

## TMUX73XXF Evaluation Module

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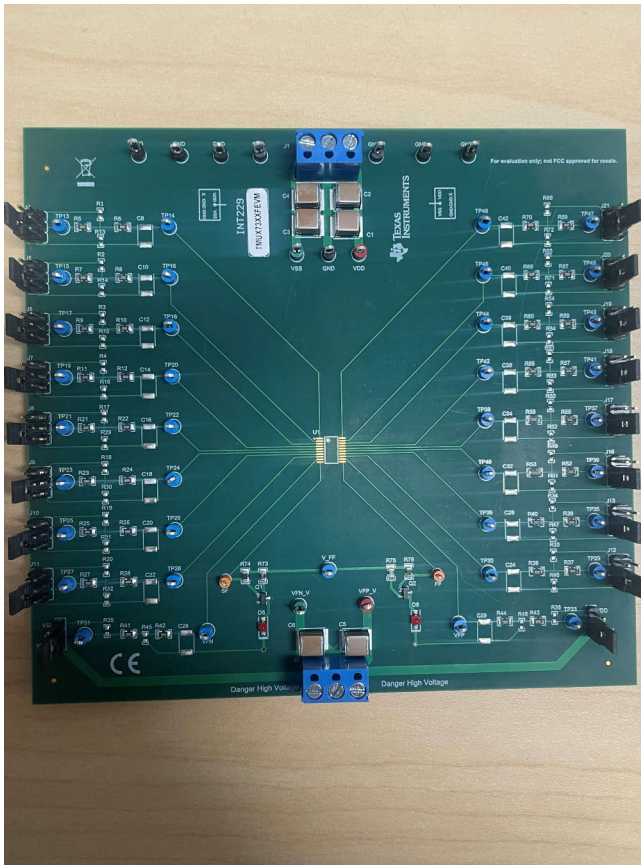


### Description

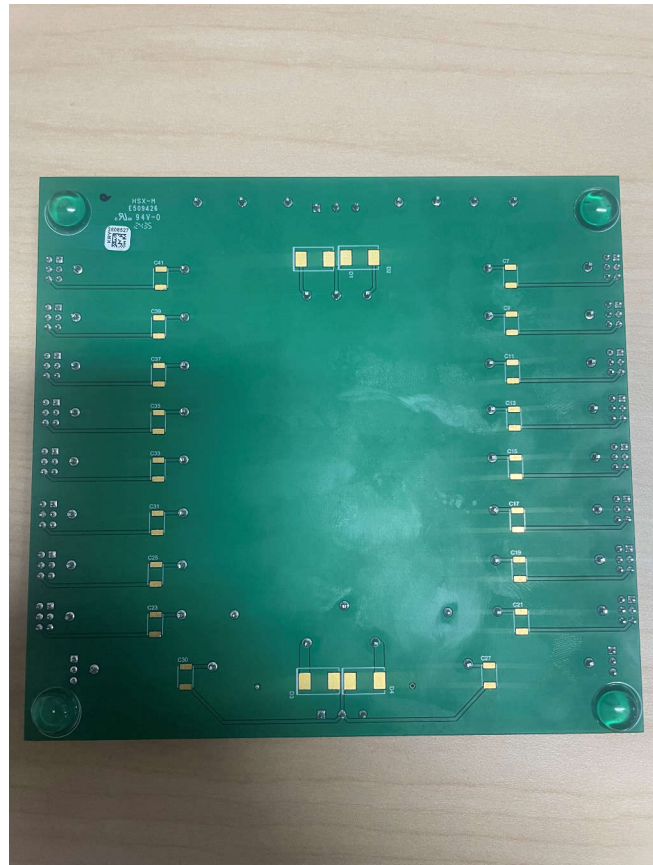
This user guide outlines the TMUX73XXF evaluation module (EVM) and its intended applications. This board facilitates rapid prototyping and DC characterization of Texas Instruments' TMUX73XXF series of components in the TSSOP (PW) package. Additionally, it features onboard test points that provide the flexibility to test various signals.

### Features

- 2 power supply decoupling capacitors from VDD to GND ( $2 \times 3.3 \mu\text{F}$ ;  $2 \times 1 \mu\text{F}$ )
- 2 power supply decoupling capacitors from VSS to GND ( $2 \times 3.3 \mu\text{F}$ ;  $2 \times 1 \mu\text{F}$ )
- Protection diode pads are available near VDD and VSS input.
- $3.3\mu\text{F}$  supply decoupling capacitor to Ground on both VFP\_V and VFN\_V supplies
- Terminal block power supply connection
- DUT footprint compatible with 16-pin PW (TSSOP), and 20-pin PW (TSSOP) packages
- 16 length-matched signal inputs
- Terminal block OVP Triggering Threshold supply connection
- General and Specific Fault Indicator Flag LED circuits included on EVM
- Selectable connections to VDD, VSS, or GND for each signal input using a 2.54 mm shunt
- Footprints for pull-up and pull-down resistors for each signal input (on each of 16 signals and 2 OVP Trigger Thresholds)
- Footprints for series resistors for each signal input (on each of 16 signals and 2 OVP Trigger Thresholds)
- Footprints for decoupling capacitors for each input (footprint on each of 16 signals and 2 OVP Trigger Thresholds)
- 2 test points for each signal and OVP Trigger Thresholds
- Multiple GND test point connections around the board



