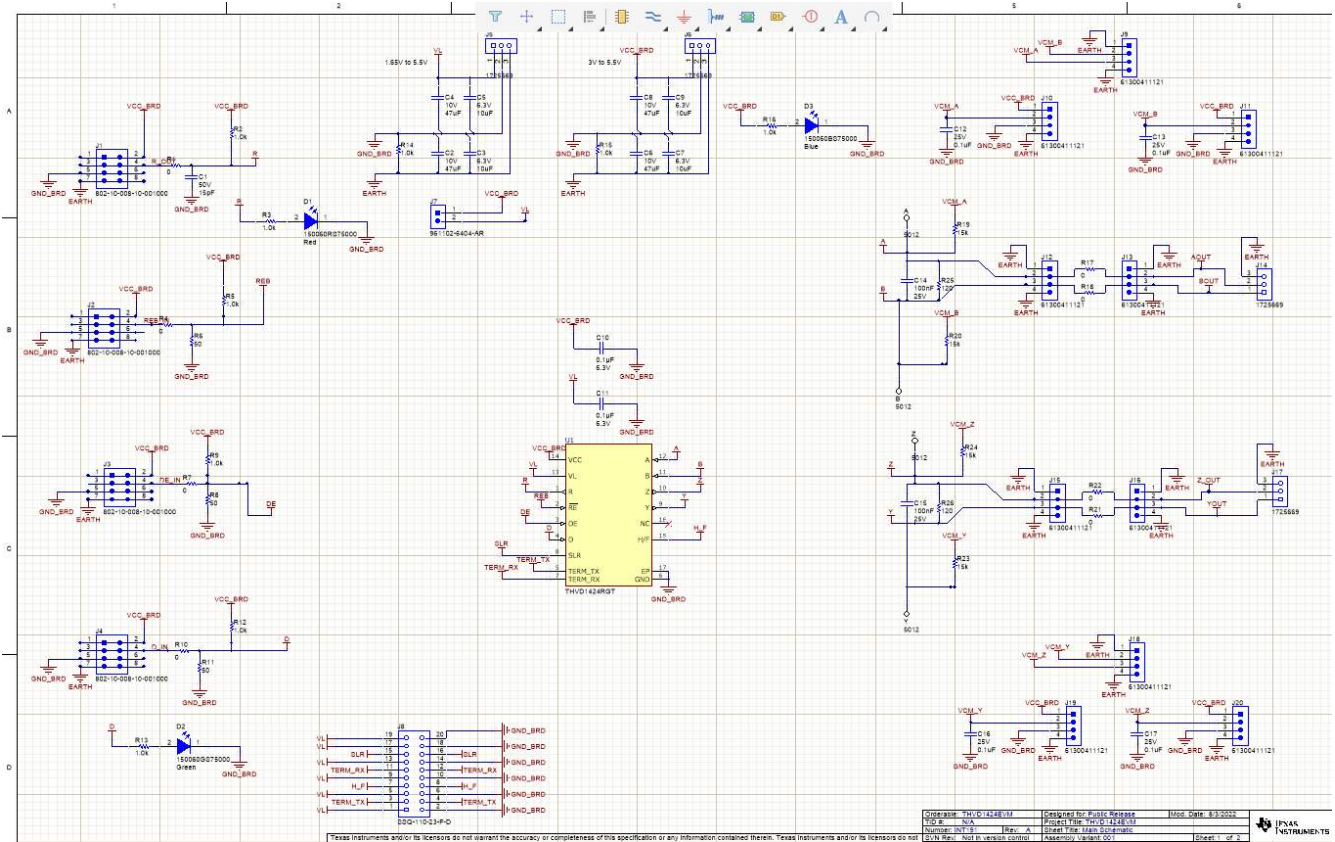
4.1 Schematics

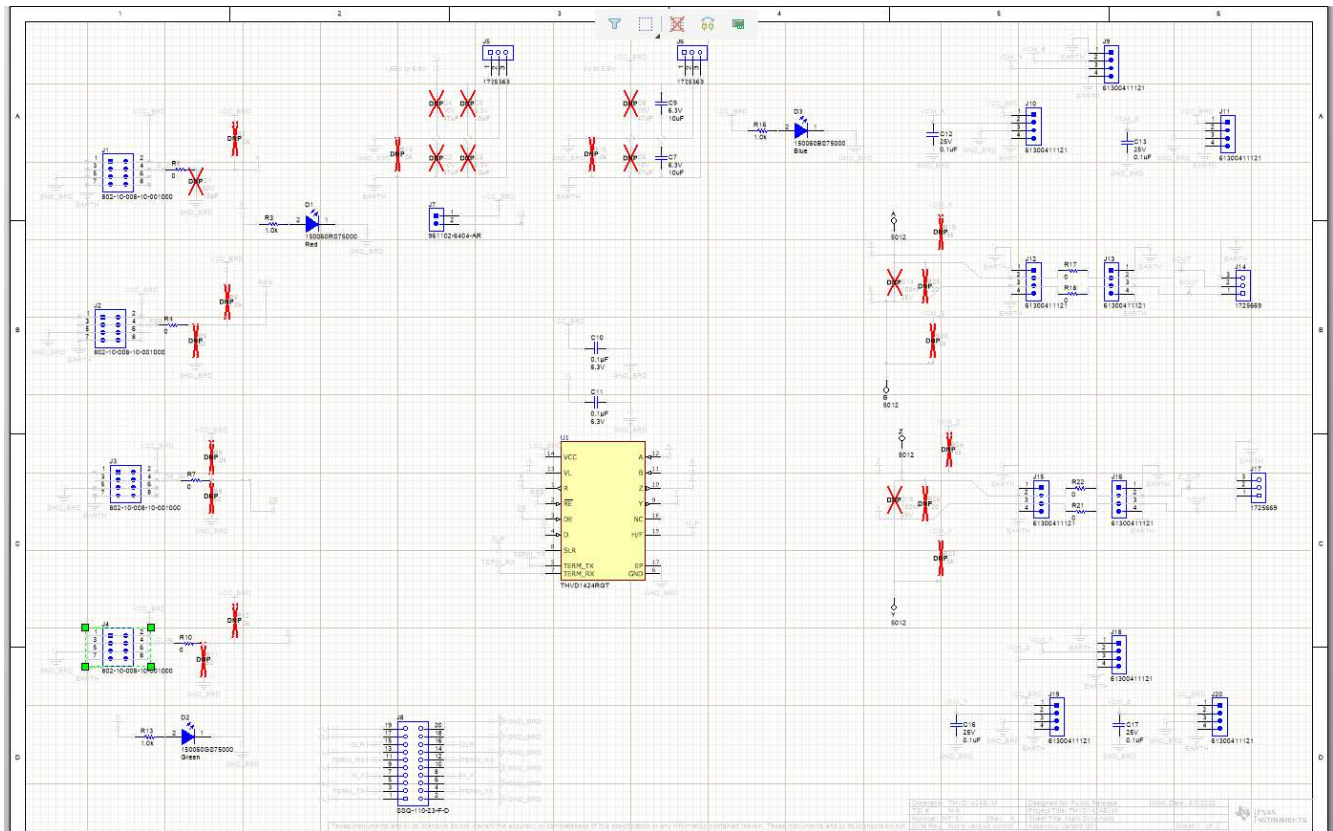**Figure 4-1. Generic THVD1424EVM Schematic**

