

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

AM62L-EVSE-DEV-EVM 评估模块



说明

AM62L-EVSE-DEV-EVM 是 AM62L 的 TI-EVSE 开发平台的一部分，代表采用开源软件栈的交流 and 直流充电站的通用充电控制器。完整的平台由三个独立部分组成：AM62L EVM (TMD62LEVM)、AM62L-EVSE-DEV-EVM 和 TIDA-010239 (可选)。

TMD62LEVM 用作主 CPU，支持以太网和无线通信连接。AM62L-EVSE-DEV-EVM 用作前端控制器，通过 EV 控制模拟握手过程以及锁定充电插头和监测内部高压触点温度等安全功能。添加可选配件的 TIDA-010239，以集成交流充电器。

开始使用

1. 订购 [TMD62LEVM](#) 中的 TMD62LEVM。
2. 订购 [AM62L-EVSE-DEV-EVM](#) 中的 AM62L-EVSE-DEV-EVM 子卡。
3. 下载 AM62L-EVSE-DEV-EVM [设计文件](#)。

4. 从以下位置下载软件：

- [适用于 AM62L-EVSE-DEV-EVM 的 AM62L 软件](#)
- [MSPM0-SDK](#)

5. 阅读该 EVM 用户指南

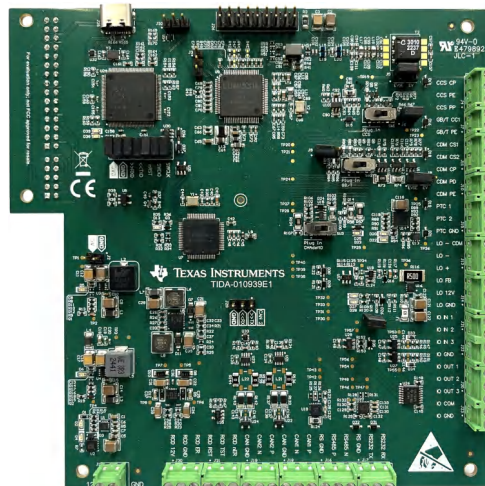
6. 阅读 [AM62L-EVSE-DEV-EVM 软件用户指南](#)。

特性

- 符合 J1772 和国际电工委员会 (IEC) 61851 标准的控制试点
 - 全面支持交流充电控制信号传输
- 电力线通信 (PLC) - 符合 ISO 15118 标准的高级通信
- 继电器控制和安全功能 - 包括集成式温度监测
- 多种通信接口 - 支持控制器局域网 (CAN)、RS-485、RS-232 和以太网，用于控制电源转换单元、外部计量器件、外设和网络
- 显示人机界面 (HMI) 支持
 - TMD62LEVM 上的显示串行接口 (DSI) 连接器可用于实现 HMI 集成

应用

- [电动汽车充电站 HMI 模块](#)
- [交流充电 \(桩\) 站](#)



AM62L-EVSE-DEV-EVM

1 评估模块概述

1.1 简介

AM62L-EVSE-DEV-EVM 是 AM62L 的 TI-EVSE 开发平台的一部分，代表采用开源软件栈的交流 and 直流充电站的通用充电控制器。完整的平台由三个独立部分组成：TMDS62LEVM、AM62L-EVSE-DEV-EVM 以及可选的 TIDA-010239。

TMDS62LEVM 作为主 CPU，在 Linux® 上运行 EVerest 开源软件充电软件栈，负责处理与电动汽车之间的数字通信。此外，EVM 支持以太网和无线连接，分别用于与后端或充电站点管理系统进行通信。如果需要，EVM 还可用于支持 HMI 显示器。

AM62L-EVSE-DEV-EVM 充当前端控制器，基于 MSPM0 微控制器。该设计控制和电动汽车进行的模拟握手以及一些安全功能，例如锁定充电插头和监测内部高压触点温度等。MSP 通过一种串行通信协议通用异步接收器/发送器 (UART) 与 AM62L 进行通信。

添加 TIDA-010239 以包含交流充电器。本参考设计使用具有备用电源的隔离式交流/直流电源（适用于电网中断时）完善了该平台。TIDA-010239 包含高压接触器和驱动器，用于将电动汽车连接到电网。此外，TIDA-010239 还检测继电器是否焊接。

充电控制器的主要功能是将充电所需的所有系统连接在一起，并处理这些系统与电动汽车之间的通信。与电动汽车之间的通信始终通过模拟握手完成。具体要求因不同的充电标准而异。AM62L-EVSE-DEV-EVM 提供的电路支持以下标准：联合充电系统 1 和 2 (CCS1 CCS2)、北美充电标准 (NACS)、中国国标/推荐标准 (GB/T) 以及日本电动汽车快速充电标准 (CHAdeMO)。

除了模拟握手外，直流充电还需要第二种高级通信。在这种情况下，并非电动汽车的车载充电器 (OBC) 而是 EVSE 用作充电器，并且需检测需要哪个电压水平和电流限制才能安全为电动汽车电池充电。用于 CCS1、CCS2 和 NACS 的 ISO15118 标准规定了通过将 HomePlug Green PHY (HPGP) 作为物理层进行的电力线通信，而 GB/T 和 CHAdeMO 使用 CAN 进行此类通信。因此，AM62L-EVSE-DEV-EVM 包括 HPGP 和一个专用 CAN 收发器。由于处理器处理数字通信，这两个元件都连接到 AM62L。

