EVM User's Guide: AM62L-EVSE-DEV-EV

AM62L-EVSE-DEV-EVM Evaluation Module

Description

The AM62L-EVSE-DEV-EVM is part of the TI-EVSE development platform for AM62L and represents a universal charging controller for AC and DC charging stations with open-source software stack. The complete platform consists of three separate parts, the AM62L EVM (TMDS62LEVM), AM62L-EVSE-DEV-EVM, and the TIDA-010239 (optional).

The TMDS62LEVM serves as the main CPU and supports Ethernet and Wireless Connectivity for communications. The AM62L-EVSE-DEV-EVM acts as the front-end controller, controlling the analog handshakes with the EV and safety functions like locking the charging plug and monitoring the temperature of the high-voltage contacts inside. The optional TIDA-010239 can be added to include an AC charger.

Get Started

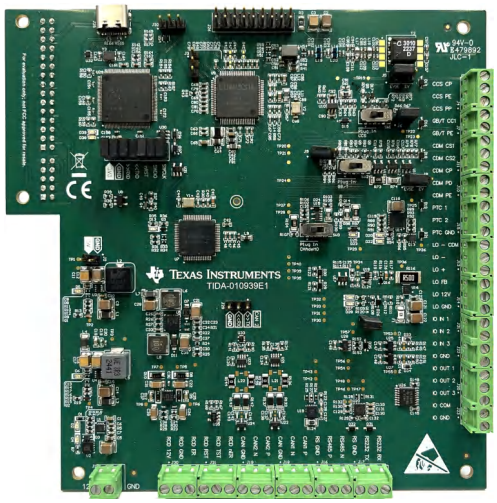
1. Order the TMDS62LEVM at TMDS62LEVM.
2. Order the AM62L-EVSE-DEV-EVM daughtercard at AM62L-EVSE-DEV-EVM.
3. Download the AM62L-EVSE-DEV-EVM design files.
4. Download the software from:
   - AM62L software for AM62L-EVSE-DEV-EVM
   - MSPM0-SDK
5. Read this EVM User's Guide.
6. Read the AM62L-EVSE-DEV-EVM Software User Guide.

Features

- J1772 and International Electrotechnical Commission (IEC) 61851 compliant Control Pilot
  - Full support for AC charging control signaling
- Power Line Communication (PLC) – High-level communication according to ISO 15118
- Relay control and safety features – Including integrated temperature monitoring
- Multiple communication interfaces – Controller Area Network (CAN), RS-485, RS-232, and Ethernet for control of power conversion units, external metering devices, peripherals, and networking
- Display human-machine interface (HMI) support
  - Display Serial Interface (DSI) connector on the TMDS62LEVM for HMI integration

Applications

- EV charging station HMI module
- AC charging (pile) station



AM62L-EVSE-DEV-EVM

1 Evaluation Module Overview

1.1 Introduction

The AM62L-EVSE-DEV-EVM is part of the TI-EVSE development platform for AM62L and represents a universal charging controller for AC and DC charging stations with open-source software stack. The complete platform consists of three separate parts, the TMDS62LEVM, AM62L-EVSE-DEV-EVM, and the optional TIDA-010239 .

The TMDS62LEVM, serving as the main CPU, running the EVerest Open Source Software charging stack on Linux® is handling the digital communication with the EV. In addition to that, the EVM supports Ethernet and Wireless Connectivity for communications with the backend or a charge point management system, respectively. If required, the EVM can be used to support a display for HMI as well.

The AM62L-EVSE-DEV-EVM acts as the front-end controller based on the MSPM0 microcontroller. The design controls the analog handshakes with the EV as well as safety functions like locking the charging plug and monitoring the temperature of the high-voltage contacts inside. The MSP communicates through Universal Asynchronous Receiver Transmitter (UART), a serial communication protocol with the AM62L.

Add the TIDA-010239 to include an AC charger. This reference design completes the platform with an isolated AC to DC power supply with backup power in case of a grid outage. The TIDA-010239 contains the high-voltage contractor and a driver to connect the electric vehicle to the grid. Additionally, the TIDA-010239 detects if the relay is welded.

The primary function of the charging controller is to connect all the systems required for charging together, and handling the communication between these systems and the electric vehicle. The communication with an EV is always done with an analog handshake. The exact requirements vary between the different charging standards. The AM62L-EVSE-DEV-EVM offers circuitry to support the following standards Combined Charging System 1 and 2 (CCS1 CCS2), North American Charging Standard (NACS), Guobiao/Tuijian (GB/T), and Charge de Move (CHAdeMO).

In addition to the analog handshake, a second, high-level communication is required for DC-charging. In this case, not the onboard charger (OBC) of the EV, but the EVSE serves as the charger and needs to detect which voltage level and current limit is required to safely charge the EV battery. The standard ISO15118, which is used for CCS1, CCS2, and NACS, specifies Powerline Communication through a HomePlug Green PHY (HPGP) as physical layer, while GB/T and CHAdeMO use the CAN for this kind of communication. Therefore, the AM62L-EVSE-DEV-EVM includes an HPGP and a dedicated CAN transceiver. Both elements are connected to the AM62L, as the processor handles the digital communication.

