EVM User's Guide: AA-EVM-MB
音频放大器主板评估模块

说明

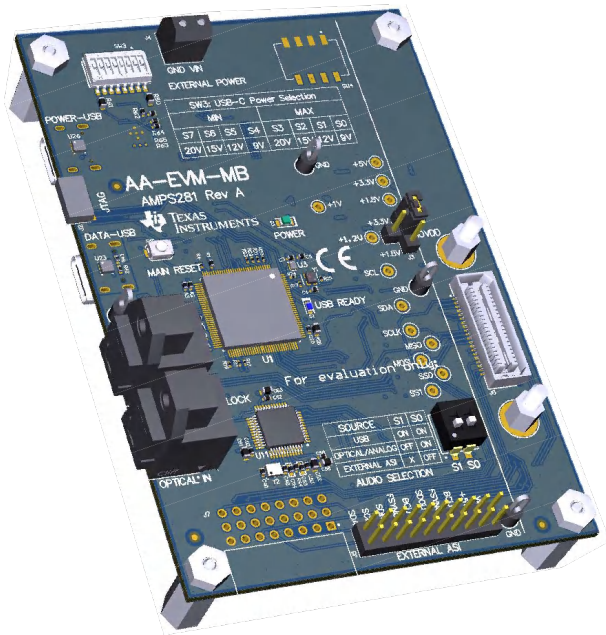
AA-EVM-MB 设计用于控制与德州仪器 (TI) 产品兼容的音频放大器 EVM。AA-EVM-MB 提供了一个 USB 接口，用于连接运行 PurePathConsole 软件的 PC，该接口同时也是一个标准 USB 音频接口。

开始使用

1. 申请访问并下载 PurePath Console 软件。

特性

- 使用 PurePath™ Console Windows® 软件的界面
- 符合 USB 音频类 (UAC2) 音频接口标准
- USB 转 I^2C 控制接口
- 提供外部 I^2C 和 I^2S/TDM 主机控制器连接
- 可选 USB-C PD 可调节电压输出，用于音频放大器测试



音频放大器 EVM 主板 – AA-EVM-MB

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1 评估模块概述

1.1 简介

AA-EVM-MB 是作为音频设备的主板平台而设计的。AA-EVM-MB 具有一个 USB 接口，可与 PurePath Console 软件配合使用。该电路板具有高度可配置性，支持 1.2V、1.8V 和 3.3V 逻辑电平下的各种数字输入。提供了一个 USB-C 电源接口，可用于为配套的音频放大器 EVM 供电。AA-EVM-MB 可与现有的 AC-MB 替代主板互换。

1.2 套件内容

该套件包含 AA-EVM-MB 电路板。EVM 包含：

- USB 数据接口
- 具有可选电压电平的 USB 电源接口
- 用于 $I^2C/I^2S/TDM$ 接口的外部 100mil 接头
- 硬件关断控制
- 光纤输入/输出音频接口
- 可选逻辑电压电平

音频放大器 EVM 单独出售，必须使用 J8 连接器连接到 AA-EVM-MB。务必遵循每个 EVM 用户指南中提供的具体说明。

同样，套件中不含电源。但是，任何具有表 2-1 中所述匹配供电能力的标准 USB-C 电源适配器均可用于为 EVM 供电，并且 J4 可用作输出，为配套的音频放大器 EVM 供电。

1.3 规格

表 1-1 列出了 AA-EVM-MB 的电源、输入和输出要求。

表 1-1. AA-EVM-MB 要求

添加列标题	添加列标题
POWER-USB/J6（仅当 J4 不用作输入时）	仅输入：根据 SW3，电压为 9V/12V/15V/20V，电流为 1A/3A
外部电源/J4	使用 POWER-USB J6 时作为输出 不使用 POWER-USB J6 时仅作为输入。支持 5V 至 20V
IOVDD	仅输出：3.3V / 1.8V / 1.2V
DATA-USB/J1	USB-C
外部 ASI/J5 连接器	引脚 3“+5V”上提供 5V 引脚 1“VIN”上提供与 J4 相同的电压

1.4 器件信息

AA-EVM-MB（音频放大器 EVM 主板）是一种可与 AC-MB（音频转换器主板）互换的硬件。两个电路板都提供 USB 转 TDM 和 USB 转 I^2C 控制接口。

AA-EVM-MB 设计为硬件升级版本，包含电源相关特性，旨在简化音频放大器评估，同时保持与 AC-MB 的向后兼容功能。AA-EVM-MB 上的 USB-C 电源输入可为配套 EVM 提供更高电压和电流选项。

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2 硬件

2.1 AA-EVM-MB 设置

2.1.1 音频串行接口设置

AA-EVM-MB 通过 USB、光学连接器和外部音频串行接口 (ASI) 接头向评估模块提供数字音频信号。图 2-1 展示了 AC-MB 上 ASI 布线的方框图。

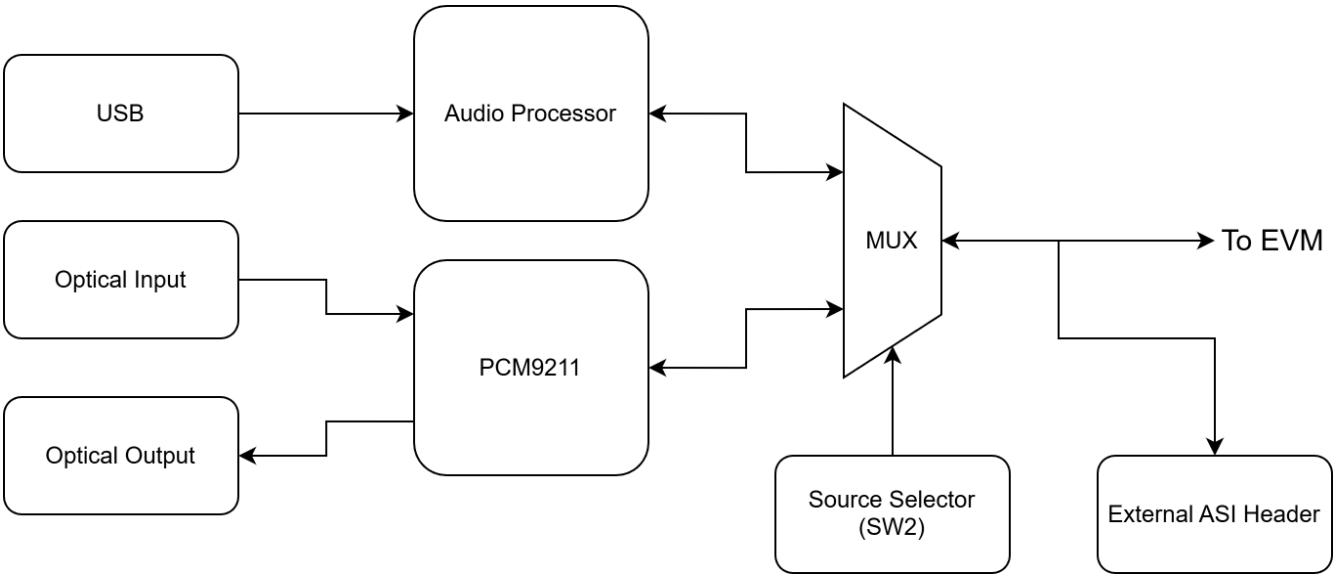


图 2-1. AA-EVM-MB 音频串行接口布线

AA-EVM-MB 上的开关 SW2 选择与 EVM 子板连接的音频串行总线。在开关 SW2 旁边，有一个 AA-EVM-MB 的快速参考表，用于识别音频串行接口源选项和开关设置。AA-EVM-MB 充当音频串行接口的控制器，具有三种不同的工作模式：USB、光学或外部 ASI。

