



ABSTRACT

The REF35EVM is an ultra low-power precision voltage reference evaluation module that demonstrates the [REF35](#) integrated circuit from Texas Instruments (TI).

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1 Overview

The REF35EVM is a voltage reference evaluation module that demonstrates the REF35 integrated circuit from Texas Instruments (TI).

The REF35 is an ultra-low power voltage reference with maximum 10 ppm/C temperature drift. The REF35 is used primarily as a voltage reference for low power data converters.

The REF35 can be operated from $V_{REF} + V_{DO}$ to 6 V. The REF35 uses only 1.4 μA of current in active mode. This device comes with a enable pin that allows the device to be set in shutdown mode. Under the shutdown condition, the REF35 only consumes 0.1 μA of current. The REF35 is optimal for a wide range of applications such as flow transmitters, blood glucose monitors, servo drive control modules, power quality analyzers, fault indicators, oscilloscopes and process analytics.

The REF35EVM features a user selectable wide VIN input which uses a [TPS7B8150](#) linear regulator, allowing the user to widen the input range to 40 V if so desired.. The VIN header can be connected to an external power supply to provide power. All of the REF35 input and output pins are accessible for external connection via test headers.

1.1 REF35EVM Features

- Includes: REF35125QDBVR
- Footprints for resistors and capacitors
- Multiple outputs for voltage measurements

KEY PARAMETERS	PARAMETER	PARAMETER LIMITS
Supply Voltage (VREF):	IN_VREF	0 V – 6 V
Supply Voltage (VLDO)	IN_LDO	0 V to 40 V
Enable Pin	EN	0 V to IN_VREF
Fixed Output Voltage:	VREF	1.25 V (REF35125QDBVR)
Output Current:	IOUT	-5 mA to 10 mA

CAUTION

Applying voltages above the limitations given in this table may cause permanent damage to your hardware.

1.2 REF35EVM Schematic

The schematic for the REF35EVM is illustrated in Figure 1-1.