Additional safety functions which are required by the charging standards are either included on the AM62L-EVSE-DEV-EVM, or can be added by external TIDA reference designs. The onboard safety functions include temperature monitoring of the contacts in the charging cable and circuitry to control a motorized locking mechanism, designed to prevent removal of the cable during the charging cycle. The AM62L-EVSE-DEV-EVM also includes connections for an external residual current detection (RCD) device, given by the TIDA-010237. To be able to connect further devices for testing, like a safety switch, or to control status LEDs, the AM62L-EVSE-DEV-EVM supports two digital inputs (24V tolerant), one analog input (0V–12V) and three digital outputs (low-side switch).

To enable communication with peripherals like energy meters and power modules, the AM62L-EVSE-DEV-EVM supports transceivers for RS-485, RS-232, and CAN.

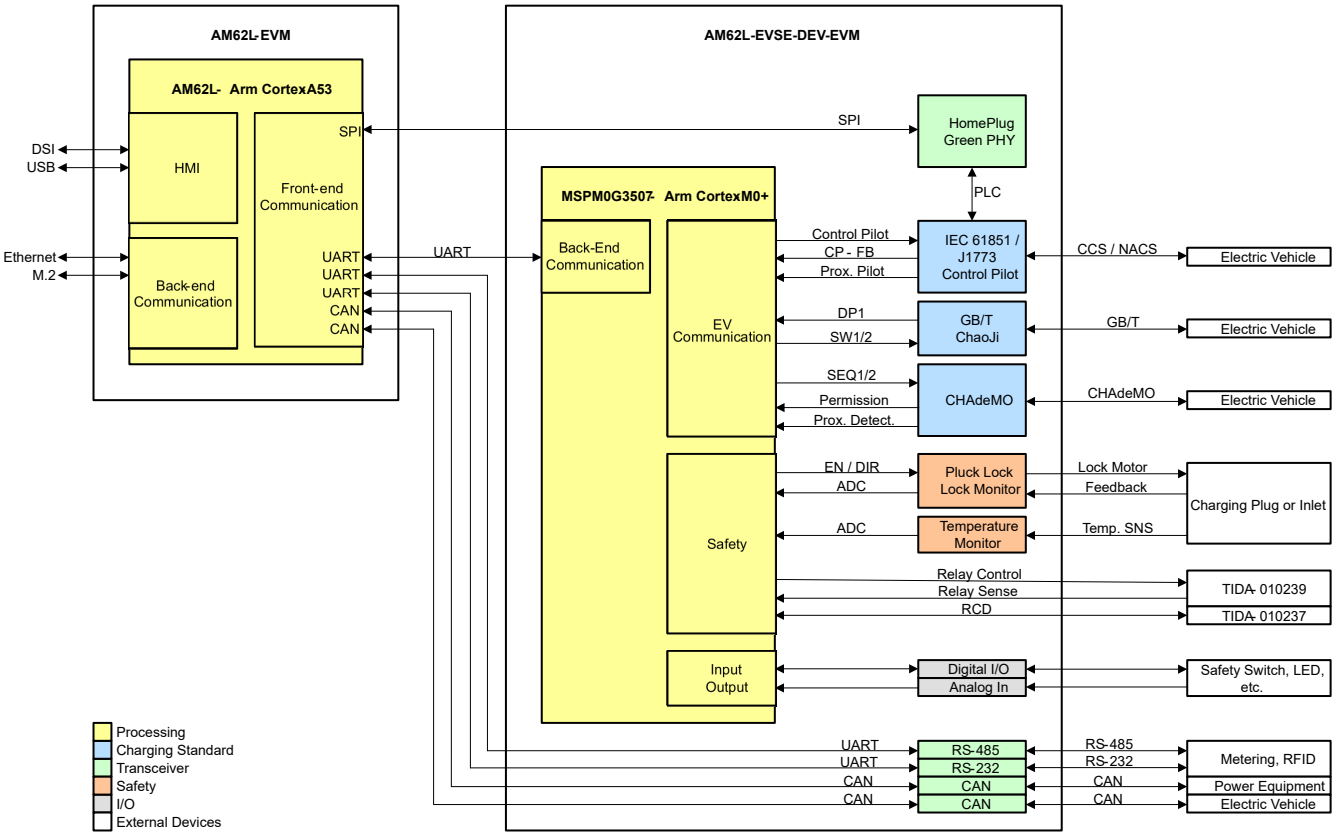
1.2 Kit Contents

This package includes:

- AM62L-EVSE-DEV-EVM
- USB 2.0 Cable (A Male to C Male)
- EVM user guide pamphlet
- EVM disclaimer and standard terms

1.3 Specification

AM62L-EVSE-DEV-EVM Block Diagram shows the functional block diagram of the AM62L-EVSE-DEV-EVM.



AM62L-EVSE-DEV-EVM Block Diagram

1.4 Device Information

1.4.1 MSPM0G3507

The MSPM0G3507 microcontroller (MCU) is part of the MSP highly integrated, ultra-low-power 32-bit MCU family based on the enhanced Arm® Cortex®-M0+ 32-bit core platform operating at up to 80MHz frequency.