**TMUX73XXF-EVM (Front Side)**



**TMUX73XXF-EVM (Back Side)**

# 1 Evaluation Module Overview

## 1.1 Introduction

This user guide describes the TMUX73XXF-EVM evaluation module (EVM) and its intended use. This board allows for the quick prototyping and characterization of TI's TMUX73XXF multiplexers.

## 1.2 Kit Contents

The EVM kit includes the following:

1. TMUX73XXF-EVM board

## 1.3 Specification

The TMUX73XXF-EVM features two test points for each I/O and OVP Trigger Threshold, resulting in thirty-four test points available for testing the TMUX73XXF line of devices. Seven extra ground test points are included to facilitate easier board testing.

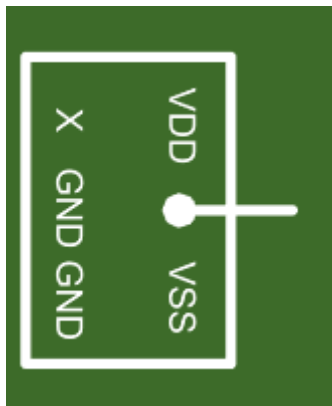
## 2 Hardware

### 2.1 Power Requirements

The TMUX73XXF-EVM requires a power supply connected either through the J1 terminal or directly to the red VDD test point. This setup establishes a passive signal pathway between the Sx and Dx pins based on the selected logic. When testing TMUX734XF devices, the Fault Indicator Flag LED circuits can be activated by applying a voltage to the V\_FF pin. Additionally, the Over Voltage Protection (OVP) Trigger Thresholds can be powered using either the J2 terminal or the VFP\_V and VFN\_V pins.

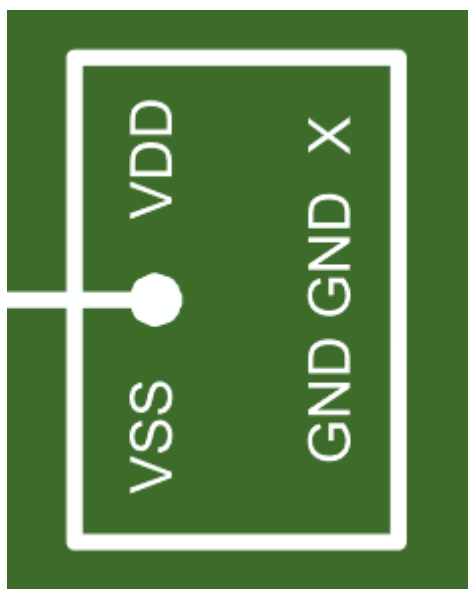
### 2.2 Setup

1. All 16 generic signal pathway headers contain six pins. [Figure 2-1](#) and [Figure 2-2](#) show the generalized pinout of the headers for the left and right sides of the board respectively. Note that the orientation is based on J1 being on the top of the board.



2.

**Figure 2-1. Left Side Jumper (J4-J11) Configuration or Pinout**



**Figure 2-2. Right Side Jumper (J12,13,J16-J21) Configuration or Pinout**

## 2.3 Jumper Information

For the left side header, pin 1 is at the top left corner pin (denoted as an X). The right side header has pin 1 (denoted as an X), which is at the top right corner. [Table 2-1](#) shows the jumper configurations. Note: U1 refers to the signal pathway that connects to the U1 TMUX73XXF footprint.

**Table 2-1. Jumper Pinout Map**

Jumper ID	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6
J4	Floating	VDD	GND	U1 Pin 1	GND	VSS
J5	Floating	VDD	GND	U1 Pin 2	GND	VSS
J6	Floating	VDD	GND	U1 Pin 3	GND	VSS
J7	Floating	VDD	GND	U1 Pin 4	GND	VSS
J8	Floating	VDD	GND	U1 Pin 5	GND	VSS
J9	Floating	VDD	GND	U1 Pin 6	GND	VSS
J10	Floating	VDD	GND	U1 Pin 7	GND	VSS
J11	Floating	VDD	GND	U1 Pin 8	GND	VSS
J12	Floating	VDD	GND	U1 Pin 13	GND	VSS
J13	Floating	VDD	GND	U1 Pin 14	GND	VSS
J14	VSS	U1 Pin 9	VFN_V	N/A	N/A	N/A
J15	VDD	U1 Pin 12	VFP_V	N/A	N/A	N/A
J16	Floating	VDD	GND	U1 Pin 15	GND	VSS
J17	Floating	VDD	GND	U1 Pin 16	GND	VSS
J18	Floating	VDD	GND	U1 Pin 17	GND	VSS
J19	Floating	VDD	GND	U1 Pin 18	GND	VSS
J20	Floating	VDD	GND	U1 Pin 19	GND	VSS
J21	Floating	VDD	GND	U1 Pin 20	GND	VSS

