

# MAXIM

## MAX9750A Evaluation Kit

### General Description

The MAX9750A evaluation kit (EV kit) is a fully assembled and tested circuit board that evaluates the MAX9750A/B/C, MAX9751, and MAX9755. The MAX9750A/B/C, MAX9751, and MAX9755 are class AB amplifiers designed to drive stereo bridge-tied-load (BTL) speakers, and a stereo headphone in portable audio applications. The speaker amplifiers operate from a 4.5VDC to 5.5VDC power supply, and deliver 2 x 1.4W continuous power into a pair of 8Ω speakers. The headphone amplifiers operate from a 3VDC to 5.5VDC power supply, and deliver 110mW continuous power into a 16Ω stereo headphone.

The MAX9750A/B/C feature an analog volume control and an audible alert input (BEEP). The MAX9750A/B/Cs' gain is jumper selectable. The MAX9751 features a 2:1 multiplexer, allowing two audio sources. The MAX9750A/B/C/MAX9751/MAX9755 have a low shutdown supply current of 5μA.

### Features

- ◆ 4.5V to 5.5V Single-Supply Operation
- ◆ Drives 2 x 1.4W into a Pair of 8Ω Speakers
- ◆ Drives 110mW into a 16Ω Stereo Headphone
- ◆ Analog Volume Control
- ◆ BEEP Input with Glitch Filter
- ◆ 5μA Shutdown Current
- ◆ Small 28-Pin TQFN Package
- ◆ Fully Assembled and Tested
- ◆ Evaluates MAX9750B/C/MAX9751/MAX9755 (IC Replacement Required)

### Ordering Information

PART	TEMP RANGE	IC PACKAGE
MAX9750AEVKIT	0°C to +70°C	28 TQFN-EP*

\*EP = Exposed Paddle

### Component List

DESIGNATION	QTY	DESCRIPTION
C1, C11, C12, C14	4	0.1μF ±10%, 25V X7R ceramic capacitors (0603) TDK C1608X7R1E104K
C2	1	10μF ±20%, 6.3V X5R ceramic capacitor (0805) TDK C2012X5R0J106M
C3	1	1000pF ±10%, 50V X7R ceramic capacitor (0603) TDK C1608X7R1H102K
C4-C10, C16	8	1μF ±10%, 10V X5R ceramic capacitors (0603) TDK C1608X5R1A105K

DESIGNATION	QTY	DESCRIPTION
C13, C15	2	100μF ±20%, 6.3V X5R ceramic capacitors (1210) TDK C3225X5R0J107M
J1	1	3.5mm switched stereo jack
JU1-JU4	4	3-pin headers
JU5	1	2-pin header
R1	1	47kΩ ±5% resistor (0603)
R2	1	10kΩ thumb-wheel potentiometer
U1	1	MAX9750AETI (28-pin TQFN-EP, 5mm x 5mm)
None	5	Shunts
None	1	MAX9750A PC board

### Component Suppliers

SUPPLIER	PHONE	FAX	WEBSITE
TDK	847-803-6100	847-390-4405	www.component.tdk.com

**Note:** Indicate that you are using the MAX9750AEVKIT when contacting this component supplier.

# MAX9750A Evaluation Kit

## Quick Start

### Recommended Equipment

- One 5V, 2A power supply
- One 3V, 1A power supply
- One audio source
- Two 8 $\Omega$  speakers
- One headphone

The MAX9750A EV kit is fully assembled and tested. Follow the steps listed below to verify board operation.

**Do not turn on the power supply until all connections are completed.**

- 1) Verify that a shunt is installed across pins 1 and 2 of jumper JU1 (EV kit ON).
- 2) Verify that shunts are installed across pins 1 and 2 of jumpers JU2 and JU3 (speaker gain = 13.5dB, headphone gain = 3dB).
- 3) Verify that a shunt is installed across pins 2 and 3 of jumper JU4 (volume control is selected).
- 4) Verify that a shunt is installed across jumper JU5 (speaker enable).
- 5) Connect the first speaker to the OUTL+ and the OUTL- pads.
- 6) Connect the second speaker to the OUTR+ and the OUTR- pads.
- 7) Connect the +5V power supply to the VDD pad. Connect the ground terminal of the power supply to the GND pad.
- 8) Connect the +3V power supply to the HPVDD pad. Connect the ground terminal of the power supply to the GND pad.
- 9) Connect the audio source to the IN\_L and the IN\_R pads. Connect the ground from the audio source to the GND pad.
- 10) Turn on both power supplies and the audio source.
- 11) Adjust potentiometer R2 to change the speakers' volume.
- 12) Connect the headphone to the phone jack J1.
- 13) Adjust potentiometer R2 to adjust the headphone's volume.

