Evaluation Board for ADCMP572/ ADCMP573/ADCMP580/ADCMP581/ADCMP582

EVAL-ADCMP572/573/580/581/582

GENERAL DESCRIPTION

This document provides an overview and suggested lab test setups of the evaluation board for Analog Devices' new ADCMP572/ ADCMP573/ADCMP580/ADCMP581/ADCMP582 comparator products. Because these comparators represent state of the art, general-purpose comparator technology, it is important that their performance characteristics be evaluated using the highest band-width components available. The evaluation board provides a relatively high quality environment in which to make such measurements. All five device types are fully released to production.

This document should be used in conjunction with the ADCMP57x/ADCMP58x data sheets that contain full technical details on the device specifications and operation. The same PCB is used to evaluate the ADCMP572, ADCMP573, ADCMP580, ADCMP581, and ADCMP580.

EVALUATION BOARD DESCRIPTION

Figure 1 is a photograph of the top of the evaluation board. It is fabricated using a high quality dielectric material between the ground plane and signal layers in order to maintain high signal integrity. All input and output signals are brought on to the board with 2.9 mm RF connectors, and transmission line paths are kept as close to 50 Ω as possible.

PACKAGE LIST

- Evaluation board with component installed
- Schematic

EVALUATION BOARD

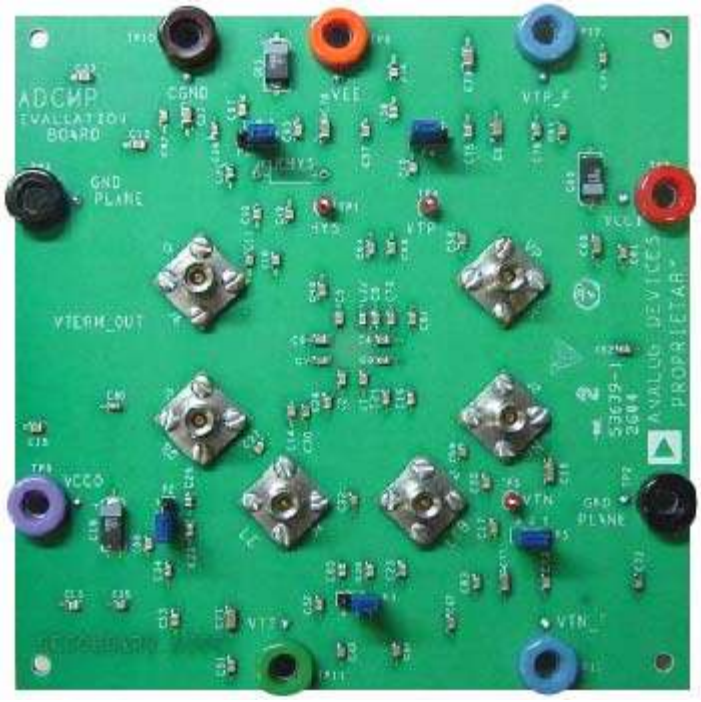

Figure 1. ADCMP572/ADCMP573/ADCMP580/ADCMP581/ADCMP5822 Evaluation Board

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REVISION HISTORY

2/06—Revision 0: Initial Version

USING THE EVALUATION BOARD

MEASUREMENTS

The same PCB is used to evaluate both ADCMP57x and ADCMP58x families. The Setting Up the Evaluation Board section describes the measurements that can be performed with this evaluation board.

Table 1. Basic Equipment

Description	Example Equipment[1]	Quantity
Power Supply with Three Outputs	Agilent E3631A	2
Pulse Generator	HP8133A, Agilent 81134A	1
Signal Analyzer	CSA 8000 with 80E04 sampling head[2]	1
Source Meter	Keithley 2400 SourceMeter, Keithley 238 high current source-measure unit	1
Matched High Speed Cables with 2.9 mm Connectors	Insulated Wire Inc. kps-1501-180-kps Florida RF LABS LAB-FLEX 160 2Y194	4

[1] Equipment used to generate example measurements within this document.
[2] 20 GHz sampling head used for all time measurements.

SETTING UP THE EVALUATION BOARD

CONNECT POWER

Several power supply levels must be provided to the board for V_{CCI}, V_{CCO}, V_{EE}, V_{TT}, CGND (the comparator's GND pin), and GND via the banana jacks. Make a direct connection from the DUT output pins to the oscilloscope because any transmission line discontinuity degrades performance.

Because of this, V_{TT} is always at GND and therefore, $V_{CCO} = V_{TT}$ (GND) + 2.0 V for the ECL/PECL ADCMP573/ADCMP581/ ADCMP582, and $V_{CCO} = V_{TT}$ = GND for the CML type ADCMP572 and GND = CGND = V_{TT} only for the CML ADCMP580, as detailed in **Table 2** through Table 4.

The flexible power supply scheme of the ADCMP572/ADCMP573 comparators can be confusing with V_{TT} at system ground. The GND pin on the comparator is no longer at GND dc potential, except for the ADCMP580, and, therefore, is named CGND on the board.

Table 2. ADCMP580/ADCMP581 Power Supply Connections

Pin No.	Mnemonic	ADCMP580 (CML)[1]	ADCMP581(NECL)[2]
5, 16	V_{CCI} (Red)	5.0 V	7.0 V
9, 12	GND (Purple) (also CGND for these devices)	0.0 V	2.0 V
13	V_{EE} (Orange)	−5.0 V	−3.0 V
14	HYS (Orange)	−5.0 V	−3.0 V
8	V_{TT} (Green)	0 V	0 V
15	CGND (Brown)[3]	0.0 V	2.0 V
	GND Plane (Black)[4]	0 V	0 V

[1] V_{CCI} = 5.0 V, V_{CCO} = 0 V, V_{EE} = −5.0 V.
[2] V_{CCI} = 5.0 V, V_{CCO} = 0 V, V_{EE} = −5.0 V.
[3] CGND is the comparator ground (Pin 15) renamed.
[4] GND is always system ground.

