19-5221; Rev 0; 5/10

MAX98500 Evaluation Kit

Evaluates: MAX98500

General Description

The MAX98500 evaluation kit (EV kit) is a fully assembled and tested circuit board that uses the MAX98500 boosted Class D amplifier to drive a mono bridge-tied-load (BTL) speaker in portable audio applications. Designed to operate from a 2.5V to 5.5V DC power supply, the EV kit delivers 2.2W into an 8Ω load. The EV kit accepts differential or single-ended input signals, features three selectable gain settings (6dB, 15.5dB, and 20dB), and provides separate speaker and boost shutdown inputs.

Features

- **2.5V to 5.5V Single-Supply Operation**
- **Output Power: 2.2W into 8Ω, 10% THD+N**
- **Selectable Gain Settings (6dB, 15.5dB, and 20dB)**
- **Boosted Class D Output**
- **Differential or Single-Ended Input Signals**
- **Boost Converter Shutdown**
- **Speaker Output Shutdown**
- **Fully Assembled and Tested**

Ordering Information

PART	TYPE
MAX98500EVKIT+	EV Kit

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

Component List

DESIGNATION	QTY	DESCRIPTION
REQUIRED COMPONENTS		
C1	1	10µF ±10%, 6.3V X7R ceramic capacitor (0805) Murata GRM21BR70J106K TDK C2012X7R0J106K
C2	1	22µF ±20%, 16V X5R ceramic capacitor (1206) Murata GRM31CR61226M Taiyo Yuden EMK316BJ226M
C3, C4	2	1µF ±10%, 25V X7R ceramic capacitors (0603) Murata GRM188R71E105K Murata GRM188R71E105M
C5	1	22µF ±10%, 6.3V X5R ceramic capacitor (0805) Murata GRM21BR60J226M TDK C2012X5R0J226K
C8	1	0.1µF ±10%, 16V X7R ceramic capacitor (0402) Murata GRM155R71C104K TDK C1005X7R1C104K
C9, C10	0	Not installed, ceramic capacitors (0402)
C12, C13	0	Not installed, ceramic capacitors (0603)
C14–C18	5	0.22µF ±10%, 25V X7R ceramic capacitors (0603) Murata GRM188R71E224K TDK C1608X7R1E224K
FB1	1	0Ω resistor (0603)
FB2, FB3	0	Not installed, ferrite beads (0603)
J1	1	Phono jack, black (side-entry PCB mount)
JU1, JU2, JU3	3	3-pin headers
JU4	1	2-pin header
L1	1	2.2µH, 34mΩ, 4.5A inductor TOKO FDV0530S-2R2M (5mm x 5mm x 3mm) TDK LTF5022T-2R2N3R2-LC (5mm x 5mm x 2.2mm) NEC MPLC0525L2R2 (5.2mm x 6.2mm x 2.5mm)
L2, L3	0	Not installed, inductors TOKO A916CY-220M (provided with EV kit)
OUT-, OUT+, PGND, RKNEE	4	Test points
R1	1	27.4kΩ ±1% resistor (0603)
R2, R3	2	22Ω ±5% resistors (0603)

Component List (continued)

DESIGNATION	QTY	DESCRIPTION
U1	1	Boosted Class D amplifier (16 WLP) Maxim MAX98500EWE+
VCCOUT	0	Not installed, test point
—	4	Shunts
—	1	PCB: MAX98500 EVALUATION KIT+

DESIGNATION	QTY	DESCRIPTION
OPTIONAL COMPONENTS		
L2, L3	2	22µH ±20%, 0.7A inductors (D63CB) TOKO A916CY-220M

Component Suppliers

SUPPLIER	PHONE	WEBSITE
Murata Electronics North America, Inc.	770-436-1300	www.murata-northamerica.com
NEC TOKIN America, Inc.	408-324-1790	www.nec-tokinamerica.com
TDK Corp.	847-803-6100	www.component.tdk.com
TOKO America, Inc.	847-297-0070	www.tokoam.com

Note: *Indicate that you are using the MAX98500 when contacting these component suppliers.*