## Detailed Description

The MAX9750A EV kit is designed to evaluate the MAX9750A/B/C, MAX9751, and MAX9755. The MAX9750A/B/C, MAX9751, and MAX9755 are class AB amplifiers that drive stereo BTL speakers, and stereo headphones in portable audio applications. The speaker amplifiers operate from a 4.5VDC to 5.5VDC power supply, and deliver 2 x 1.4W continuous power into a pair of 8 $\Omega$  speakers. The headphone amplifiers operate from a 3VDC to 5.5VDC power supply, and deliver 110mW continuous power into 16 $\Omega$  stereo headphones. The EV kit can be powered by a 4.5VDC to 5.5VDC single power supply.

The EV kit comes with the MAX9750A installed. The volume of the speakers and the headphone are adjustable by the thumb-wheel potentiometer (R2) connected to the analog volume control (VOL). The maximum gain of the MAX9750A is selectable by jumpers JU2 and JU3. The MAX9750A also features an audible alert input (PC\_BEEP).

The EV kit can also evaluate the MAX9750B, MAX9750C, MAX9751, and MAX9755. To evaluate the MAX9750B or MAX9750C, replace the MAX9750A with the desired IC. To evaluate the MAX9751 or the MAX9755, see the *Evaluating the MAX9751* or the *Evaluating the MAX9755* sections in this data sheet for additional information.

The speaker and headphone outputs on the EV kit can be selected by jumper JU5 and the headphone jack J1. See Table 4 in the *Jumper Selection* section.

### Jumper Selection

#### Shutdown Mode ( $\overline{\text{SHDN}}$ )

Jumper JU1 controls the shutdown pin ( $\overline{\text{SHDN}}$ ) of the MAX9750A/B/C, MAX9751, and MAX9755 ICs. See Table 1 for shunt positions.

**Table 1. JU1 Jumper Selection**

SHUNT POSITION	$\overline{\text{SHDN}}$ PIN	EV KIT FUNCTION
1-2	High	Enabled
2-3	Low	Disabled
None	Connected to external controller	$\overline{\text{SHDN}}$ driven by external controller, shutdown is active low

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## Gain Selection (MAX9750A/B/C)

For the MAX9750A/B/C, jumpers JU2 and JU3 provide an option to set the maximum gain of the speakers and headphone amplifiers on the EV kit. See Table 2 for shunt positions.

## Analog Volume Control (MAX9750A/B/C)

Jumper JU4 selects between the analog volume control (VOL) for the MAX9750A/B/C or the right input channel for the MAX9751/MAX9755. See Table 3 for shunt positions.

## Speaker/Headphone Mode (HPS)

Jumper JU5 selects between the speaker mode and the headphone mode for the MAX9750A/B/C, MAX9751, and MAX9755 ICs. See Table 4 for shunt positions.

## Evaluating the MAX9751

To evaluate the MAX9751, replace the MAX9750A with the MAX9751. The MAX9751 features a 2:1 multiplexer, allowing two sets of audio sources to be connected to the inputs of the MAX9751. The first set of audio input signals are connected to the IN\_L and IN\_R pads

(same as the MAX9750A), while the second set of audio signals are connected to the PC\_BEEP (left channel) and INRB (right channel) pads. To utilize the PC\_BEEP and INRB pads for the second set of audio input signals, replace R1 with a 0Ω resistor and install shunts on pins 1 and 2 of jumper JU4. The two sets of audio sources are selectable by jumper JU3. The gain for the speaker and headphone amplifiers is set by jumper JU2. Refer to the MAX9751 IC data sheet for the correct pinout and function.

The speaker and headphone outputs on the EV kit can be selected by jumper JU5 and headphone jack J1. See Table 4 in the *Jumper Selection* section.

