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Evaluating the ADAU7112 2-Channel PDM to I²S/TDM Converter

EVALUATION KIT CONTENTS

EVAL-ADAU7112Z evaluation board

ADDITIONAL DOCUMENTS NEEDED

ADAU7112 data sheet

GENERAL DESCRIPTION

This user guide describes the design and setup of the EVAL-ADAU7112Z evaluation board, which can be configured to operate in several different hardware modes. An I²S/time division multiplexing (TDM) serial interface is accessible via header pins spaced at 0.1 inches. Pulse density modulation (PDM) data and the clock interface are available on these headers.

The evaluation board can be powered in several ways:

- External 5 V dc power supply and ground using the J14 header
- External 5 V power supply (not included) using the J8 power connector
- Directly powered using external power supplies that bypass the on-board regulators

On-board regulators derive supplies of 3.3 V, 1.8 V, and 1.2 V. Current measurements of the ADAU7112 can be performed with the supplied header pins.

The evaluation board allows demonstration and performance testing of the features of the ADAU7112.

For full details, see the ADAU7112 data sheet, which must be consulted in conjunction with this user guide when using the evaluation board.

EVALUATION BOARD PHOTOGRAPH

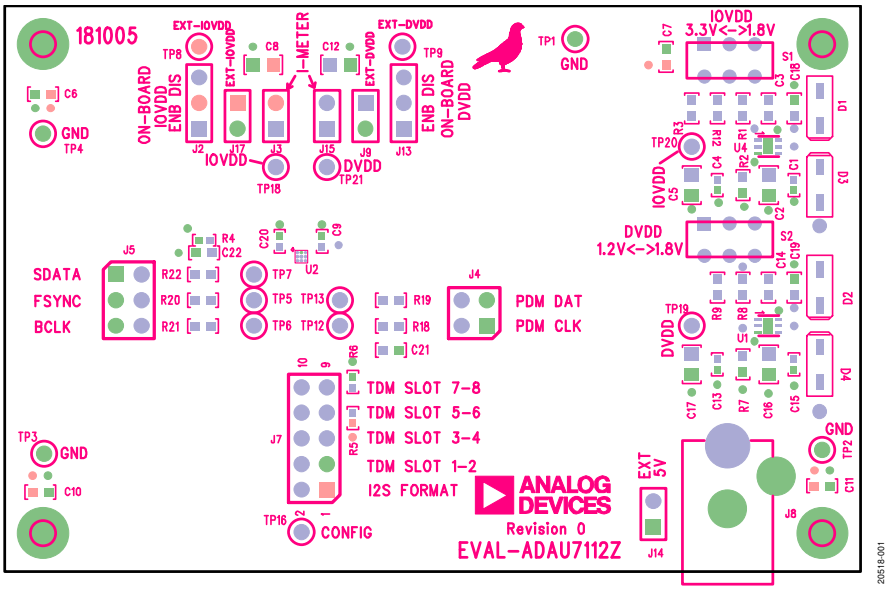

Figure 1. EVAL-ADAU7112Z

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REVISION HISTORY

6/2019—Revision 0: Initial Version

EVALUATION BOARD HARDWARE

HARDWARE MODE

The hardware mode of the ADAU7112 allows the user to choose between a limited number of operation modes without the need for a control interface. Applying a jumper on the J7 header floats the CONFIG Pin (Pin B2) and enables the ADAU7112 to drive the TDM Slot 3-4 with the two PDM audio signal sources, as shown in Figure 2. The CONFIG pin configuration options are listed in Table 1.

Table 1. CONFIG Pin Configuration Options, J7

Serial Port Operational Mode	CONFIG Pin Configuration
I²S Format	Tie to IOVDD
TDM Slot 1-2[1]	Tie to GND
TDM Slot 3-4[1]	Open
TDM Slot 5-6[1]	Tie to IOVDD with 47 kΩ resistor
TDM Slot 7-8[1]	Tie to GND with 47 kΩ resistor

[1] 32-bit slots.

The CONFIG pin is brought to header J7 on the EVAL-ADAU7112Z to allow the selection of all hardware modes. The jumper on this header can connect the CONFIG pin to high (IOVDD), low (GND), floating, or through pull-up/pull-down resistors to put the ADAU7112 in the desired mode.