2.1.2 USB 控制

串行接口时钟和数据由 USB 接口提供。采样率和格式由操作系统上的 USB 音频类驱动程序确定。USB 音频接口的默认设置为 32 位帧大小、48kHz 采样率、BCLK 和 FSYNC 比率为 256，格式为时分多路复用 (TDM)。

操作系统将 AA-EVM-MB 检测为音频器件，其名称为 *TI USB Audio UAC2.0*。图 2-2 展示了 USB 工作模式的 AA-EVM-MB 音频设置。

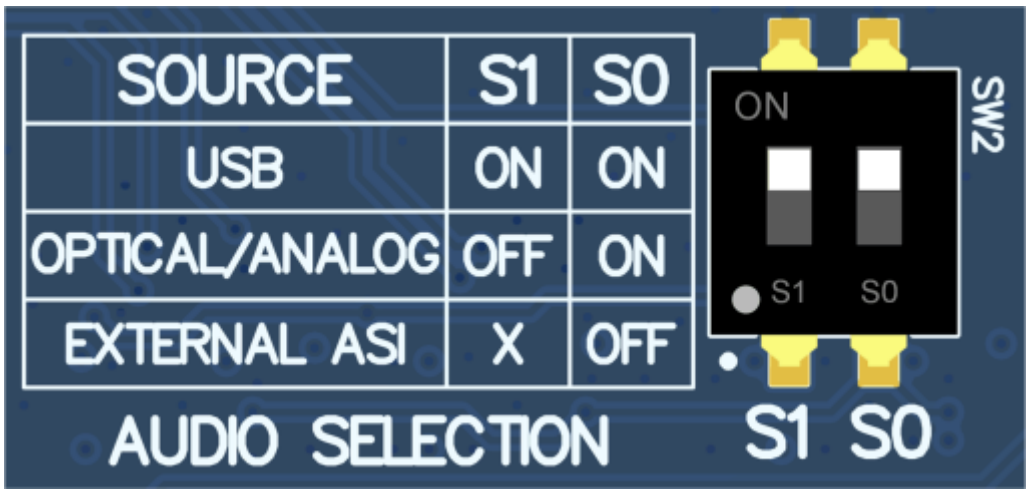


图 2-2. AA-EVM-MB USB 音频设置

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2.1.3 外部控制

在此模式下，评估板的音频串行接口时钟通过连接器 J5 从外部源提供。这一架构支持使用外部系统与评估板进行通信，此类外部系统包括不同的主机处理器或测试设备（例如，Audio Precision PSIA）。从 USB 接口和 PCM9211 生成的时钟使用此设置进行隔离。图 2-3 展示了外部工作模式下的 AC-MB 音频设置。

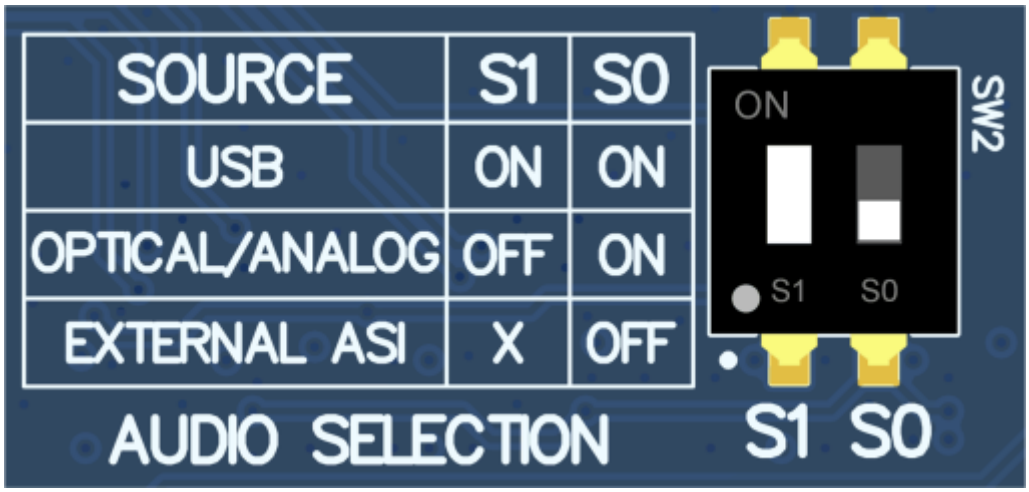


图 2-3. AC-MB 外部音频设置

图 2-4 展示了如何连接外部音频接口，底部一排为信号，顶部一排接地。

AA-EVM-MB 提供了重复的 BCLK 和 FSYNC 连接器，以便于连接到主机侧的发送器和接收器接口。如果只需要其中一个接口，另一个 BCLK 和 FSYNC 连接器可以悬空。