## MAX9751 Gain Selection

When evaluating the MAX9751, jumper JU2 provides an option to set the gain of the speakers and headphone amplifiers of the EV kit. See Table 5 for shunt positions.

**Table 2. JU2 and JU3 Jumper Selection**

SHUNT POSITION		SPEAKER MODE GAIN, JU5 NOT INSTALLED (dB)			HEADPHONE MODE GAIN, JU5 INSTALLED (dB)
JU3 (GAIN2)	JU2 (GAIN1)	MAX9750A	MAX9750B	MAX9750C	MAX9750A/B/C
2-3 (low)	2-3 (low)	9	15	6	0
2-3 (low)	1-2 (high)	10.5	16.5	7.5	0
1-2 (high)	2-3 (low)	12	18	9	3
1-2 (high)	1-2 (high)	13.5	19.5	10.5	3

**Table 3. JU4 Jumper Selection**

SHUNT POSITION	MAX9750A/B/C, Pin 28 (VOL)	EV KIT FUNCTION
1-2	Not allowed when evaluating the MAX9750A/B/C	See <i>Evaluating the MAX9751</i> or <i>Evaluating the MAX9755</i> section
2-3	Connected to the thumb-wheel potentiometer R2	MAX9750A/B/C's analog volume control is selected

**Table 4. JU5 Jumper Selection**

SHUNT POSITION	EV KIT FUNCTION
None	Forced headphone mode
Installed (No headphone plugged into J1)	Speaker mode
Installed (Headphone plugged into J1)	Headphone mode

**Table 5. JU2 Jumper Selection**

SHUNT POSITION	MAX9751 PIN 24 (GAIN)	SPEAKER MODE GAIN, JU5 INSTALLED (dB)	HEADPHONE MODE GAIN, JU5 NOT INSTALLED (dB)
1-2	Connected to VDD	9	0
2-3	Connected to GND	10.5	3

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Evaluates: MAX9750A/B/C/MAX9751/MAX9755

**Table 6. JU3 Jumper Selection**

SHUNT POSITION	MAX9751 PIN 23 (IN1/2)	STEREO INPUT SOURCE SELECTED
1-2	Connected to VDD	The stereo source that is connected to the IN_L and IN_R pads is selected
2-3	Connected to GND	The stereo source that is connected to the PC_BEEP and INRB pads* is selected

\*Replace R1 with a 0Ω resistor, and install shunts on pins 1 and 2 of jumper JU4.

**MAX9751 Stereo Input Selection**

When evaluating the MAX9751, jumper JU3 provides an option to select between two stereo input sources. See Table 6 for shunt positions.

**MAX9751 Second Right Input Channel (INR2)**

Jumper JU4 selects between the analog volume control (VOL) for the MAX9750A/B/C or the second right input channel (INR2) for the MAX9751. See Table 7 for shunt positions.

**Evaluating the MAX9755**

To evaluate the MAX9755, replace the MAX9750A with the MAX9755. The MAX9755's audio input signals INL and INR are connected to the PC\_BEEP and INRB pads on the EV kit, respectively. To utilize the PC\_BEEP and INRB pads for audio input signals, replace resistor

R1 with a 0Ω resistor and install a shunt on pins 1 and 2 of jumper JU4. Install a shunt on pins 2 and 3 of jumper JU3. The speaker and headphone amplifier gains are set by jumper JU2. Refer to the MAX9755 IC data sheet for the correct pinout.

The speaker and headphone outputs on the EV kit can be selected by jumper JU5 and the headphone jack J1. See Table 4 in the *Jumper Selection* section.

**MAX9755 Gain Selection**

When evaluating the MAX9755, jumper JU2 provides an option to set the gain of the speakers and headphone amplifiers of the EV kit. See Table 8 for shunt positions.

**MAX9755 Jumper JU3**

When evaluating the MAX9755, install a shunt across pins 2 and 3 on jumper JU3 (see Table 9).

**MAX9755 Right Input Channel (INR)**

Jumper JU4 selects between the analog volume control (VOL) for the MAX9750A/B/C or the right input channel (INR) for the MAX9755. See Table 10 for shunt positions.

