



MAX9820 Evaluation Kit

General Description

The MAX9820 evaluation kit (EV kit) demonstrates the MAX9820 stereo headphone amplifier with external gain and DirectDrive® outputs for portable applications. Maxim's DirectDrive technology eliminates the need for bulky DC-blocking capacitors at the output of the amplifier.

The MAX9820 EV kit is configured for a -1V/V gain and is designed to operate from a 2.7V to 5.5V DC power supply. The EV kit is capable of delivering up to 95mW into a 32Ω load and achieves 0.005% THD+N.

Features

- ◆ No DC-Blocking Output Capacitors Required
- ◆ 2.7V to 5.5V Operation
- ◆ Adjustable -1V/V Gain
- ◆ 95mW Into a 32Ω Load
- ◆ 0.005% THD+N
- ◆ Lead(Pb)-Free and RoHS Compliant
- ◆ Fully Assembled and Tested

DirectDrive is a registered trademark of Maxim Integrated Products, Inc.

Ordering Information

PART	TYPE
MAX9820EVKIT+	EV Kit

+Denotes lead(Pb)-free and RoHS compliant.

Component List

DESIGNATION	QTY	DESCRIPTION
C1, C2	2	1μF ±10%, 50V X7R ceramic capacitors (0805) Murata GRM21BR71H105K
C3	1	10μF ±10%, 10V X5R ceramic capacitor (0805) Murata GRM21BR61A106K
C4	1	0.1μF ±10%, 16V X7R ceramic capacitor (0603) Murata GRM188R71C104K
C5, C6	2	1μF ±10%, 10V X5R ceramic capacitors (0603) Murata GRM188R61A105K
C1P, VSS	0	Not installed, miniature PCB test points
HPOUT	1	Stereo headphone jack (3.5mm)

DESIGNATION	QTY	DESCRIPTION
JU1	1	2-pin header
OUTL	1	White miniature PCB test point
OUTR	1	Red miniature PCB test point
PGND	1	Black miniature PCB test point
R1–R4	4	40.2kΩ ±1% resistors (0603)
R5	1	10kΩ ±5% resistor (0603)
U1	1	External gain headphone amplifier (10 TDFN-EP*) Maxim MAX9820ETB+ (Top Mark: AAU)
—	1	Shunt (JU1)
—	1	PCB: MAX9820 EVALUATION KIT+

*EP = Exposed pad.

Component Supplier

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

Note: Indicate that you are using the MAX9820 when contacting this component supplier.



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Quick Start

Required Equipment

- 2.7V to 5.5V, 500mA power supply
- One set of stereo headphones
- Audio signal source

Procedure

The MAX9820 EV kit is fully assembled and tested. Follow the steps below to verify board operation. **Caution: Do not turn on the power supply until all connections are completed.**

- 1) Verify that a shunt is installed on jumper JU1 (IC disabled).
- 2) Set the power-supply output to 5V.
- 3) Disable the power-supply output.
- 4) Connect the power-supply ground to the PGND PCB pad and the power-supply positive output to the VDD PCB pad.
- 5) Verify that the audio source output is disabled.
- 6) Connect the audio source ground, left signal, and right signal to the GND, VINL, and VINR PCB pads, respectively.
- 7) Plug the headphone into the HPOUT headphone jack.
- 8) Enable the power-supply output.
- 9) Enable the audio source.
- 10) Remove the shunt from jumper JU1 (IC enabled).
- 11) Verify that the headphones are playing the audio source signal.

Detailed Description of Hardware

The MAX9820 EV kit features the MAX9820 stereo headphone amplifier, in a 10-pin TDFN package with an exposed pad, for portable applications. The MAX9820 IC features adjustable gain and DirectDrive outputs. DirectDrive generates an internal negative supply (-VDD) from the external positive supply (VDD), thus biasing the output signal at 0V DC. Zero-voltage biasing eliminates the need for bulky DC-blocking capacitors at the output of the amplifier. The MAX9820 operates from a 2.7V to 5.5V, 500mA power supply.

The EV kit's gain for each channel is set to -1V/V. The left- and right-channel gain can be adjusted by modifying the ratio of the corresponding gain-setting resistors (R1–R4). R1 and R4 set the left-channel gain, while R2 and R3 set the right-channel gain. The gain for either channel can be adjusted to a minimum of -1V/V. The IC delivers up to 95mW into a 32Ω load, while achieving 0.005% THD+N.

Test points OUTR, OUTL, and PGND are provided to easily measure the output signals.

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

Jumper JU1 controls the shutdown pin ($\overline{\text{SHDN}}$) of the MAX9820, which enables and disables the MAX9820 IC. See Table 1 for jumper JU1 configuration.

