General Description

The MAX44281V evaluation kit (EV kit) provides a proven design to evaluate the MAX44281V, the industry's first op amp in a 4-bump wafer-level package (WLP). The device is offered as a noninverting amplifier with gain (A_V) of +2V/V.

The EV kit comes with a MAX44281VANS+ installed.

Features

- Accommodates Multiple Op-Amp Configurations
- Component Pads Allow for Sallen-Key Filter
- Accommodates Easy-to-Use Components
- Proven PCB Layout
- Fully Assembled and Tested

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

Component List

DESIGNATION	QTY	DESCRIPTION
C1	1	0.1µF ±10%, 16V X7R ceramic capacitor (0603) Murata GCM188R71C104K
C2	1	4.7µF ±10%, 25V X5R ceramic capacitor (0805) Murata GRM21BR61E475K
C5–C9	0	Not installed, ceramic capacitors (0603) C5, C7, C8 are open; C6, C9 are short (PC trace)
IN, OUT	2	50Ω PCB vertical-mount BNC connectors

DESIGNATION	QTY	DESCRIPTION
IN, OUT	2	Red multipurpose test points
R1, R3, R4, R6, R8	0	Not installed, resistors (0603)
R2, R5, R7	3	0Ω ±5% resistors (0603)
TP1	1	Miniature test point
U1	1	Ultra-small, 4-bump op amp (4 WLP) Maxim MAX44281VANS+
—	1	PCB: MAX44281V 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 MAX44281V when contacting this component supplier.*

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Quick Start

Required Equipment

- MAX44281V EV kit
- +1.8V to +5.5V, 1mA DC power supply (e.g., Agilent E3620A)
- Function generator (e.g., Agilent 33220A)
- Digital oscilloscope (e.g., Tektronix TDS3012)

Procedure

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

1) Set the DC power supply to +3.3V and connect the positive terminal to VDD and the negative terminal to GND pads.
2) Set the function generator amplitude to $1V_{P-P}$, 1kHz sine wave, and 500mV offset.
3) Connect the output of the function generator to the IN BNC connector on the EV kit.
4) Connect a channel of the oscilloscope to the OUT BNC connector on the EV kit.
5) Turn on the power supply.
6) Enable the function generator.
7) Verify that the signal displayed on the oscilloscope is 2x the amplitude of the signal applied at the IN BNC connector.

Detailed Description of Hardware

The MAX44281V is a single-supply op amp that is ideal for noninverting amplification, buffering, and filtering. A few common configurations are shown in the next few sections.

Op-Amp Configurations

AC-Coupled Configuration

An AC-coupled application can be configured with the addition of two resistors, R8 and R3. The following equation sets the output bias voltage at midsupply.

$$V_{DD} \times \left(R_{R3} / (R_{R8} + R_{R3})\right) = V_{DD} / (2 \times A_V)$$

Sallen-Key Configuration

The Sallen-Key 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 signal is noninverting and applied to INP. The filter component pads are R2–R4 and R7, 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 R7 pads with resistors and populate the R3 and R4 pads with capacitors. The corner frequency and Q are then given by:

$$f_C = \frac{1}{2\pi\sqrt{R_{R2} R_{R7} C_{C7} C_{R4}}}$$

$$Q = \frac{\sqrt{R_{R2} R_{R7} C_{C7} C_{R4}}}{C_{C7}(R_{R2} + R_{R7}) + R_{R7} C_{R4}(1 - K)}$$

where,

$$K = \left(1 + \frac{R_F}{R_G}\right)$$

R_F and R_G are internal resistors in the device where $R_F = R_G$.

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 R7 pads with capacitors. The corner frequency and Q are then given by:

$$f_C = \frac{1}{2\pi\sqrt{R_{C7} R_{R4} C_{R2} C_{R7}}}$$

$$Q = \frac{\sqrt{R_{C7} R_{R4} C_{R2} C_{R7}}}{R_{R4}(C_{R2} + C_{R7}) + R_{C7} C_{R2}(1 - K)}$$

Capacitive Loads

Some applications require driving large capacitive loads. The EV kit provides C8, R6, and R5 pads for optional capacitive-load driving circuit. C8 simulates the capacitive load, R6 simulates resistive load, while R5 acts as an isolation resistor to improve op-amp's stability at higher capacitive loads. To improve the stability of the amplifier in such cases, replace R6 with a suitable resistor value to improve amplifier phase margin.

