



# MAX9989/MAX9990 Evaluation Kits

## Quick Start

The MAX9987/MAX9988 EV kits are fully assembled and factory tested. Follow the instructions in the *Connections and Setup* section for proper device evaluation.

## Test Equipment Required

Table 1 lists the equipment required to verify the operation of the MAX9989/MAX9990 EV kits. It is intended as a guide only, and some substitutions are possible.

## Connections and Setup

This section provides a step-by-step guide to testing the basic functionality of the EV kits. As a general precaution to prevent damaging the outputs by driving high-VSWR loads, do not turn on DC power or the RF signal generator until all connections are made:

- 1) Calibrate the power meter at 900MHz for the MAX9989, or at 1800MHz for the MAX9990. Be sure to use a power sensor rated to at least 20dBm. Measure the loss of the 20dB attenuator (pad) that is connected to OUTLO; account for this loss as an offset in the power meter.
- 2) Connect a 20dB pad to the LO driver output (OUTLO). The 20dB pad maintains a reasonable load VSWR for the output drivers and protects the RF equipment from accidental overload.
- 3) Connect a 50Ω termination to OUTPLL.
- 4) For the MAX9989, set the RF signal generator for 900MHz CW (i.e., unmodulated) at +10dBm (accounts for 3dB loss of input pad); for the MAX9990, set the generator for 1800MHz at +12dBm. Connect the generator to the EV kit input through a 3dB pad. Disable the RF output until all connections are made.
- 5) Connect the power sensor to OUTLO's 20dB pad.
- 6) Set the DC supply to +5.0V (set the current limit to around 250mA, if possible). Disable the output voltage and connect the supply to the EV kit through the ammeter.
- 7) Enable the supply.
- 8) Enable the RF signal generator's output.

## Testing the Buffer

- 1) From the procedure above, the power meter should be reading a power of about +17dBm. Keep in mind that because of a 2nd harmonic component in the output, these measured results are slightly higher than the true on-frequency RF power.
- 2) Ensure that the supply current is not more than 122mA at  $V_{CC} = 5.25V$  and  $P_{IN} = +10dBm$ .
- 3) Leaving the 20dB power pad connected to OUTLO, move the power detector to OUTPLL (removing the 50Ω termination) and verify an output level of about +3dBm. Be sure to turn off the 20dB offset.
- 4) After testing, disable the RF generator, disconnect the supply, then disconnect the RF cables.

## Layout Considerations

A properly designed PC board is an essential part of any RF/microwave circuit. Keep RF signal lines as short as possible to reduce losses, radiation, and inductance. For best performance, route the ground pin traces directly to the exposed paddle underneath the package. This paddle should be connected to the ground plane of the board by using multiple vias under the device to provide the best RF/thermal conduction path. Solder the exposed paddle, on the bottom of the device package, to a PC board exposed pad.

**Table 1. List of Required Equipment**

EQUIPMENT	QTY	DESCRIPTION
HP E3631A	1	DC power supply
Fluke 75 series II	1	Digital multimeter
HP/Agilent 8648B	1	RF signal generator
HP 437B	1	RF power meter
HP 8482A	1	High-power sensor (power head)
20dB pad	1	20dB (1W) attenuator
3dB pad	1	3dB attenuator
50Ω termination	1	50Ω (1W) termination