Quick Start

Recommended Equipment

- 2.5V to 5.5V, 4A DC power supply
- 8Ω speaker
- Mono audio signal source

Procedure

The MAX98500 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 shunts are installed as follows:
   JU1: Open (15.5dB gain)
   JU2: Pins 1-2 (speaker enabled)
   JU3: Pins 1-2 (boost enabled)
   JU4: Short (single-ended/unbalanced input)
2) Set the power-supply output to 3.6V.
3) Disable the power-supply output.
4) Connect the power-supply ground to the PGND pad and the power-supply positive output to the VBAT pad on the EV kit. Keep VBAT lengths < 6in and twisted to minimize inductance, to ensure proper device operation.
5) Verify that the audio source output is disabled.
6) Connect the mono audio source between the IN+ and IN- pads or J1 on the EV kit.
7) Connect the speaker across the OUT+ and OUT- test points.
8) Enable the power-supply output.
9) Enable the audio source.
10) Verify that the speaker is playing the audio source signal.

Detailed Description of Hardware

The MAX98500 EV kit features the MAX98500 boosted Class D amplifier IC, designed to drive a BTL mono speaker in portable audio applications. The EV kit accepts a differential or single-ended audio input, features three selectable gain settings (6dB, 15.5dB, and 20dB), and provides two active-low shutdown inputs for flexibility. The audio input source is amplified to drive 2.2W into an 8Ω speaker. The EV kit operates from a single DC power supply that provides 2.5V to 5.5V.

The EV kit provides two sets of differential outputs. The device outputs (OUT+ and OUT-) can be connected directly to a speaker load without any filtering. However, a filter can be added to ease evaluation.

Selectable Gain Setting

The MAX98500 features three internal gain settings that are selectable with the GAIN input. Jumper JU1 controls the amplifier's gain select input. See Table 1 for jumper JU1 configuration.

Shutdown Inputs

The MAX98500 features two active-low shutdown inputs ($\overline{SDSPK}$ and $\overline{SDBST}$). Jumper JU2 enables or disables the speaker amplifier ($\overline{SDSPK}$) and jumper JU3 controls the boost converter ($\overline{SDBST}$). See Table 2 for jumpers JU2 and JU3 configuration. Note that the boost must be enabled for the speaker amplifier to enable.

Input Mode

Jumper JU4 provides the option to select between a differential or single-ended input mode for the EV kit. See Table 3 for JU4 configuration.

Optional Output Filtering

The MAX98500 speaker amplifier is designed to pass FCC emissions standards without any filtering. When evaluating the MAX98500 without any filtering, connect the speaker to the output test points (OUT+, OUT-).

The EV kit also features PCB pads for a lowpass filter that can be added to ease evaluation. Audio analyzers typically cannot accept the Class D amplifier's pulse-width-modulated (PWM) waveform at their inputs. The lowpass filter extracts the audio content from the PWM output signal and allows the device to be connected directly to an audio analyzer. The PWM output signal can be lowpass-filtered by simply installing L2 and L3; all other components are populated. The filtered outputs should then be monitored at the FOUT+/FOUT- pads. See Table 4 for suggested filtering components for an 8Ω load.

Table 1. Gain Input (JU1)

SHUNT POSITION	GAIN PIN	GAIN SETTING (dB)
2-3	Connected to AGND	6
Not installed*	Unconnected	15.5
1-2	Connected to VBAT	20

**Default position.*

Table 2. Shutdown Configuration (JU2, JU3)

$\overline{SDSPK}$ PIN (JU2)	$\overline{SDBST}$ PIN (JU3)	BOOST STATUS	SPEAKER STATUS
2-3 (low)	2-3 (low)	Off	Off
1-2 (high)	2-3 (high)	Off	Off
2-3 (low)	1-2 (low)	On	Off
1-2* (high)	1-2* (high)	On	On

**Default position.*

Table 3. Input Mode (JU4)

SHUNT POSITION	IN- PIN	INPUT MODE
Installed*	Connected to AGND	Single-ended/ unbalanced input
Not installed	Connected to user-supplied negative differential output	Differential input