**Table 7. JU4 Jumper Selection**

SHUNT POSITION	MAX9751 PIN 28 (INR2)	EV KIT FUNCTION
1-2	AC coupled to the INRB pad on the EV kit	MAX9751's second right input channel is selected
2-3	Not allowed when evaluating the MAX9751	See the <i>Jumper Selection</i> section

**Table 8. JU2 Jumper Selection**

SHUNT POSITION	MAX9755 PIN 24 (GAIN)	SPEAKER MODE GAIN, JU5 INSTALLED (dB)	HEADPHONE MODE GAIN, JU5 NOT INSTALLED (dB)
1-2	Connected to VDD	9	0
2-3	Connected to GND	10.5	3

**Table 9. JU3 Jumper Selection**

SHUNT POSITION	MAX9755 PIN 23 (GND)	EV KIT FUNCTION
1-2 (not allowed)	Connected to VDD (not allowed)	Not functional
2-3 (required)	Connected to GND	Normal operation

**Table 10. JU4 Jumper Selection**

SHUNT POSITION	MAX9755 PIN 28 (INR)	EV KIT FUNCTION
1-2	AC coupled to the INRB pad on the EV kit	MAX9755's right input channel is selected
2-3	Not allowed when evaluating the MAX9755	See the <i>Jumper Selection</i> section

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Evaluates: MAX9750A/B/C/MAX9751/MAX9755