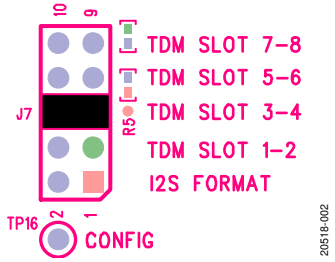

Figure 2. Hardware Mode, TDM Slot 3-4 Setting

POWERING THE BOARD

The EVAL-ADAU7112 evaluation board requires a power supply input of 5 V dc to 10 V dc and ground to the on-board voltage regulators. Plug the power supply into J8 or J14 on the evaluation board.

The on-board regulators provide the IOVDD and DVDD voltage rails. The IOVDD is switchable between 3.3 V and 1.8 V. The DVDD supply is switchable between 1.8 V and 1.2 V.

J2 and J13 allow the user to disable the internal regulators to allow external power injection for the IOVDD and DVDD.

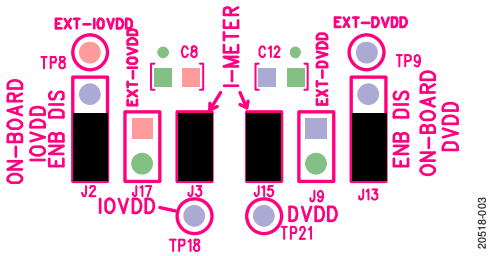

Figure 3. DVDD and IOVDD Jumper Positions for On-Board Power

The J3 and J15 jumpers allow access to the IOVDD and DVDD current path for measuring current to the ADAU7112. The jumpers function for both the internal on-board voltage regulators and when an external power supply is used.

Figure 4 shows the jumper settings to disable the on-board voltage regulators allowing the user to connect an external power supply using the J17 and J9 jumpers. Pin 1 of each connector is the positive side of the power. Pin 2 of each header is ground.

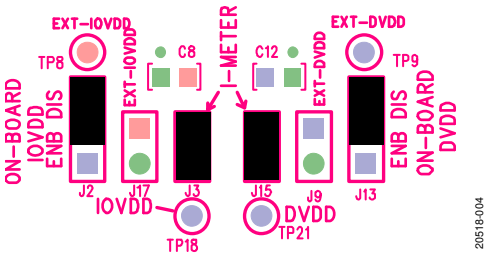

Figure 4. External Power Jumper Settings

The 5 V dc to 10 V dc input can come from two sources: via the J8 connector or via the J14 jumper with an external laboratory power supply. This 5 V dc to 10 V dc power supplies the internal regulators to operate the evaluation board using the on-board power. This supply is not required when powering the board from external IOVDD and DVDD supplies.

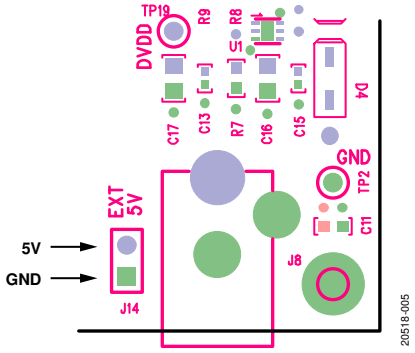

Figure 5. External Power Connections

Figure 6 shows the configuration for using an external 5 V dc supply using the J8 jumper.

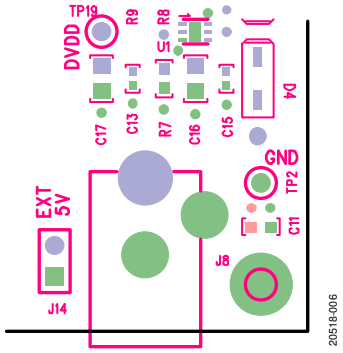

Figure 6. External 5 V DC Power with J8 Jumper

CONNECTING THE PDM SIGNALS

Figure 7 shows the connections for the PDM signal sources and the PDM clock output located on the J4 jumper. The odd pin numbers are ground, and the even pin numbers are signals. The TP12 and TP13 test points allow the user to view the signals on an oscilloscope.

The 0 Ω resistors, R18 and R19, allow the addition of damping resistors.

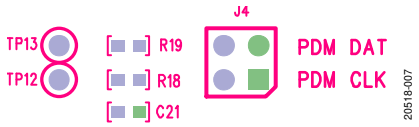

Figure 7. Connecting to the PDM Input

CONNECTING THE I²S SIGNALS

Figure 8 shows the I²S/TDM interface connections located on the J5 jumper. The odd pin numbers are ground, and the even pin numbers are signals. The TP5 to TP7 test points allow the user to view the signals on an oscilloscope.

