19-5904; Rev 0; 6/11

MAX44260 Evaluation Kit
Evaluates: MAX44260

General Description

The MAX44260 evaluation kit (EV kit) provides a proven design to evaluate the MAX44260 low-power, low-input-offset voltage, high-bandwidth operational amplifier (op amp) in a 6-pin SC70 package. The EV kit circuit is preconfigured as a noninverting amplifier, but can easily be adapted to other topologies by changing few components. Low power, low-input-offset voltage, and rail-to-rail input/output stages make the device ideal for a variety of precision measurement applications. The EV kit comes with a MAX44260AXT+ installed.

Features

- **Accommodates Multiple Op-Amp Configurations**
- **Component Pads Allow for Sallen-Key Filter**
- **Rail-to-Rail Inputs/Output**
- **Proven PCB Layout**
- **Fully Assembled and Tested**

***Ordering Information* appears at end of data sheet.**

Component List

DESIGNATION	QTY	DESCRIPTION
C1, C3	2	0.1µF ±10%, 16V X7R ceramic capacitors (0603) Murata GCM188R71C104K
C2, C4	2	4.7µF ±10%, 25V X5R ceramic capacitors (0805) Murata GRM21BR61E475K
C5–C10	0	Not installed, ceramic capacitors (0603) C5, C6, C10 are short (PC trace); C7, C8, C9 are open
INMB, INPB, OUTAB	3	50Ω PCB vertical-mount BNC connectors
INM, INP, OUTA	3	Red multipurpose test points
JU1	1	2-pin header
JU2	1	3-pin header
R1, R2	2	1kΩ ±1% resistors (0603)
R3, R4, R7, R9, R10	0	Not installed, resistors (0603)
R5	1	10kΩ ±1% resistor (0603)
R6, R8	2	0Ω ±5% resistors (0603)
TP8	0	Not installed, miniature test point
U1	1	Low-power, rail-to-rail op amp (6 SC70) Maxim MAX44260AXT+
—	2	Shunts
—	1	PCB: MAX44260 EVALUATION KIT

Component Supplier

SUPPLIER	PHONE	WEBSITE
Murata Electronics North America, Inc.	770-436-1300	www.murata-northamerica.com

Note: *Indicate that you are using the MAX44260 when contacting this component supplier.*

For pricing, delivery, and ordering information, please contact Maxim Direct at 1-888-629-4642, or visit Maxim's website at www.maxim-ic.com.

Quick Start

Required Equipment

- MAX44260 EV kit
- +5V, 10mA DC power supply (PS1)
- Precision voltage source
- Digital voltmeter (DVM)

Procedure

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

1) Verify that shunts are installed in the default positions on jumpers JU1 and JU2, as shown in Table 1.
2) Jumper JU1 shorts VEE to GND for single-supply operation. The 1-2 position of JU2 enables the device.
3) Connect the positive terminal of the +5V supply to the VCC PCB pad. Connect the negative terminal of the power supply to the GND PCB pad nearest VCC.
4) Connect the positive terminal of the precision voltage source to the INP test point. Connect negative terminal of the precision voltage source to the GND PCB pad.
5) Connect the INM test point to the GND PCB pad.
6) Connect the positive terminal of the DVM to the OUTA test point to monitor the output voltage. Connect the negative terminal of the DVM to the GND PCB pad. With the default 10kΩ feedback resistor (R5) and 1kΩ series input resistor (R1) of the op amp, the gain is +11V/V (noninverting configuration).
7) Turn on the +5V power supply.
8) Apply 100mV from the precision voltage source. Observe the output at OUTA on the DVM. OUTA should read approximately +1.1V.
9) Apply 400mV from the precision voltage source. OUTA should read approximately +4.4V.

Table 1. Jumper Descriptions (JU1, JU2)

JUMPER	SHUNT POSITION	DESCRIPTION
JU1	Installed*	Connects VEE to GND for single-supply operation.
	Not installed	VEE and GND are independently supplied for dual-supply operation.
JU2	1-2*	Connects the $\overline{SHDN}$ pin to VCC to enable the device (normal operation).
	2-3	Connects the $\overline{SHDN}$ pin to VEE to disable the device (shutdown).