These cost-optimized MCUs integrate high-performance analog peripherals, including two simultaneous sampling 12-bit 4-Msps analog-to-digital converters (ADCs) with up to 17 external channels used for measuring signals such as the control pilot and temperature sensors. With two 16-bit advanced control timers and five general-purpose timers, the MCU can precisely schedule ADC readings to sample both high and low phases of a PWM signal after a given settling time, enabling accurate measurement of the control pilot waveform. The timers are also used to generate PWM outputs for driving relays and controlling the timing of the locking actuator. The integrated CRC module accelerates cyclic redundancy check calculations used to verify the integrity of data packets received from the AM62L MPU through the UART interface.

1.4.2 AM62L

The low-cost and performance optimized AM62L family of application processors are built for Linux® application development. Based on scalable Arm® Cortex®-A53 cores, the devices offer multimedia DSI/DPI support, dual Gigabit Ethernet, advanced lower power management modes, and extensive security options for IP protection with the built-in security features.

The AM62Lx family includes an extensive set of peripherals that make these devices well-designed for industrial and EV-charging applications while offering intelligent features and optimized power architecture as well. In addition, the extensive set of peripherals included in AM62Lx enables system-level connectivity, such as: CANFD, USB, MMC/SD, OSPI and an ADC.

2 Hardware

2.1 Additional Images

Figure 2-1 is a labeled representation of the top side of the AM62L-EVSE-DEV-EVM board.

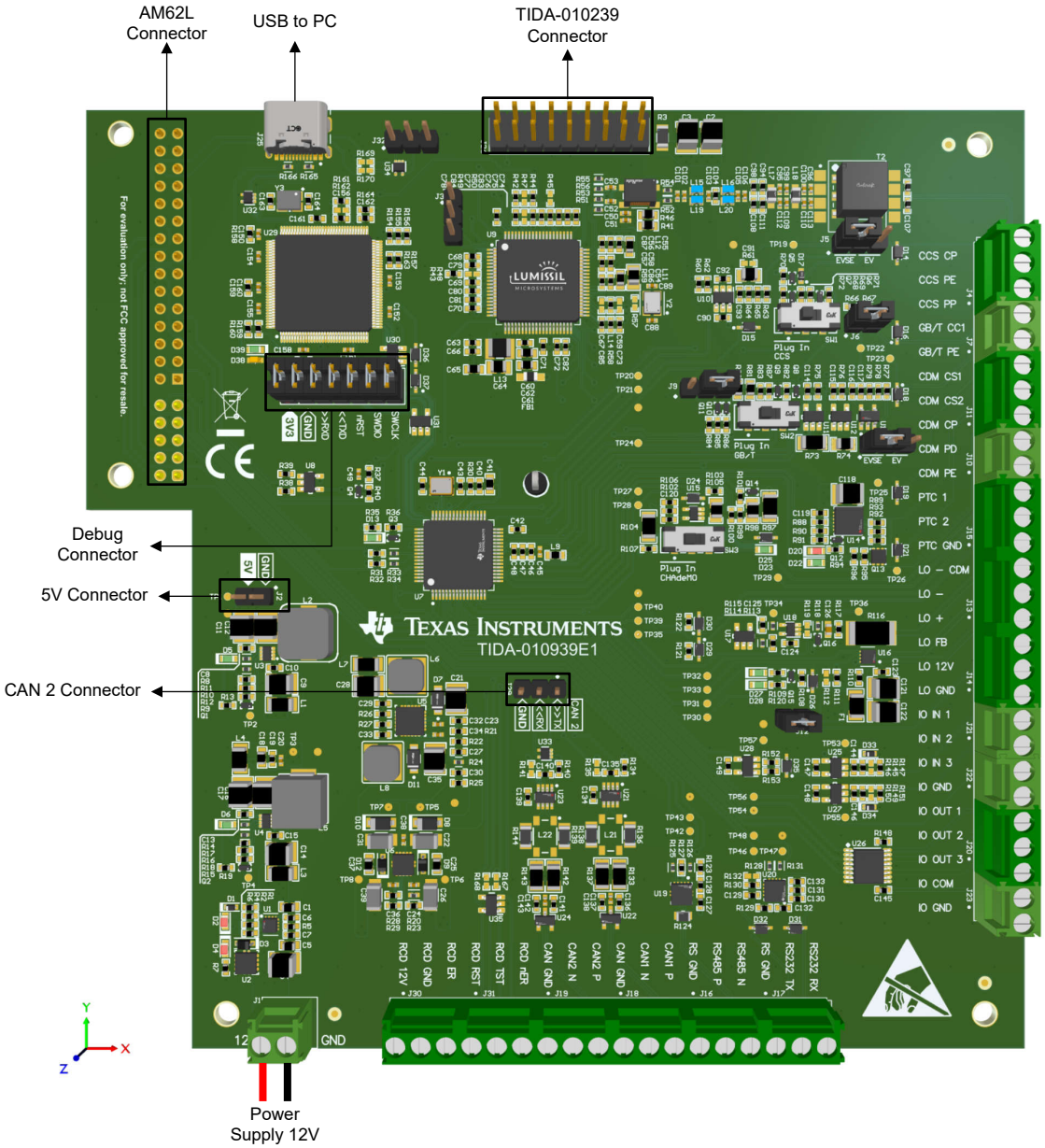


Figure 2-1. AM62L-EVSE-DEV-EVM Top Side

2.2 Power Requirements

The AM62L-EVSE-DEV-EVM design can be powered in two ways:

1. External 12V power supply.
   a. The AM62L-EVSE-DEV-EVM can be powered from a single 12V external voltage rail connected at screw terminal J1.
   b. When used together with the TIDA-010239, both boards can be powered from the AM62L-EVSE-DEV-EVM external 12V input. This way the whole system can be supplied without the need of a single- or three-phase high-voltage input.