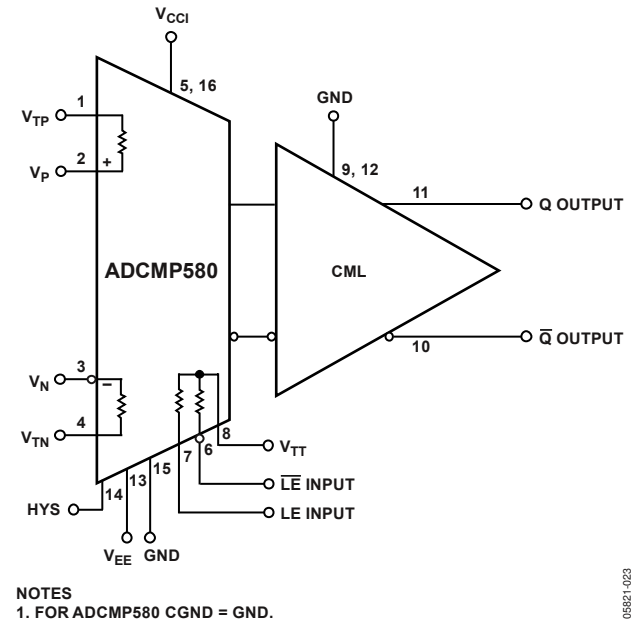

Figure 2. ADCMP580 Power Supply Connections

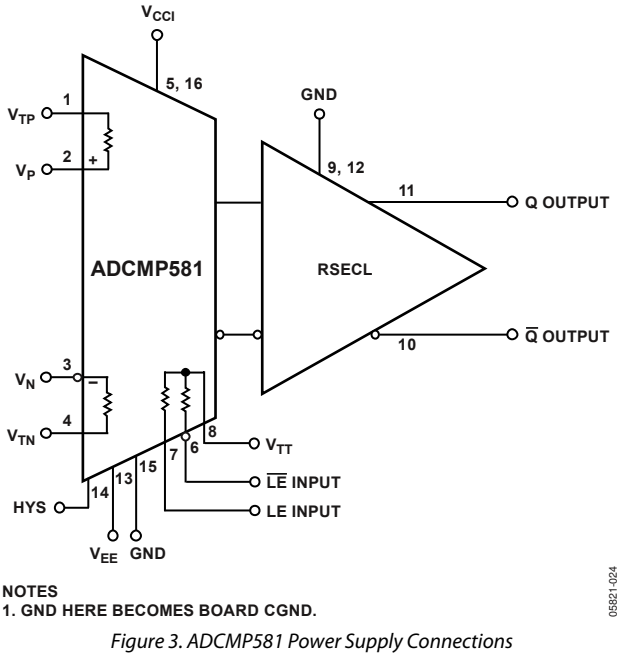

Figure 3. ADCMP581 Power Supply Connections

Table 3. ADCMP582 Power Supply Connections

Pin No.	Mnemonic	ADCMP582(PECL)[1]	ADCMP582(PECL)[2]	ADCMP582(PECL)
5, 16	V_{CCI} (Red)	2.0 V	3.7 V	4.5 V
9, 12	V_{CCO} (Purple)	2.0 V	2.0 V	2.0 V
13	V_{EE} (Orange)	−8.0 V	−6.3 V	−5.5 V
14	HYS	−8.0 V	−6.3 V	−5.5 V
8	V_{TT} (Green)	0 V	0 V	0 V
15	CGND (Brown)[3]	−3.0 V	−1.3 V	−0.5 V
	GND Plane (Black)[4]	0 V	0 V	0 V

[1] V_{CCI} = 5.0 V, V_{CCO} = 5.0 V, V_{EE} = −5.0 V.
[2] V_{CCI} = 5.0 V, V_{CCO} = 3.3 V, V_{EE} = −5.0 V.
[3] CGND is the comparator ground (Pin 15) renamed.
[4] GND is always system ground.

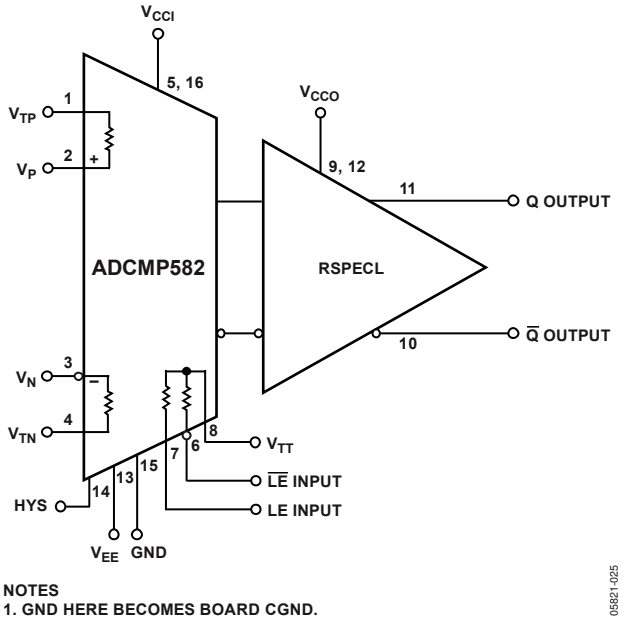

Figure 4. ADCMP582 Power Supply Connections

Table 4. ADCMP572 Power Supply and Input Translation

Pin	Case 1[1]	Case 2[2]	Case 3[3]
V_{CCI}	0.0 V	1.9 V	0.0 V
V_{CCO}	0.0 V	0.0 V	0.0 V
CGND	−3.3 V	−3.3 V	−5.2 V
V_{TP}_F/V_{TN}_F	0 V	0 V	0 V
V_{TT}	0.0 V	0.0 V	0.0 V
V_P/V_N	$-3.5V < V_N/V_P < -2.1V$	$-3.5\ V < V_P/V_N < -0.1\ V$	$-5.4\ V < V_P/V_N < -2.0\ V$
LE/$\overline{LE}$	0.0 V/−0.4 V	0.0 V/−0.4 V	0.0 V/−0.4 V
AGND (This is not a pin in the part.)	0.0 V	0.0 V	0.0 V

[1] $V_{CCI} = V_{CCO} = 3.3$ V.
[2] $V_{CCI} = 5.2$ V, $V_{CCO} = 3.3$ V.
[3] $V_{CCI} = V_{CCO} = 5.2$ V.