The 0 Ω resistors, R20 to R22, allow the addition of damping resistors.

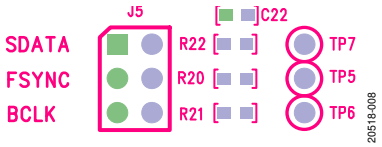

Figure 8. Connecting to the I²S/TDM Interface

EVALUATION BOARD SCHEMATICS AND ARTWORK

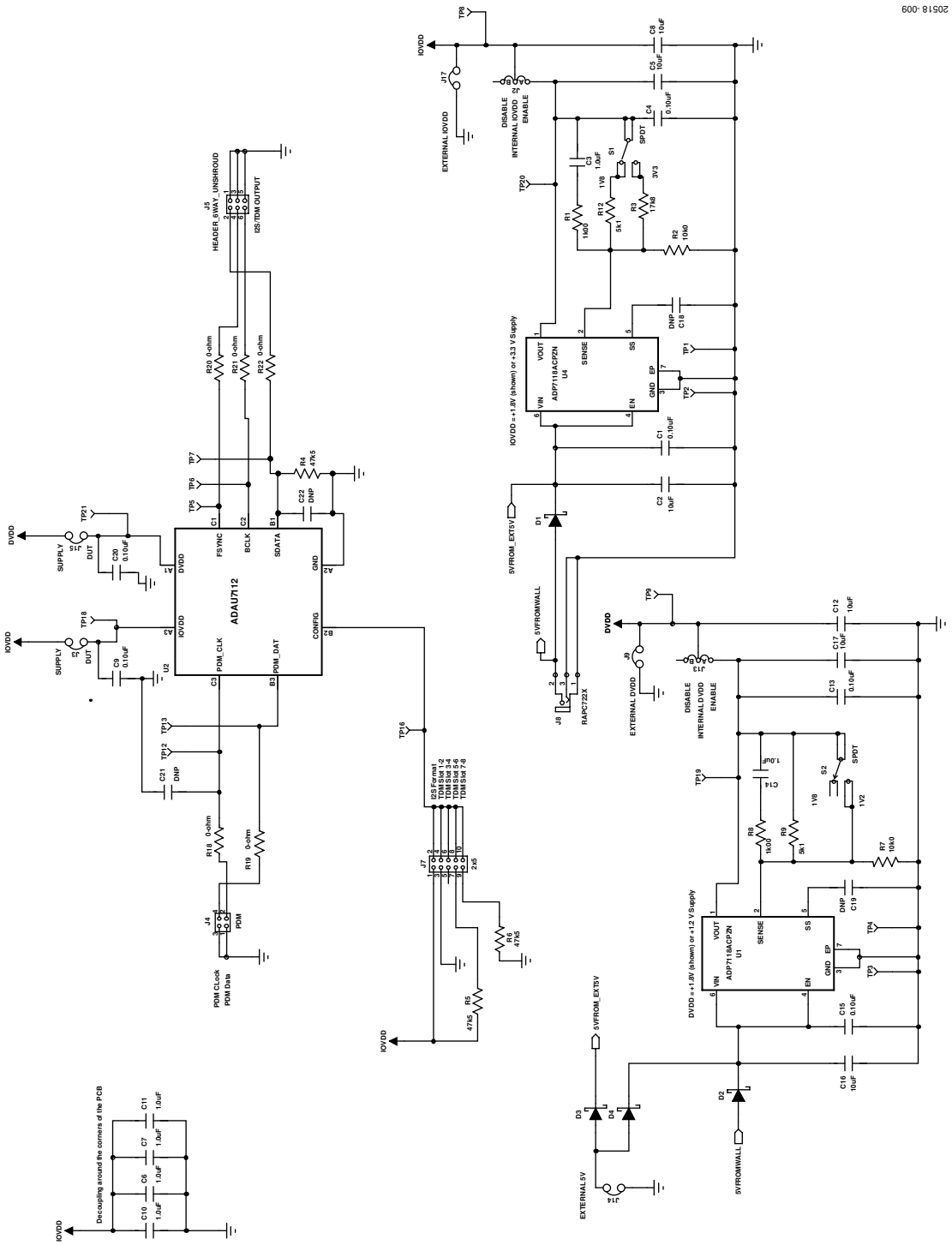

Figure 9. EVAL-ADAU7112 Schematic

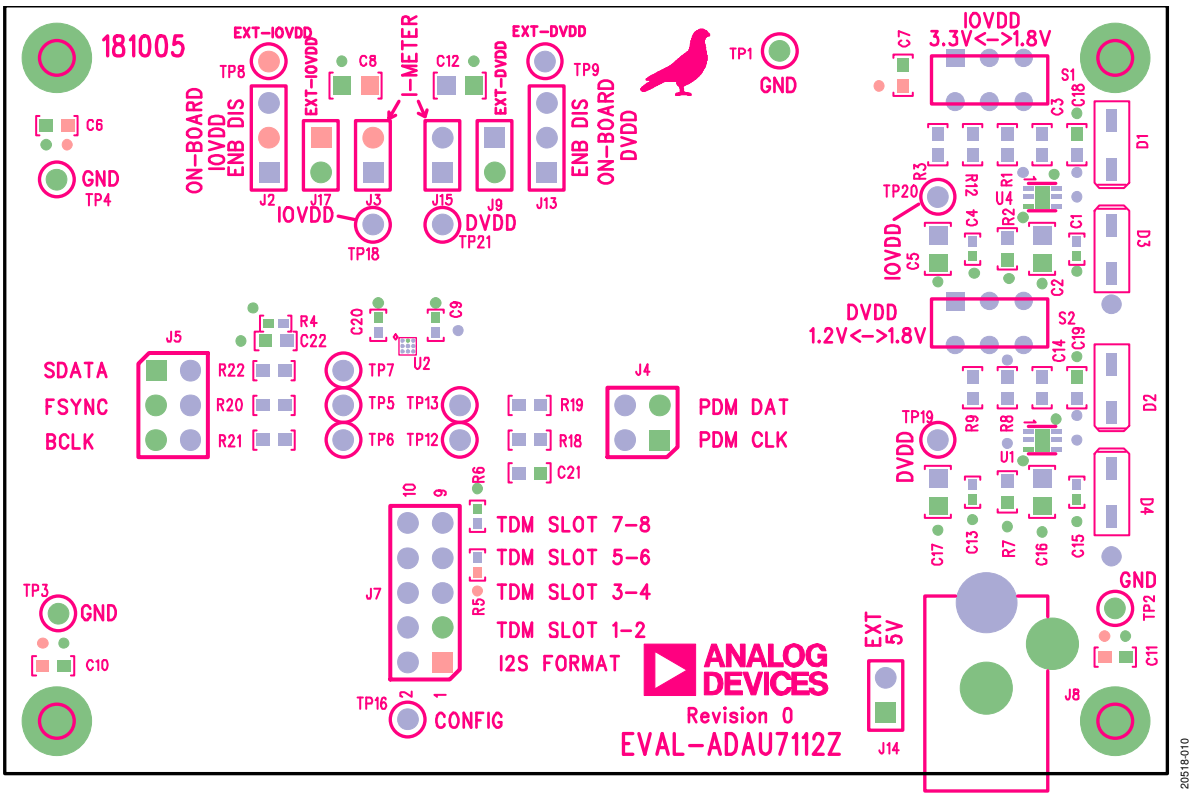

Figure 10. Top Assembly

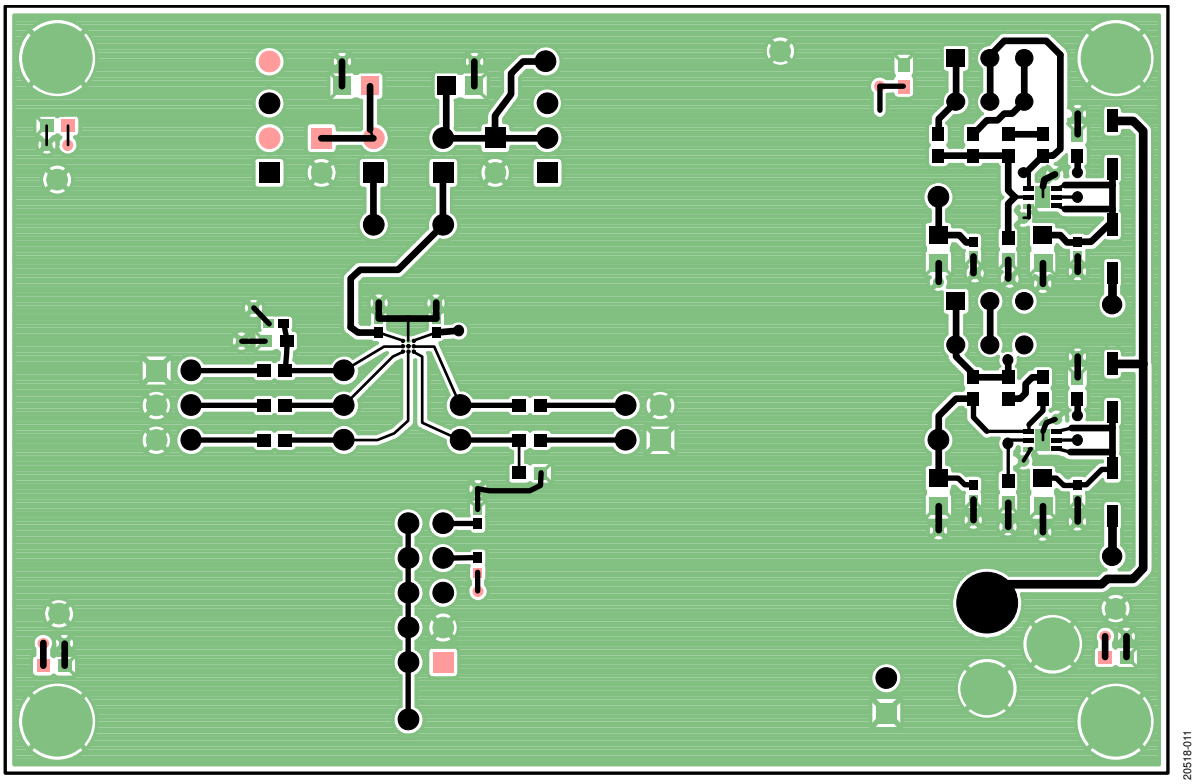

Figure 11. Top Layer, Copper

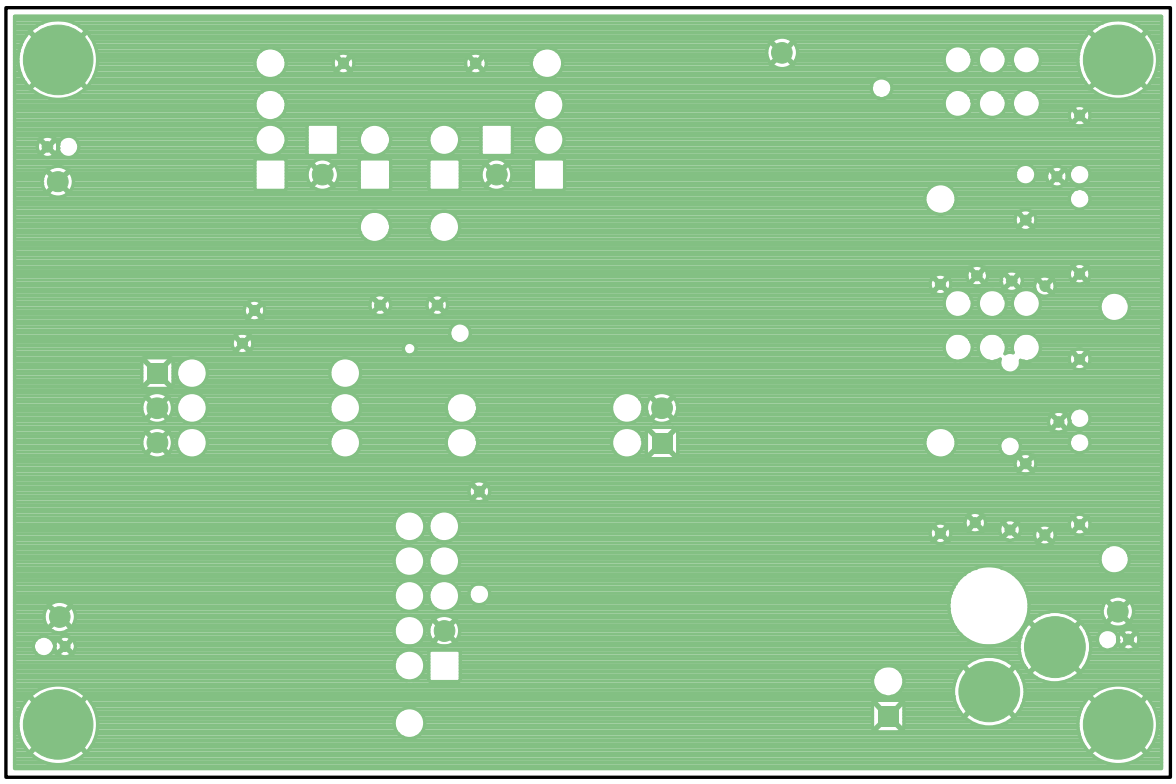