   External Power Supply or Power Accessory Requirements:
   Nominal Output Voltage: 12VDC (10.8V - 13.2V)
   Max Output Current: 5A Efficiency Level V

   Note

   TI recommends using an external power supply or power accessory which complies with applicable regional safety standards such as (by example) UL, CSA, VDE, CCC, PSE, etc.

2. Through the TIDA-010239 board from a single- or three-phase high-voltage input
   a. In this case, the isolated AC/DC power stage on the TIDA-010239 provides the necessary power to the AM62L-EVSE-DEV-EVM.
   b. Do not supply an external 12V input to the AM62L-EVSE-DEV-EVM when it is connected to the TIDA-010239 and powered from grid voltage, as this can cause damage to the system.

2.3 Setup

The following items are required to setup the AM62L-EVSE-DEV-EVM:

- Auxiliary power supply 12V (10.08V – 13.2V, 5A)
- TMDS62LEVM
- USB 2.0 Type-C® cable
- TIDA-010239 (Optional)
- TIDA-010237 (Optional)

2.4 Connector, Pin Header, and Jumper Settings

Table 2-1 lists the header names and jumper settings for the AM62L-EVSE-DEV-EVM. Table 2-2 shows the screw terminal pinouts.

Table 2-1. Header Names and Jumper Settings

DESIGNATOR	FUNCTIONALITY	COMMENTS
J2	5V connector	5V output
J3	Lumissil debug header	UART connection for Lumissil IS31CG5317-LQLS3 • Pin 1: UART RX • Pin 2: GND • Pin 3: UART TX
J5	CCS configuration	Configures the CCS hardware ether as EVSE or EV for back-to-back testing • Pin 1 and 2: EVSE • Pin 2 and 3: EV
J6	CCS proximity pilot header	Configures PP between Type 1, NACS, and Type 2 plugs • Populated: Type 2 • Unpopulated: Type 1, NACS
J8	GB/T configuration header	Configures the GB/T hardware ether as EVSE or EV for back-to-back testing • Pin 1 and 2: EVSE • Pin 2 and 3: EV

Table 2-1. Header Names and Jumper Settings (continued)

DESIGNATOR	FUNCTIONALITY	COMMENTS
J9	GB/T – ChaoJi test setup selection header	Configures the GB/T test hardware ether for GB/T or ChaoJi • Pin 1 and 2: ChaoJi • Pin 2 and 3: GB/T
J12	Pluck lock mode setting	Configures the control mode of the DRV8220. Must be set before the device starts-up. • Populated: PH/EN Mode • Unpopulated: Half Bridge Mode
J24	MSP debug header	Header to connect or disconnect the onboard XDS110 debug probe. Remove jumper to connect an external debug probe to the MSPM0. • Pin 1: 3.3V • Pin 2: 3.3V • Pin 3: GND • Pin 4: GND • Pin 5: MSPM0 PA9 (55) – UART1 RX • Pin 6: XDS110 – TXD • Pin 7: MSPM0 PA8 (54) – UART1 TX • Pin 8: XDS110 – RXD • Pin 9: MSPM0 nRST (38) • Pin 10: XDS110 reset out • Pin 11: MSPM0 PA19 (12) – SWDIO • Pin 12: XDS110 TMS SWDIO • Pin 13: MSPM0 PA20 (13) – SWCLK • Pin 14: XDS110 TCK SWDCLK
J29	CAN 2 header	CAN input from the AM62L to the TCAN device • Pin 1: CAN TX • Pin 2: CAN RX • Pin 3: GND
J32	I2C header	Connected to the AM62L for possible I2C communication • Pin 1: I2C SCL • Pin 2: I2C SDA • Pin 3: GND

Table 2-2. Screw Terminal Pinouts

DESIGNATOR	FUNCTIONALITY	COMMENTS
J1	Auxiliary power supply input	External 12V input (10.08V–13.2V, 5A)
J4	CCS, NACS	Connects to charging plug for CCS or NACS • Pin 1: CCS PP - Proximity Pilot • Pin 2: CCS PE - Protective Earth • Pin 3: CCS CP - Control Pilot
J7	GB/T, ChaoJi	Connects to charging plug for GB/T or ChaoJi • Pin 1: GBT PE - Protective earth • Pin 2: GBT CC1 - charging conformation 1
J10	CHAdeMO	Connects to charging plug for CHAdeMO • Pin 1: CDM PE - Protective earth • Pin 2: CDM PD - Proximity detection

Table 2-2. Screw Terminal Pinouts (continued)