充电标准要求的其他安全功能要么包含在 AM62L-EVSE-DEV-EVM 中，要么可以通过外部 TIDA 参考设计添加。板载安全功能包括对充电电缆中的触点进行温度监测，还包括用于控制电动锁定机构的电路，该机构旨在防止在充电周期内移除电缆。AM62L-EVSE-DEV-EVM 还包括用于外部剩余电流检测 (RCD) 器件的连接，由 TIDA-010237 提供。为了能够连接更多器件进行测试（例如安全开关）或者控制状态 LED，AM62L-EVSE-DEV-EVM 支持两个数字输入（可耐受 24V 电压）、一个模拟输入 (0V - 12V) 和三个数字输出（低侧开关）。

为了实现与能量计和电源模块等外设的通信，AM62L-EVSE-DEV-EVM 支持适用于 RS-485、RS-232 和 CAN 的收发器。

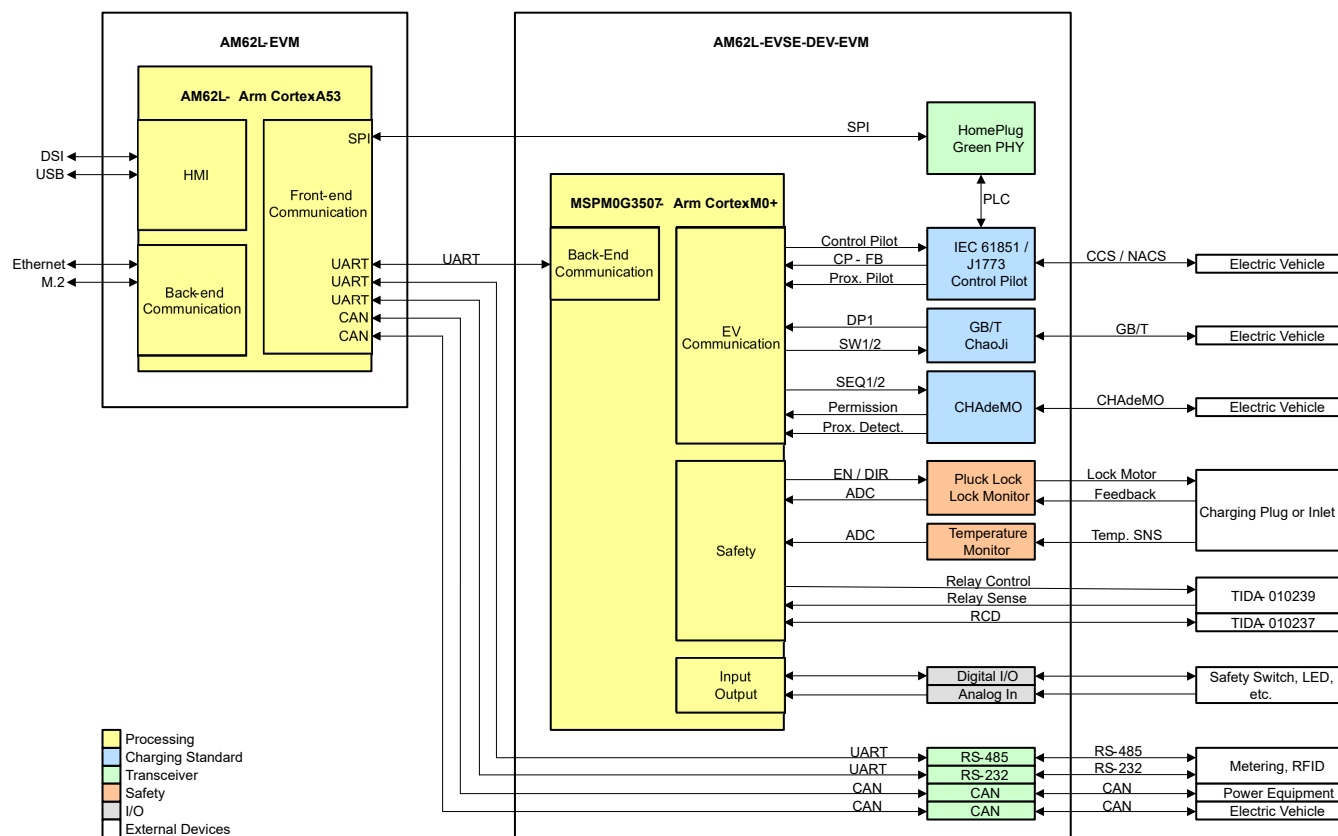
1.2 套件内容

该软件包包括：

- AM62L-EVSE-DEV-EVM
- USB 2.0 电缆 (A 公型转 C 公型)
- EVM 用户指南手册
- EVM 免责声明和标准条款

1.3 规格

AM62L-EVSE-DEV-EVM 方框图 展示了 AM62L-EVSE-DEV-EVM 的功能方框图。



AM62L-EVSE-DEV-EVM 方框图

1.4 器件信息

1.4.1 MSPM0G3507

MSPM0G3507 微控制器 (MCU) 属于 MSP 高度集成的超低功耗 32 位 MCU 系列，该 MCU 系列基于增强型 Arm® Cortex®-M0+ 32 位内核平台，工作频率最高可达 80MHz。