**Default position.*

Detailed Description of Hardware

The MAX44260 EV kit provides a proven layout for the MAX44260 low-power, low-input-voltage offset op amp. The device can be operated as a single-supply or dual-supply op amp that is ideal for buffering precision sensor signals. The circuit's Sallen-Key filter is easily evaluated by changing and removing some components. The Sallen-Key filter is ideal for buffering and filtering sensor signals. BNC connectors are installed to test at high frequency, but not required for DC and low-frequency testing. Various test points are included for easy evaluation.

The device is a single-supply op amp whose primary application is operating in the noninverting configuration; however, the device can operate with dual supply as long as the voltage across the device's VCC and VEE pins do not exceed the *Absolute Maximum Ratings*. When operating with a single supply, short VEE to GND by installing a shunt on jumper JU1.

Op-Amp Configurations

The device is a single-supply op amp that is ideal for differential sensing, noninverting amplification, buffering, and filtering. The following configurations are shown in the next few sections: noninverting, differential, lowpass Sallen-Key filter, and highpass Sallen-Key filter.

Noninverting Configuration

The EV kit comes preconfigured as a noninverting amplifier. The gain is set by the ratio of resistors R5 and R1. The EV kit comes preconfigured for a gain of +11V/V. The output voltage for the noninverting configuration is given by the equation below:

$$V_{OUT} = \left(1 + \frac{R5}{R1}\right)(V_{INP} + V_{OS})$$

where V_{OS} = Input-referred offset voltage

Differential Amplifier

To configure the EV kit as a differential amplifier, replace R1, R2, R3, and R5 with appropriate resistors. When resistors R1 = R2 and R3 = R5, the CMRR of the differential amplifier is determined by the matching of the resistor ratios R1/R2 and R3/R5.

$$V_{OUT} = GAIN(V_{INP} - V_{INM}) + \left(1 + \frac{R5}{R1}\right) V_{OS}$$

where:

$$GAIN = \frac{R5}{R1} = \frac{R3}{R2}$$

Sallen-Key Filter Configuration

The Sallen-Key filter topology is ideal for filtering sensor signals with a second-order filter and acting as a buffer. Schematic complexity is reduced by combining the filter and buffer operations. The EV kit can be configured in a Sallen-Key topology by replacing and populating a few components. The Sallen-Key topology is typically configured as a unity-gain buffer, which can be done by replacing R1 and R5 with 0Ω resistors. The noninverting signal is applied to the INP test point or the INPB BNC connector. The filter component pads are R2, R3, R4, and R8, where some have to be populated with resistors and others with capacitors.

Lowpass Sallen-Key Filter

To configure the Sallen-Key as a lowpass filter, populate the R2 and R8 pads with resistors, and populate the R3 and R4 pads with capacitors. The corner frequency and Q are then given by:

$$f_C = \frac{1}{2\pi\sqrt{R_{R2}R_{R8}C_{R3}C_{R4}}}$$

$$Q = \frac{\sqrt{R_{R2}R_{R8}C_{R3}C_{R4}}}{C_{R3}(R_{R2} + R_{R8})}$$

Highpass Sallen-Key Filter

To configure the Sallen-Key as a highpass filter, populate the R3 and R4 pads with resistors, and populate the R2 and R8 pads with capacitors. The corner frequency and Q are then given by:

$$f_C = \frac{1}{2\pi\sqrt{R_{R3}R_{R4}C_{R2}C_{R8}}}$$

$$Q = \frac{\sqrt{R_{R3}R_{R4}C_{R2}C_{R8}}}{R_{R4}(C_{R2} + C_{R8})}$$

Capacitive Loads

Some applications require driving large capacitive loads. To improve the stability of the amplifier circuit in such cases, replace resistor R6 with a suitable resistor value to improve amplifier phase margin. Refer to the MAX44260 IC data sheet for resistor value selection.