Figure 12. Layer 2, Ground

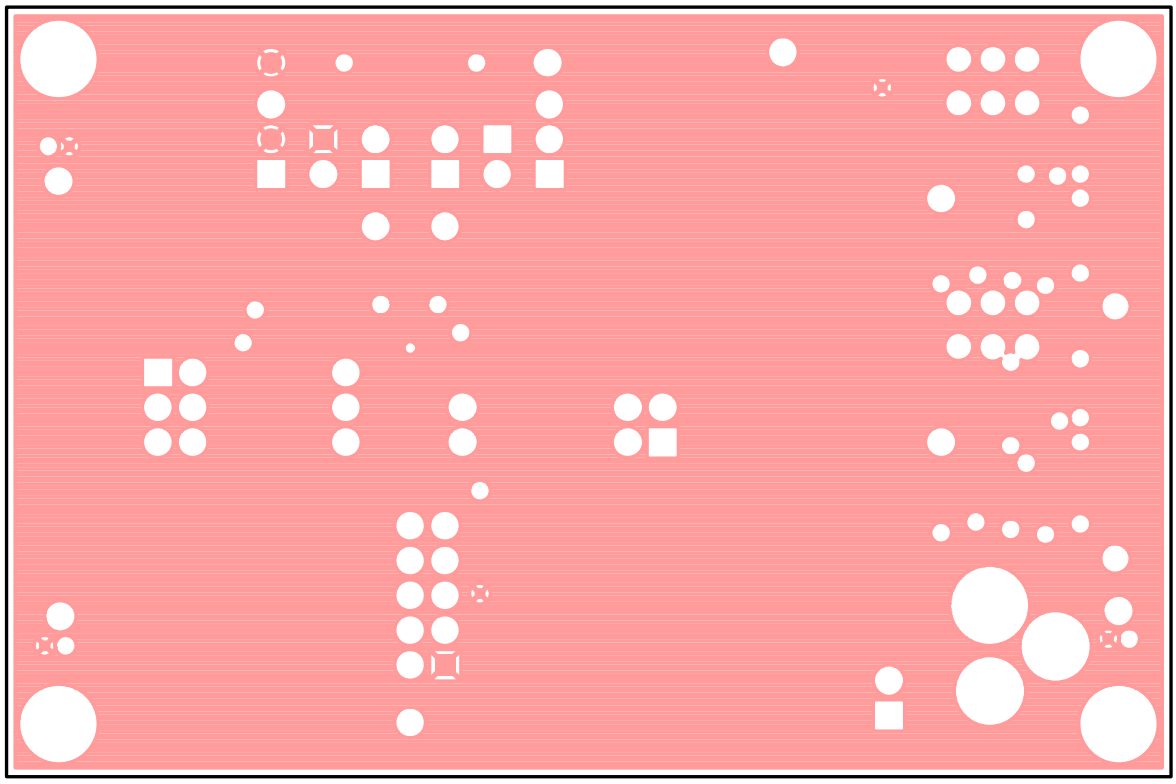

Figure 13. Layer 3, Power

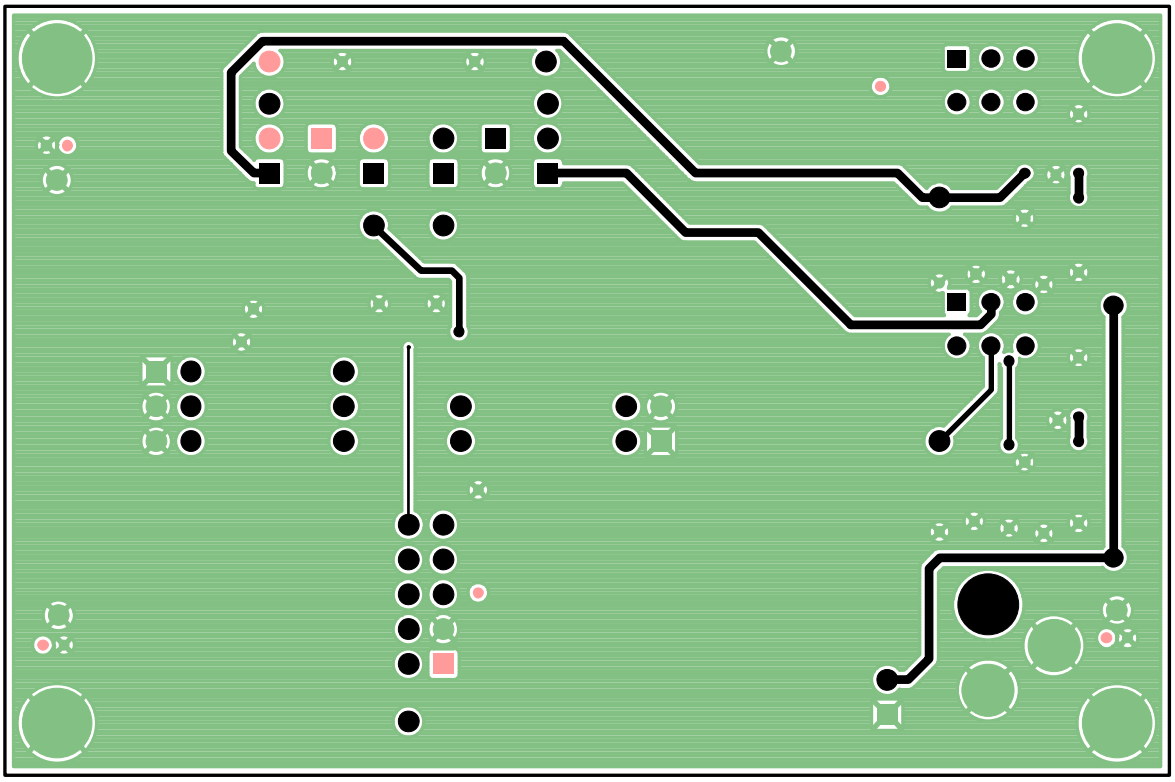

Figure 14. Bottom Layer, Copper

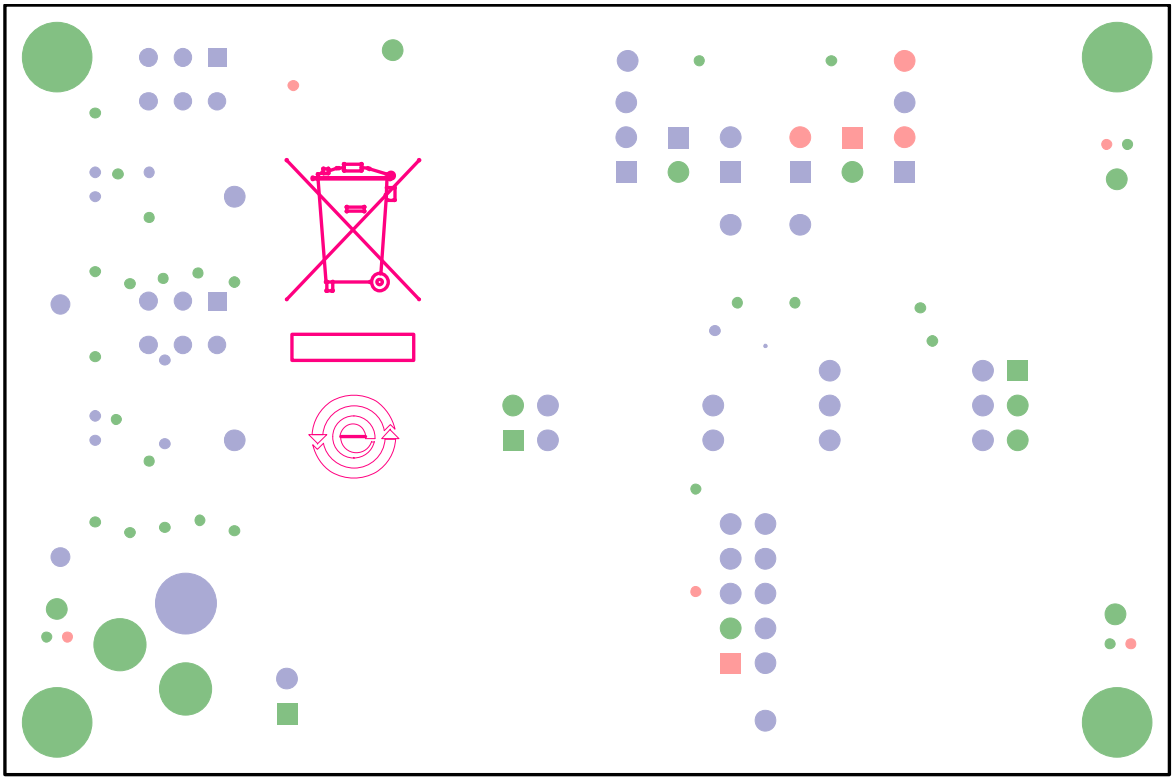

Figure 15. Bottom Assembly

ORDERING INFORMATION

BILL OF MATERIALS

Table 2.

Qty	Reference Designator	Description	Manufacturer	Part Number
6	C1, C4, C9, C13, C15, C20	Multilayer ceramic capacitor (MLCC), 16 V, X7R, 0402	Murata ENA	GRM155R71C104JA88D