# MAX9989/MAX9990 Evaluation Kits

Evaluate: MAX9989/MAX9990

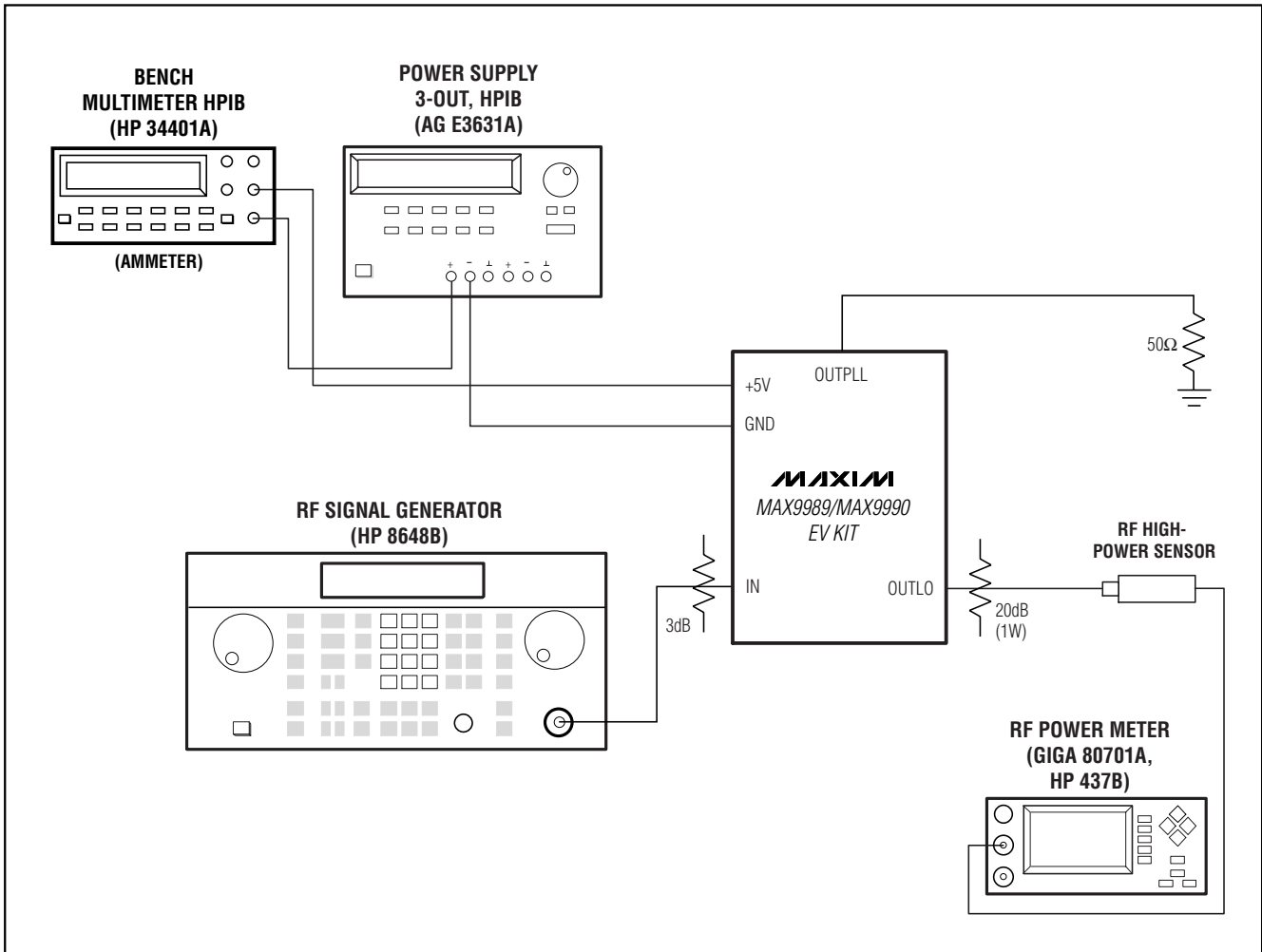


Figure 1. Test Setup Diagram

# MAX9989/MAX9990 Evaluation Kits

**Evaluate: MAX9989/MAX9990**

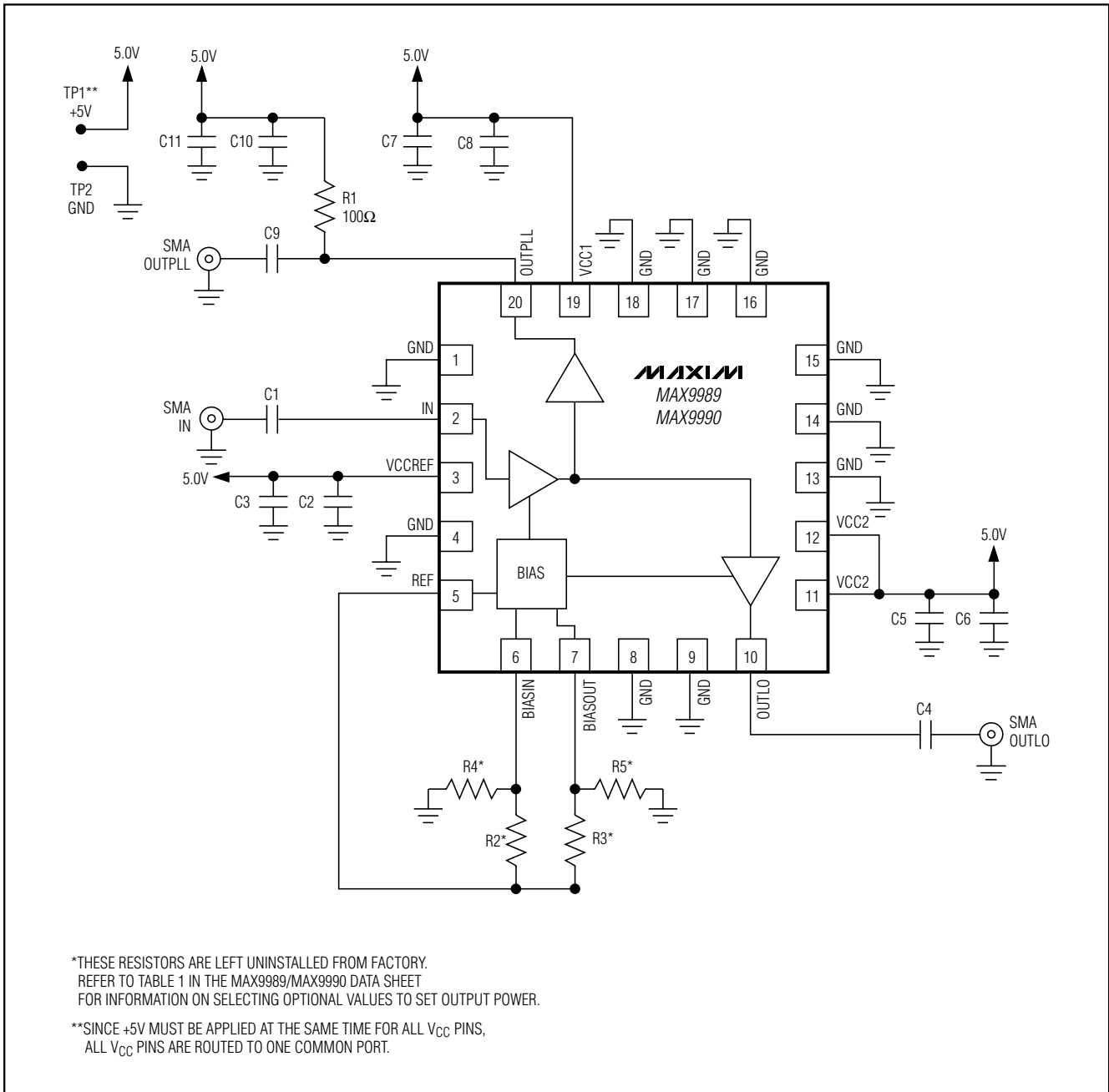


Figure 2. MAX9989/MAX9990 EV Kit Schematic