Figure 4-2. THVD1424EVM Schematic Out of Box Set-Up
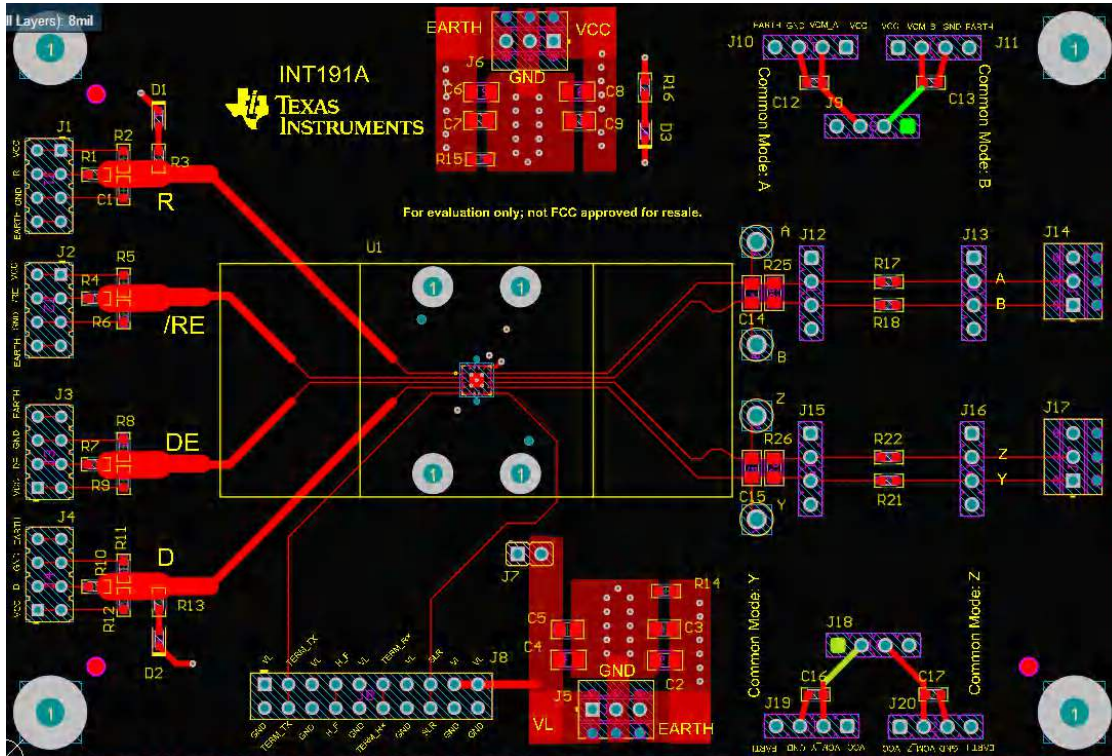
4.2 Board Layout