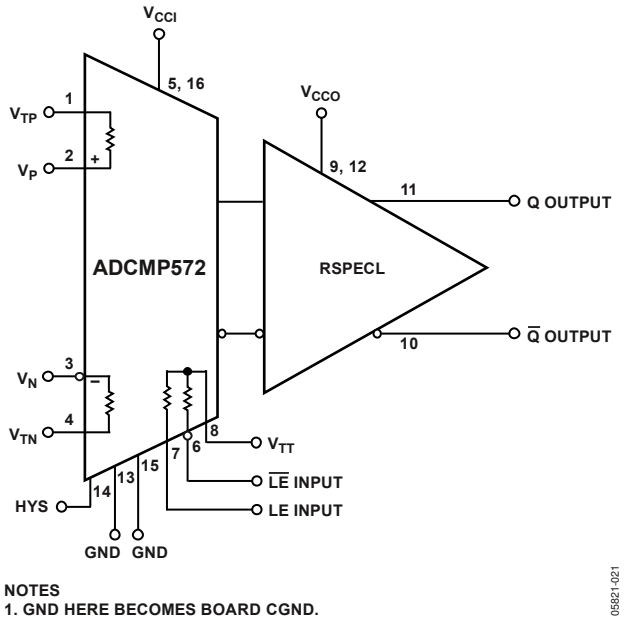

Figure 5. ADCMP572 Power Supply Connections

Table 5. ADCMP573 Power Supply and Input Translation

Pin	Case 1[1]	Case 2[2]	Case 3[3]
V_{CCI}	2.0 V	3.9 V	2.0 V
V_{CCO}	2.0 V	2.0 V	2.0 V
CGND	−1.3 V	−1.3 V	−3.2 V
V_{TP}_F/V_{TN}_F	0 V	0 V	0 V
V_{TT}	0.0 V	0.0 V	0.0 V
V_P/V_N	$-1.5V < V_N/V_P < -0.1$ V	-1.5 V < V_P/V_N < +1.9 V	-3.4 V < V_P/V_N < 0.0 V
LE/$\overline{LE}$	1.2 V/0.8V	1.2 V/0.8 V	1.2 V/0.8 V
AGND	0.0 V	0.0 V	0.0 V
This is not a pin in the part.			

[1] $V_{CCI} = V_{CCO} = 3.3$ V.
[2] $V_{CCI} = 5.2$ V, $V_{CCO} = 3.3$ V.
[3] $V_{CCI} = V_{CCO} = 5.2$ V.

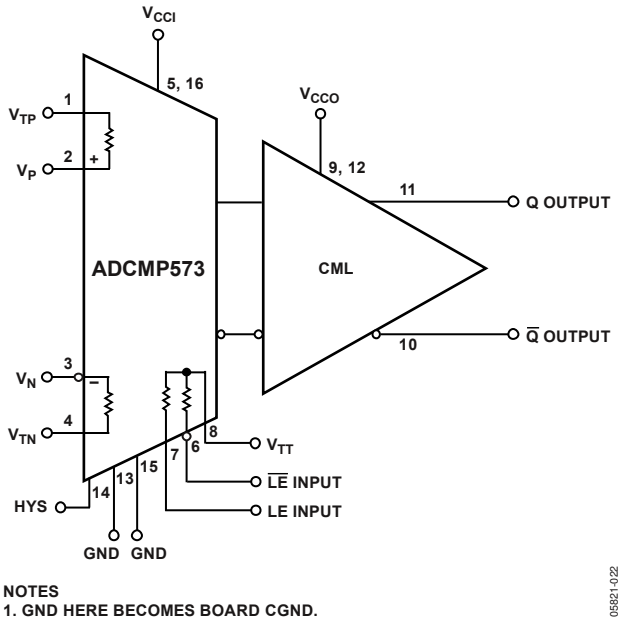

Figure 6. ADCMP573 Power Supply Connections

CONNECT INPUTS

Connect the differential output of the generator to the differential comparator input pins of the device, V_P and V_N.

Connect the differential data output of the generator to the differential latch input of the device, LE and $\overline{LE}$.

SETUP INPUT SIGNALS

Input and latch levels must be shifted consistently with the power supplies (see Table 4 through Table 7).

Set voltage termination V_{TP}_F and V_{TN}_F to GND to terminate the on-chip, 50 Ω input resistors.

Leave the hysteresis control pin, HYS, open for zero hysteresis or connect the HYS pin to V_{EE} with a suitably sized resistor to add the desired amount of hysteresis.

CONNECT OUTPUT SIGNALS

Connect the output of the comparator, Q and QB, to the signal analyzer. The sampling head must have an internal 50 Ω termination to ground.

Table 6. ADCMP580/ADCMP581 Input Signal and Latch Setup

Pin	Mnemonic	ADCMP580 (CML)[1]	ADCMP581(NECL)[2]
2, 3	V_P/V_N	$-2.0\ V < V_P/V_N < +3.0\ V$	$0.0\ V < V_P/V_N < +5.0\ V$
1, 4	V_{TP}_F/V_{TN}_F (Blue)	0 V	0 V
6, 7	$\overline{LE}$/LE	0.0 V/−0.4 V	0.8 V/0.4 V

[1] V_{CCI} = 5.0 V, V_{CCO} = 0 V, V_{EE} = −5.0 V.
[2] V_{CCI} = 5.0 V, V_{CCO} = 0 V, V_{EE} = −5.0V.

Table 7. ADCMP582 Input Signal and Latch Setup

Pin	Mnemonic	ADCMP582(PECL)[1]	ADCMP582(PECL)[2]	ADCMP582(PECL)[3]
2, 3	V_P/V_N	$-5.0\ V < V_P/V_N < 0.0\ V$	$-3.3\ V < V_P/V_N < 1.7\ V$	$-2.5\ V < V_P/V_N < 2.5\ V$
1, 4	V_{TP}_F/V_{TN}_F (Blue)	0 V	0 V	0 V
6, 7	$\overline{LE}$/LE	0.8 V/0.4 V	0.8 V/0.4 V	0.8 V/0.4 V

[1] VCCI = 5.0 V, VCCO = 5.0 V, VEE = −5.0 V
[2] VCCI = 5.0 V, VCCO = 3.3 V, VEE = −5.0 V
[3] VCCI = 5.0 V, VCCO = 2.5 V, VEE = −5.0 V

JUMPER SETUP

This evaluation board works with five different comparators, the ADCMP572/ADCMP573 and the ADCMP580/ ADCMP581/ADCMP582. To reduce the number of wires to the power supply, jumpers are provided wherever comparator supplies might be rerouted. When a comparator is mounted onto the board, the jumpers should be set properly for that product. The user does not have to adjust Jumper 1, Jumper 2, and Jumper 3 unless a new device type is soldered onto the board.