DESIGNATOR	FUNCTIONALITY	COMMENTS
J11	CHAdeMO	Connects to charging plug for CHAdeMO • Pin 1: CDM CP - Vehicle Charge Permission • Pin 2: CDM CS2 - Charge Sequence 2 • Pin 3: CDM CS1 - Charge Sequence 1
J13	Pluck lock	Connects to charging Inlet or plug • Pin 1: LO+ Lock Motor Positive Terminal • Pin 2: LO- Lock Motor Negative Terminal • Pin 3: LO- CDM – CHAdeMO Lock Negative Terminal
J14	Pluck lock feedback	Connects to charging Inlet or plug • Pin 1: LO GND – Ground for Feedback • Pin 2: LO 12V – 12V Supply for Feedback • Pin 3: LO FB – Feedback input
J15	Temperature sensing	Connects to charging Inlet or plug • Pin 1: PTC GND – Ground for temperature sensors • Pin 2: PTC 2 – Temperature Sensor 2 input • Pin 3: PTC 1 – Temperature Sensor 1 input
J16	RS-485	RS-485 connector • Pin 1: RS GND – Ground • Pin 2: RS485 P – Bus I/O port, A • Pin 3: RS485 N – Bus I/O port, B
J17	RS-232	RS-232 connector • Pin 1: RS GND • Pin 2: RS232 TX – RS232 line data output • Pin 3: RS232 RX – RS232 line data input
J18	CAN 1	CAN 1 connector • Pin 1: CAN GND • Pin 2: CAN 1 N – Low-level CAN bus I/O • Pin 3: CAN 1 P – High-level CAN bus I/O
J19	CAN 2	CAN 2 connector • Pin 1: CAN GND • Pin 2: CAN 2 N – Low-level CAN bus I/O • Pin 3: CAN 2 P – High-level CAN bus I/O
J20	Digital output	Digital output connector • Pin 1: IO OUT 3 – Digital output 3 • Pin 2: IO OUT 2 – Digital output 2 • Pin 3: IO OUT 1 – Digital output 1
J21	Digital input	Digital input connector: • Pin 1: IO IN 2 – Digital input 2 • Pin 2: IO IN 1 – Digital input 1
J22	Analog input	Analog input connector • Pin 1: IO GND – Ground • Pin 2: IO IN 3 – Analog input

Table 2-2. Screw Terminal Pinouts (continued)

DESIGNATOR	FUNCTIONALITY	COMMENTS
J23	Digital output	Digital output connector • Pin 1: IO GND – Ground • Pin 2: IO COM – Supply input
J30	RCD input	RCD input connector • Pin 1: RCD 12V – 12V output for RCD • Pin 2: RCD GND – Ground • Pin 3: RCD ER – Error input
J31	RCD input	RCD input connector • Pin 1: RCD RST – Reset output • Pin 2: RCD TST – Test output • Pin 3: RCD nER – Negative active Error input

2.5 Interfaces

2.5.1 RS-485

The THVD2429 is a 3V-to-5.5V, 20Mbps, half-duplex RS-485 transceiver with integrated surge protection. Surge protection is achieved by integrating transient voltage suppressor (TVS) diodes in the package. This feature increases the reliability by providing better immunity to noise transients coupled to the data cable which eliminates the need for external protection components. The devices in this family feature a wide common-mode voltage range making them an excellent choice for multi-point applications over long cable runs.

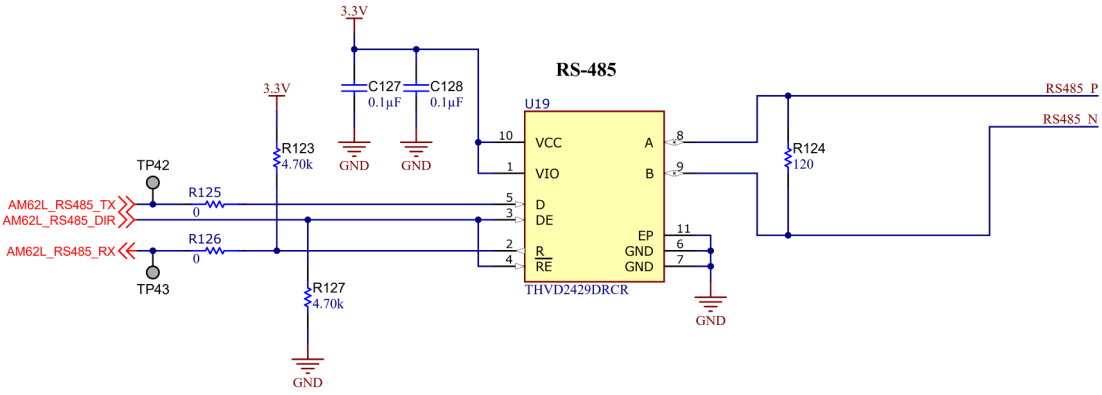


Figure 2-2. RS-485 Circuit

2.5.2 RS-232

To properly interface with the RS-232 standard, a voltage translation system is required to convert between the 3.3V domain on the board and from the 12V on the port. To facilitate the translation, the design uses a TRSF3221E device. The TRSF3221E device is capable of driving the higher voltage signals on the RS-232 port from only the 3.3V DVCC through a charge pump system. The TRSF3221E consists of a line driver, a line receiver, and a dual charge-pump circuit with ±15kV IEC ESD protection pin to pin (serial-port connection pins, including GND). The charge pump and four small external capacitors allow operation from a single 3V to 5.5V supply. The TRSF3221E operates at data signaling rates up to 1Mbit/s and a driver output slew rate of 24V/µs to 150V/µs.