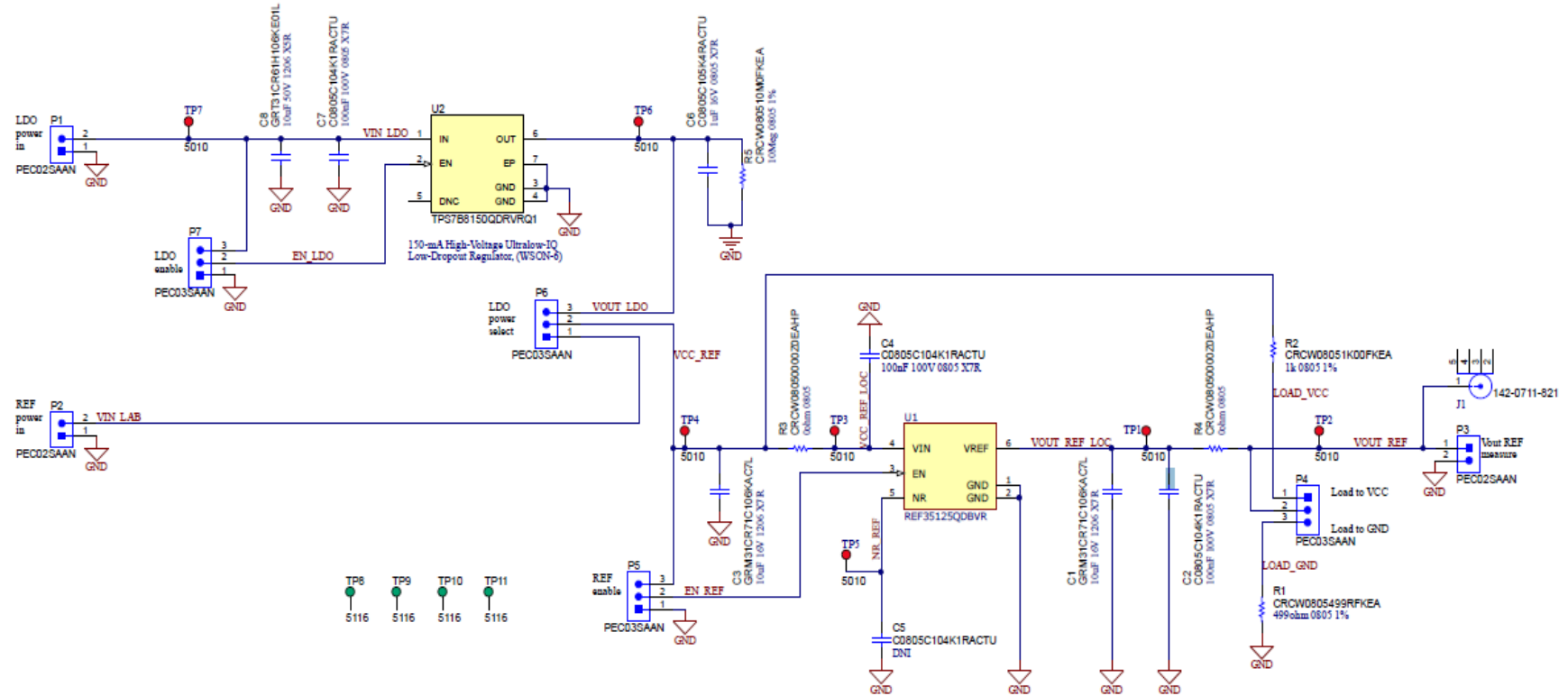


Figure 1-1. REF35EVM Schematic

1.3 REF35EVM Bill of Materials

Table 1-1. REF35EVM BOM

DESIGNATOR	QTY	VALUE	DESCRIPTION	PACKAGE	PART NUMBER	MANUFACTURER
!PCB	1		Printed Circuit Board		LP053	
C1, C3	2	10uF	CAP, CERM, 10 uF, 16 V, +/-10%, X7R, 1206	1206	GRM31CR71C106KAC7L	Murata Electronics
C2, C4, C5, C7	4	0.1uF	CAP, CERM, 0.1 uF, 100V, +/-10%, X7R, 0805	0805	C0805C104K1RACTU	KEMET
C6	1	1uF	CAP, CERM, 1 uF, 16 V, +/-10%, X7R, 0805	0805	C0805C105K4RACTU	KEMET
C8	1	10uF	CAP, CERM, 10 uF, 50 V, +/-10%, X5R, AEC-Q200 Grade 1, 1206	1206	GRT31CR61H106KE01L	Murata Electronics
J1	1	50OHM	SMA JACK 50 OHM EDGE MNT, SMT	SMT	142-0711-821	Cinch Connectivity Solutions Johnson
P1, P2, P3	3	100mil	Header, 100mil, 2x1, Tin, TH	TH	PEC02SAAN	Sullins Connector Solutions
P4, P5, P6, P7	4	100mil	Header, 100mil, 3x1, Tin, TH	TH	PEC03SAAN	Sullins Connector Solutions
R1	1	499OHM	RES, 499, 1%, 0.125 W, AEC-Q200 Grade 0, 0805	0805	CRCW0805499RFKEA	Vishay Dale
R2	1	1k	RES, 1.00 k, 1%, 0.125W, AEC-Q200 Grade 0, 0805	0805	CRCW08051K00FKEA	Vishay Dale
R3, R4	2	0	RES, 0, 5%, 0.333 W, AEC-Q200 Grade 0, 0805	0805	CRCW08050000Z0EAHP	Vishay Dale
R5	1	10M	RES, 10.0 M, 1%, 0.125 W, 0805	0805	CRCW080510M0FKEA	Vishay Dale
TP1, TP2, TP3, TP4, TP5, TP6, TP7	7		Test Point, Multipurpose, Red, TH	Keystone_5010	5010	Keystone Technologies
TP8, TP9, TP10, TP11	4		Test Point, Miniature, Green, TH	Keystone_5116	5116	Keystone Technologies
U1	1		Ultra Low-Power, High-Precision Voltage Reference, SOT23-6	SOT23-6	REF35125QDBVR	Texas Instruments
U2	1		150-mA High-Voltage Ultralow-IQ Low-Dropout Regulator, DRV0006A (WSO6)	WSO6	TPS7B8150QDRVRQ1	Texas Instruments

1.4 REF35EVM Board

The PCB layout for the REF35EVM is illustrated in Figure 1-2 and Figure 1-3.