If the evaluation board is to be used for a different comparator type than was mounted on the board originally, pull all the jumpers to prevent errors. Once the new part type is installed, the jumpers can be reinstalled. Table 8 gives the correct jumper settings and resulting banana jack connections for each of the comparator products. Set conservative current limits on all power supplies.

Table 8. Jumper Connections

Jumper	ADCMP572/ADCMP573	ADCMP580/ADCMP581	ADCMP582	Conditions
P1	Short 1, 2 (TP10)	Short 2, 3 (TP6)	Short 2, 3 (TP6)	Device V_{EE}/GND
P2	Short 2, 3 (TP9)	Short 1, 2 (TP10)	Short 2, 3 (TP9)	Device V_{CCO}
P3	Short 1, 2 (TP2/GND)	Short 1, 2 (TP2/GND)	Short 1, 2 (TP2/GND)	Device V_{TT}
P4/P5	Short 2, 3	Short 2, 3	Short 2, 3	V_P/V_N as a differential input
P4	Short 2, 3	Short 2, 3	Short 2, 3	Drive V_P
	Short 1, 2	Short 1, 2	Short 1, 2	Drive V_N
P5	Short 1, 2	Short 1, 2	Short 1, 2	DC Bias V_N
	Short 2, 3	Short 2, 3	Short 2, 3	DC Bias V_P

TEST SETUP

Figure 2 shows Analog Devices' test configuration setup that was used for much of the initial engineering evaluation. It is provided here as a guideline and to assist in replicating our setup.

ADDITIONAL SUPPORT

For further support regarding the ADCMP572/ADCMP573 and ADCMP580/ADCMP581/ADCMP582 comparators and/or evaluation boards, refer to www.analog.com.