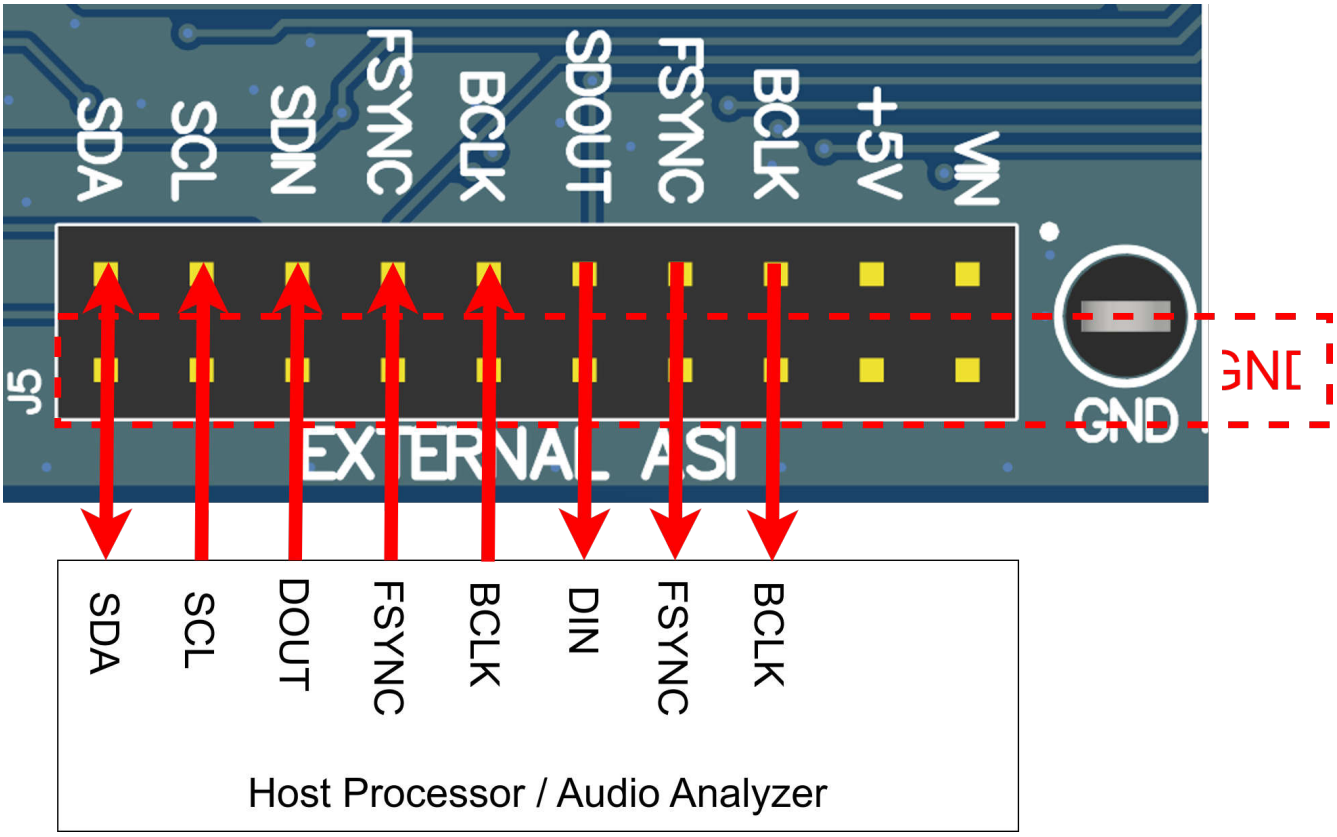


图 2-4. AA-EVM-MB 与外部音频串行接口的连接

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2.2 AA-EVM-MB 电源

AA-EVM-MB 主板具有两个 USB-C 端口，一个用作与主机 PC 的数据接口，另一个用于为电路板供电以及为 EVM 测试提供可选输出电压。

请注意，两个 USB-C 连接器都必须使用，因为仅数据端口不能用于为电路板供电。

连接一个能够在通过 SW3 选择的电压下提供 3A 电流的 USB-C 电源适配器，支持的组合示例如表 2-1 所示。

表 2-1. USB-C 电源适配器要求

SW3 MIN 设置	电压/电流	电源适配器要求
9V	9V/1A - 3A	⩾ 30W
12V	12V/1A - 3A	⩾ 35W
15V	15V/ 1A - 3A	⩾ 45W
20V	20V/1A - 3A	⩾ 60W

AA-EVM-MB 集成了不同的低压降稳压器 (LDO)，为主板的不同模块提供所需的电源。图 2-5 展示了描述 AA-EVM-MB 电源结构的方框图。

SW3 选择的电压可用于通过 J4 螺丝端子为外部电路板（例如 EVM）供电。或者，如果没有 USB-C 电源适配器，同一个 J4 可用于为 AA-EVM-MB 主电源供电。J4 支持 5V 至 20V 的电压范围。*如果使用了 USB-C 适配器，请勿向 J4 提供外部电压。*

提供给评估模块的数字信号的 IOVDD 电压由主板从主电源生成。可用的电压电平为 1.2V、1.8V 和 3.3V，可通过 J3 接头 IOVDD 进行选择。

当主板完全通电且板载 LDO 的电源正常时，绿色电源 LED (D3) 亮起。USB 就绪 LED 指示 AA-EVM-MB 和主机之间已成功建立 USB 通信。

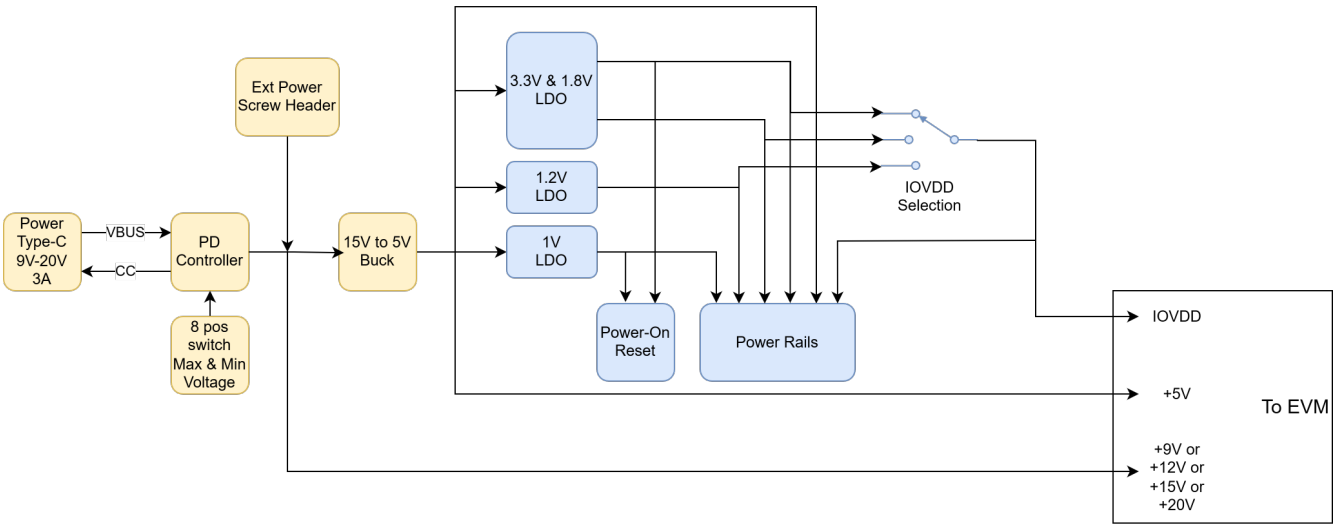


图 2-5. AA-EVM-MB 的电源分配

2.3 AA-EVM-MB 上的默认跳线和开关设置

图 2-6 展示了 AA-EVM-MB 的所有默认跳线设置。

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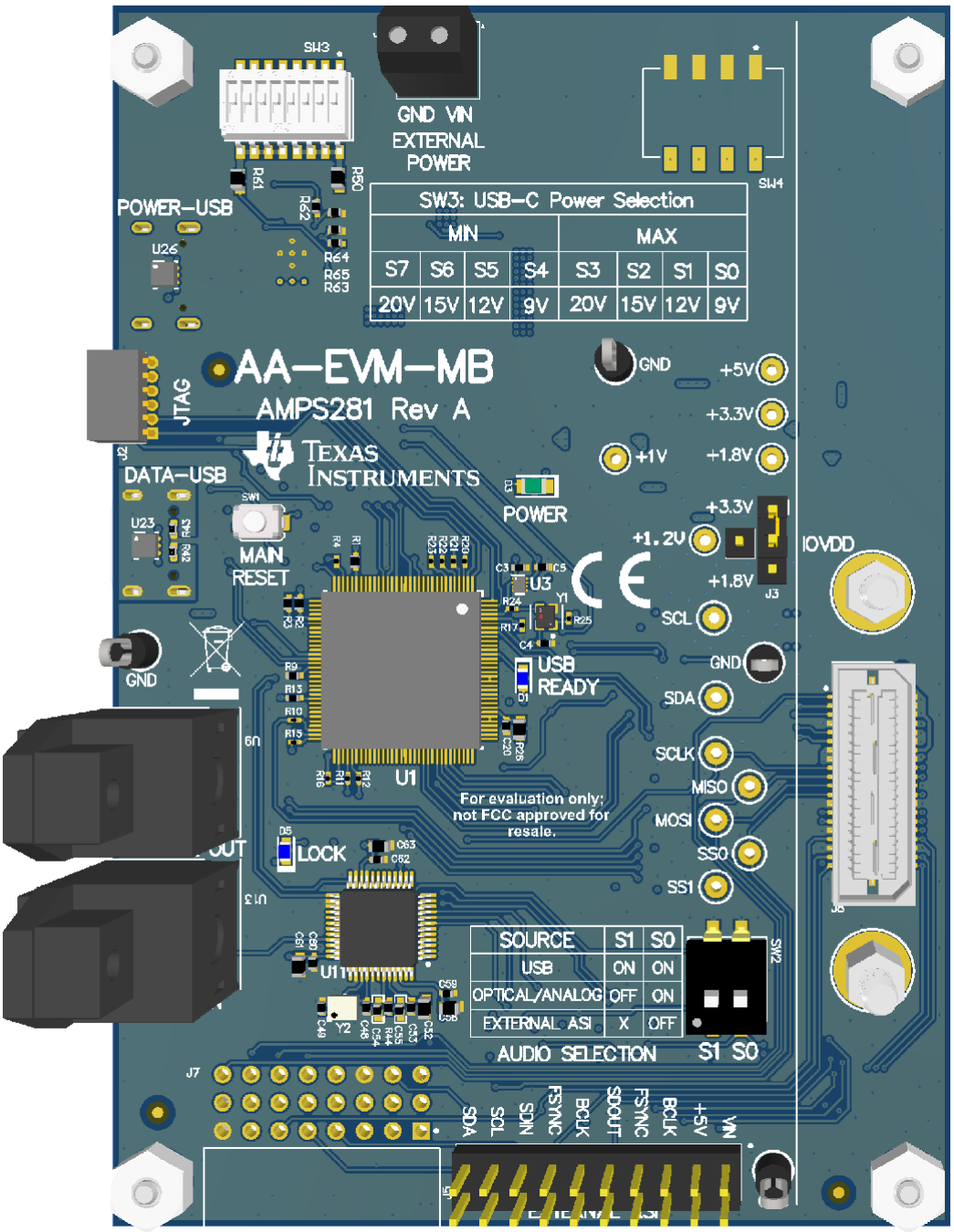