Check the device-specific data sheet for the pin-out. For power (VDD or VSS) and ground (GND), lines connect shunts on the appropriate jumpers to short the U1 pin to the respective VDD, VSS, or GND line. For testing where control pins do not change state (such as the select or enable pin always being at a logic '1' for the duration of testing), shunts can be connected on the appropriate jumpers to short the U1 control pins to VDD or GND. For the remaining I/O pins (VDD, VSS, and GND), signals can be applied using shunts in the same manner as before or the shunt can be removed and an external signal can be applied to the U1 pin of the jumper or the respective test point.

In cases where the tests require pull-up or pull-down resistors versus directly attaching the source to the respective U1 pin, all 16 generic pathways contain 0603 resistor pads to add these components. [Table 2-2](#) shows the IDs.

During the evaluation of TMUX734X devices, it is recommended to use the shunts on J14 and J15 to connect the multiplexer's VFP and VFN pins to the desired VFP/VFN threshold voltage. The VFP\_V and VFN\_V threshold supplies can be either powered through the J2 terminal block or connected directly to the VFP\_V and VFN\_V test points. Additionally, the fault flag voltage (VFF\_V) can be connected and powered through the V\_FF blue test point.

**Table 2-2. Pull-Up or Pull-Down Resistor Configuration Map**

0603 Sized Resistor Pad ID	Jumper ID	Function
R1	J4	Pull up
R13	J4	Pull down
R2	J5	Pull up
R14	J5	Pull down
R3	J6	Pull up
R15	J6	Pull down
R4	J7	Pull up
R16	J7	Pull down
R17	J8	Pull up
R29	J8	Pull down
R18	J9	Pull up
R30	J9	Pull down
R19	J10	Pull up
R31	J10	Pull down
R20	J11	Pull up
R32	J11	Pull down
R33	J12	Pull up
R46	J12	Pull down
R34	J13	Pull up
R47	J13	Pull down
R35	J14	Pull Up
R45	J14	Pull down
R36	J15	Pull Up
R48	J15	Pull down
R49	J16	Pull Up
R61	J16	Pull down
R50	J17	Pull Up
R62	J17	Pull down
R51	J18	Pull Up
R63	J18	Pull down
R54	J19	Pull Up
R64	J19	Pull down
R65	J20	Pull Up
R71	J20	Pull down
R66	J21	Pull Up
R72	J21	Pull down

Now loads can be attached to the board. If a pull-down pad was unused, then this pad can now be used as a pad for a resistive load. There are also pads for capacitive loads for each of the 16 generic signal paths and 2 OVP Trigger Thresholds that can also be utilized. [Table 2-3](#) shows the corresponding pad and jumper IDs.

**Note**

The 1812-sized capacitor pads are on the bottom side of the EVM.

**Table 2-3. RC Load Configuration Map**

Jumper ID	0603 Sized Resistor Pad ID	1206 Sized Capacitor Pad ID	1812 Sized Capacitor Pad ID
J4	R13	C8	C7
J5	R14	C10	C9
J6	R15	C12	C11
J7	R16	C14	C13
J8	R29	C16	C15
J9	R30	C18	C17
J10	R31	C20	C19
J11	R32	C22	C21
J12	R46	C24	C23
J13	R47	C26	C25
J14	R45	C28	C27
J15	R48	C29	C30
J16	R61	C32	C31
J17	R62	C34	C33
J18	R63	C36	C35
J19	R64	C38	C37
J20	R71	C40	C39
J21	R72	C42	C41

Now that the loading is complete for the board, additional supply decoupling capacitance to ground can be added for the VDD or VSS lines. [Table 2-4](#) shows the power supply decoupling capacitance for each VDD or VSS line. If the default capacitance is enough, then move on to step 8.

**Table 2-4. Capacitors**

Capacitor Pad ID	Pad Size (LxW)	Associated Power Signal
C1	6mm × 5mm	VDD
C2	6mm × 5mm	VDD
C3	6mm × 5mm	VSS
C4	6mm × 5mm	VSS

Finally, attach the supply signals (VDD, GND, or VSS) to the appropriate pins of the terminal block labeled J1. Power is now ready to be applied to the board. For test points, please see the next section.

## 2.4 Test Points

There are multiple test points (48) on the board that can be used to either measure the associated trace or apply external signals for testing purposes. [Table 2-5](#) shows the test points for the sixteen generic U1 connections and 2 OVP Trigger Thresholds. There are two test points per pin of the IC, which are colored blue.