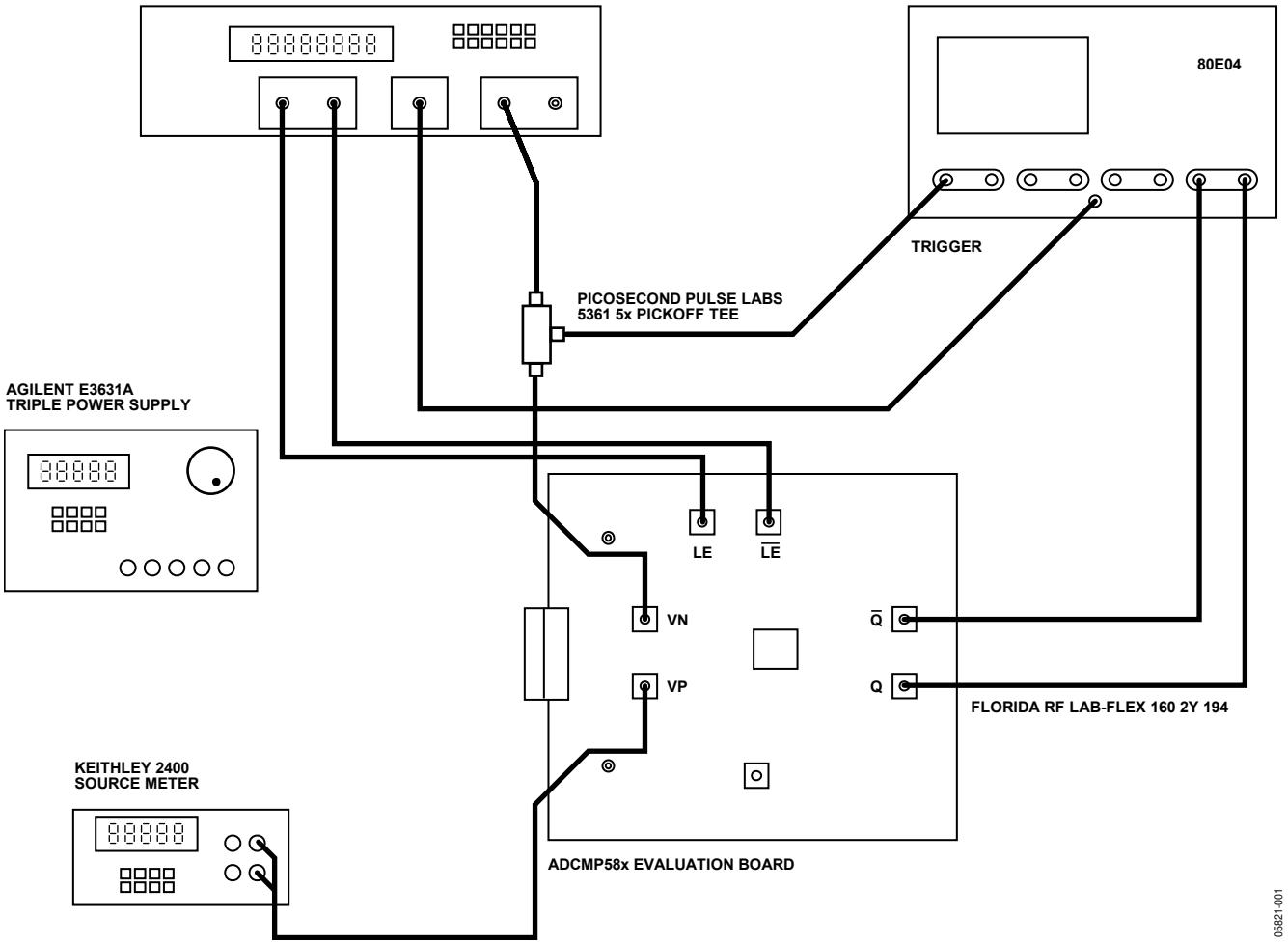

Figure 7. Typical Test Setup for Measuring Performance

SCHEMATICS

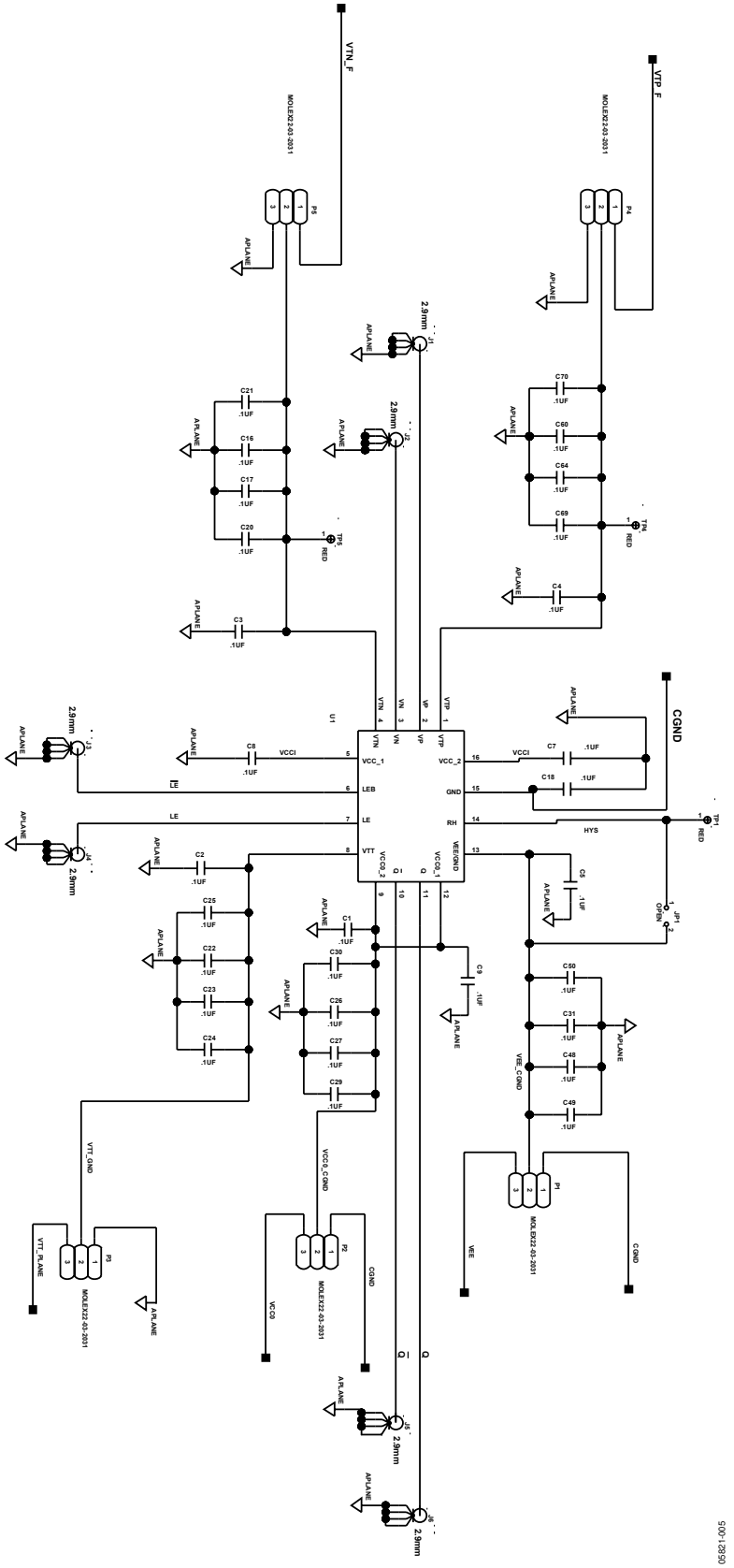

Figure 8. Schematic, Main

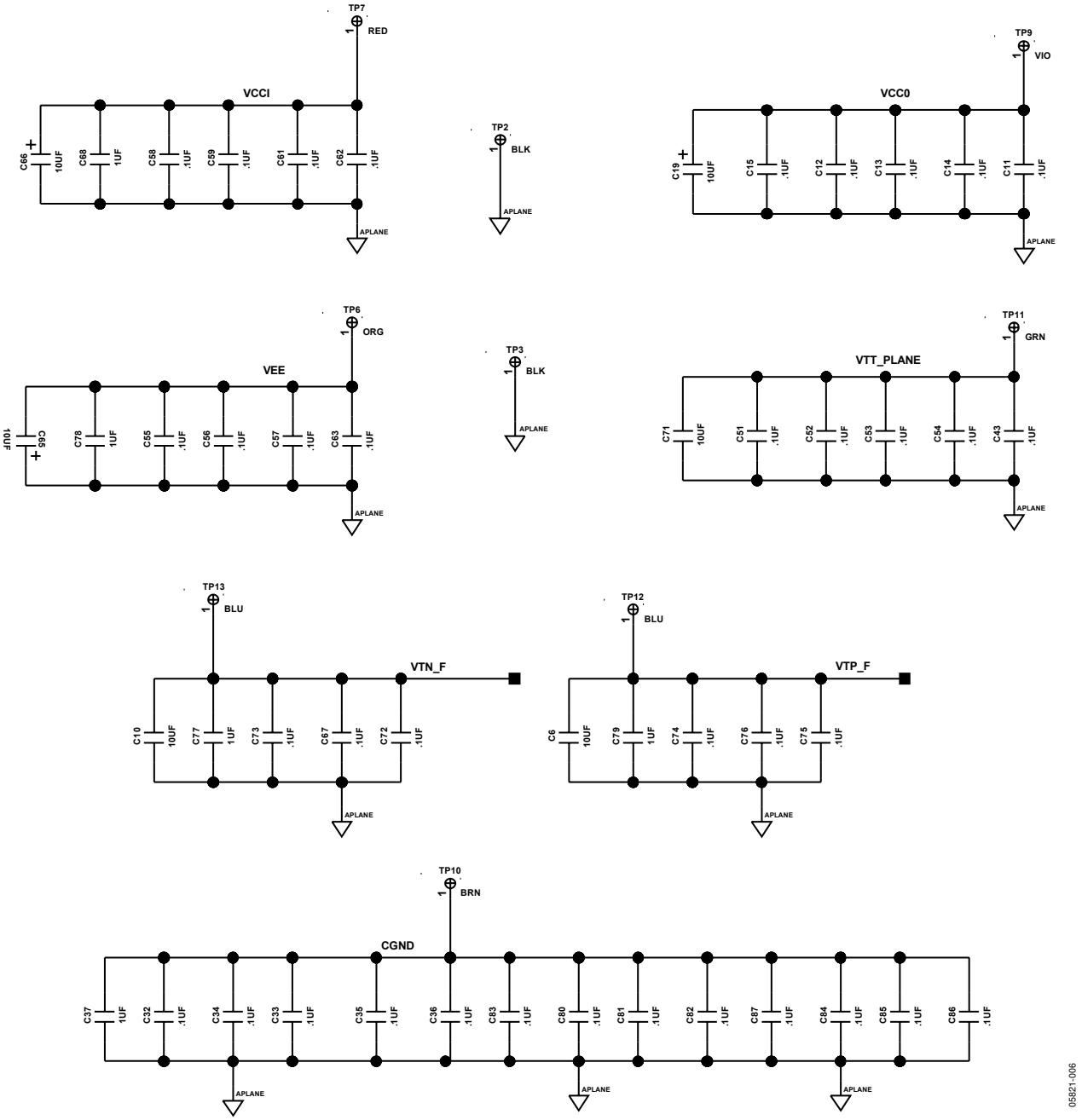

Figure 9. Schematic, Bypass Capacitors

PC BOARD

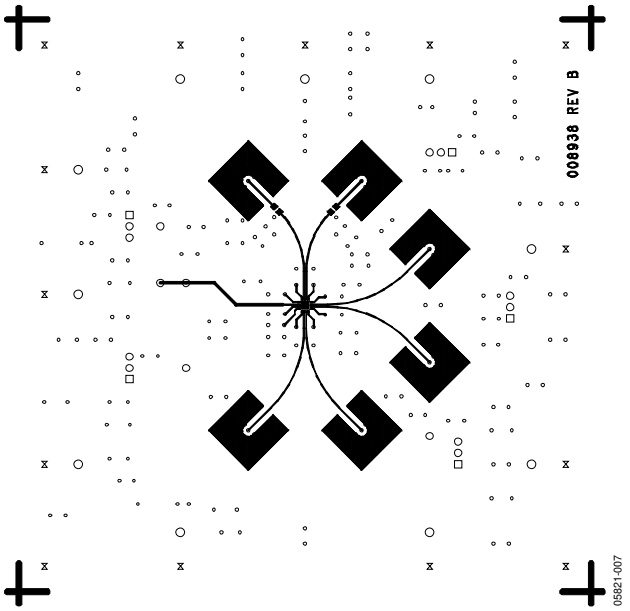

Figure 10. Bottom Signal Layer

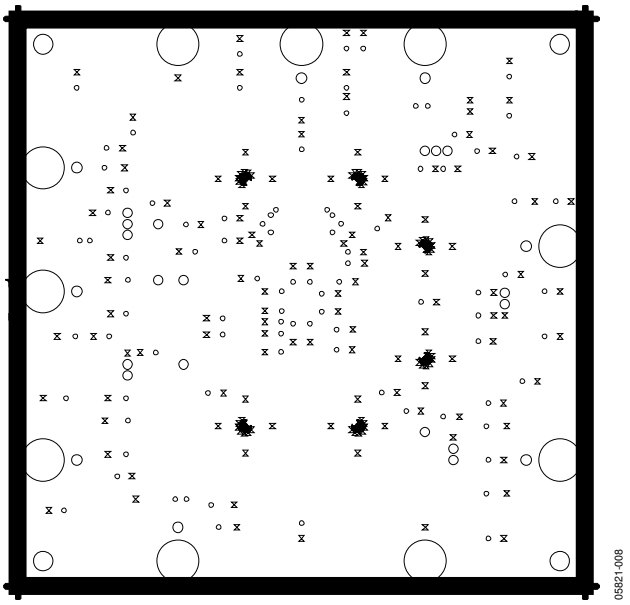

Figure 11. GND Plane

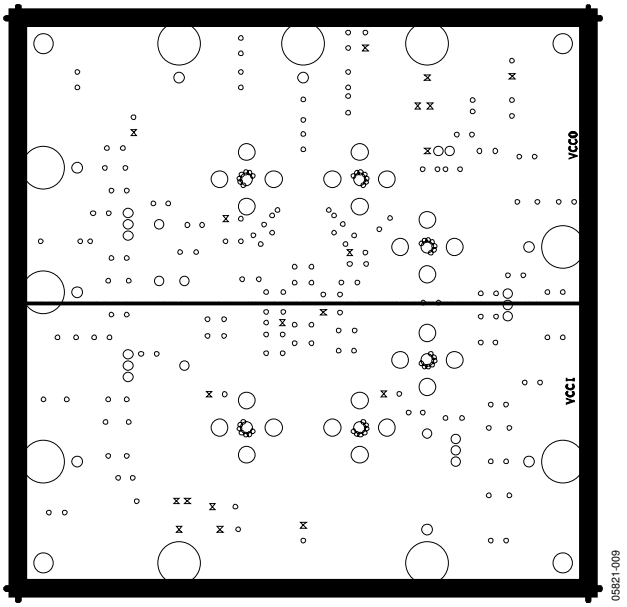

Figure 12. V_{CC} Plane

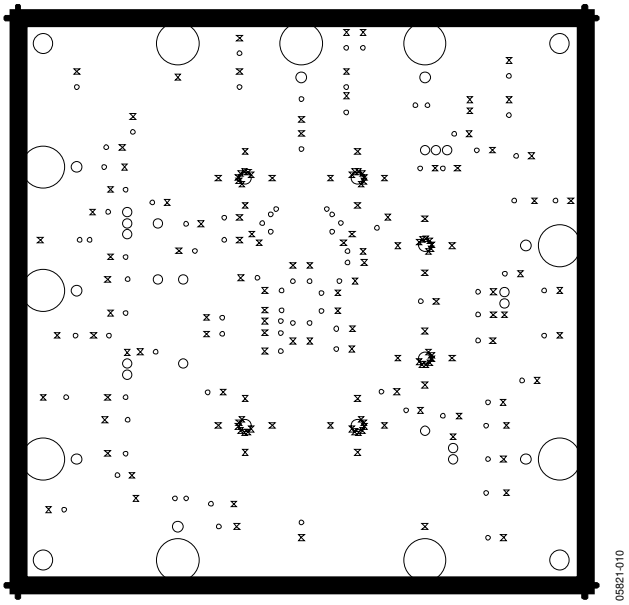