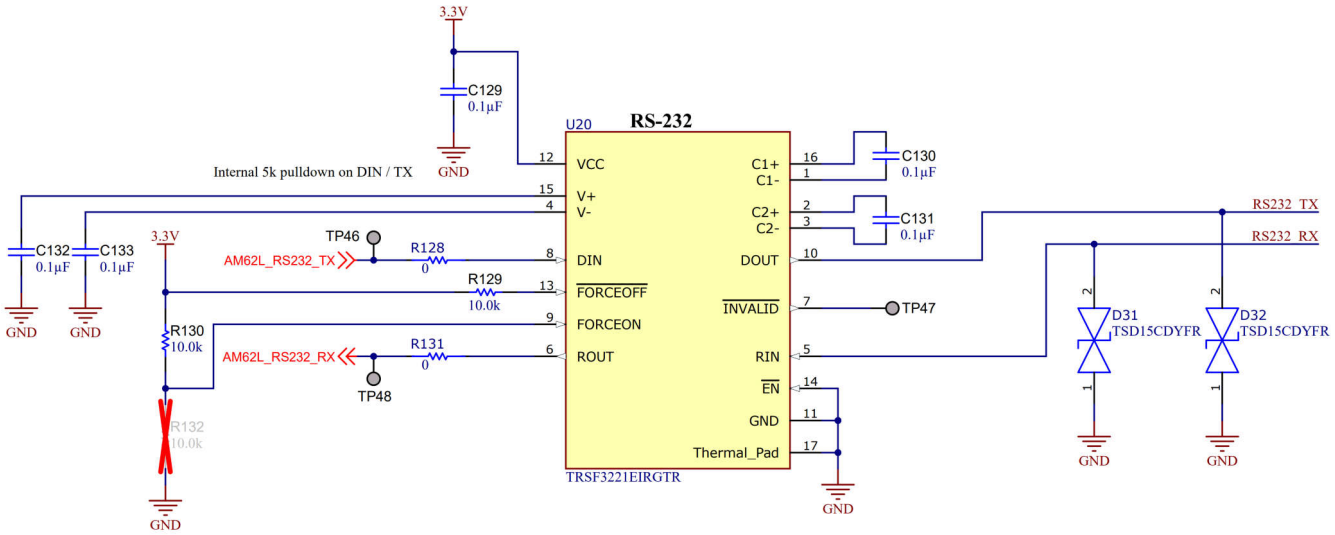


Figure 2-3. RS-232 Circuit

2.5.3 CAN

The AM62L-EVSE-DEV-EVM offers two controller area network transceivers, the TCAN1044A-Q1. The device is a high-speed CAN transceiver that meets the physical layer requirements of the ISO 11898-2:2016 high-speed CAN specification. The transceivers have certified electromagnetic compatibility (EMC) operation making the device an excellent choice for classical CAN and CAN FD networks up to five megabits per second (Mbps). The transceivers also include thermal-shutdown (TSD), TXD-dominant time-out (DTO), supply undervoltage detection, and ±58V bus fault protection.

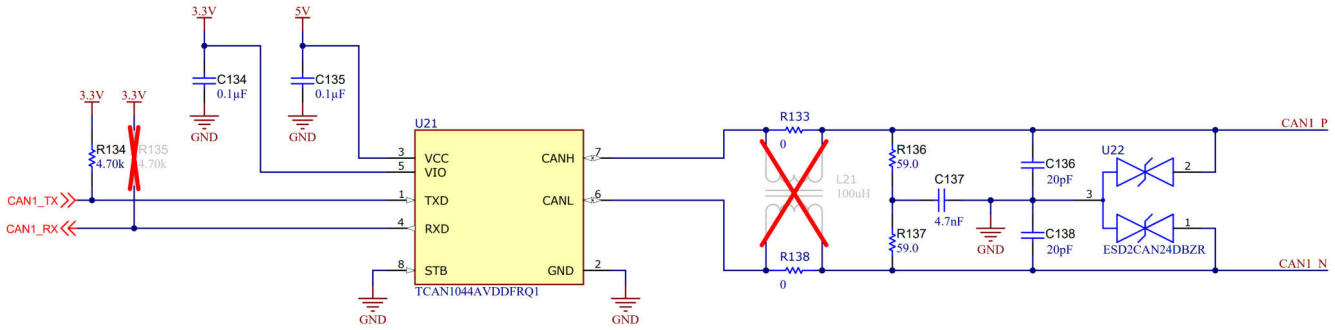


Figure 2-4. CAN Circuit

Both transceivers have a termination of 120Ω in a split configuration, that creates a low-pass resistor-capacitor (RC) filter for the common-mode signal present on the bus. This split termination scheme filters both the common-mode fluctuations caused by transceivers on the bus and the common-mode fluctuations caused by external noise coupling onto the bus.