**Default position.*

Table 4. Suggested Filtering Components for 8Ω Load

DESIGNATION	QTY	DESCRIPTION
L2, L3	2	22µH ±20%, 0.7A inductor (D63CB) TOKO A916CY-220M

MAX98500 Evaluation Kit

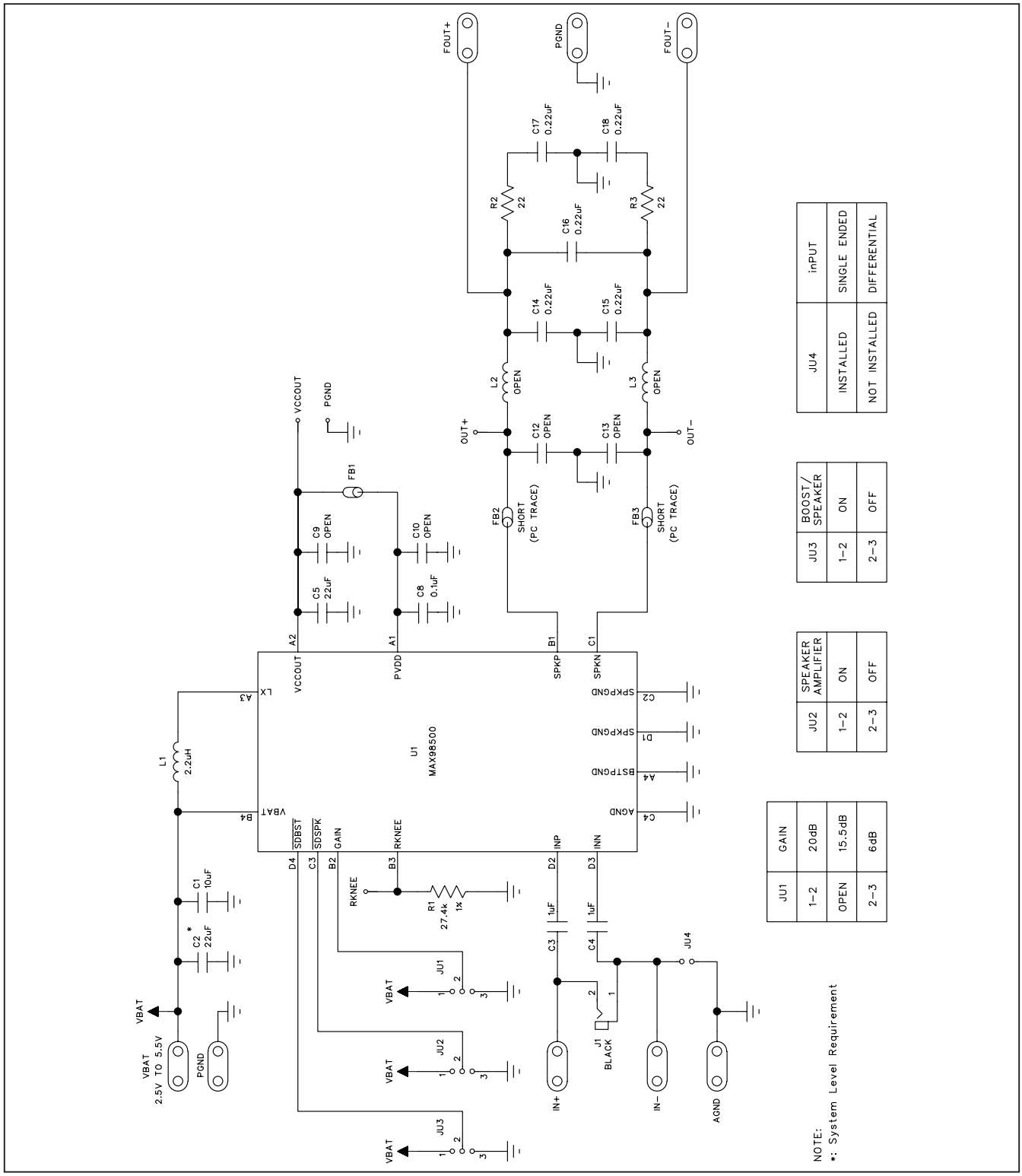

Figure 1. MAX98500 EV Kit Schematic

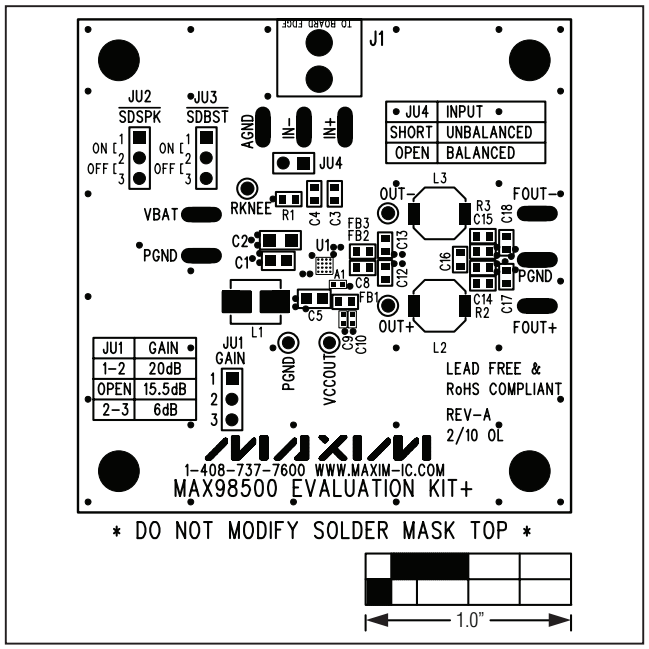

Figure 2. MAX98500 EV Kit Component Placement Guide—Component Side

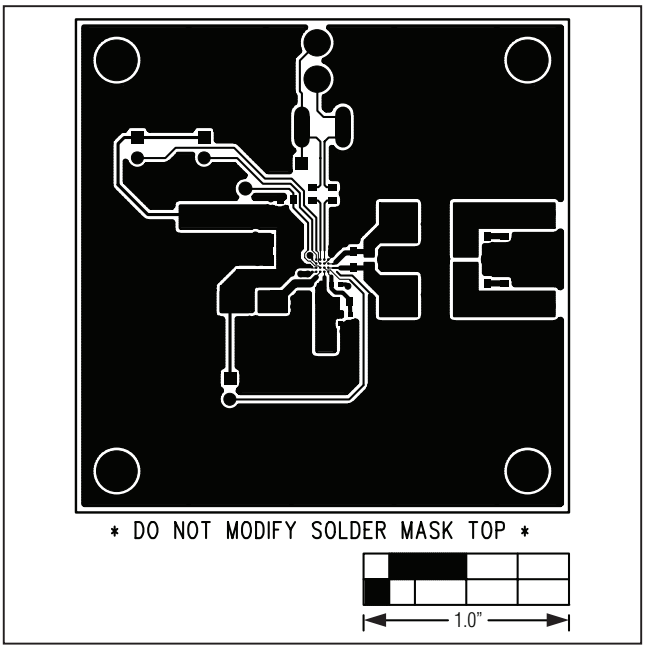

Figure 3. MAX98500 EV Kit PCB Layout—Component Side

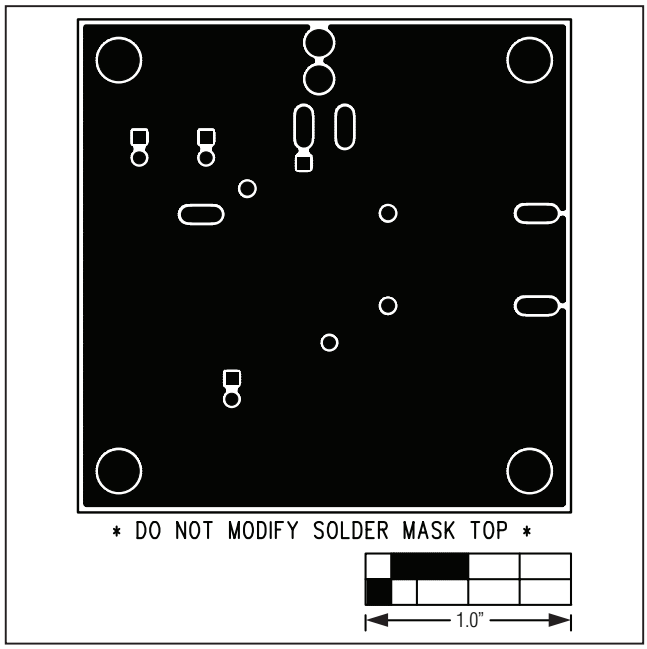

Figure 4. MAX98500 EV Kit PCB Layout—Solder Side

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	5/10	Initial release	—

AMEYA360
Components Supply Platform

Authorized Distribution Brand :

Website :

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Contact Us :

- ### Address :

  401 Building No.5, JiuGe Business Center, Lane 2301, Yishan Rd
  Minhang District, Shanghai , China

- ### Sales :

  Direct +86 (21) 6401-6692

  Email amall@ameya360.com

  QQ 800077892

  Skype ameyasales1 ameyasales2

- ### Customer Service :

  Email service@ameya360.com

- ### Partnership :

  Tel +86 (21) 64016692-8333

  Email mkt@ameya360.com