# MAX9989/MAX9990 Evaluation Kits

**Evaluate: MAX9989/MAX9990**

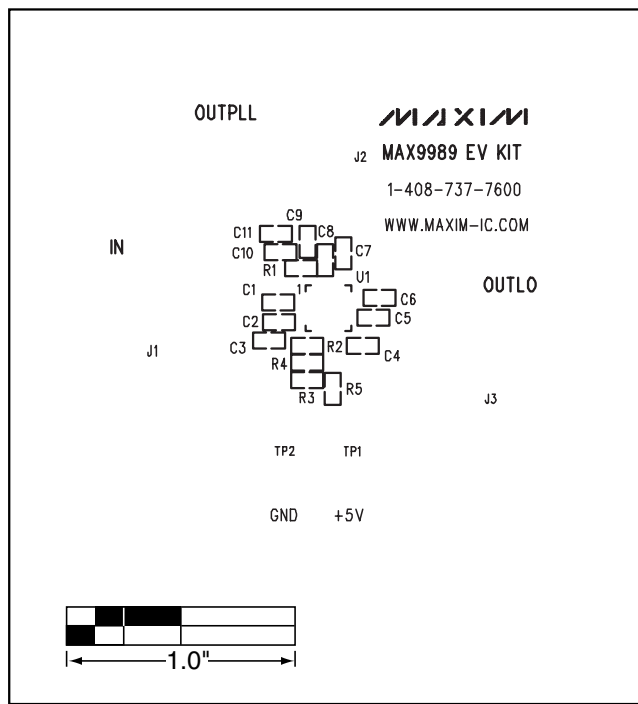


Figure 3a. MAX9989 EV Kit Component Placement Guide—Top Silkscreen

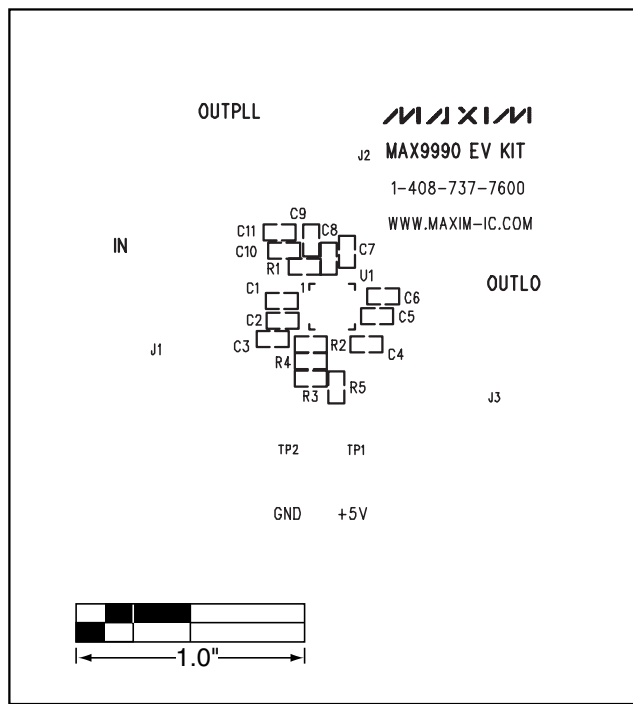


Figure 3b. MAX9990 EV Kit Component Placement Guide—Top Silkscreen