**Table 2-5. Test Points for Jumpers Map**

Jumper ID	Test Point ID	Test Point ID	U1 Pin
J4	TP13	TP14	1
J5	TP15	TP16	2
J6	TP17	TP18	3
J7	TP19	TP20	4
J8	TP21	TP22	5
J9	TP23	TP24	6
J10	TP25	TP26	7
J11	TP27	TP28	8
J12	TP29	TP30	13
J13	TP35	TP36	14
J14	TP31	VFN	9
J15	TP33	VFP	12
J16	TP39	TP40	15
J17	TP37	TP38	16
J18	TP41	TP42	17
J19	TP43	TP44	18
J20	TP45	TP46	19
J21	TP47	TP48	20

Test points also connect to VSS, VDD, and GND planes. In addition, there are test points for the fault flag indicator led circuits and OVP Trigger Thresholds.

[Table 2-6](#) shows these test points.

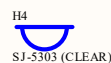
**Table 2-6. Test Points**

Test Point ID	Color	Signal
VDD	Red	VDD
GND	Black	GND
VSS	Green	VSS
VFP_V	Red	VFP Threshold Supply
VFN_V	Green	VFN Threshold Supply
V_FF	Blue	Fault Flag Indicator Led Circuits Supply
SF	Orange	Specific Fault Flag
FF	Orange	General Fault Flag



## 3 Hardware Design Files

### 3.1 Schematics



PCB Number:  
PCB Rev:

PCB  
LOGO  
Texas Instruments



PCB  
LOGO  
FCC disclaimer

PCB  
LOGO  
WEEE logo

LBL1  
PCB Label  
TH14-423-10  
Size: 0.65" x 0.20 "

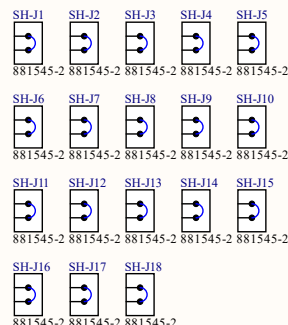
ZZ1  
Label Assembly Note  
This Assembly Note is for PCB labels only

ZZ2  
Assembly Note  
These assemblies are ESD sensitive, ESD precautions shall be observed.

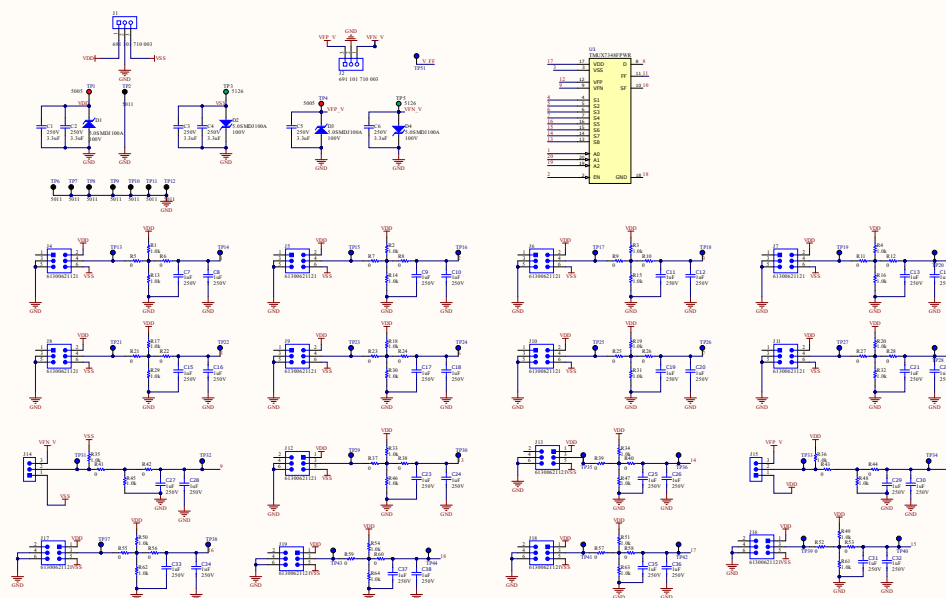
ZZ3  
Assembly Note  
These assemblies must be clean and free from flux and all contaminants. Use of no clean flux is not acceptable.