图 2-6. 默认跳线设置

表 2-2 展示了 AA-EVM-MB 上所有跳线的默认位置。

表 2-2. 默认跳线设置

跳线	设置	说明
J3	3.3V	板载 TDM/I²S 和 I²C 信号的 IOVDD 选择。IOVDD 也会馈送到 EVM。
SW2	开-开	ASI (TDM/I²S) 源选择。
SW3	9V-MIN – 9V-MAX	电源 USB-C 电压选择。9V/9V，兼容 30W USB-C 适配器。

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3 硬件设计文件

3.1 原理图

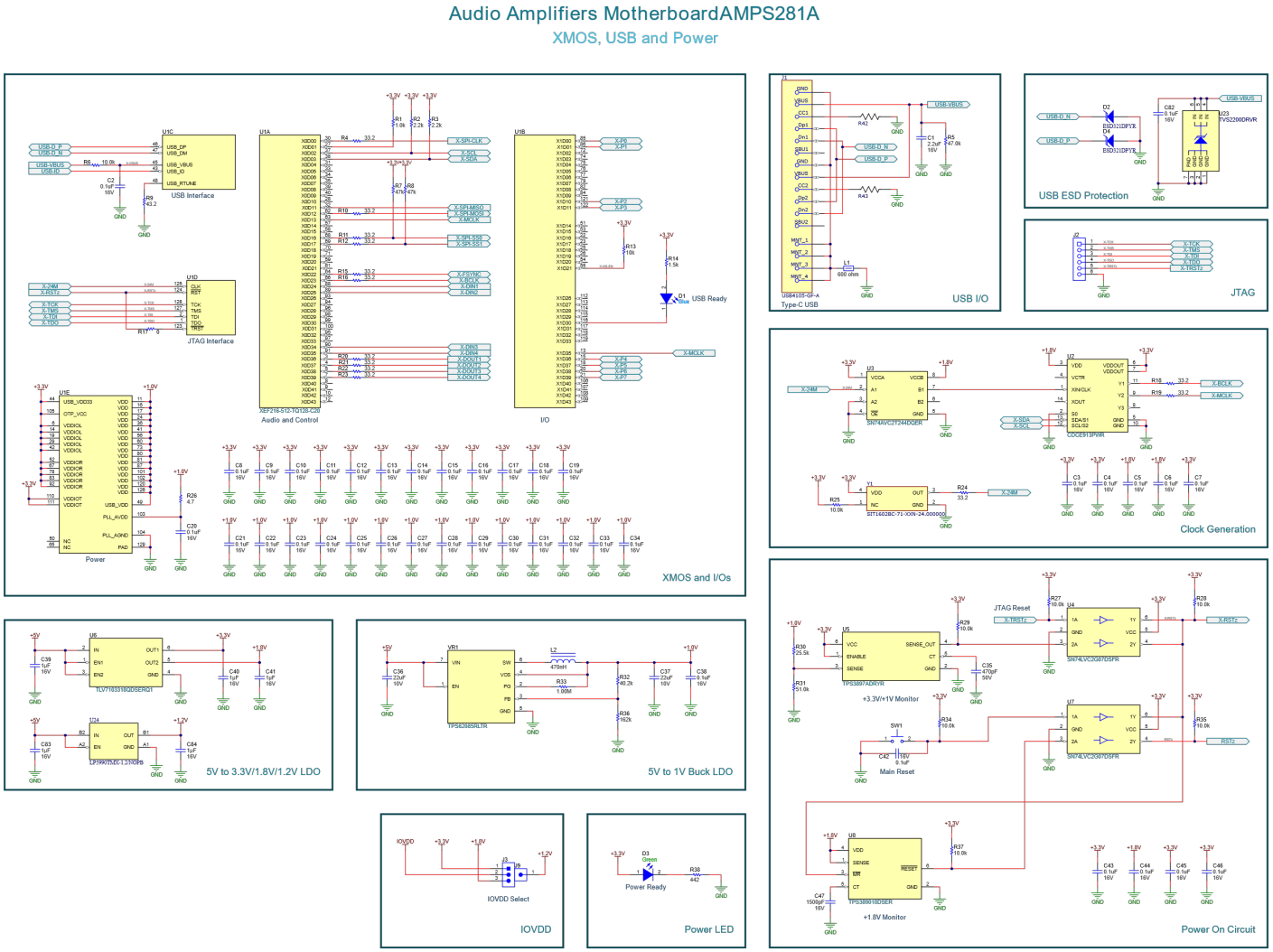


图 3-1. AA-EVM-MB 原理图（第 1 页，共 3 页）

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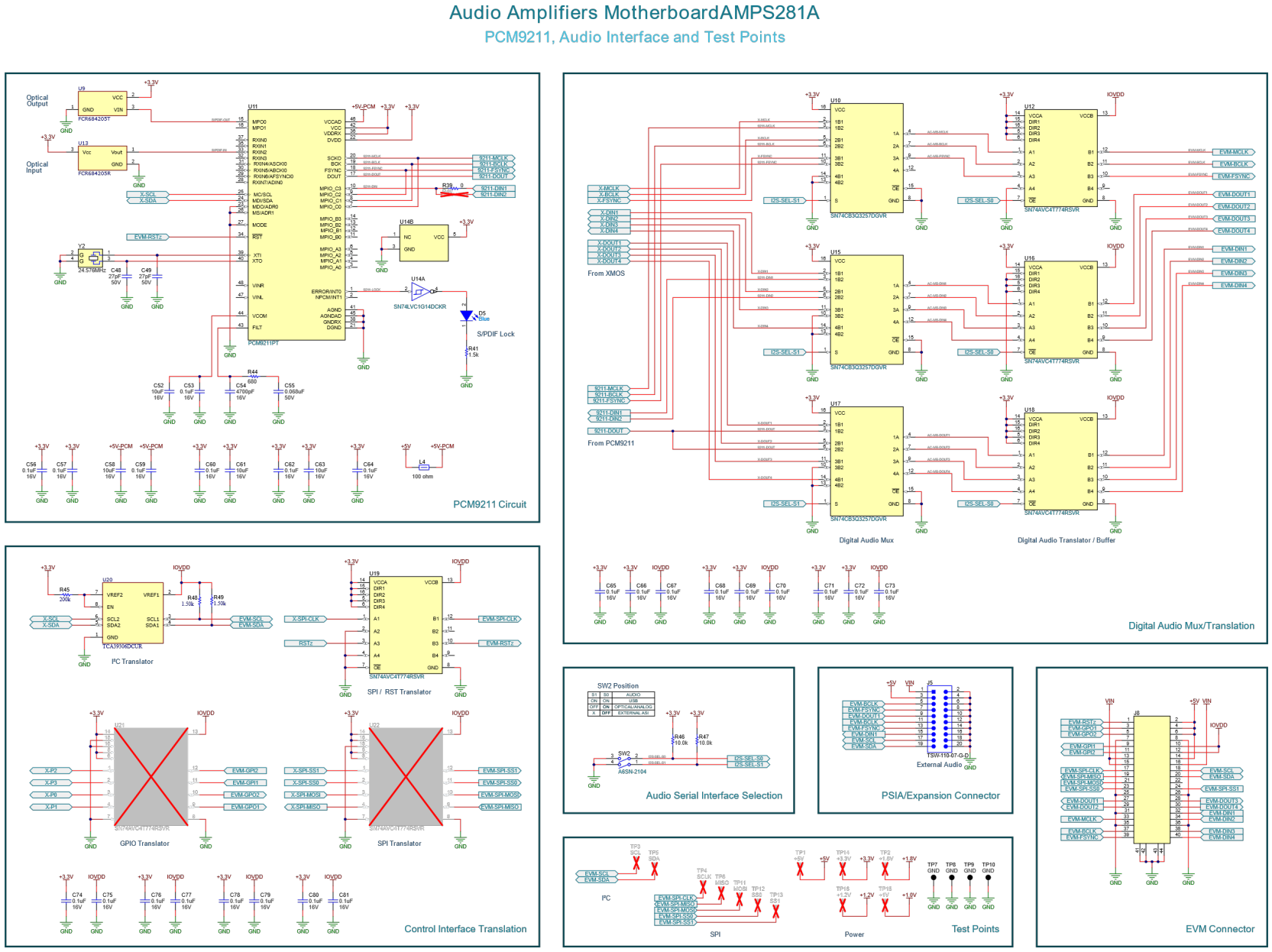


图 3-2. AA-EVM-MB 原理图（第 2 页，共 3 页）

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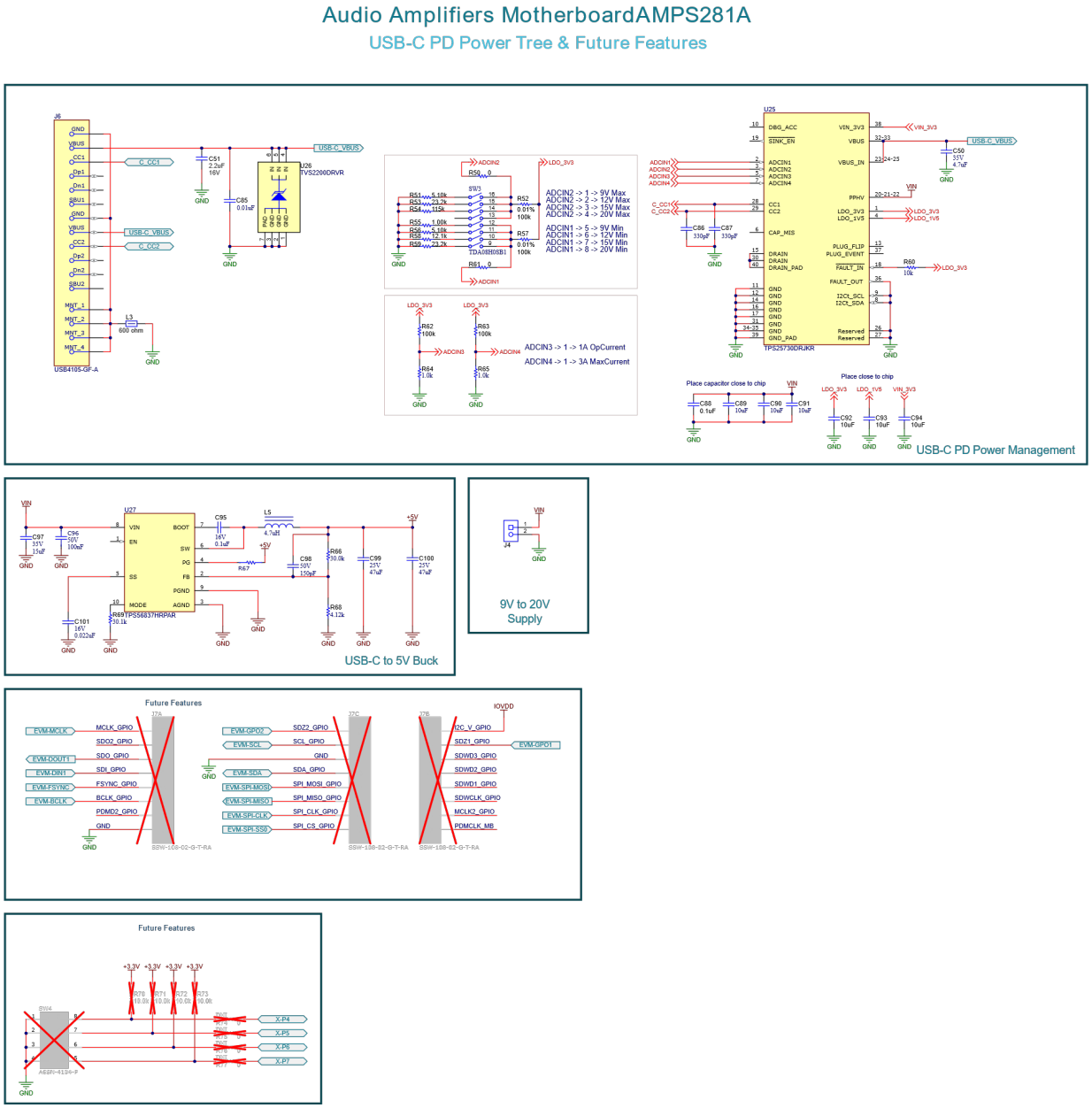