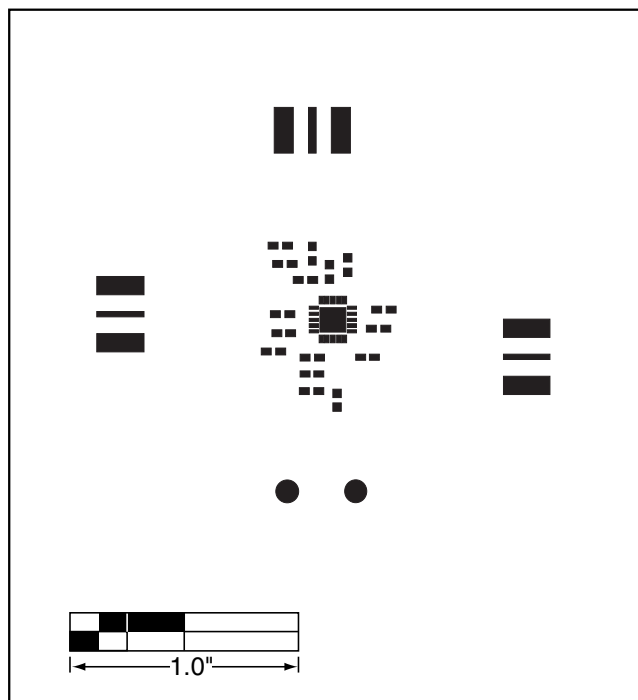


Figure 4. MAX9989/MAX9990 EV Kit PC Board Layout—Top Soldermask

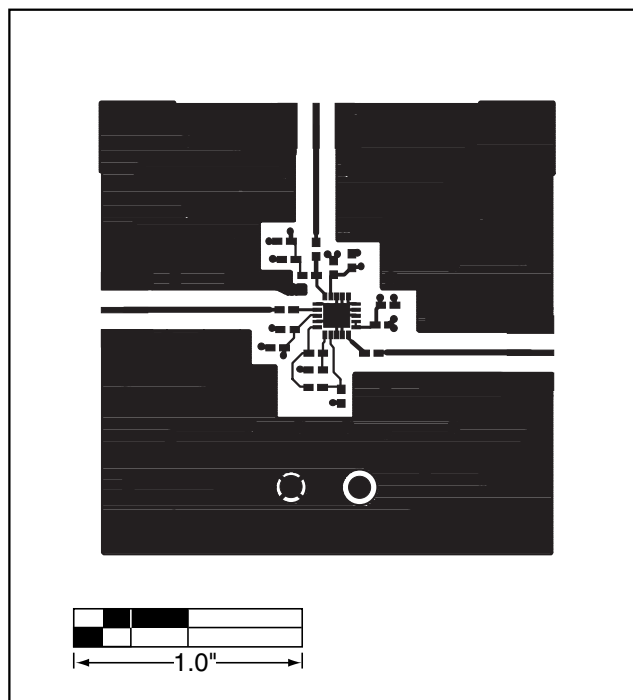


Figure 5. MAX9989/MAX9990 EV Kit PC Board Layout—Top Layer Metal