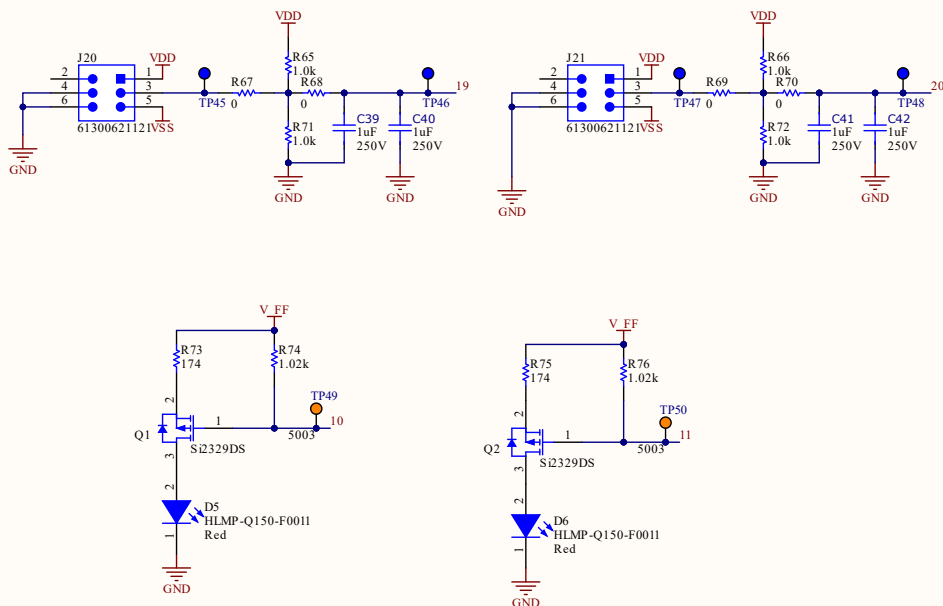
ZZ4  
Assembly Note  
These assemblies must comply with workmanship standards IPC-A-610 Class 2, unless otherwise specified.

Variant/Label Table	
Variant	Label Text
001	TMUX73XXF EVM



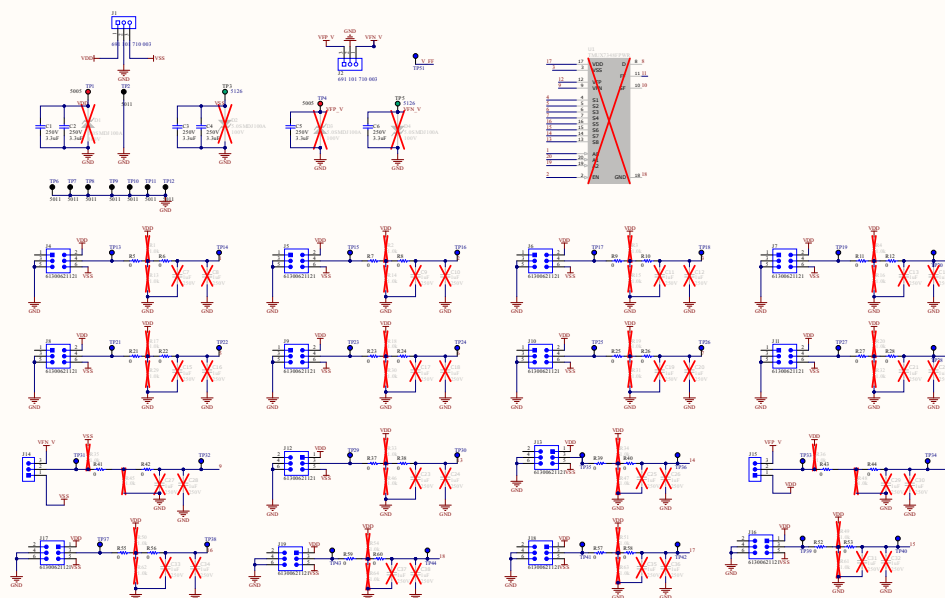
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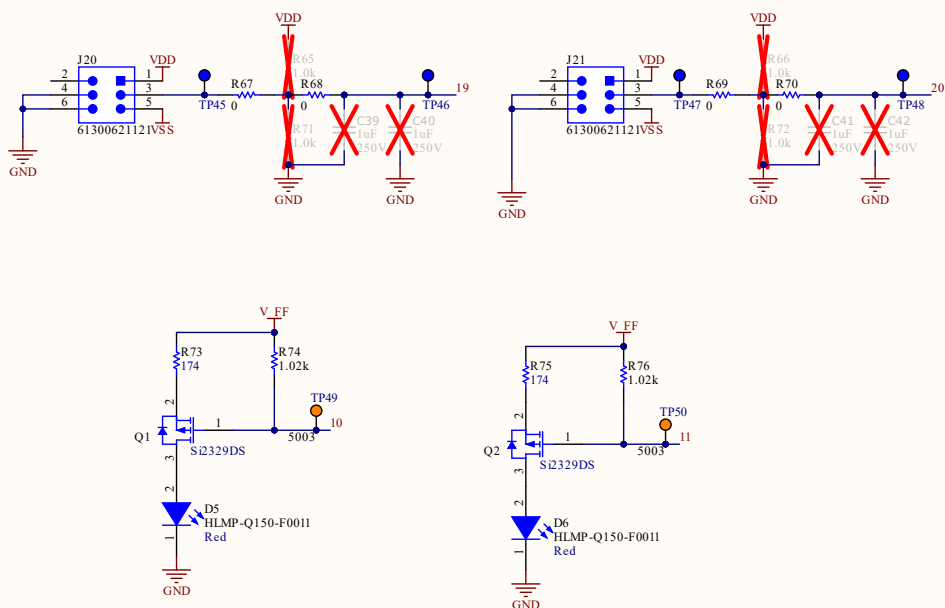