图 3-3. AA-EVM-MB 原理图（第 3 页，共 3 页）

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3.2 PCB 布局

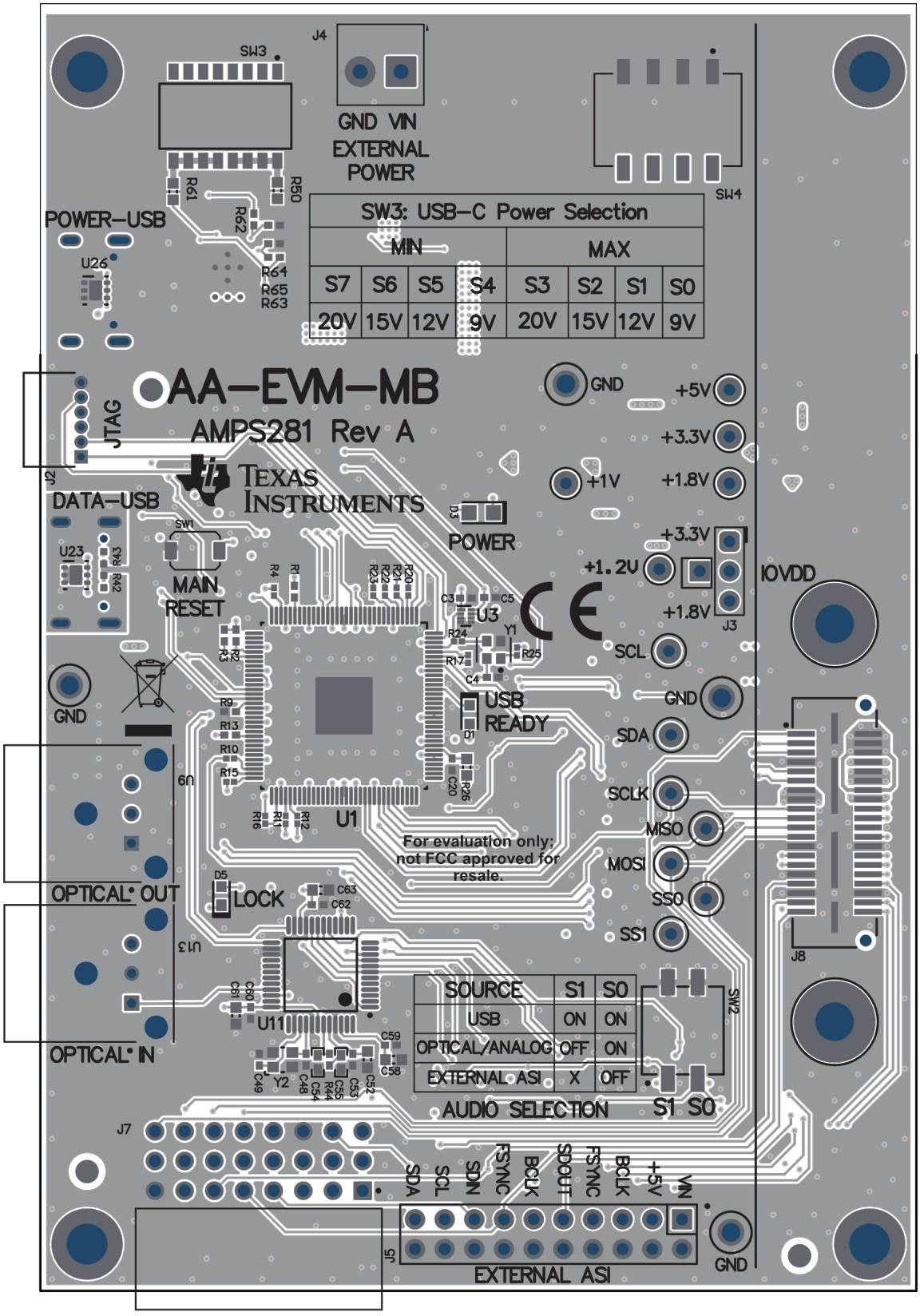


图 3-4. AA-EVM-MB 顶部复合图

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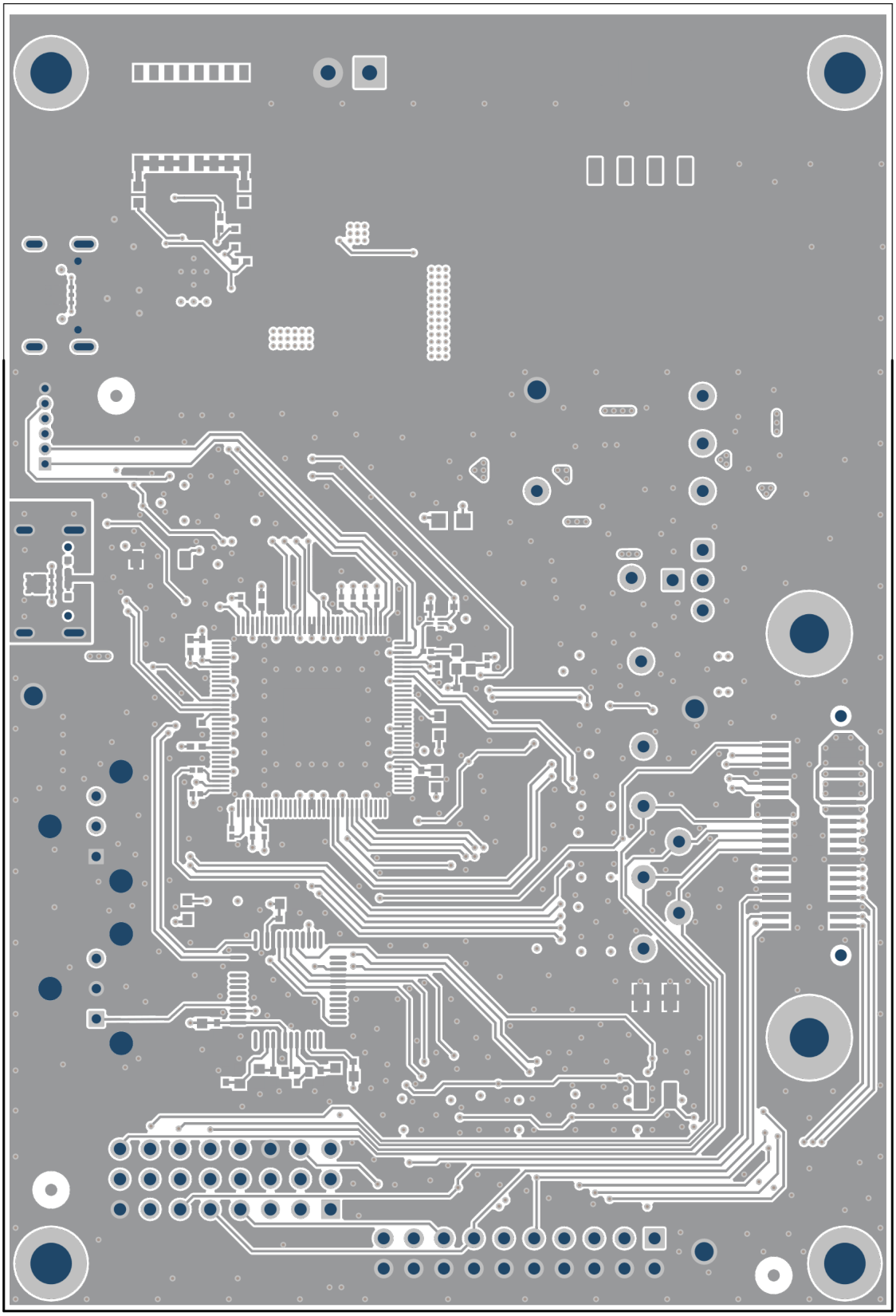