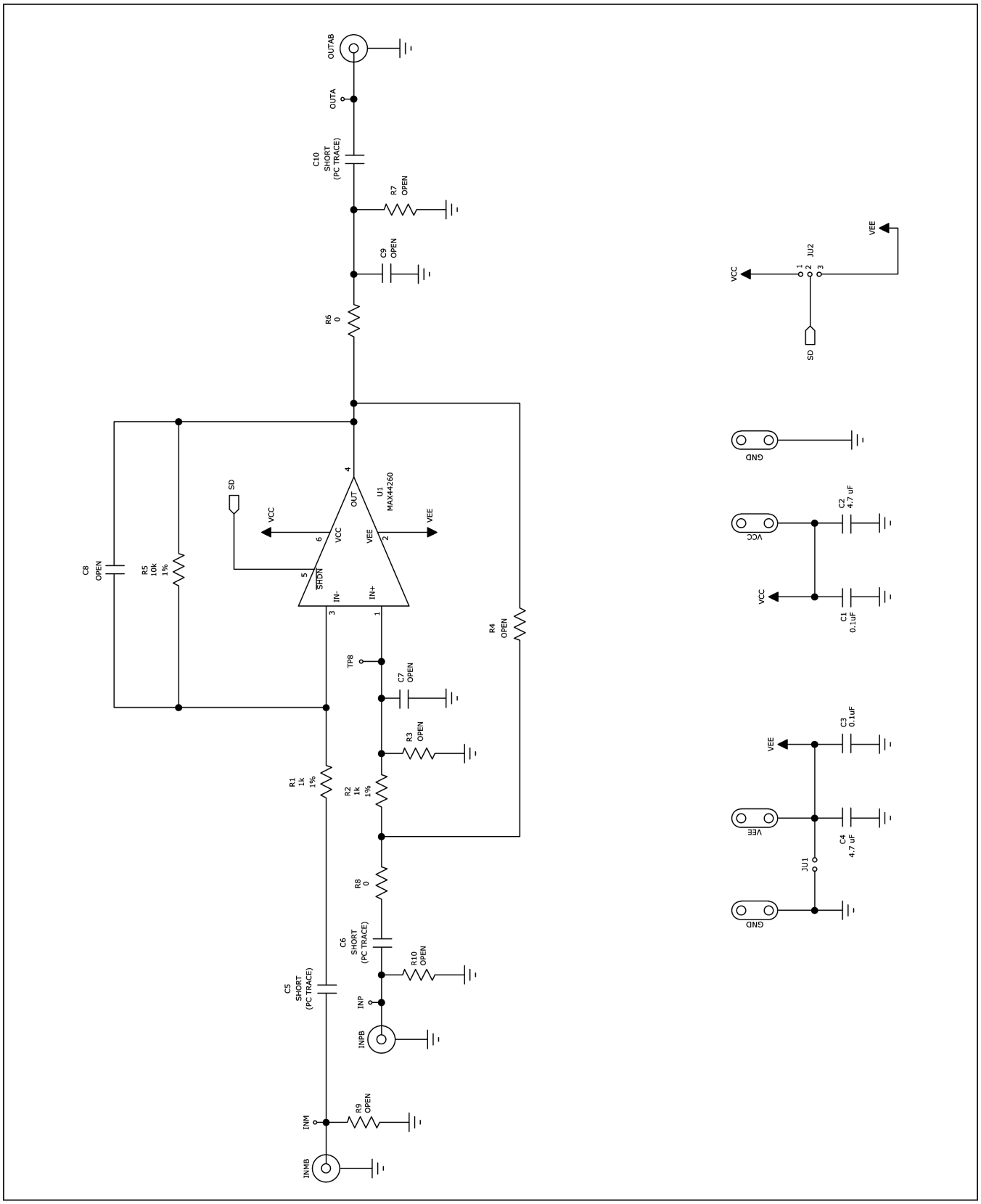

Figure 1. MAX44260 EV Kit Schematic

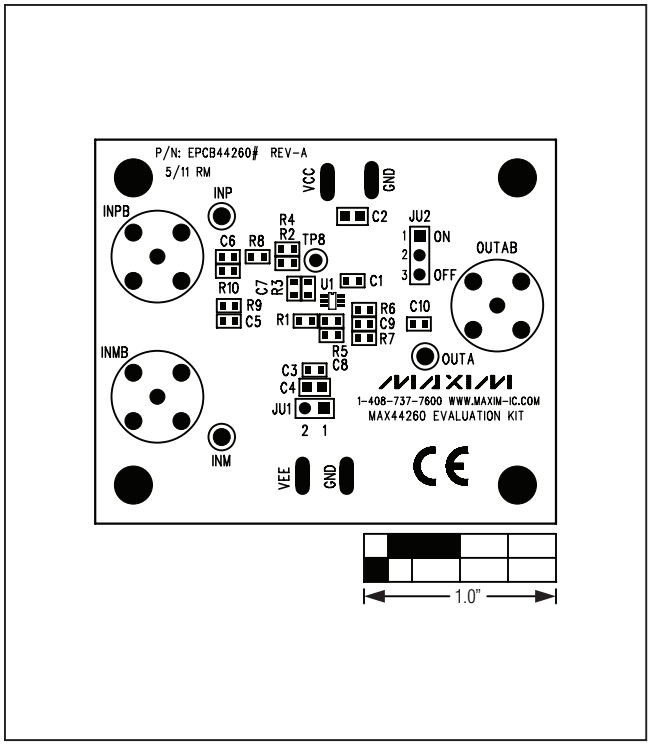

Figure 2. MAX44260 EV Kit Component Placement Guide—Component Side

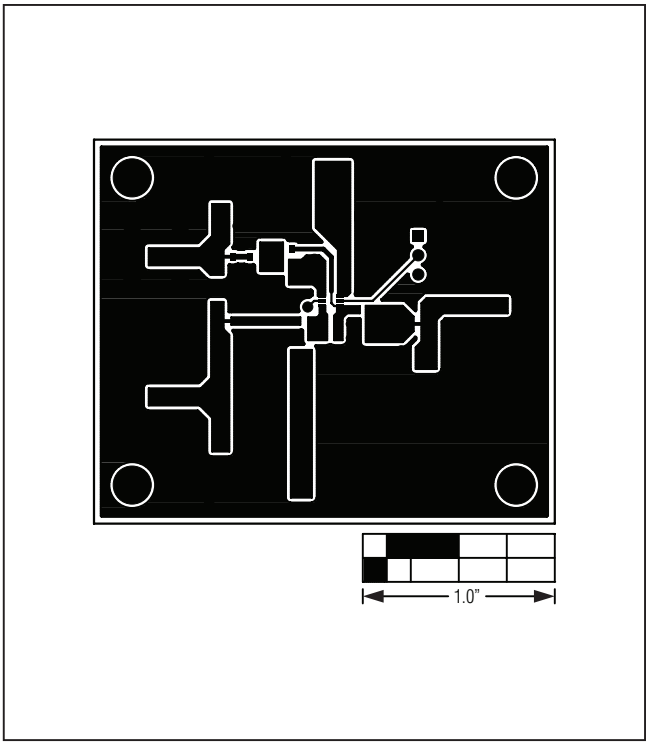

Figure 3. MAX44260 EV Kit PCB Layout—Component Side