6	C2, C5, C8, C12, C16, C17	MLCC, 10 V, X7R, 0805	TDK Corp	C2012X7R1A106K125AC
6	C3, C6, C7, C10, C11, C14	MLCC, 16 V, X7R, 0603	Knowles Novacap	0603BB105K160YT
2	C18 C19	MLCC, 16 V, X7R, 0603	Knowles Novacap	0603BB105K160YT
1	C22	MLCC, 100 V, NP0, 0603	Murata ENA	GRM1885C2A330JA01D
4	D1 to D4	Diode, Schottky, 30 V, 0.5 A SOD123	On Semiconductor	MBR0530T1G
2	J2, J13	Header, SIP, 3-position	Sullins	PBC03SAAN or cut PBC36SAAN
5	J3, J9, J14, J15, J17	Jumper	Sullins	PBC02SAAN or cut PBC36SAAN
1	J4	Header, unshrouded 4-way	3M	PBC02DAAN or cut PBC36DAAN
1	J5	Header, unshrouded, 6-way	3M	PBC03DAAN or cut PBC36DAAN
1	J7	Header, unshrouded 10-way	3M	PBC05DAAN or cut PBC36DAAN
1	J8	Power jack, mini, 0.08 inch, right angle through-hole	Switchcraft, Inc.	RAPC722X
2	R1, R8	Resistor, thick film, chip, 1%, 125 mW, 0603	Panasonic EC	ERJ-3EKF1001V
2	R2, R7	Resistor, thick film, chip, 1%, 100 mW, 0603	Panasonic	ERJ-3EKF1002V
1	R3	Resistor, thick film, chip, 1%, 100 mW, 0603	Panasonic ECG	ERJ-3EKF1782V
1	R4	Do not populate	Stackpole	RMCF0402FT4K75
2	R5, R6	Resistor, thick film, chip, 1%, 63 mW, 0402	Stackpole	RMCF0402FT4K75
2	R9, R12	Resistor, thick film, chip, 1%, 100 mW, 0603	Panasonic EC	ERJ-3EKF5101V
9	R14 to R22	Resistor, thick film, chip, 1%, 100 mW, 0603	Panasonic	ERJ-3GEY0R00V
2	S1, S2	Switch, single-pole, double throw (SPDT), slide, PC mount	E-Switch	EG1271
17	TP1 to TP9, TP12, TP13, TP16, TP18 to TP21	Test point, mini, white, 1 inch	Keystone Electronics	5002
2	U1, U4	Complementary metal-oxide semiconductor (CMOS) linear dropout (LDO) regulator	Analog Devices, Inc.	ADP7118ACPZN-R7
1	U2	2-channel pulse density modulation to I^2S converter	Analog Devices	ADAU7112

NOTES

ESD Caution

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

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