图 3-5. AA-EVM-MB 顶层

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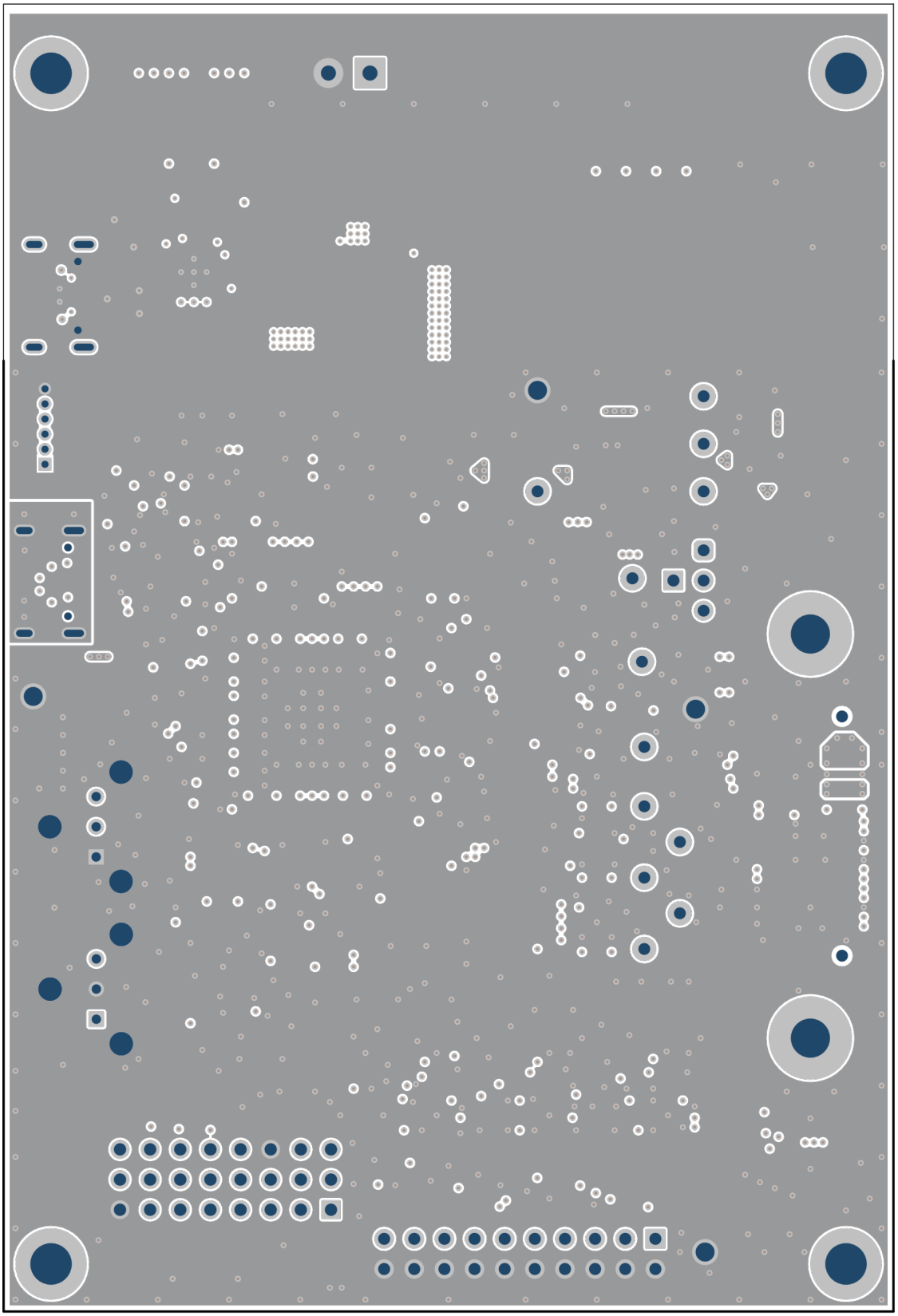


图 3-6. AA-EVM-MB 信号层 1

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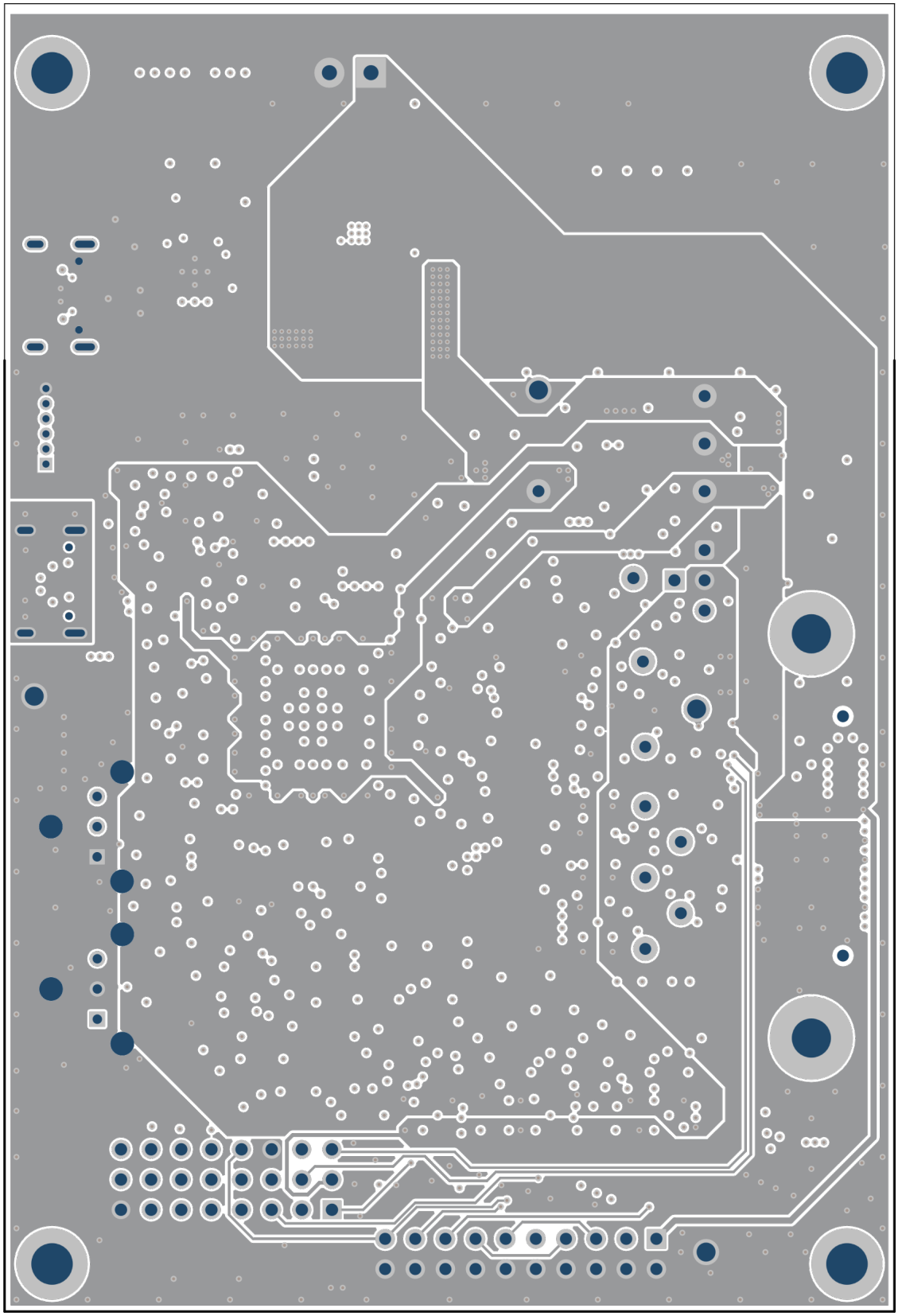