这些成本优化型 MCU 集成了高性能模拟外设，其中包括两个同步采样 12 位 4 Msps 模数转换器 (ADC)，该 ADC 具有多达 17 个外部通道，用于测量控制引导和温度传感器等信号。借助两个 16 位高级控制计时器和五个通用计时器，MCU 可以精确调度 ADC 读取，以在给定的稳定时间后对 PWM 信号的高低相位进行采样，从而精确测量控制引导波形。这些计时器还用于生成 PWM 输出，以便驱动继电器并控制锁定执行器的时序。集成 CRC 模块可加快循环冗余校验计算，此计算用于验证通过 UART 接口从 AM62L MPU 接收的数据包的完整性。

1.4.2 AM62L

低成本并且性能经过优化的 AM62L 系列应用处理器专为 Linux® 应用开发而构建。这些器件基于可扩展的 Arm® Cortex®-A53 内核，提供多媒体 DSI/DPI 支持、双路千兆位以太网、高级低功耗管理模式、以及丰富的具有内置安全功能的 IP 保护安全选项。

AM62Lx 系列器件包含大量外设，非常适合各种工业和电动汽车充电应用，同时还提供智能功能和优化的电源架构。此外，AM62Lx 中包含大量外设，可实现系统级连接，例如：CANFD、USB、MMC/SD、OSPI 和 ADC。