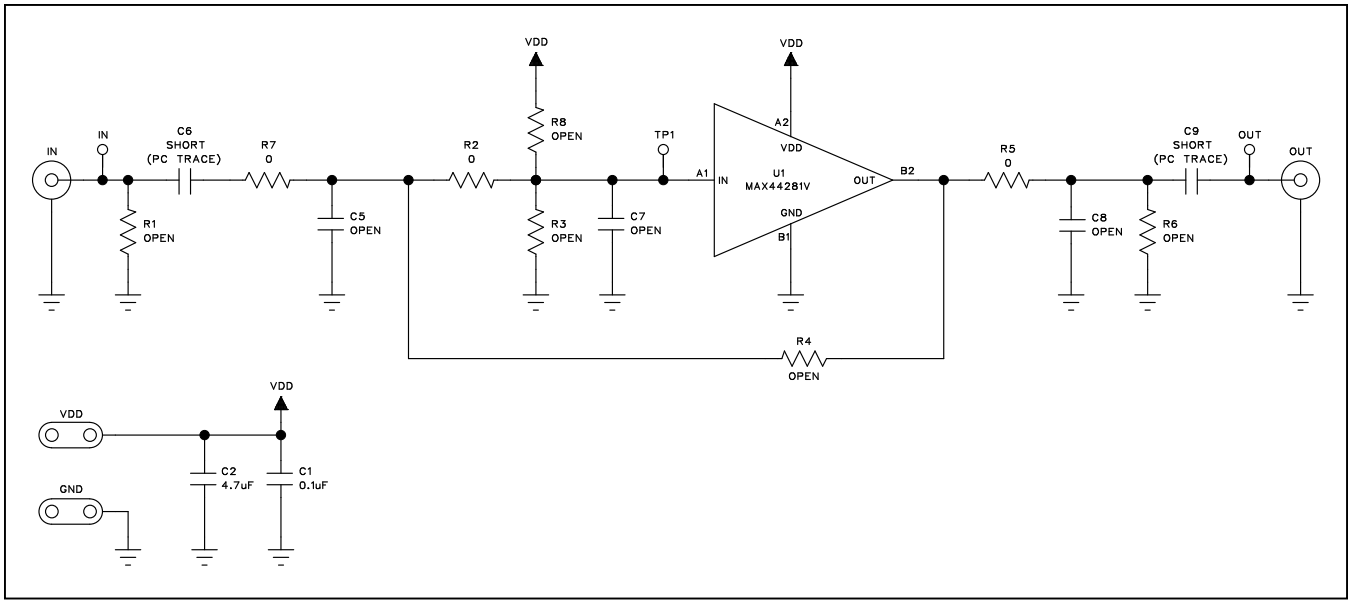

Figure 1. MAX44281V EV Kit Schematic

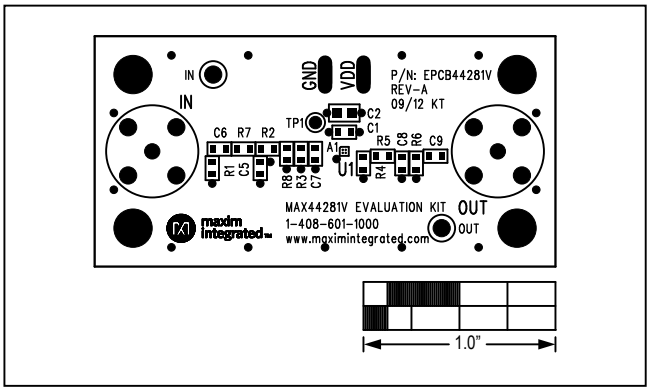

Figure 2. MAX44281V EV Kit Component Placement Guide—Component Side

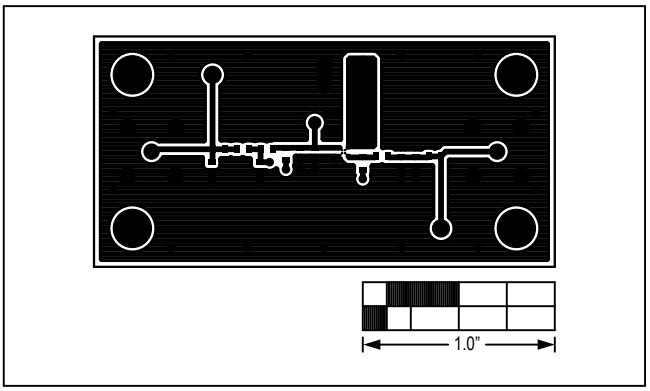

Figure 3. MAX44281V EV Kit PCB Layout—Component Side

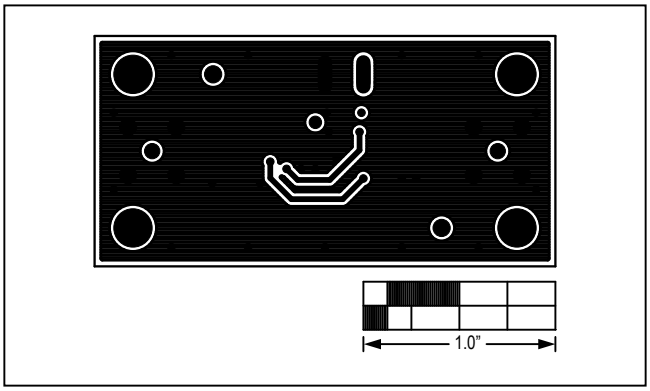

Figure 4. MAX44281V EV Kit PCB Layout—Solder Side

Ordering Information

PART	TYPE
MAX44281VEVKIT#	EV Kit

#Denotes RoHS compliant.

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	2/13	Initial release	—