Figure 13. GND Plane

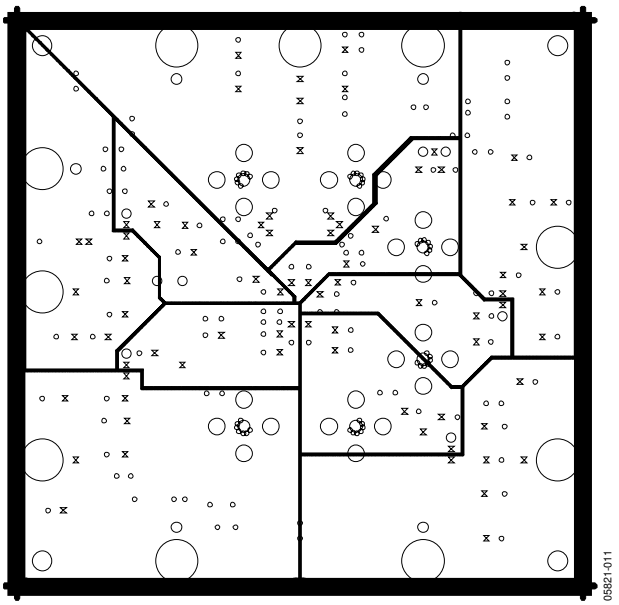

Figure 14. Miscellaneous DC Plane

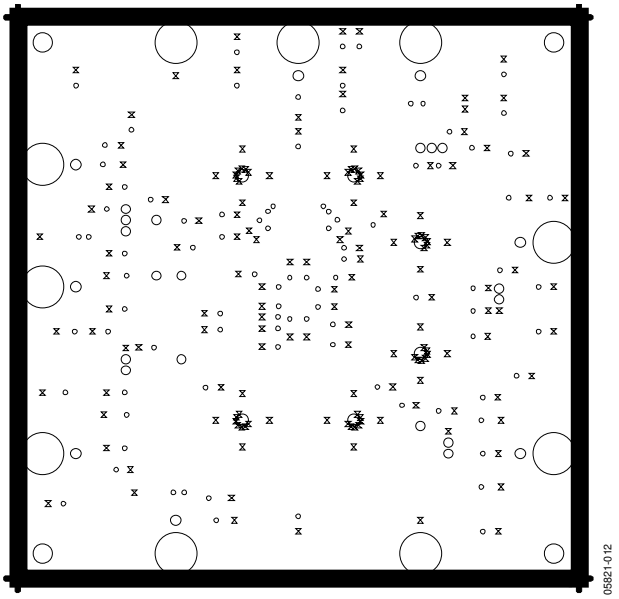

Figure 15. GND Plane

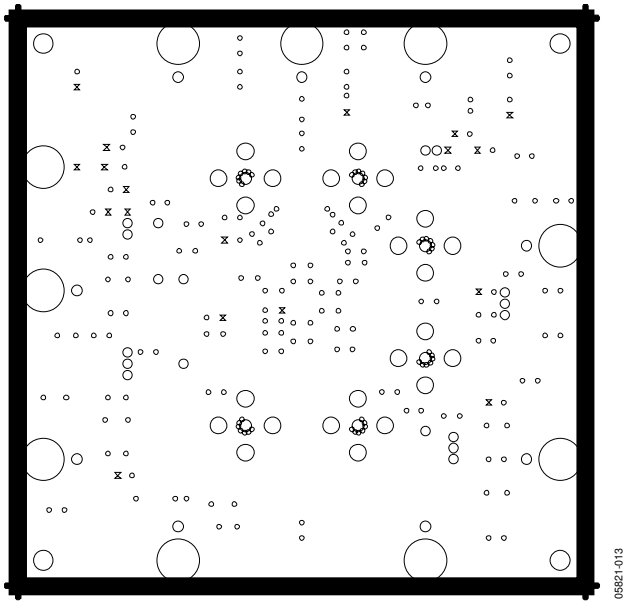

Figure 16. Upper Plane

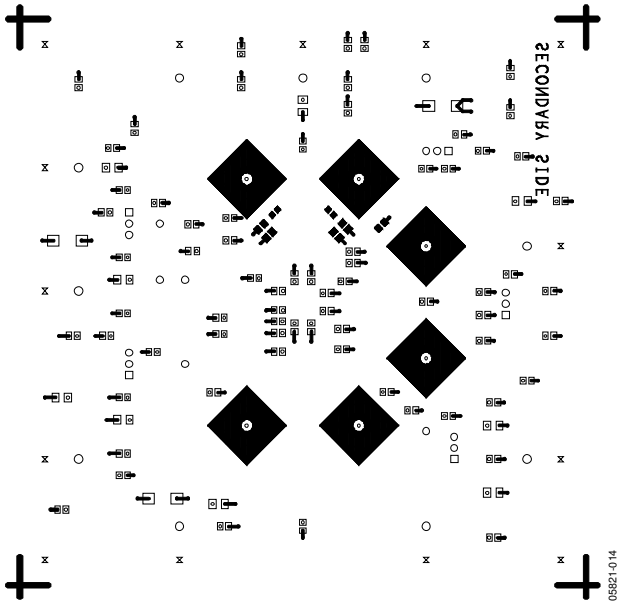

Figure 17. Top

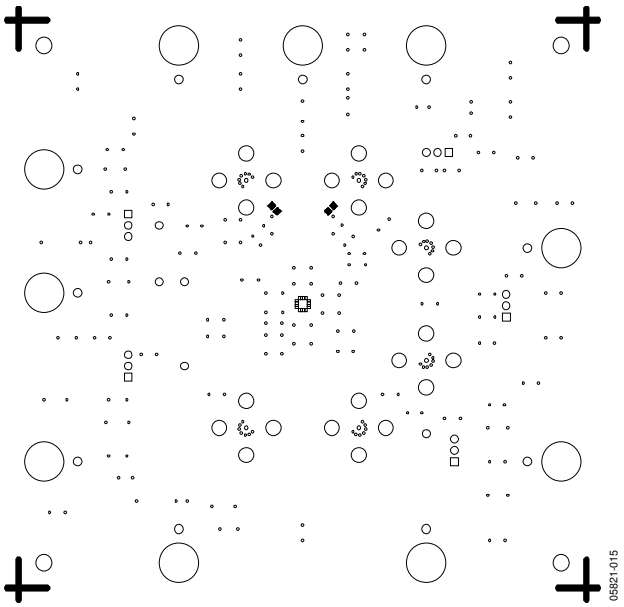

Figure 18. Solder Mask

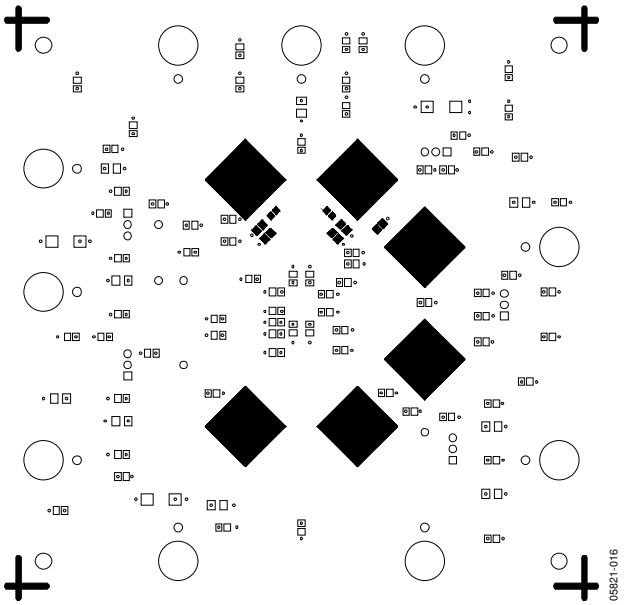

Figure 19. Solder Mask

SILKSCREENS

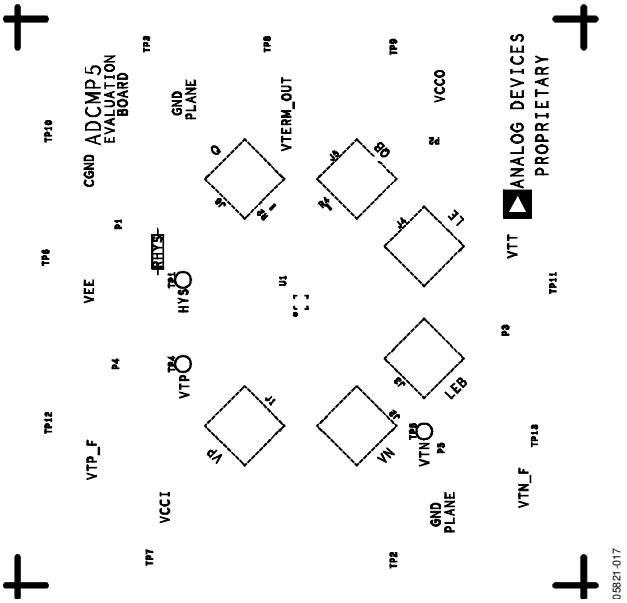