The charging standard GB/T, as well as CHAdeMO define CAN as the physical layer for digital communication between an off-board conductive charger and the battery management system (BMS) of the electric vehicle (EV). Both protocols utilize a dedicated CAN connection, version 2.0B between the electric vehicle and the charging station and both the charger and the vehicle is equipped with a terminating resistor with a nominal resistance of 120Ω. Based on the recommended national standard GB/T 27930 the communication rate is 250kbps, while CHAdeMO uses a default transition rate of 500kbps.

2.6 Debug Information - XDS110 Debug Probe

To keep development simple, the AM62L-EVSE-DEV-EVM integrates an onboard debug probe, which eliminates the need for additional programmers. The AM62L-EVSE-DEV-EVM has the XDS110 debug probe, which is a simple and low-cost debugger that supports all MSPM0 device derivatives. The XDS110 also provides a *back*

channel UART-over-USB connection with the host, which can be very useful during debugging and for easy communication with a PC.

The jumper block at jumper J24 allows the user to connect or disconnect signals between the XDS110 and the MSPM0G3507. This includes XDS110 SWD signals, application UART signals, and 3.3V power.

The jumper can be removed to:

- Expose the target MCU pins for other use than onboard debugging and application UART communication
- Expose the programming and UART interface of the XDS110 so that the programming and UART interface can be used for devices other than the onboard MCU
- Power external devices with 3.3V

2.6.1 Application (or Back Channel) UART

The back-channel UART allows communication with the USB host that is not part of the main functionality of the target application. This is very useful during development and also provides a communication channel to the PC host side.

The back-channel UART is the UART on UART1 (PA8, PA9) on the MSPM0. On the host side, a virtual COM port for the application back-channel UART is generated when the AM62L-EVSE-DEV-EVM enumerates on the host. Use any PC application that interfaces with COM ports, including terminal applications like Hyperterminal® or Docklight, to open this port and communicate with the target application. Identify the COM port for the back channel. On Microsoft® Windows® PCs, use the *Device Manager* to find the COM ports.

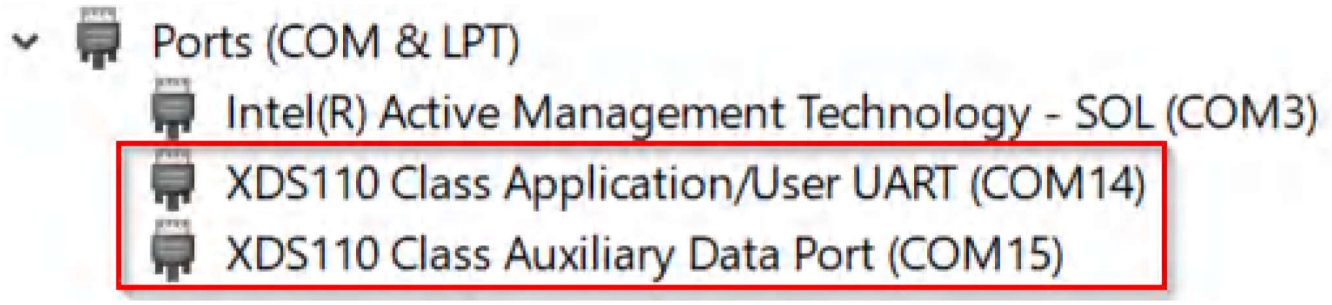


Figure 2-5. Application Back-Channel UART in Device Manager

The back-channel UART is the XDS110 Class Application/User UART port. In this case, Figure 2-5 shows COM14, but this port can vary from one host PC to the next. After identifying the correct COM port, configure in the host application according to the documentation. The user can then open the port and begin communication from the host.

On the target MSPM0G3507 side, the back channel is connected to the UART1 module. The XDS110 has a configurable baud rate; therefore, it is important that the PC application configuring the baud rate is the same as what is configured on the UART1.

2.6.2 Using an External Debug Probe Instead of the Onboard XDS110

Many users have a preferred external debug probe and want to bypass the XDS110 debug probe to program the MSPM0 target MCU. The bypass is enabled by jumpers on the connector J24.

1. Remove jumpers on the JTAG signals on the J24 connector, including NRST, SWDIO, and SWCLK.
2. Plug any ARM debug probe into J24.
3. Plug in 12V extremal power into the AM62L-EVSE-DEV-EVM development kit.
   - Make sure that no 3.3V is connected to the J24 connector when AM62L-EVSE-DEV-EVM is powered through 12V or through TIDA-010239.

2.7 Assembly Instructions

To connect the AM62L-EVSE-DEV-EVM to the TMDS62LEVM, connect J27 and J28 on the AM62L-EVSE-DEV-EVM to the GPIO expansion headers on the TMDS62LEVM.

The GPIO expansion signals on the TMDS62LEVM are shared with the High-Definition Multimedia Interface (HDMI) and are routed to HDMI by default. To enable the GPIO expansion header, the TMDS62LEVM must be reconfigured. Signal routing can be switched by controlling the SoC_VOUT0_FET_SEL0 and SoC_VOUT0_FET_SEL1 signals through software, and by shorting the J29 jumper on the EVM.