图 3-7. AA-EVM-MB 信号层 2

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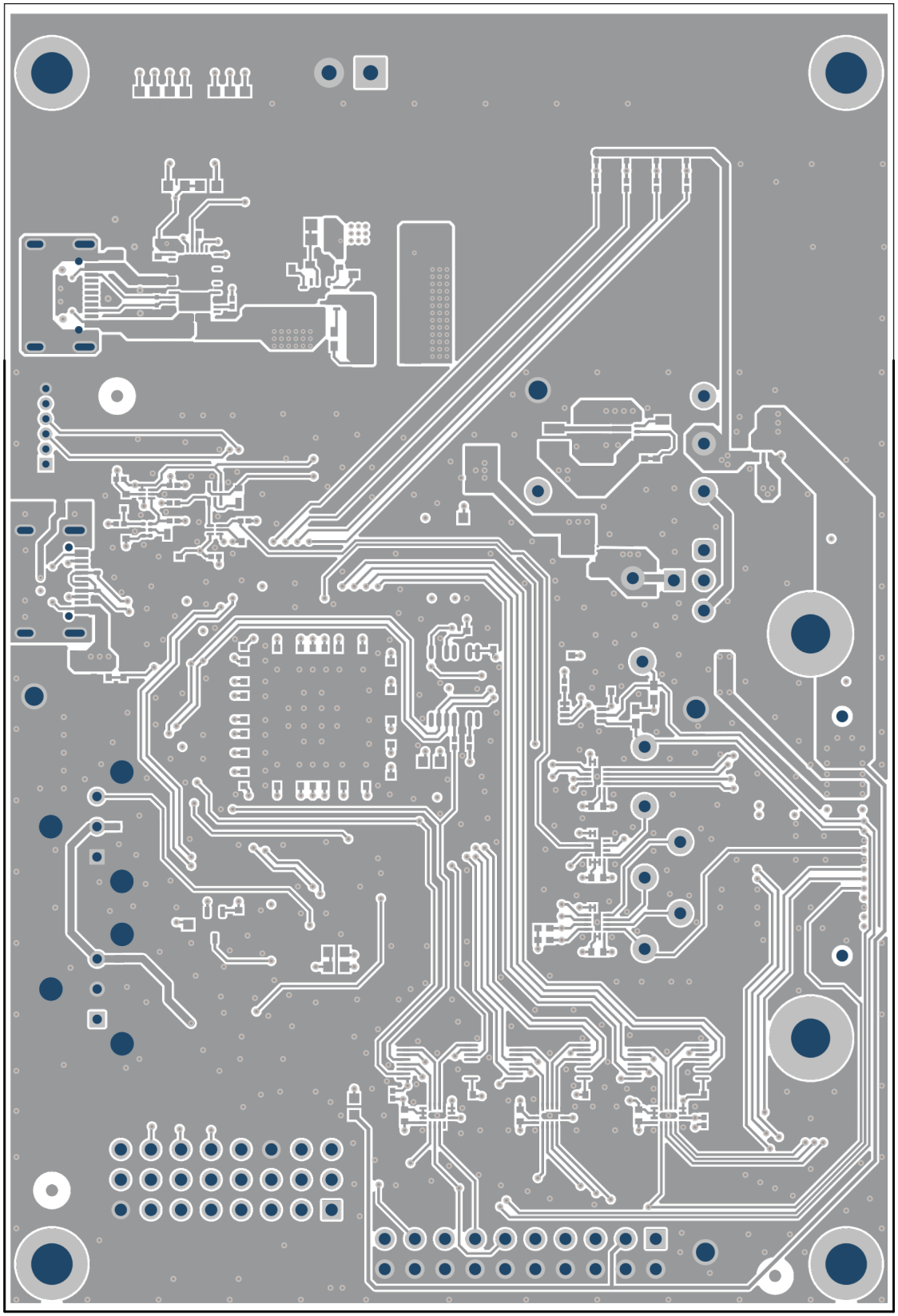


图 3-8. AA-EVM-MB 底层

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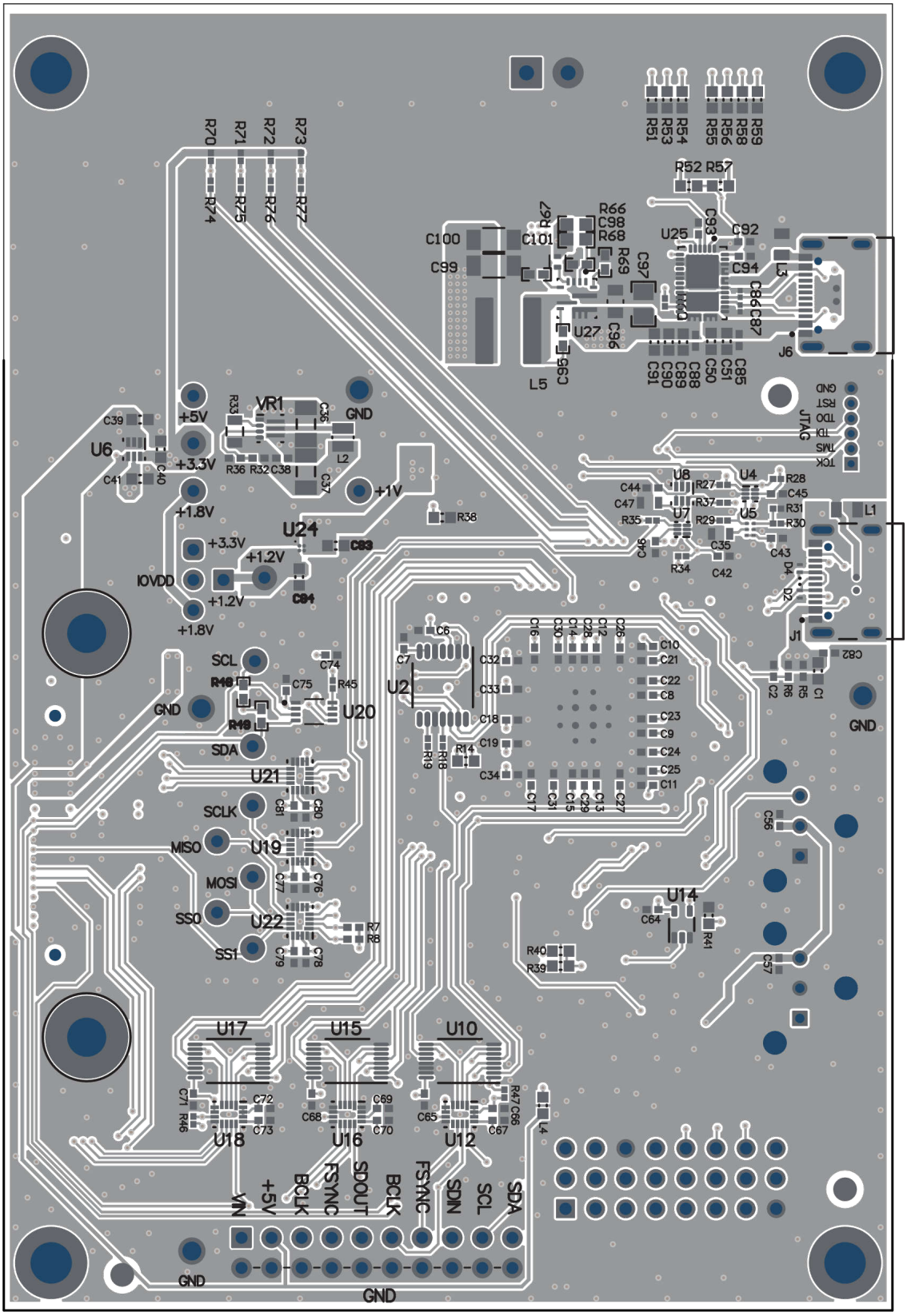


图 3-9. AA-EVM-MB 底部复合图

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3.3 物料清单 (BOM)

请参阅 AA-EVM-MB 产品页面上的设计文件。

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4 其他信息

4.1 故障排查

1. 确保根据 SW3 的选择，将 POWER-USB 连接到兼容的 USB-C 充电器。此电源输入是 AA-EVM-MB 正常工作所必需的。
   a. 如果不使用 USB-C 充电器，可以向 J4 连接器提供外部 5V 至 20V。
2. 如果连接到 AA-EVM-MB 的 EVM 上的音频不工作，请仔细检查音频选择 SW2。
3. 如果 PC 上的 USB 音频停止工作，可以使用主复位 SW1 刷新 USB 连接。
4. 确保根据所连接 EVM 支持的 IOVDD 电压更改 IOVDD J3 电压。

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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。

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3.3.3 *Notice for EVMs for Power Line Communication:* Please see http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_02.page

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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.

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.

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   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.

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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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最后更新日期：2025 年 10 月