2 硬件

2.1 其他图像

图 2-1 所示为 AM62L-EVSE-DEV-EVM 电路板顶面带标注的示意图。

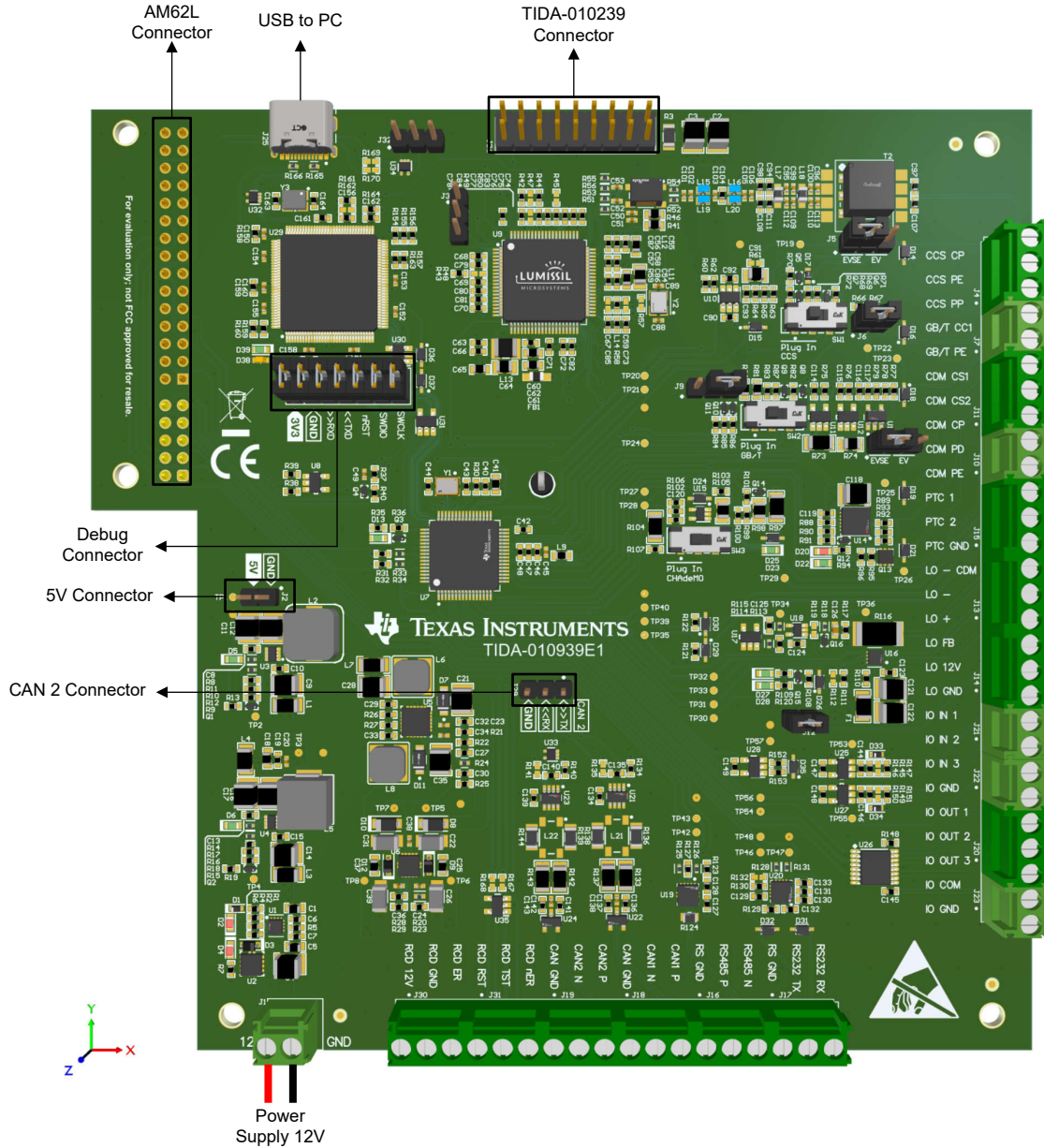


图 2-1. AM62L-EVSE-DEV-EVM 顶部

2.2 电源要求

AM62L-EVSE-DEV-EVM 设计可通过两种方式上电：

1. 外部 12V 电源。
 - a. AM62L-EVSE-DEV-EVM 可由连接在螺纹端子 J1 处的单个 12V 外部电压轨供电。
 - b. 与 TIDA-010239 配合使用时，这两个电路板均可由 AM62L-EVSE-DEV-EVM 外部 12V 输入供电。这样一来，无需单相或三相高压输入，即可为整个系统供电。

外部电源或电源配件要求：

标称输出电压：12V 直流 (10.8V - 13.2V)

最大输出电流：5A 效率等级 V

备注

TI 建议使用符合适用地区安全标准 (如 UL、CSA、VDE、CCC 和 PSE 等) 的外部电源或电源配件。

2. 通过 TIDA-010239 电路板由单相或三相高压输入供电
 - a. 在这种情况下，TIDA-010239 上的隔离式交流/直流功率级可为 AM62L-EVSE-DEV-EVM 提供必要的电源。
 - b. 当 AM62L-EVSE-DEV-EVM 连接到 TIDA-010239 并由电网电压供电时，请勿向其提供外部 12V 输入，否则可能会对系统造成损坏。

2.3 设置

设置 AM62L-EVSE-DEV-EVM 时需具备以下各项：

- 12V 辅助电源 (10.08V - 13.2V , 5A)
- TMD562LEVM
- USB 2.0 Type-C® 电缆
- TIDA-010239 (可选)
- TIDA-010237 (可选)

2.4 连接器、引脚接头和跳线设置

表 2-1 列出了 AM62L-EVSE-DEV-EVM 的接头名称和跳线设置。表 2-2 显示了螺纹端子的引脚排列。

表 2-1. 接头名称和跳线设置

指示符	功能	注释
J2	5V 连接器	5V 输出
J3	Lumissil 调试接头	用于 Lumissil IS31CG5317-LQLS3 的 UART 连接 • 引脚 1：UART RX • 引脚 2：GND • 引脚 3：UART TX
J5	CCS 配置	将 CCS 硬件以太网配置为 EVSE 或电动汽车，以进行背对背测试 • 引脚 1 和 2：EVSE • 引脚 2 和 3：EV
J6	CCS 接近引导接头	在 1 类、NACS 和 2 类插头之间配置 PP • 组装：2 类 • 未组装：1 类、NACS
J8	GB/T 配置接头	将 GB/T 硬件以太网配置为 EVSE 或电动汽车，以进行背对背测试 • 引脚 1 和 2：EVSE • 引脚 2 和 3：EV

表 2-1. 接头名称和跳线设置 (续)

指示符	功能	注释
J9	GB/T - ChaoJi 测试设置选择接头	为 GB/T 或 ChaoJi 配置 GB/T 测试硬件以太网 - 引脚 1 和 2 : ChaoJi 标准 - 引脚 2 和 3 : GB/T
J12	插头锁定模式设置	配置 DRV8220 的控制模式。必须在器件启动之前设置。 - 组装 : PH/EN 模式 - 未组装 : 半桥模式
J24	MSP 调试接头	用于连接或断开板载 XDS110 调试探针的接头。移除跳线可将外部调试探针连接到 MSPM0。 - 引脚 1 : 3.3V - 引脚 2 : 3.3V - 引脚 3 : GND - 引脚 4 : GND - 引脚 5 : MSPM0 PA9 (55) - UART1 RX - 引脚 6 : XDS110 - TXD - 引脚 7 : MSPM0 PA8 (54) - UART1 TX - 引脚 8 : XDS110 - RXD - 引脚 9 : MSPM0 nRST (38) - 引脚 10 : XDS110 复位输出 - 引脚 11 : MSPM0 PA19 (12) - SWDIO - 引脚 12 : XDS110 TMS SWDIO - 引脚 13 : MSPM0 PA20 (13) - SWCLK - 引脚 14 : XDS110 TCK SWDCLK
J29	CAN 2 接头	从 AM62L 到 TCAN 器件的 CAN 输入端 - 引脚 1 : CAN TX - 引脚 2 : CAN RX - 引脚 3 : GND
J32	I2C 接头	连接到 AM62L 以便可以进行 I2C 通信 - 引脚 1 : I2C SCL - 引脚 2 : I2C SDA - 引脚 3 : GND