# MAX9989/MAX9990 Evaluation Kits

**Evaluate: MAX9989/MAX9990**

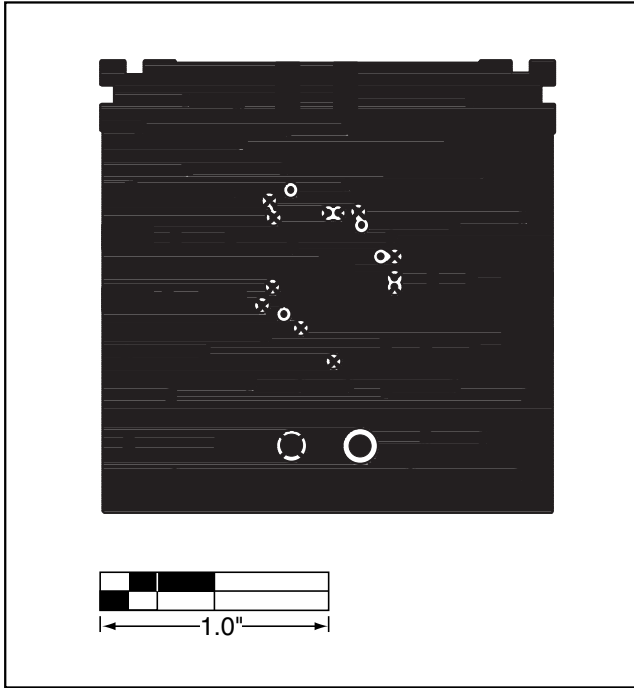


Figure 6. MAX9989/MAX9990 EV Kit PC Board Layout—Inner Layer 2 (GND)

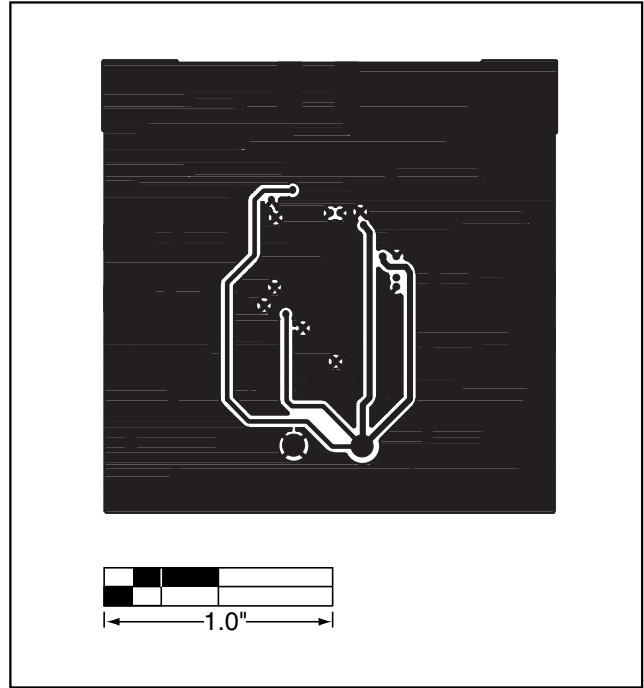


Figure 7. MAX9989/MAX9990 EV Kit PC Board Layout—Inner Layer 3 (Routes)