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Date: 11/06/2024	Sheet of	
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**Figure 3-1. Main Schematic – TMUX73XXF-EVM All Components Shown**

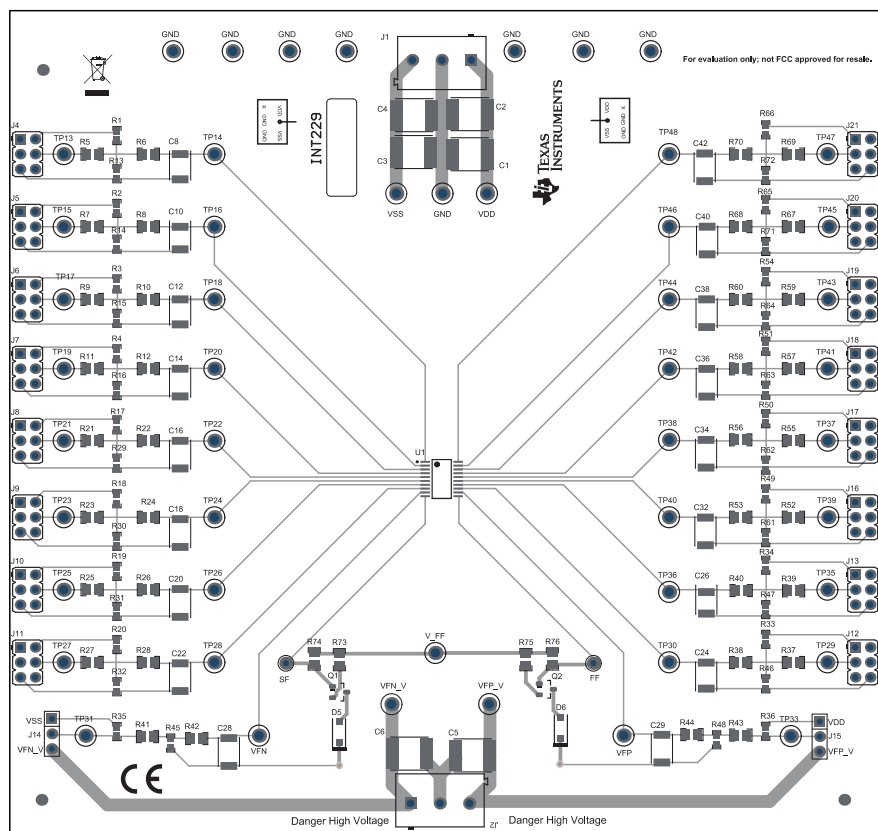




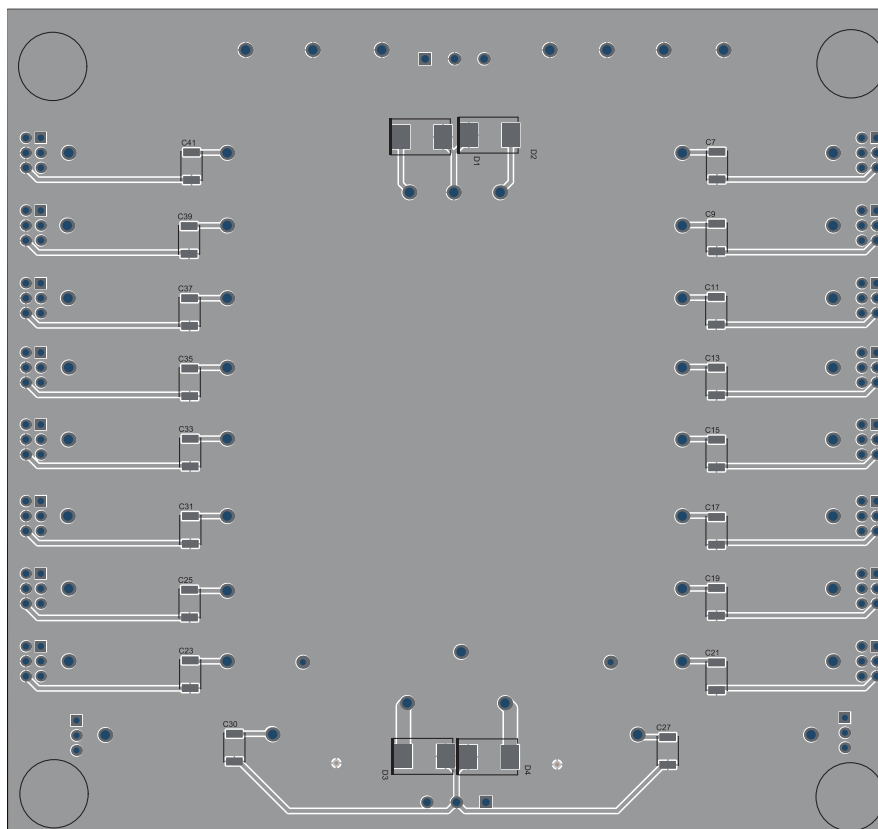
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Size A	Number	Revision
Date:	11/06/2024	Sheet of
File:	C:\Users\JINT229 Page2.SchDoc	Drawn By:

### Figure 3-2. Main Schematic – TMUX73XXF-EVM Default

## 3.2 PCB Layouts



**Figure 3-3. TMUX73XXF-EVM Top Layer Layout**



**Figure 3-4. TMUX73XXF-EVM Bottom Layer Layout**

### 3.3 Bill of Materials (BOM)

**Table 3-1. Bill of Materials**

Description	Designator	PartNumber	Quantity	Manufacturer	PackageReference	Value
Printed Circuit Board			1	Any		
CAP, CERM, 3.3 uF, 250 V, +/- 20%, X7T, AEC-Q200 Grade 1, 6x5x5mm	C1, C2, C3, C4, C5, C6	CKG57NX7T2 E335M500JH	6	TDK	6x5x5mm	3.3uF
LED, Red, SMD	D5, D6	HLMP-Q150-F0011	2	Avago	2.08x2.21mm	Red
Fiducial mark. There is nothing to buy or mount.	FID1, FID2, FID3	N/A	3	N/A	N/A	
Bumpon, Hemisphere, 0.44 X 0.20, Clear	H1, H2, H3, H4	SJ-5303 (CLEAR)	4	3M	Transparent Bumpon	
Terminal Block, 5 mm, 3x1, Tin, TH	J1, J2	691 101 710 003	2	Wurth Elektronik	Terminal Block, 5 mm, 3x1, TH	
Header, 2.54mm, 3x2, Gold, TH	J4, J5, J6, J7, J8, J9, J10, J11, J12, J13, J16, J17, J18, J19, J20, J21	61300621121	16	Wurth Elektronik	Header, 2.54mm, 3x2, TH	
Header, 100mil, 3x1, Gold, TH	J14, J15	PBC03SAAN	2	Sullins Connector Solutions	PBC03SAAN	
Thermal Transfer Printable Labels, 0.650" W x 0.200" H - 10,000 per roll	LBL1	THT-14-423-1 0	1	Brady	PCB Label 0.650 x 0.200 inch	
MOSFET, P-CH, -8 V, -5.3 A, SOT-23	Q1, Q2	Si2329DS	2	Vishay-Semiconductor	SOT-23	-8V



**Table 3-1. Bill of Materials (continued)**

Description	Designator	PartNumber	Quantity	Manufacturer	PackageReference	Value
RES, 0, 0%, W, AEC-Q200 Grade 0, 0805	R5, R6, R7, R8, R9, R10, R11, R12, R21, R22, R23, R24, R25, R26, R27, R28, R37, R38, R39, R40, R41, R42, R43, R44, R52, R53, R55, R56, R57, R58, R59, R60, R67, R68, R69, R70	PMR10EZPJ000	36	Rohm	0805	0
RES, 174, 0.1%, 0.125 W, 0805	R73, R75	RT0805BRD07174RL	2	Yageo America	0805	174
RES, 1.02 k, 1%, 0.125 W, AEC-Q200 Grade 0, 0805	R74, R76	CRCW08051K02FKEA	2	Vishay-Dale	0805	1.02k
Shunt, 100mil, Gold plated, Black	SH-J1, SH-J2, SH-J3, SH-J4, SH-J5, SH-J6, SH-J7, SH-J8, SH-J9, SH-J10, SH-J11, SH-J12, SH-J13, SH-J14, SH-J15, SH-J16, SH-J17, SH-J18	881545-2	18	TE Connectivity	Shunt 2 pos. 100 mil	
Test Point, Compact, Red, TH	TP1, TP4	5005	2	Keystone	Red Compact Testpoint	

**Table 3-1. Bill of Materials (continued)**

Description	Designator	PartNumber	Quantity	Manufacturer	PackageReference	Value
Test Point, Multipurpose, Black, TH	TP2, TP6, TP7, TP8, TP9, TP10, TP11, TP12	5011	8	Keystone	Black Multipurpose Testpoint	
Test Point, Multipurpose, Green, TH	TP3, TP5	5126	2	Keystone	Green Multipurpose Testpoint	
Test Point, Compact, Blue, TH	TP13, TP14, TP15, TP16, TP17, TP18, TP19, TP20, TP21, TP22, TP23, TP24, TP25, TP26, TP27, TP28, TP29, TP30, TP31, TP32, TP33, TP34, TP35, TP36, TP37, TP38, TP39, TP40, TP41, TP42, TP43, TP44, TP45, TP46, TP47, TP48, TP51	5122	37	Keystone	Blue Compact Testpoint	
Test Point, Miniature, Orange, TH	TP49, TP50	5003	2	Keystone	Orange Miniature Testpoint	