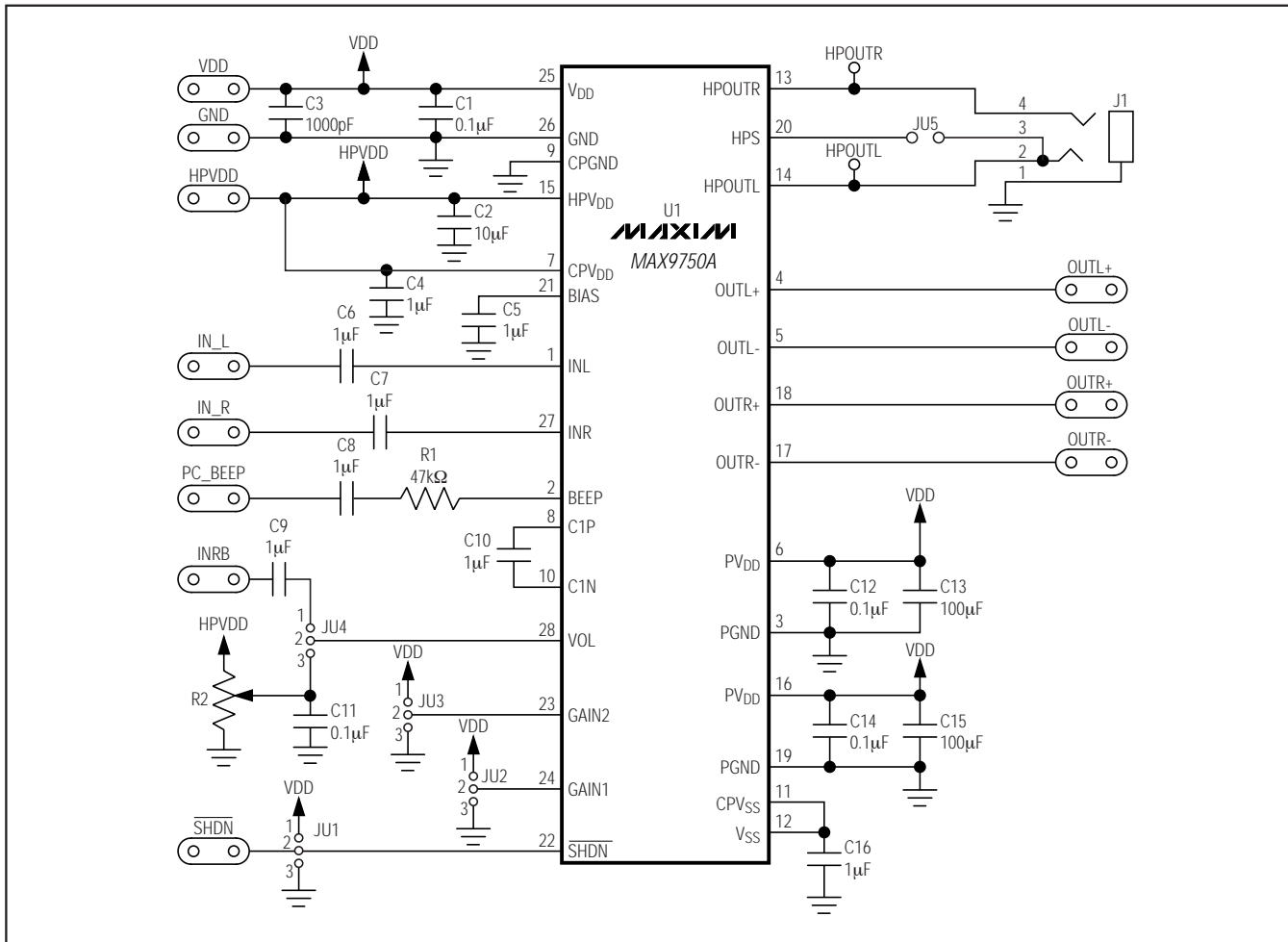


Figure 1. MAX9750A EV Kit Schematic

# MAX9750A Evaluation Kit

Evaluates: MAX9750A/B/C/MAX9751/MAX9755