The EVM requires a dedicated USB Type-C power supply (5V, 3A).

See the *expansion headers* section of the *AM62L Evaluation Module* user's guide.

3 Implementation Results

3.1 Performance Data and Results

See Electric Vehicle Supply Equipment Front-End Controller Reference Design for Test results. (Note, TIDA-010939 is equivalent with AM62L-EVSE-DEV-EVM.)

4 Hardware Design Files

4.1 Schematics

To download schematics, see the design files page.

4.2 PCB Layouts

To download PCB layout, see the design files page.

4.3 Bill of Materials (BOM)

To download the BOM, see the design files page.

5 Additional Information

5.1 Trademarks

Linux® is a registered trademark of Linus Torvalds.
Arm® and Cortex® are registered trademarks of Arm Ltd..
USB 2.0 Type-C® is a registered trademark of USB Implementers Forum, Inc..
All trademarks are the property of their respective owners.

6 Related Documentation

6.1 Supplemental Content

1. Texas Instruments: TMDS62LEVM Design File Package
2. Texas Instruments: AM62L-EVSE-DEV-EVM Design File Package
3. Texas Instruments: Electric Vehicle Supply Equipment Front-End Controller Reference Design (Note, TIDA-010939 is equivalent with AM62L-EVSE-DEV-EVM.)

7 Revision History

Changes from November 30, 2025 to February 28, 2026 (from Revision * (November 2025) to Revision A (February 2026)) **Page**

- Updated download link..... 1

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 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。

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.

【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・インスツルメンツ株式会社

東京都新宿区西新宿 6 丁目 2 4 番 1 号

西新宿三井ビル

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.

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.

6.2 EXCEPT FOR THE LIMITED RIGHT TO USE THE EVM SET FORTH HEREIN, NOTHING IN THESE TERMS SHALL BE CONSTRUED AS GRANTING OR CONFERRING ANY RIGHTS BY LICENSE, PATENT, OR ANY OTHER INDUSTRIAL OR INTELLECTUAL PROPERTY RIGHT OF TI, ITS SUPPLIERS/LICENSORS OR ANY OTHER THIRD PARTY, TO USE THE EVM IN ANY FINISHED END-USER OR READY-TO-USE FINAL PRODUCT, OR FOR ANY INVENTION, DISCOVERY OR IMPROVEMENT, REGARDLESS OF WHEN MADE, CONCEIVED OR ACQUIRED.

7. *USER'S INDEMNITY OBLIGATIONS AND REPRESENTATIONS.* USER WILL DEFEND, INDEMNIFY AND HOLD TI, ITS LICENSORS AND THEIR REPRESENTATIVES HARMLESS FROM AND AGAINST ANY AND ALL CLAIMS, DAMAGES, LOSSES, EXPENSES, COSTS AND LIABILITIES (COLLECTIVELY, "CLAIMS") ARISING OUT OF OR IN CONNECTION WITH ANY HANDLING OR USE OF THE EVM THAT IS NOT IN ACCORDANCE WITH THESE TERMS. THIS OBLIGATION SHALL APPLY WHETHER CLAIMS ARISE UNDER STATUTE, REGULATION, OR THE LAW OF TORT, CONTRACT OR ANY OTHER LEGAL THEORY, AND EVEN IF THE EVM FAILS TO PERFORM AS DESCRIBED OR EXPECTED.

8. *Limitations on Damages and Liability:*

   8.1 *General Limitations*. IN NO EVENT SHALL TI BE LIABLE FOR ANY SPECIAL, COLLATERAL, INDIRECT, PUNITIVE, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES IN CONNECTION WITH OR ARISING OUT OF THESE TERMS OR THE USE OF THE EVMS , REGARDLESS OF WHETHER TI HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. EXCLUDED DAMAGES INCLUDE, BUT ARE NOT LIMITED TO, COST OF REMOVAL OR REINSTALLATION, ANCILLARY COSTS TO THE PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES, RETESTING, OUTSIDE COMPUTER TIME, LABOR COSTS, LOSS OF GOODWILL, LOSS OF PROFITS, LOSS OF SAVINGS, LOSS OF USE, LOSS OF DATA, OR BUSINESS INTERRUPTION. NO CLAIM, SUIT OR ACTION SHALL BE BROUGHT AGAINST TI MORE THAN TWELVE (12) MONTHS AFTER THE EVENT THAT GAVE RISE TO THE CAUSE OF ACTION HAS OCCURRED.

   8.2 *Specific Limitations.* IN NO EVENT SHALL TI'S AGGREGATE LIABILITY FROM ANY USE OF AN EVM PROVIDED HEREUNDER, INCLUDING FROM ANY WARRANTY, INDEMITY 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.

9. *Return Policy.* Except as otherwise provided, TI does not offer any refunds, returns, or exchanges. Furthermore, no return of EVM(s) will be accepted if the package has been opened and no return of the EVM(s) will be accepted if they are damaged or otherwise not in a resalable condition. If User feels it has been incorrectly charged for the EVM(s) it ordered or that delivery violates the applicable order, User should contact TI. All refunds will be made in full within thirty (30) working days from the return of the components(s), excluding any postage or packaging costs.

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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