表 2-2. 螺纹端子引脚排列

指示符	功能	注释
J1	辅助电源输入	外部 12V 输入 (10.08V - 13.2V , 5A)
J4	CCS、NACS	连接到 CCS 或 NACS 的充电插头 - 引脚 1 : CCS PP - 接近引导 - 引脚 2 : CCS PE - 保护性接地 - 引脚 3 : CCS CP - 控制引导
J7	GB/T、ChaoJi	连接到 GB/T 或 ChaoJi 的充电插头 - 引脚 1 : GBT PE - 保护性接地 - 引脚 2 : GBT CC1 - 充电确认 1
J10	CHAdemo	连接到 CHAdemo 的充电插头 - 引脚 1 : CDM PE - 保护性接地 - 引脚 2 : CDM PD - 接近检测

表 2-2. 螺纹端子引脚排列 (续)

指示符	功能	注释
J11	CHAdEMO	连接到 CHAdEMO 的充电插头 - 引脚 1 : CDM CP - 车辆充电授权 - 引脚 2 : CDM CS2 - 充电序列 2 - 引脚 3 : CDM CS1 - 充电序列 1
J13	插头锁定	连接到充电插口或插头 - 引脚 1 : LO+ 锁定马达正极端子 - 引脚 2 : LO- 锁定马达负极端子 - 引脚 3 : LO- CDM - CHAdEMO 锁定负极端子
J14	插头锁定反馈	连接到充电插口或插头 - 引脚 1 : LO GND - 反馈接地 - 引脚 2 : LO 12V - 反馈的 12V 电源 - 引脚 3 : LO FB - 反馈输入
J15	温度检测	连接到充电插口或插头 - 引脚 1 : PTC GND - 温度传感器的接地端 - 引脚 2 : PTC 2 - 温度传感器 2 的输入 - 引脚 3 : PTC 1 - 温度传感器 1 的输入
J16	RS-485	RS-485 连接器 - 引脚 1 : RS GND - 接地 - 引脚 2 : RS485 P - 总线 I/O 端口, A - 引脚 3 : RS485 N - 总线 I/O 端口, B
J17	RS-232	RS-232 连接器 - 引脚 1 : RS 接地 - 引脚 2 : RS232 TX - RS232 线路数据输出 - 引脚 3 : RS232 RX - RS232 线路数据输入
J18	CAN 1	CAN 1 连接器 - 引脚 1 : CAN 接地 - 引脚 2 : CAN 1 N - 低电平 CAN 总线 I/O - 引脚 3 : CAN 1 P - 高电平 CAN 总线 I/O
J19	CAN 2	CAN 2 连接器 - 引脚 1 : CAN 接地 - 引脚 2 : CAN 2 N - 低电平 CAN 总线 I/O - 引脚 3 : CAN 2 P - 高电平 CAN 总线 I/O
J20	数字输出	数字输出连接器 - 引脚 1 : IO OUT 3 - 数字输出 3 - 引脚 2 : IO OUT 2 - 数字输出 2 - 引脚 3 : IO OUT 1 - 数字输出 1
J21	数字输入	数字输入连接器 : - 引脚 1 : IO IN 2 - 数字输入 2 - 引脚 2 : IO IN 1 - 数字输入 1
J22	模拟输入	模拟输入连接器 - 引脚 1 : IO GND - 接地 - 引脚 2 : IO IN 3 - 模拟输入

表 2-2. 螺纹端子引脚排列 (续)

指示符	功能	注释
J23	数字输出	数字输出连接器 - 引脚 1 : IO GND - 接地 - 引脚 2 : IO COM - 电源输入
J30	RCD 输入	RCD 输入连接器 - 引脚 1 : RCD 12V - 用于 RCD 的 12V 输出 - 引脚 2 : RCD GND - 接地 - 引脚 3 : RCD ER - 误差输入
J31	RCD 输入	RCD 输入连接器 - 引脚 1 : RCD RST - 复位输出 - 引脚 2 : RCD TST - 测试输出 - 引脚 3 : RCD nER - 负主动误差输入

2.5 接口

2.5.1 RS-485

THVD2429 是一款具有集成浪涌保护功能的 3V 至 5.5V、20Mbps、半双工 RS-485 收发器。浪涌保护是通过在封装中集成瞬态电压抑制器 (TVS) 二极管实现的。此功能提高了可靠性,可以更好地抵抗耦合到数据电缆的噪声瞬变,而无需外部保护元件。此系列器件具有宽共模电压范围,是长线缆上的多点应用的理想之选。