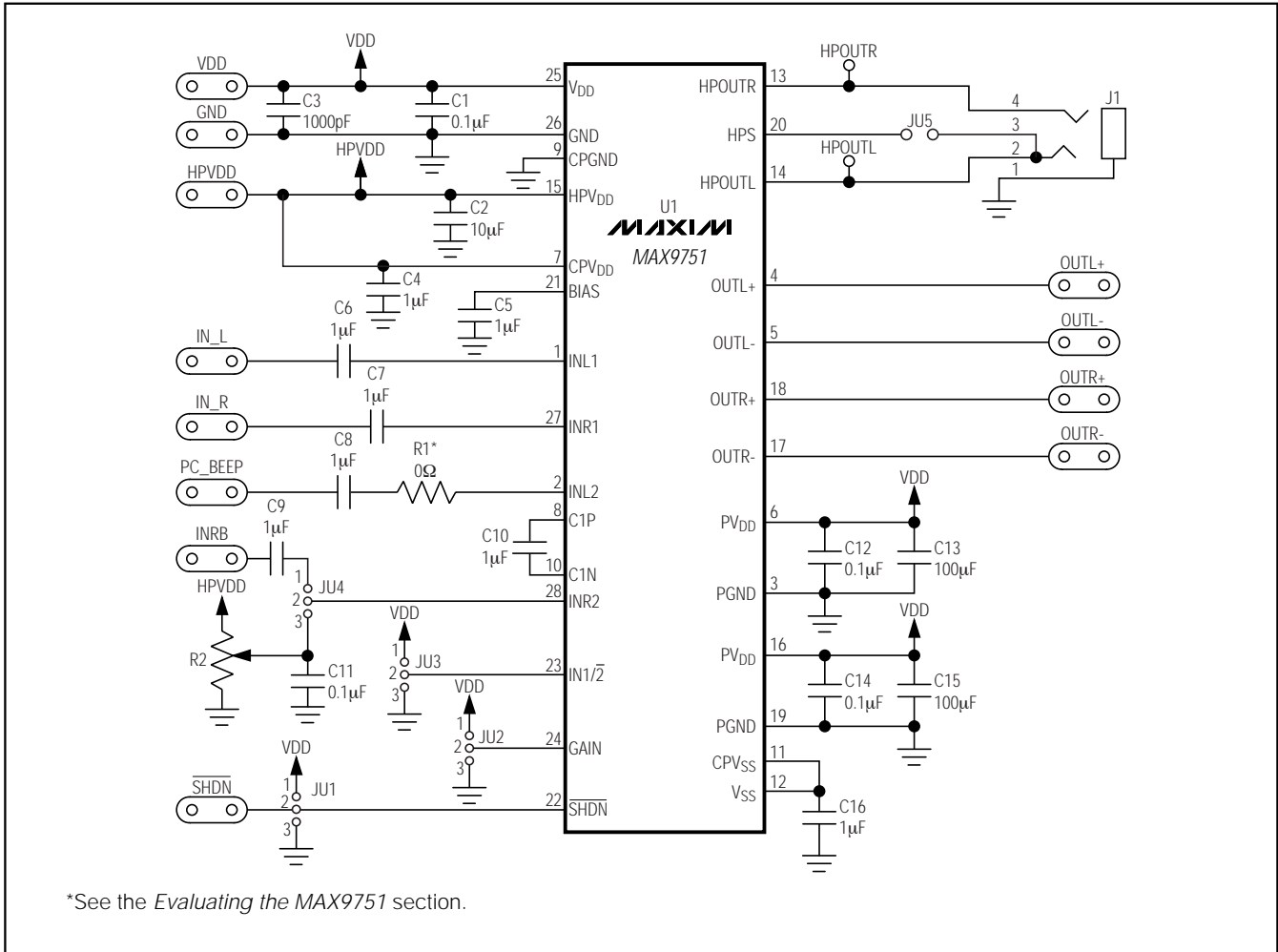


Figure 2. Application Circuit for MAX9751

# MAX9750A Evaluation Kit

Evaluates: MAX9750A/B/C/MAX9751/MAX9755