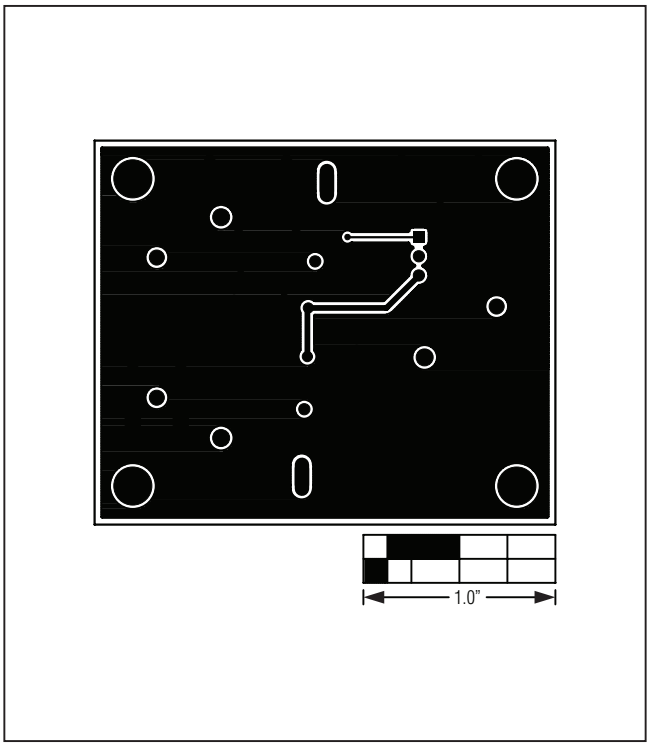

Figure 4. MAX44260 EV Kit PCB Layout—Solder Side

Ordering Information

PART	TYPE
MAX44260EVKIT#	EV Kit

#Denotes RoHS compliant.

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	6/11	Initial release	—

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