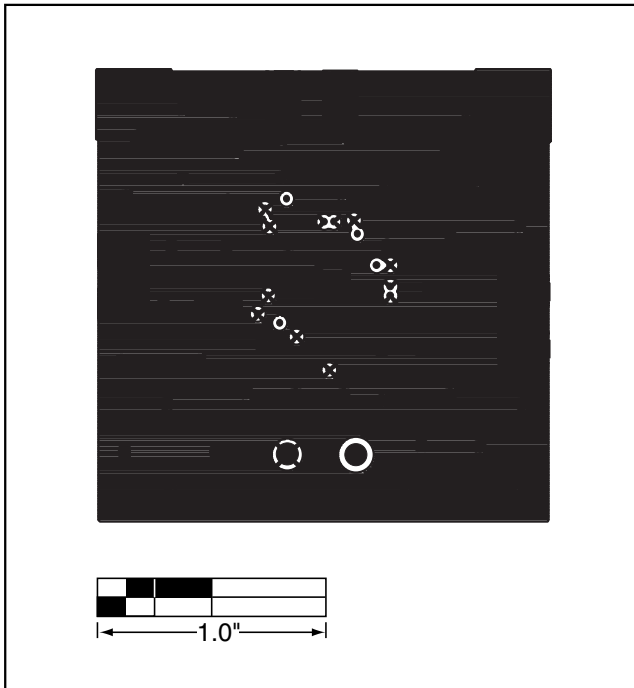


Figure 8. MAX9989/MAX9990 EV Kit PC Board Layout—Bottom Layer Metal

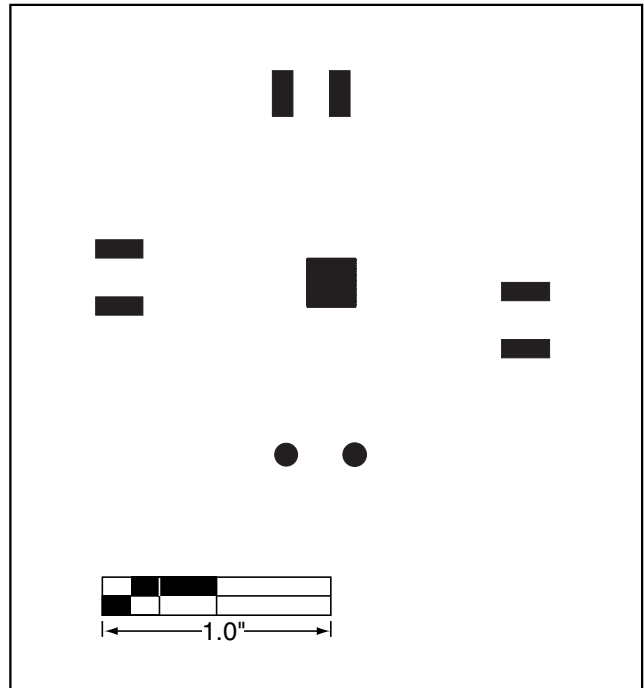


Figure 9. MAX9989/MAX9990 EV Kit PC Board Layout—Bottom Soldermask

# MAX9989/MAX9990 Evaluation Kit

Evaluate: MAX9989/MAX9990

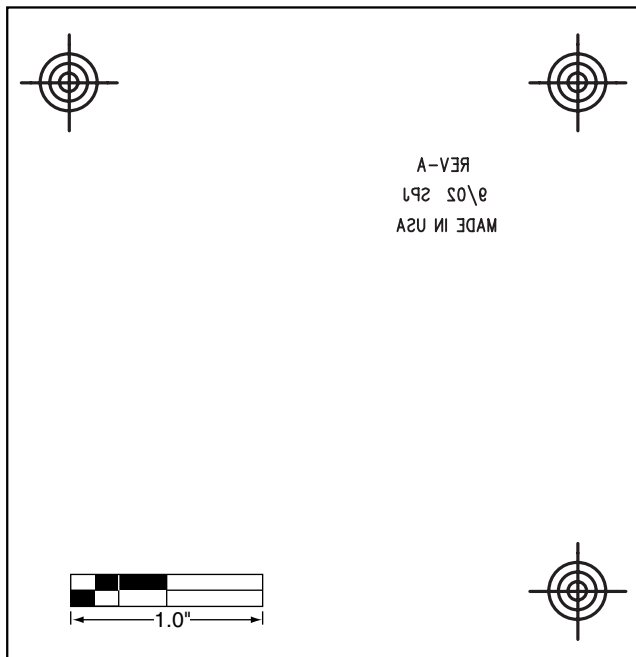


Figure 10. MAX9989/MAX9990 EV Kit PC Board Layout—  
Bottom Silkscreen

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