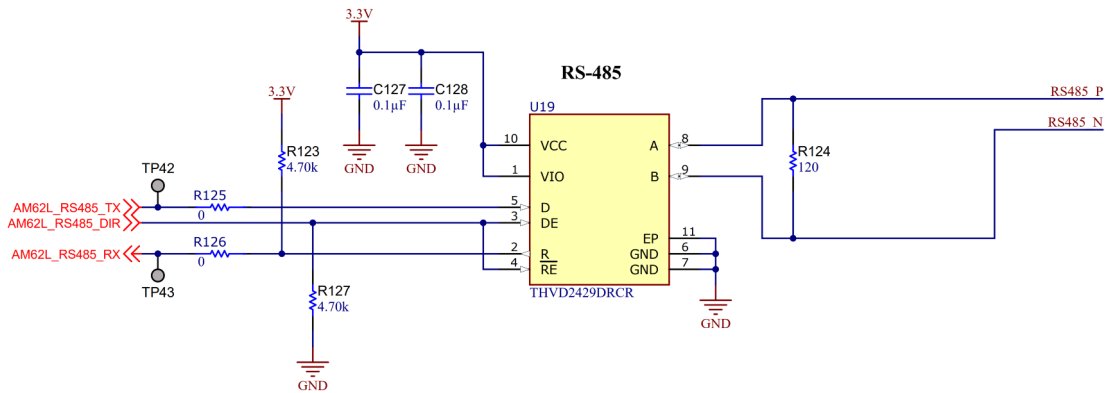


图 2-2. RS-485 电路

2.5.2 RS-232

为了正确对接 RS-232 标准,需要一个电压转换系统,用于在电路板上的 3.3V 域与端口的 12V 之间进行转换。为了方便转换,本设计使用了 TRSF3221E 器件。TRSF3221E 器件能够通过电荷泵系统,仅从 3.3V DVCC 驱动 RS-232 端口上的更高电压信号。TRSF3221E 包含一个线路驱动器、一个线路接收器和一个具有引脚对引脚 (串行端口连接引脚,包括 GND) $\pm 15\text{kV}$ IEC ESD 保护功能的双电荷泵电路。电荷泵和四个小型外部电容器支持由单个 3V 至 5.5V 电源供电。TRSF3221E 以高达 1Mbit/s 的数据信号传输速率运行,驱动器输出压摆率为 $24\text{V}/\mu\text{s}$ 至 $150\text{V}/\mu\text{s}$ 。

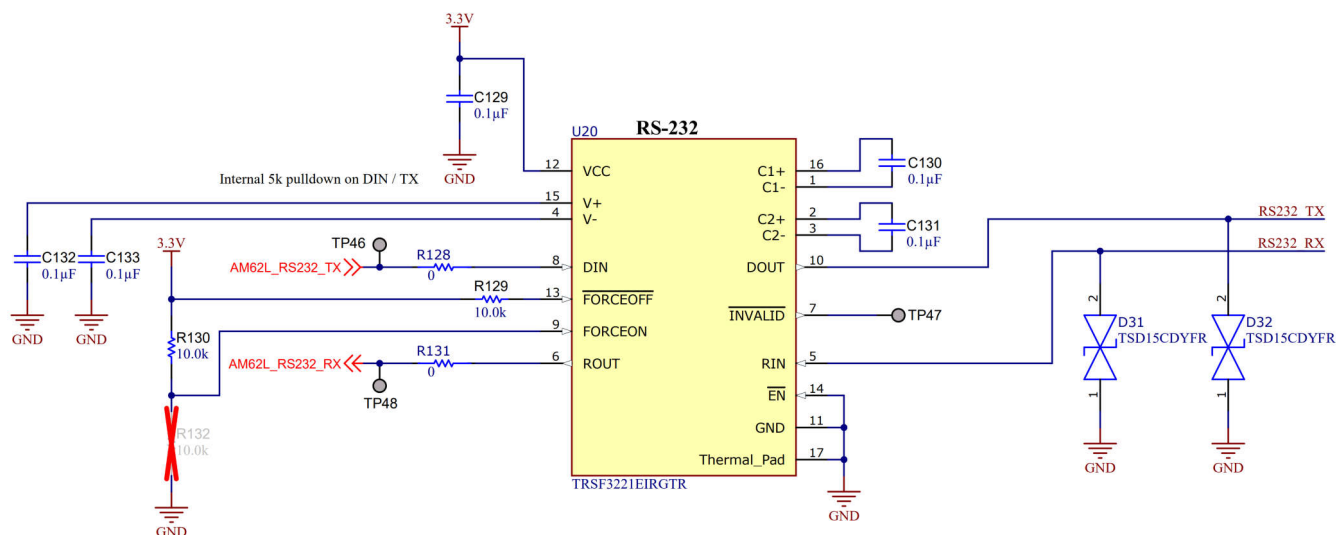


图 2-3. RS-232 电路

2.5.3 CAN

AM62L-EVSE-DEV-EVM 提供两个控制器局域网收发器 TCAN1044A-Q1。该器件是一款高速 CAN 收发器，符合 ISO 11898-2:2016 高速 CAN 规范的物理层要求。此类收发器具有经过认证的电磁兼容性 (EMC)，是传统 CAN 和 CAN FD (数据速率高达 5 兆位/秒 (Mbps)) 网络的理想选择。此外，该收发器还包含热关断 (TSD)、TXD 显性超时 (DTO)、电源欠压检测和 $\pm 58V$ 的总线故障保护功能。