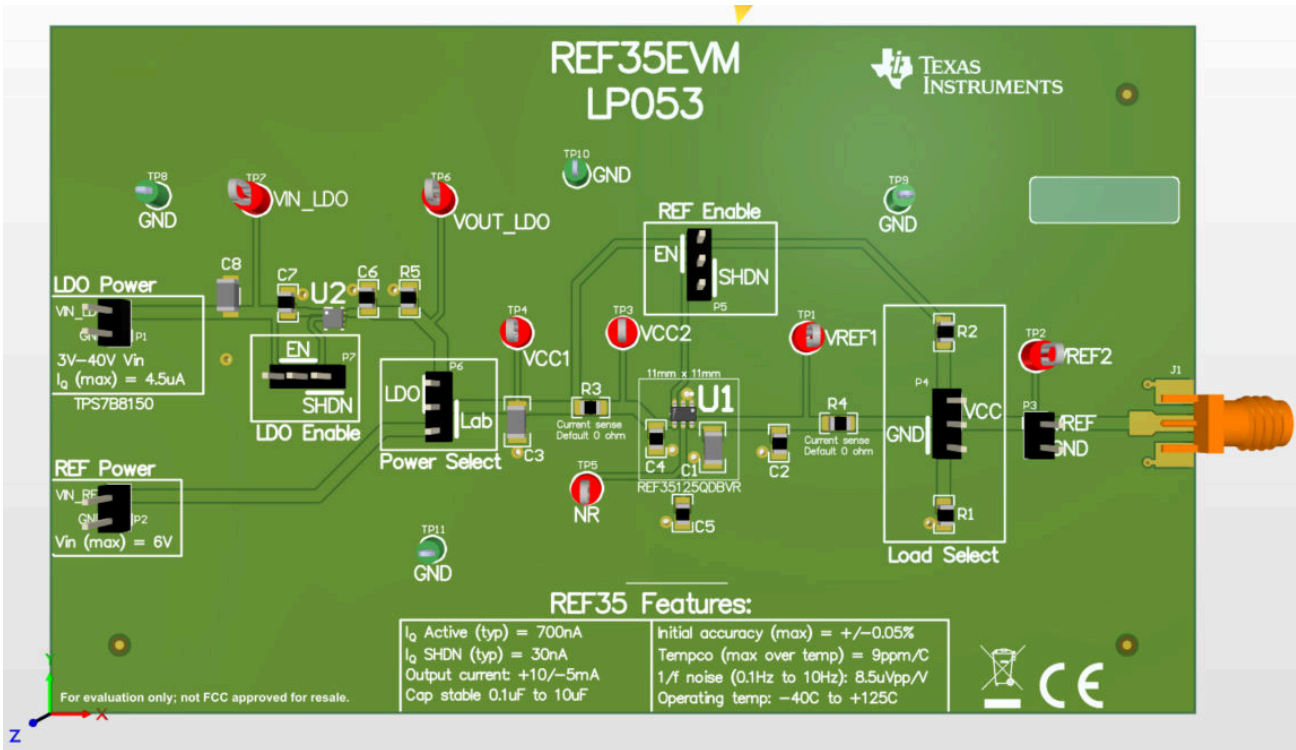


Figure 1-2. REF35EVM Board Top

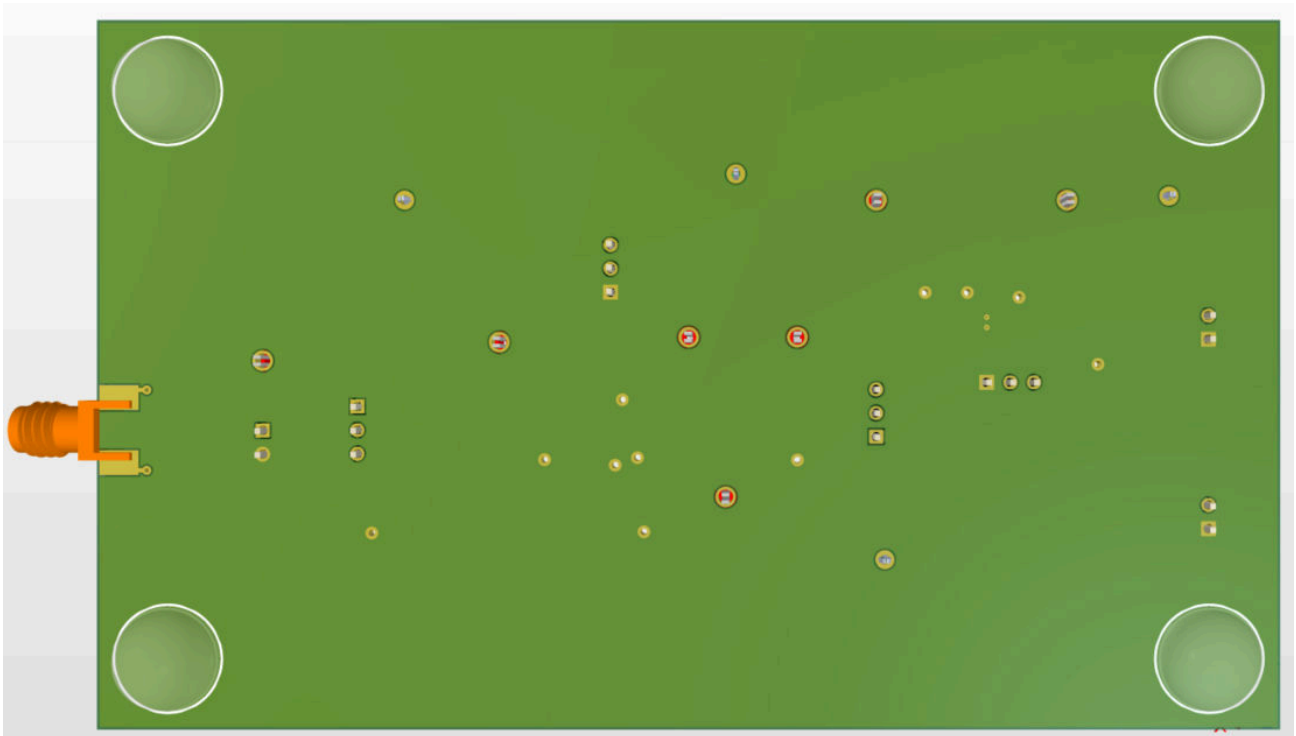


Figure 1-3. REF35EVM Board Bottom

2 Quick Setup Guide

This section describes the setup to quickly check the functionality of the REF35EVM.

2.1 Electrostatic Discharge Warning

Many of the components on the REF35EVM are susceptible to damage by electrostatic discharge (ESD). Customers are advised to observe proper ESD handling precautions when unpacking and handling the EVM, including the use of a grounded wrist strap at an approved ESD workstation.

CAUTION

Failure to observe ESD handling procedures may result in damage to EVM components.

2.2 Power Supply Setup and Functional Test

Normal operation:

If directly connecting the REF35 to the lab supply, a 5-V power supply capable of 50 mA of current is required (to handle load transients). The "Power Select" jumpers should be set to "Lab". The REF35 consumes 1.4 μ A of current during normal operation and has a maximum 10 mA of output current for maintaining regulated voltage. During start-up, the REF35 might consume I_{SC} momentarily to charge the output capacitors.

Connect the positive power supply lead to the "VIN_REF" pin on the "REF Power" header pin on the left side of the board. Connect the negative power supply lead to the "GND" pin on the "REF Power" header pin.

If powering the REF35 through the on-EVM LDO, a 5-V (up to the LDO max voltage, 40 V) power supply capable of 50 mA of current is required. The "Power Select" jumpers should be set to "LDO".

Connect the positive power supply lead to the "VIN_REF" pin on the "REF Power" header pin on the left side of the board. Connect the negative power supply lead to the "GND" pin on the "REF Power" header pin.