Figure 20. Silkscreen Bottom

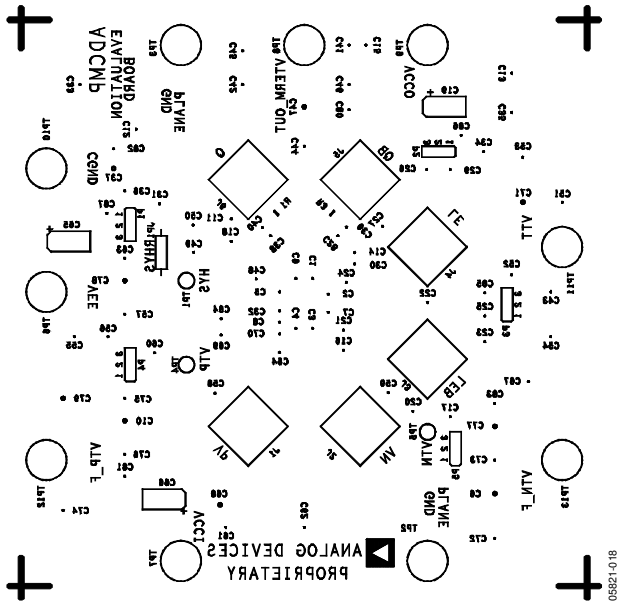

Figure 21. Silkscreen Top

COMPONENTS

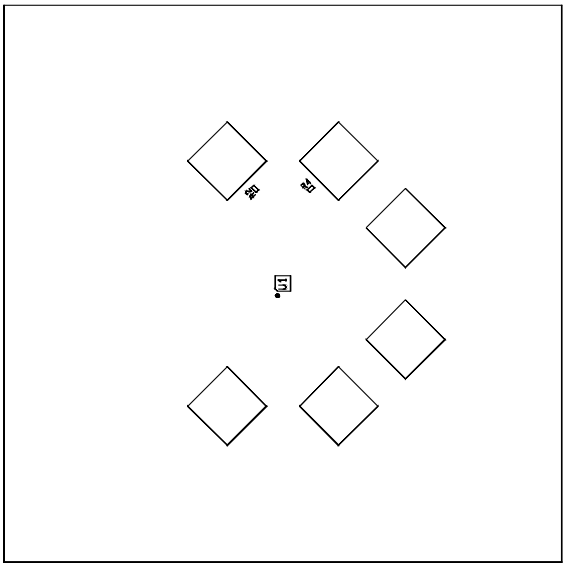

Figure 22 Bottom Components

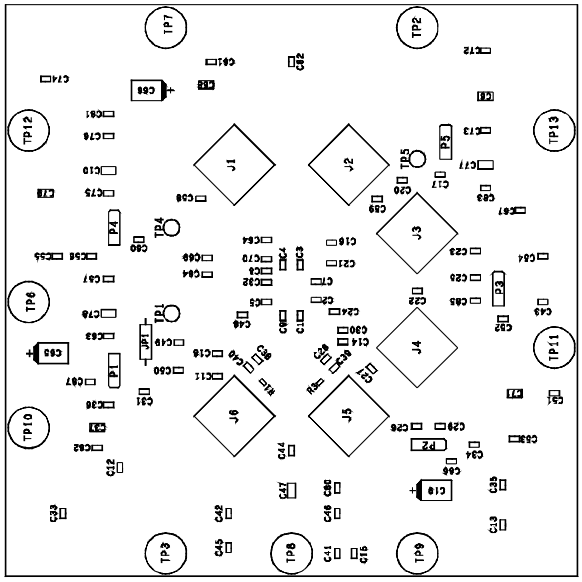

Figure 23. Top Components

ORDERING INFORMATION

ORDERING GUIDE

Model	Package Description
EVAL-ADCMP572BCP	Evaluation Board
EVAL-ADCMP573BCP	Evaluation Board
EVAL-ADCMP580BCP	Evaluation Board
EVAL-ADCMP581BCP	Evaluation Board
EVAL-ADCMP582BCP	Evaluation Board

ESD CAUTION

ESD (electrostatic discharge) sensitive device. Electrostatic charges as high as 4000 V readily accumulate on the human body and test equipment and can discharge without detection. Although this product features proprietary ESD protection circuitry, permanent damage may occur on devices subjected to high energy electrostatic discharges. Therefore, proper ESD precautions are recommended to avoid performance degradation or loss of functionality.

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