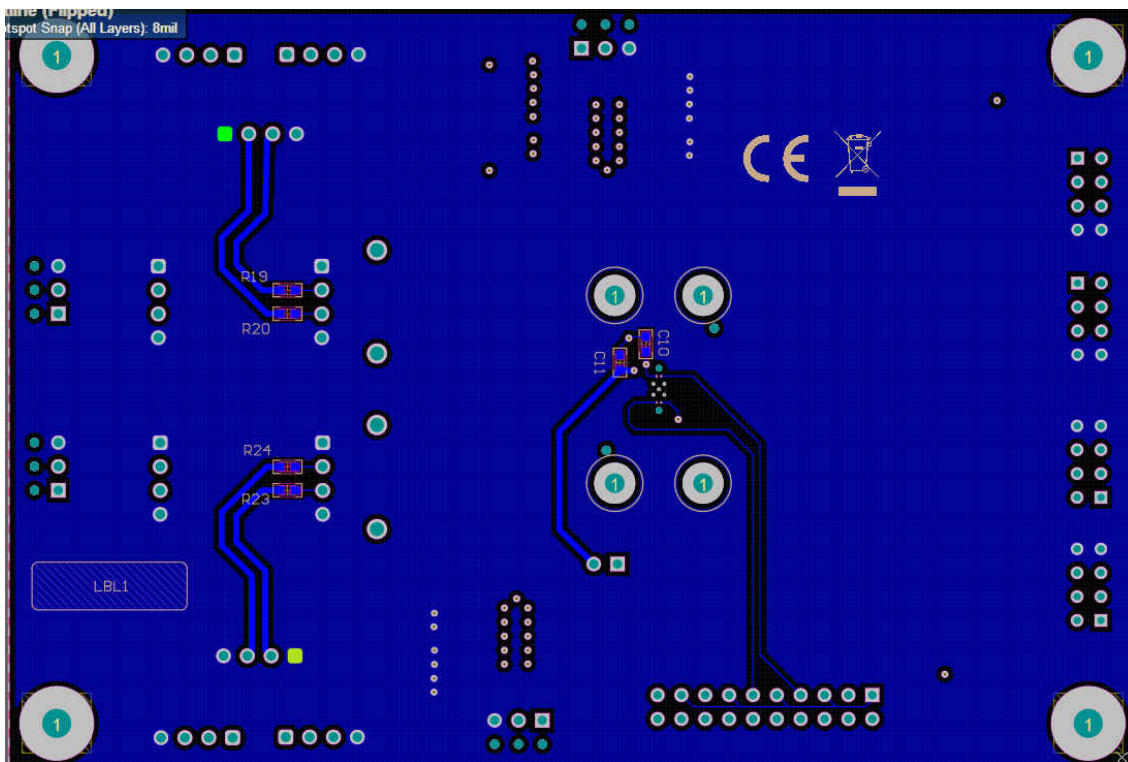

Figure 4-3. THVD1424EVM Top Layer Layout

Figure 4-4. THVD1424EVM Bottom Layer Layout

4.3 Bill Of Materials

Table 4-1. THVD1424EVM BOM

Manufacturer	PartNumber	Designator	Quantity
Keystone	5012	A, B, Y, Z	4
Samsung	CL21A106KQFNNNG	C7, C9	2
Kemet	C0603C104K9PAC7867	C10, C11	2
TDK	C1608X7R1E104K080AA	C12, C13, C16, C17	4
Wurth Elektronik	150060RS75000	D1	1
Wurth Elektronik	150060GS75000	D2	1
Wurth Elektronik	150060BS75000	D3	1
B&F Fastener Supply	NY PMS 440 0025 PH	H1, H2, H3, H4	4
Keystone	1902C	H5, H6, H7, H8	4
Mill-Max	802-10-008-10-001000	J1, J2, J3, J4	4
Phoenix Contact	1725669	J5, J6, J14, J17	4
3M	961102-6404-AR	J7	1
Samtec	SSQ-110-23-F-D	J8	1
Wurth Elektronik	61300411121	J9, J10, J11, J12, J13, J15, J16, J18, J19, J20	10
Brady	THT-14-423-10	LBL1	1
Vishay-Dale	RCS06030000Z0EA	R1, R4, R7, R10, R17, R18, R21, R22	8
Vishay-Dale	CRCW06031K00JNEA	R3, R13, R16	3
Texas Instruments	THVD1424RGT	U1	1

5 Revision History

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

DATE	REVISION	NOTES
September 2022	*	Initial Release

STANDARD TERMS FOR EVALUATION MODULES

1. *Delivery:* TI delivers TI evaluation boards, kits, or modules, including any accompanying demonstration software, components, and/or documentation which may be provided together or separately (collectively, an "EVM" or "EVMs") to the User ("User") in accordance with the terms set forth herein. User's acceptance of the EVM is expressly subject to the following terms.

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    1.2 EVMs are not intended for consumer or household use. EVMs may not be sold, sublicensed, leased, rented, loaned, assigned, or otherwise distributed for commercial purposes by Users, in whole or in part, or used in any finished product or production system.

2 *Limited Warranty and Related Remedies/Disclaimers*:

    2.1 These terms do not apply to Software. The warranty, if any, for Software is covered in the applicable Software License Agreement.

    2.2 TI warrants that the TI EVM will conform to TI's published specifications for ninety (90) days after the date TI delivers such EVM to User. Notwithstanding the foregoing, TI shall not be liable for a nonconforming EVM if (a) the nonconformity was caused by neglect, misuse or mistreatment by an entity other than TI, including improper installation or testing, or for any EVMs that have been altered or modified in any way by an entity other than TI, (b) the nonconformity resulted from User's design, specifications or instructions for such EVMs or improper system design, or (c) User has not paid on time. Testing and other quality control techniques are used to the extent TI deems necessary. TI does not test all parameters of each EVM. User's claims against TI under this Section 2 are void if User fails to notify TI of any apparent defects in the EVMs within ten (10) business days after delivery, or of any hidden defects with ten (10) business days after the defect has been detected.