This EVM features selectable loads, where the load can be pulled to GND or VCC.

Connect a voltmeter to the VREF pin on the right side of the board. Connect the negative voltmeter terminal to "GND". An SMA cable can also be used to measure the same output.

The output voltage of the REF35125QDBVR will be 1.25V.

Shutdown mode: Move the jumper pin from EN to SHDN to place the part in shutdown mode. The REF35 will be in active mode if the jumper pin is either in EN or not present.

3 Layout

Figure 3-1 and Figure 3-2 show the top and bottom layers, and Figure 3-3 shows the top solder mask of the EVM.

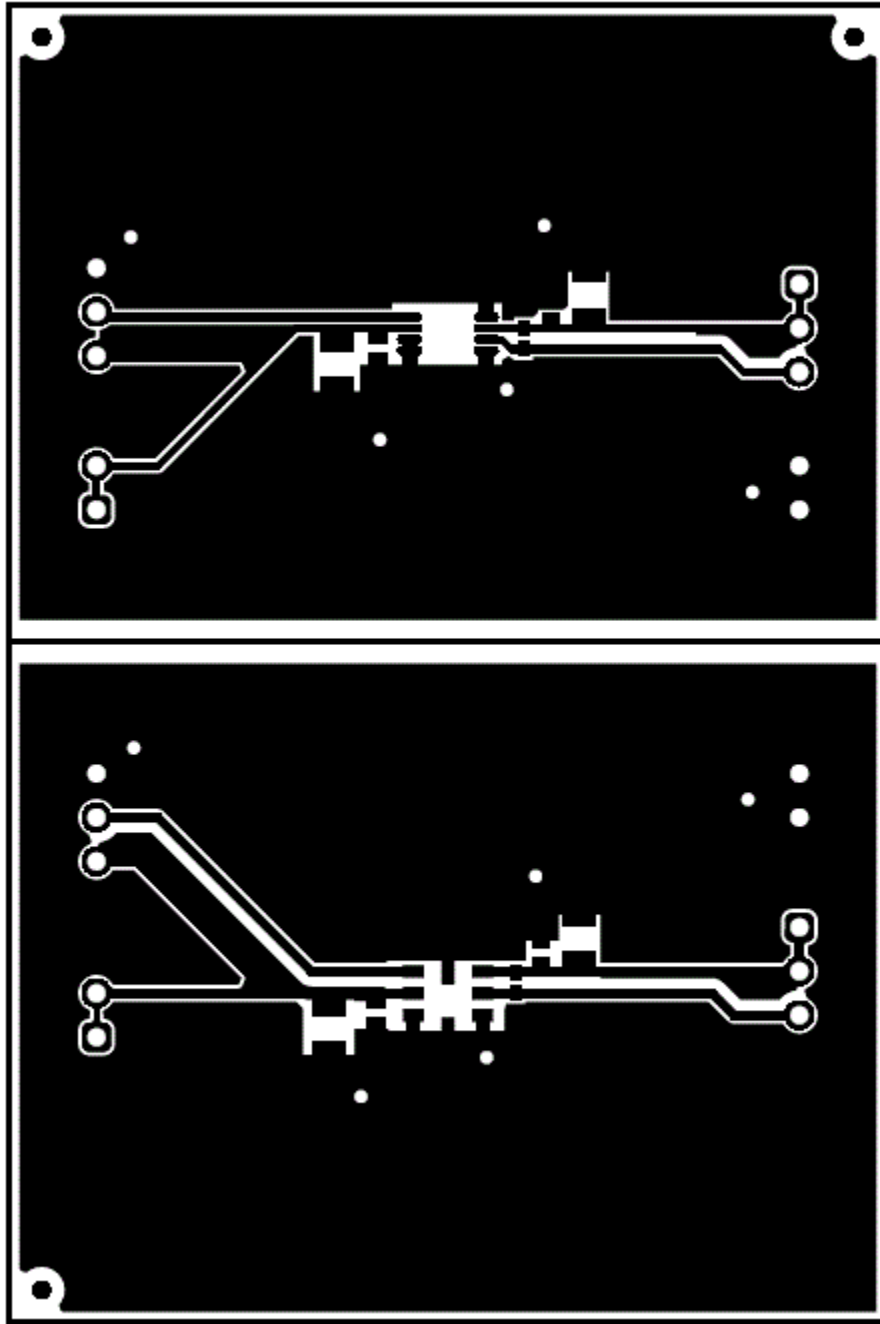


Figure 3-1. Top Layer

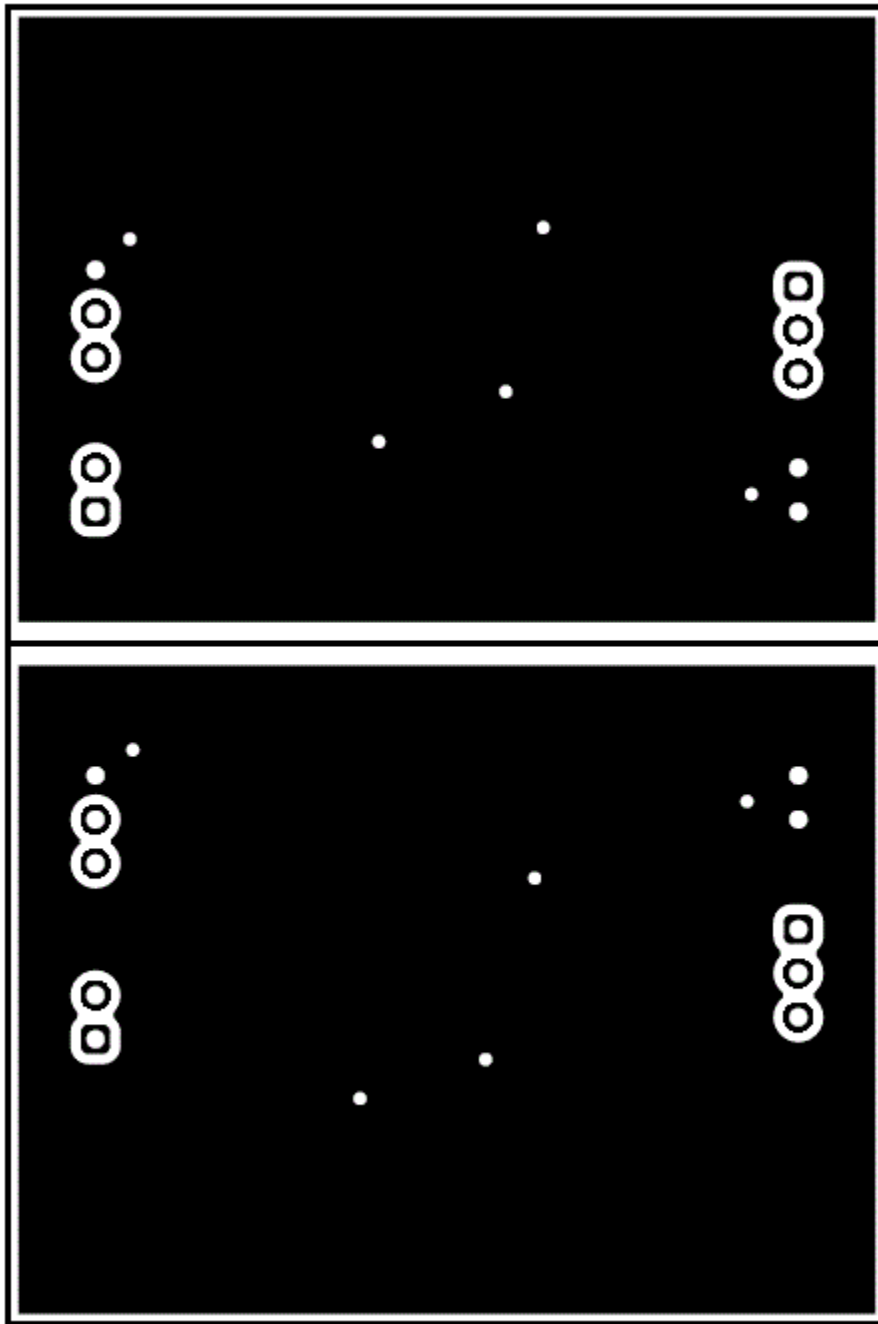


Figure 3-2. Bottom Layer

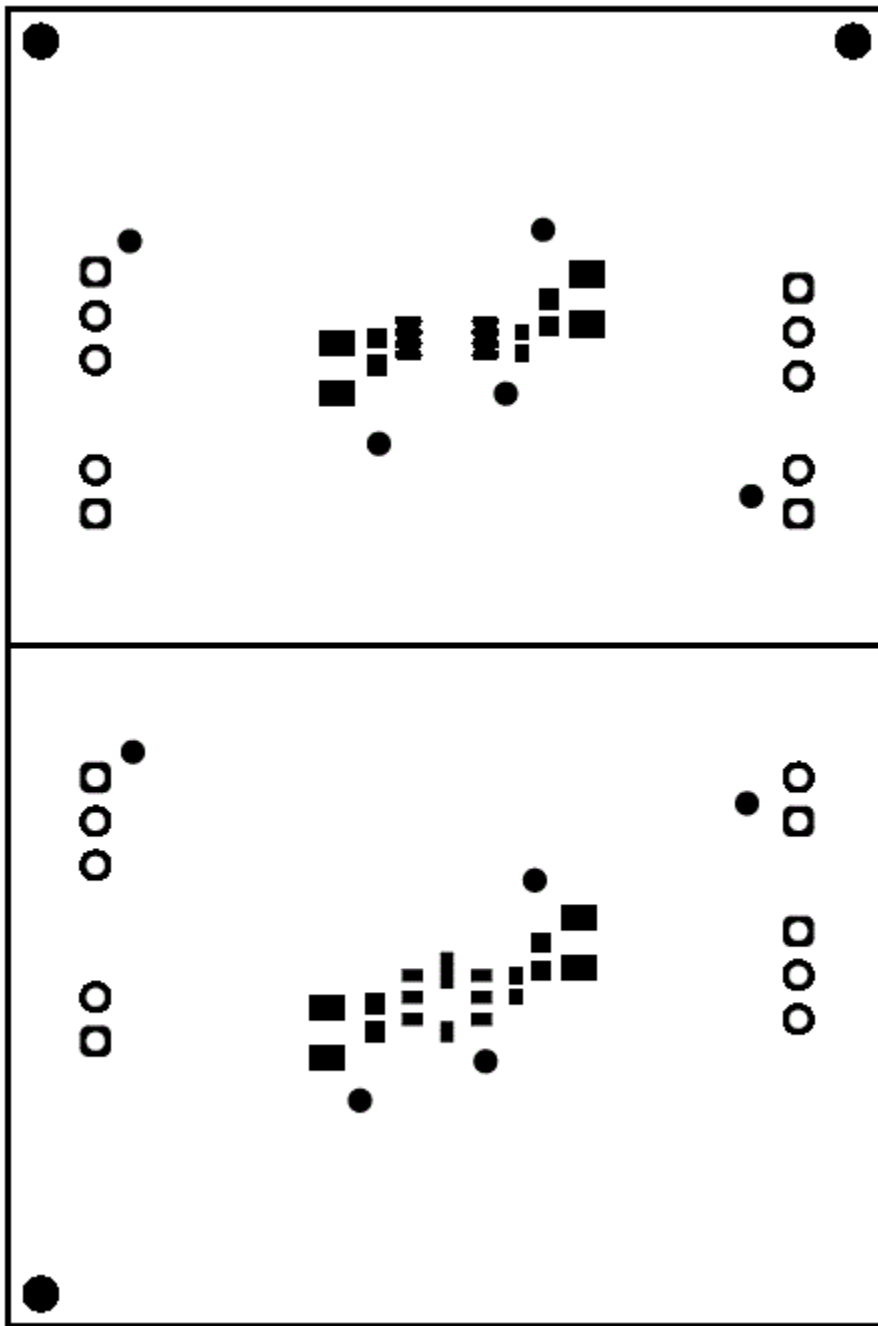


Figure 3-3. Top Solder Mask

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