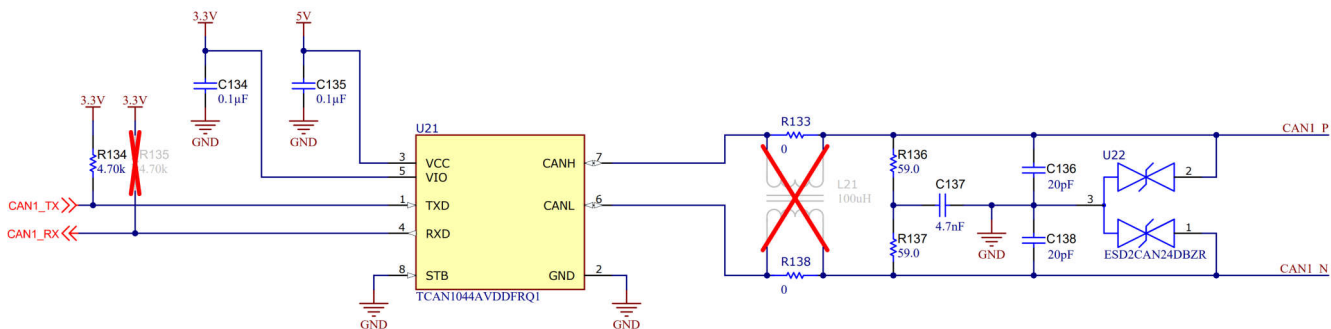


图 2-4. CAN 电路

两个收发器都有采用拆分配置的 120Ω 端接，从而创建一个用于总线上共模信号的低通电阻电容 (RC) 滤波器。这种拆分端接方案既可以滤除总线上收发器引起的共模波动，也可以滤除耦合到总线上的外部噪声引起的共模波动。

充电标准 GB/T 以及 CHAdeMO 将 CAN 定义为在非车载传导式充电器和电动汽车 (EV) 电池管理系统 (BMS) 之间进行数字通信的物理层。这两种协议都使用电动汽车和充电站之间的专用 CAN 连接 (2.0B 版)，并且充电器和车辆都配备了标称电阻为 120Ω 的端接电阻器。根据建议的国家标准 GB/T 27930，通信速率为 250kbps，而 CHAdeMO 使用 500kbps 的默认转换速率。

2.6 调试信息 - XDS110 调试探针

为了简化开发，AM62L-EVSE-DEV-EVM 集成了板载调试探针，因而不需额外的编程器。AM62L-EVSE-DEV-EVM 具有 XDS110 调试探针，这是一款简单且成本很低的调试器，支持所有 MSPM0 器件衍生产品。XDS110 还提供与主机的反向通道 UART-over-USB 连接，这在调试过程中非常有用，并且有助于轻松地与 PC 进行通信。

利用跳线 J24 处的跳线块，用户可以连接或断开 XDS110 和 MSPM0G3507 之间的信号。这包括 XDS110 SWD 信号、应用 UART 信号以及 3.3V 电源。

可以移除跳线，从而：

- 释放目标 MCU 引脚，用于除板载调试和应用 UART 通信以外的其他目的
- 释放 XDS110 的编程和 UART 接口，使其可用于板载 MCU 以外的器件
- 使用 3.3V 电压为外部器件供电

2.6.1 应用 (或反向通道) UART

反向通道 UART 可实现与 USB 主机进行通信 (不属于目标应用的主要功能)。这在开发过程中非常实用，而且还能提供与 PC 主机侧进行通信的通道。

反向通道 UART 是 MSPM0 上的 UART1 (PA8、PA9) 上的 UART。在主机侧，当 AM62L-EVSE-DEV-EVM 在主机上进行枚举时，将生成一个用于应用反向通道 UART 的虚拟 COM 端口。可以使用任何与 COM 端口连接的 PC 应用程序 (包括 Hyperterminal® 或 Docklight 等终端应用程序) 来打开该端口并与目标应用程序通信。识别用于反向通道的 COM 端口。在 Microsoft® Windows® PC 上，使用 *设备管理器* 查找 COM 端口。

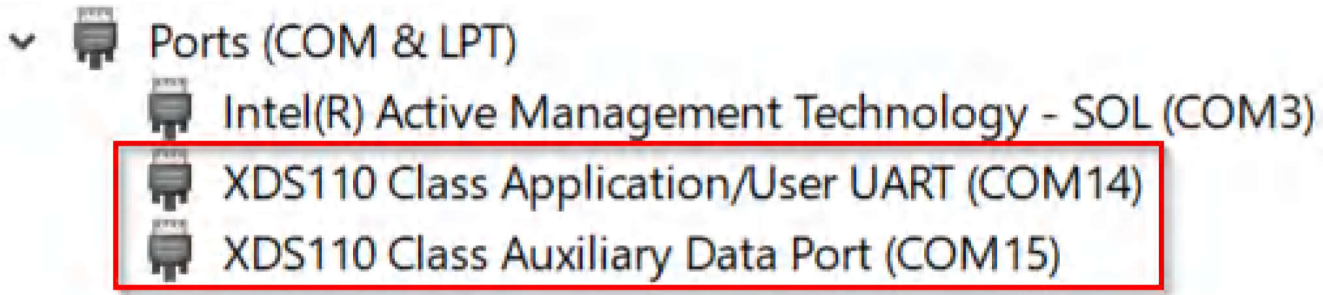


图 2-5. 设备管理器中的应用反向通道 UART

反向通道 UART 为 XDS110 Class Application/User UART 端口。此时，图 2-5 展示了 COM14，但该端口可能因主机 PC 而异。确定了正确的 COM 端口后，请根据文档在主机应用中配置该端口。然后，用户可以打开该端口并开始与主机进行通信。