**Table 3-1. Bill of Materials (continued)**

Description	Designator	PartNumber	Quantity	Manufacturer	PackageReference	Value
Multilayer Ceramic Capacitors 1uF ±10% 250V X7T SMD 1812	C7, C8, C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29, C30, C31, C32, C33, C34, C35, C36, C37, C38, C39, C40, C41, C42	C4532X7T2E1 05K250KA	0	TDK	1812	1μF
Diode, TVS, Uni, 100 V, 162 Vc, SMC	D1, D2, D3, D4	5.0SMDJ100A	0	Littelfuse	SMC	100V
RES, 1.0 k, 5%, 0.1 W, AEC-Q200 Grade 0, 0603	R1, R2, R3, R4, R13, R14, R15, R16, R17, R18, R19, R20, R29, R30, R31, R32, R33, R34, R35, R36, R45, R46, R47, R48, R49, R50, R51, R54, R61, R62, R63, R64, R65, R66, R71, R72	CRCW06031K 00JNEA	0	Vishay-Dale	0603	1.0k

**Table 3-1. Bill of Materials (continued)**

Description	Designator	PartNumber	Quantity	Manufacturer	PackageReference	Value
+60 V or -60 V Tolerant, Fault-protected, Latch-up Immune, Single-Ended 8:1 Multiplexers with Adjustable Fault Threshold	U1	TMUX7348FP WR	0	Texas Instruments	TSSOP20	

## 4 Additional Information

### 4.1 Trademarks

All trademarks are the property of their respective owners.

## 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.
  - 1.1 EVMs are intended solely for product or software developers for use in a research and development setting to facilitate feasibility evaluation, experimentation, or scientific analysis of TI semiconductors products. EVMs have no direct function and are not finished products. EVMs shall not be directly or indirectly assembled as a part or subassembly in any finished product. For clarification, any software or software tools provided with the EVM ("Software") shall not be subject to the terms and conditions set forth herein but rather shall be subject to the applicable terms that accompany such Software
  - 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 DEGRADATION 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/sds/ti\\_ja/general/eStore/notice\\_01.page](http://www.tij.co.jp/sds/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。

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

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.

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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。

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3.3.3 *Notice for EVMs for Power Line Communication:* Please see [http://www.tij.co.jp/sds/ti\\_ja/general/eStore/notice\\_02.page](http://www.tij.co.jp/sds/ti_ja/general/eStore/notice_02.page)

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#### 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.



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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.

6. *Disclaimers:*

6.1 EXCEPT AS SET FORTH ABOVE, EVMS AND ANY MATERIALS PROVIDED WITH THE EVM (INCLUDING, BUT NOT LIMITED TO, REFERENCE DESIGNS AND THE DESIGN OF THE EVM ITSELF) ARE PROVIDED "AS IS" AND "WITH ALL FAULTS." TI DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, REGARDING SUCH ITEMS, INCLUDING BUT NOT LIMITED TO ANY EPIDEMIC FAILURE WARRANTY OR IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF ANY THIRD PARTY PATENTS, COPYRIGHTS, TRADE SECRETS OR OTHER INTELLECTUAL PROPERTY RIGHTS.

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8.2 *Specific Limitations.* IN NO EVENT SHALL TI'S AGGREGATE LIABILITY FROM ANY USE OF AN EVM PROVIDED HEREUNDER, INCLUDING FROM ANY WARRANTY, INDEMNITY OR OTHER OBLIGATION ARISING OUT OF OR IN CONNECTION WITH THESE TERMS, , EXCEED THE TOTAL AMOUNT PAID TO TI BY USER FOR THE PARTICULAR EVM(S) AT ISSUE DURING THE PRIOR TWELVE (12) MONTHS WITH RESPECT TO WHICH LOSSES OR DAMAGES ARE CLAIMED. THE EXISTENCE OF MORE THAN ONE CLAIM SHALL NOT ENLARGE OR EXTEND THIS LIMIT.

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10. *Governing Law:* These terms and conditions shall be governed by and interpreted in accordance with the laws of the State of Texas, without reference to conflict-of-laws principles. User agrees that non-exclusive jurisdiction for any dispute arising out of or relating to these terms and conditions lies within courts located in the State of Texas and consents to venue in Dallas County, Texas. Notwithstanding the foregoing, any judgment may be enforced in any United States or foreign court, and TI may seek injunctive relief in any United States or foreign court.

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