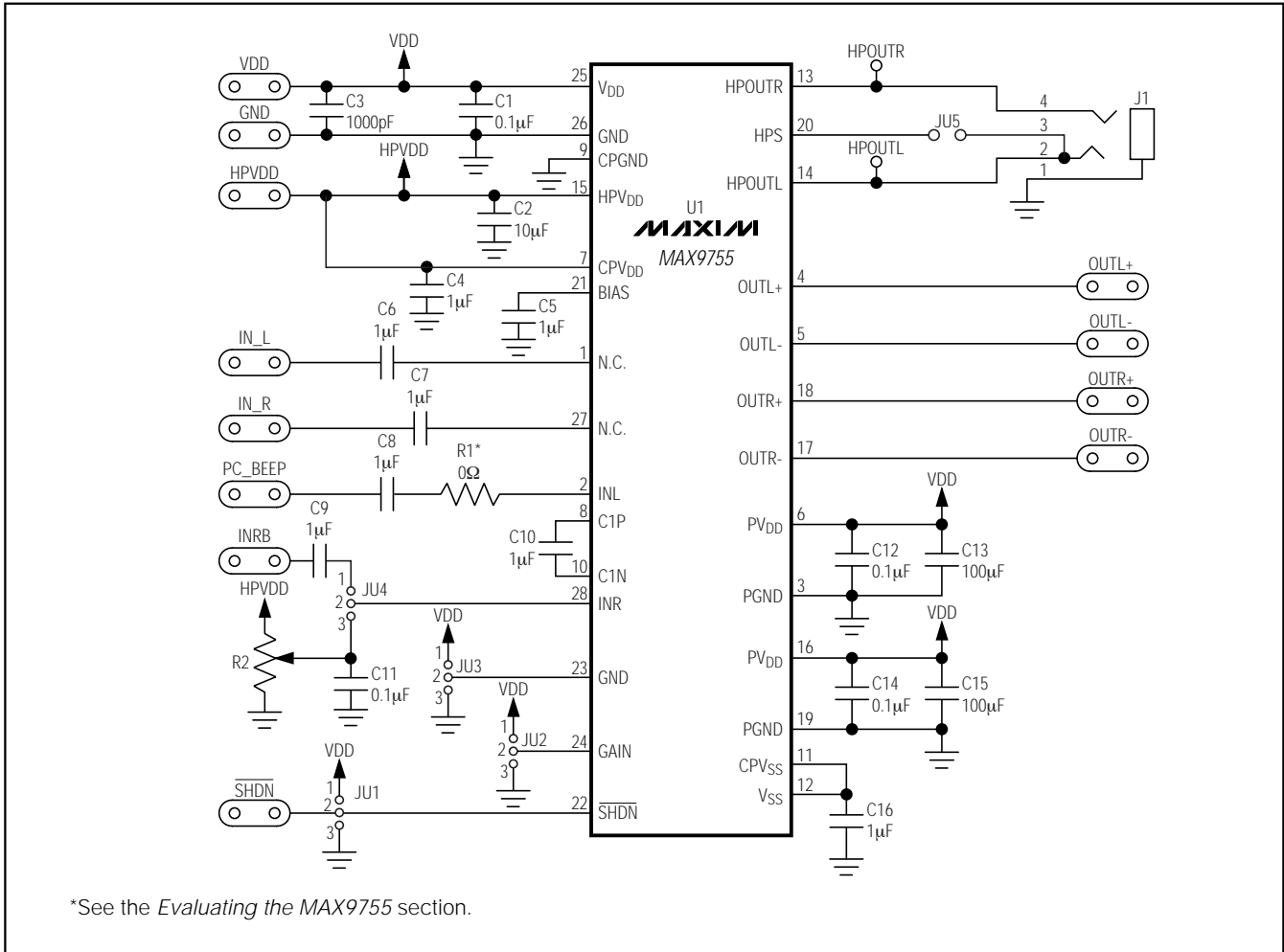


Figure 3. Application Circuit for MAX9755

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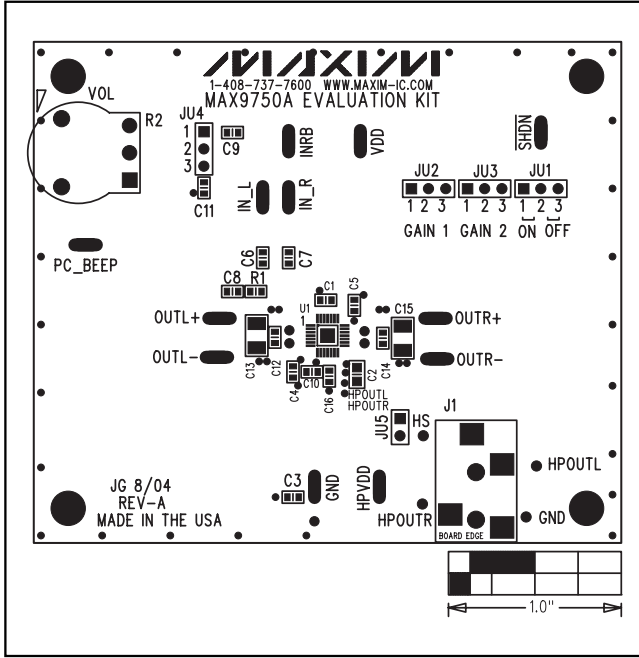