    2.3 TI's sole liability shall be at its option to repair or replace EVMs that fail to conform to the warranty set forth above, or credit User's account for such EVM. TI's liability under this warranty shall be limited to EVMs that are returned during the warranty period to the address designated by TI and that are determined by TI not to conform to such warranty. If TI elects to repair or replace such EVM, TI shall have a reasonable time to repair such EVM or provide replacements. Repaired EVMs shall be warranted for the remainder of the original warranty period. Replaced EVMs shall be warranted for a new full ninety (90) day warranty period.

> ## WARNING
>
> **Evaluation Kits 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 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*

3.3.1 *Notice for EVMs delivered in Japan:* Please see http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_01.page 日本国内に輸入される評価用キット、ボードについては、次のところをご覧ください。
http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_01.page

3.3.2 *Notice for Users of EVMs Considered "Radio Frequency Products" in Japan:* EVMs entering Japan may not be certified by TI as conforming to Technical Regulations of Radio Law of Japan.

If User uses EVMs in Japan, not certified to Technical Regulations of Radio Law of Japan, User is required to follow the instructions set forth by Radio Law of Japan, which includes, but is not limited to, the instructions below with respect to EVMs (which for the avoidance of doubt are stated strictly for convenience and should be verified by User):

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.

【無線電波を送信する製品の開発キットをお使いになる際の注意事項】 開発キットの中には技術基準適合証明を受けて

いないものがあります。 技術適合証明を受けていないもののご使用に際しては、電波法遵守のため、以下のいずれかの

措置を取っていただく必要がありますのでご注意ください。

1. 電波法施行規則第6条第1項第1号に基づく平成18年3月28日総務省告示第173号で定められた電波暗室等の試験設備でご使用いただく。
2. 実験局の免許を取得後ご使用いただく。
3. 技術基準適合証明を取得後ご使用いただく。

なお、本製品は、上記の「ご使用にあたっての注意」を譲渡先、移転先に通知しない限り、譲渡、移転できないものとします。

上記を遵守頂けない場合は、電波法の罰則が適用される可能性があることをご留意ください。 日本テキサス・イ

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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。http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_02.page

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.

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