在目标 MSPM0G3507 侧，反向通道连接到 UART1 模块。XDS110 具有可配置的波特率；因此，PC 应用程序配置的波特率务必与在 UART1 上配置的波特率相同。

2.6.2 使用外部调试探针代替板载 XDS110

许多用户都有自己青睐的外部调试探针，并且希望绕过 XDS110 调试探针来对 MSPM0 目标 MCU 进行编程。这可以通过连接器 J24 上的跳线来实现。

1. 拆下 J24 连接器上有关 JTAG 信号的跳线，包括 NRST、SWDIO 和 SWCLK。
2. 将任意 ARM 调试探针插入 J24。
3. 将 12V 外部电源插入 AM62L-EVSE-DEV-EVM 开发套件。
 - 通过 12V 电压或 TIDA-010239 为 AM62L-EVSE-DEV-EVM 供电时，确保 J24 连接器未连接 3.3V 电压。

2.7 组装说明

要将 AM62L-EVSE-DEV-EVM 连接到 TMDS62LEVM，请将 AM62L-EVSE-DEV-EVM 上的 J27 和 J28 连接到 TMDS62LEVM 上的 GPIO 扩展接头。

TMDS62LEVM 上的 GPIO 扩展信号与高清多媒体接口 (HDMI) 共享并默认路由至 HDMI。要支持 GPIO 扩展接头，必须重新配置 TMDS62LEVM。可以通过软件控制 SoC_VOUT0_FET_SEL0 和 SoC_VOUT0_FET_SEL1 信号并短接 EVM 上的 J29 跳线来切换信号路由。

EVM 需要专用 USB Type-C 电源 (5V、3A)。

请参阅 [AM62L 评估模块](#) 用户指南中的 *扩展接头* 部分。

3 实现结果

3.1 性能数据和结果

请参阅[电动汽车供电设备前端控制器参考设计](#)以获取测试结果。(请注意, TIDA-010939 与 AM62L-EVSE-DEV-EVM 等效。)

4 硬件设计文件

4.1 原理图

要下载原理图，请参阅[设计文件](#)页面。

4.2 PCB 布局

要下载 PCB 布局，请参阅[设计文件](#)页面。

4.3 物料清单 (BOM)

要下载 BOM，请参阅[设计文件](#)页面。

5 其他信息

5.1 商标

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6 相关文档

6.1 补充内容

1. 德州仪器 (TI) : [TMDS62LEVMM 设计文件包](#)
2. 德州仪器 (TI) : [AM62L-EVSE-DEV-EVM 设计文件包](#)
3. 德州仪器 (TI) : [电动汽车供电设备前端控制器参考设计](#) (请注意 , TIDA-010939 与 AM62L-EVSE-DEV-EVM 等效。)

7 修订历史记录

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

	Page
• 更新了下载链接。	1

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

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4.3.1 User shall operate the EVM within TI's recommended specifications and environmental considerations stated in the user guide, other available documentation provided by TI, and any other applicable requirements and employ reasonable and customary safeguards. Exceeding the specified performance ratings and specifications (including but not limited to input and output voltage, current, power, and environmental ranges) for the EVM may cause personal injury or death, or property damage. If there are questions concerning performance ratings and specifications, User should contact a TI field representative prior to connecting interface electronics including input power and intended loads. Any loads applied outside of the specified output range may also result in unintended and/or inaccurate operation and/or possible permanent damage to the EVM and/or interface electronics. Please consult the EVM user guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative. During normal operation, even with the inputs and outputs kept within the specified allowable ranges, some circuit components may have elevated case temperatures. These components include but are not limited to linear regulators, switching transistors, pass transistors, current sense resistors, and heat sinks, which can be identified using the information in the associated documentation. When working with the EVM, please be aware that the EVM may become very warm.

4.3.2 EVMs are intended solely for use by technically qualified, professional electronics experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems, and subsystems. User assumes all responsibility and liability for proper and safe handling and use of the EVM by User or its employees, affiliates, contractors or designees. User assumes all responsibility and liability to ensure that any interfaces (electronic and/or mechanical) between the EVM and any human body are designed with suitable isolation and means to safely limit accessible leakage currents to minimize the risk of electrical shock hazard. User assumes all responsibility and liability for any improper or unsafe handling or use of the EVM by User or its employees, affiliates, contractors or designees.

4.4 User assumes all responsibility and liability to determine whether the EVM is subject to any applicable international, federal, state, or local laws and regulations related to User's handling and use of the EVM and, if applicable, User assumes all responsibility and liability for compliance in all respects with such laws and regulations. User assumes all responsibility and liability for proper disposal and recycling of the EVM consistent with all applicable international, federal, state, and local requirements.

5. *Accuracy of Information:* To the extent TI provides information on the availability and function of EVMs, TI attempts to be as accurate as possible. However, TI does not warrant the accuracy of EVM descriptions, EVM availability or other information on its websites as accurate, complete, reliable, current, or error-free.

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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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