Gain Setting

The default gain-setting resistors (R1–R4) configure the gain for both the left and right channels to -1V/V. The gain can be changed by replacing these resistors with other surface-mount 0603 resistors. Resistors with a tolerance of 1% or better are recommended for optimum performance. Use Table 2 and the following equations to select new gain-setting resistors for the corresponding channel.

$$\begin{aligned} RIN &> \frac{1}{2\pi \times 20\text{Hz} \times C_{IN}} \\ RFB &\geq 10\text{k}\Omega \\ RIN &= \frac{RFB}{-A} \end{aligned}$$

where RIN is the respective input resistance, CIN is the respective input capacitance, RFB is the respective feedback resistance, A is the desired gain, and -3dB frequency is set at 20Hz. The gain for either channel can be adjusted to a minimum of -1V/V. Refer to the MAX9820 IC data sheet for more details.

Table 1. Shutdown Selection (JU1)

SHUNT POSITION	$\overline{\text{SHDN}}$ PIN	MAX9820 FUNCTION
Installed	Connected to PGND	Disabled
Not installed	Connected to VDD through resistor R5	Enabled

Table 2. Component Function

CHANNEL	RIN	RFB	CIN
Right	R2	R3	C2
Left	R1	R4	C1

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Evaluates: MAX9820

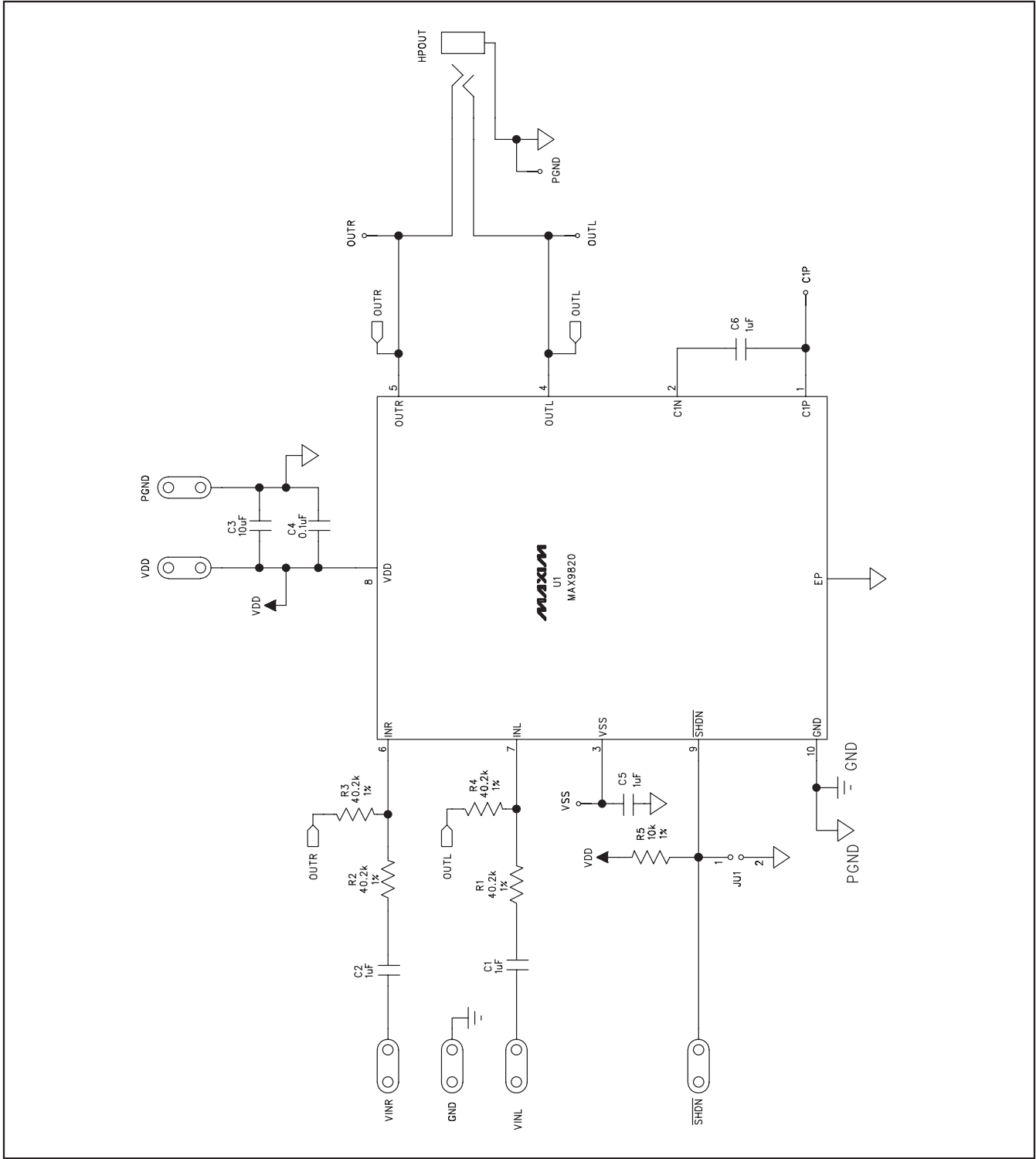


Figure 1. MAX9820 EV Kit Schematic

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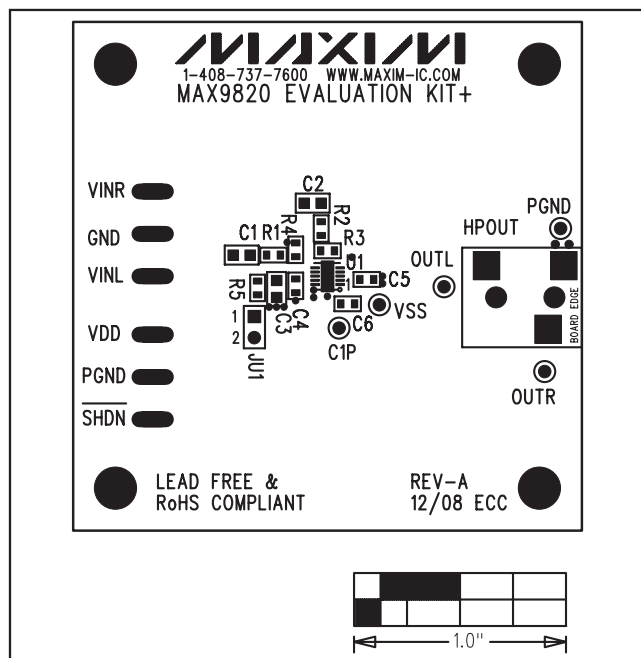


Figure 2. MAX9820 EV Kit Component Placement Guide—Component Side

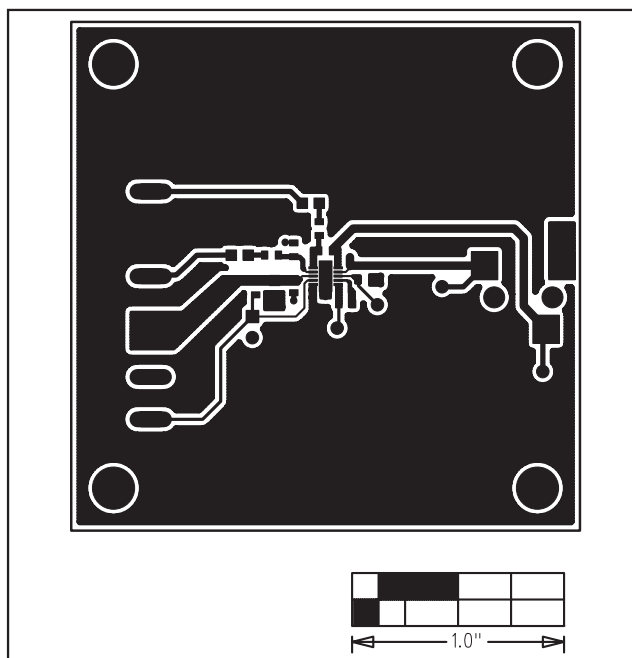


Figure 3. MAX9820 EV Kit PCB Layout—Component Side

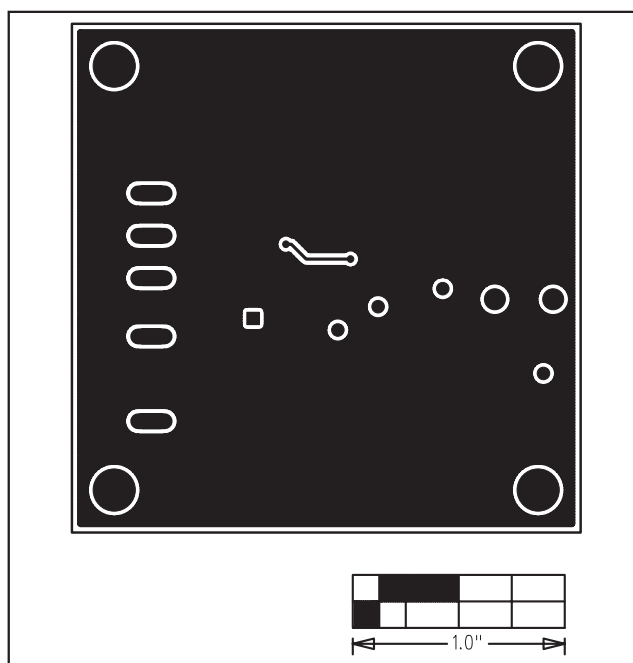


Figure 4. MAX9820 EV Kit PCB Layout—Solder Side

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