Figure 4. MAX9750A EV Kit Component Placement Guide—Component Side

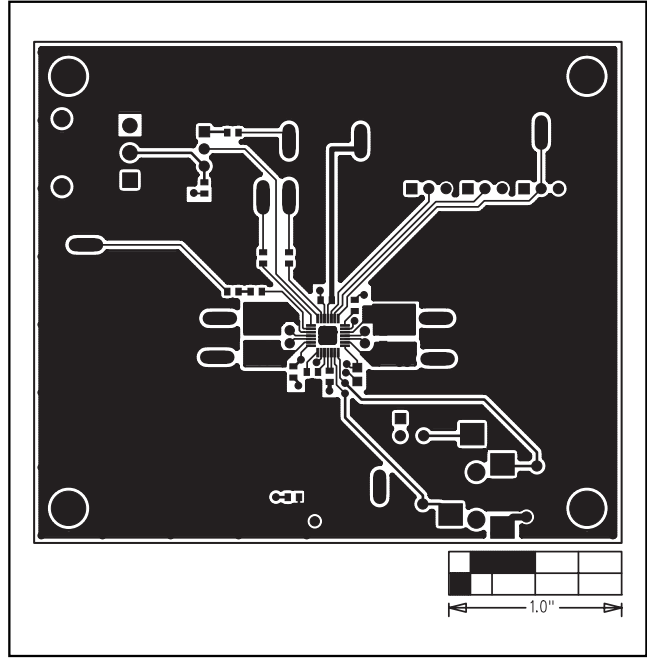


Figure 5. MAX9750A EV Kit PC Board Layout—Component Side

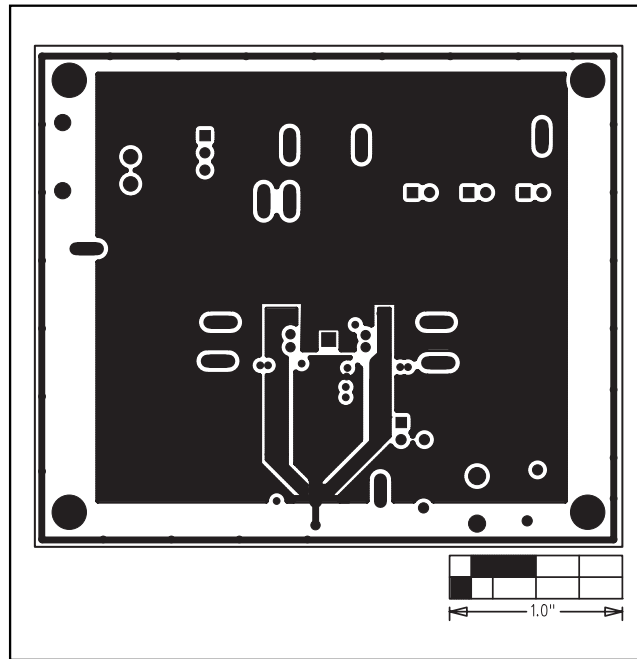


Figure 6. MAX9750A EV Kit PC Board Layout—GND Layer 2



# MAX9750A Evaluation Kit

Evaluates: MAX9750A/B/C/MAX9751/MAX9755

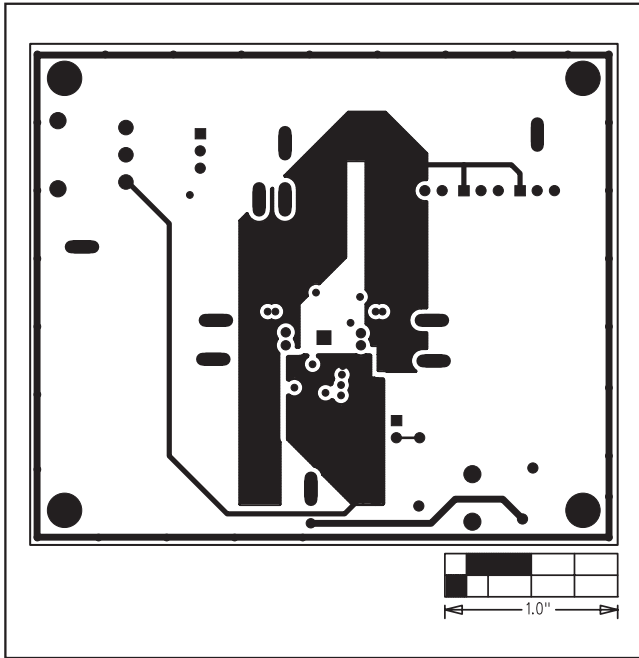


Figure 7. MAX9750A EV Kit PC Board Layout—VDD Layer 3

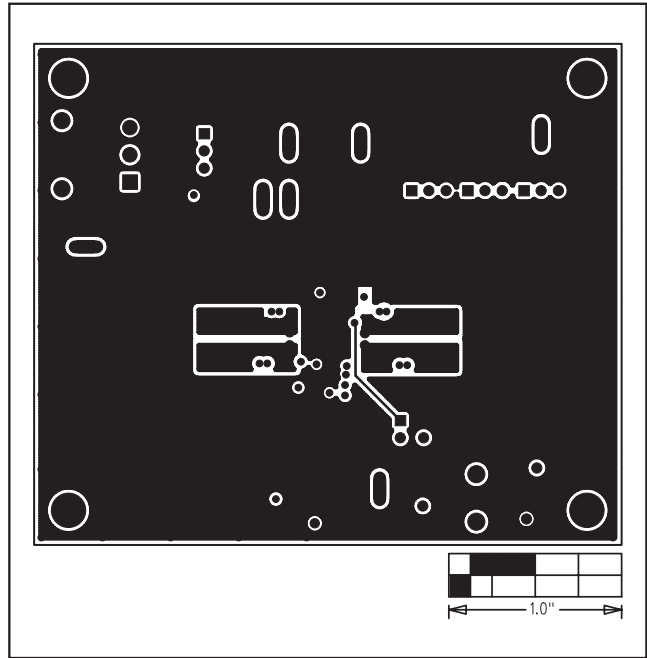


Figure 8. MAX9750A EV Kit PC Board Layout—Solder Side

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