

# MAX98050 Evaluation System

Evaluates: MAX98050

## General Description

The MAX98050 evaluation system (MAX98050EVSYS#) evaluates the MAX98050, a low-power, high-performance audio CODEC with integrated low-latency digital filters for wireless hearables, headsets, and headphones. The EV system is comprised of two MAX98050 Development Boards (DEV boards), Maxim's Audio Interface Board III (AUDINT3), Maxim's Dual EVKit Adapter board, and a USB cable. In addition to the hardware, the MAX98050 Evaluation Software and Hearable Sound Studio Basic software are available for download.

It is recommended that the DEV boards be evaluated with the AUDINT3 board as an EV system. The EV system can be configured as Mono Hardware Setup (1 DEV board) or Stereo Hardware Setup (2 DEV boards). MAX98050 supports standard I<sup>2</sup>S, left-justified, and TDM digital audio interfaces, as well as I<sup>2</sup>C for control.

The AUDINT3 board provides all of the necessary supply voltages for proper operation of MAX98050. In addition, the AUDINT3 provides the USB-to-PCM and USB-to-I<sup>2</sup>C interfaces that are needed to evaluate the system. The Simplified EV System Block Diagrams show details of the DEV boards, Dual EVKit Adapter board and connection with the AUDINT3 board.

For GUIs, there is the MAX98050 Evaluation Software, which provides complete access to all hardware registers. There is also the Hearable Sound Studio Basic software, which facilitates the tuning of the onboard 5 band playback equalizer, digital filter channels, and the digital filter dynamic range compression (DRC).

## Benefits and Features

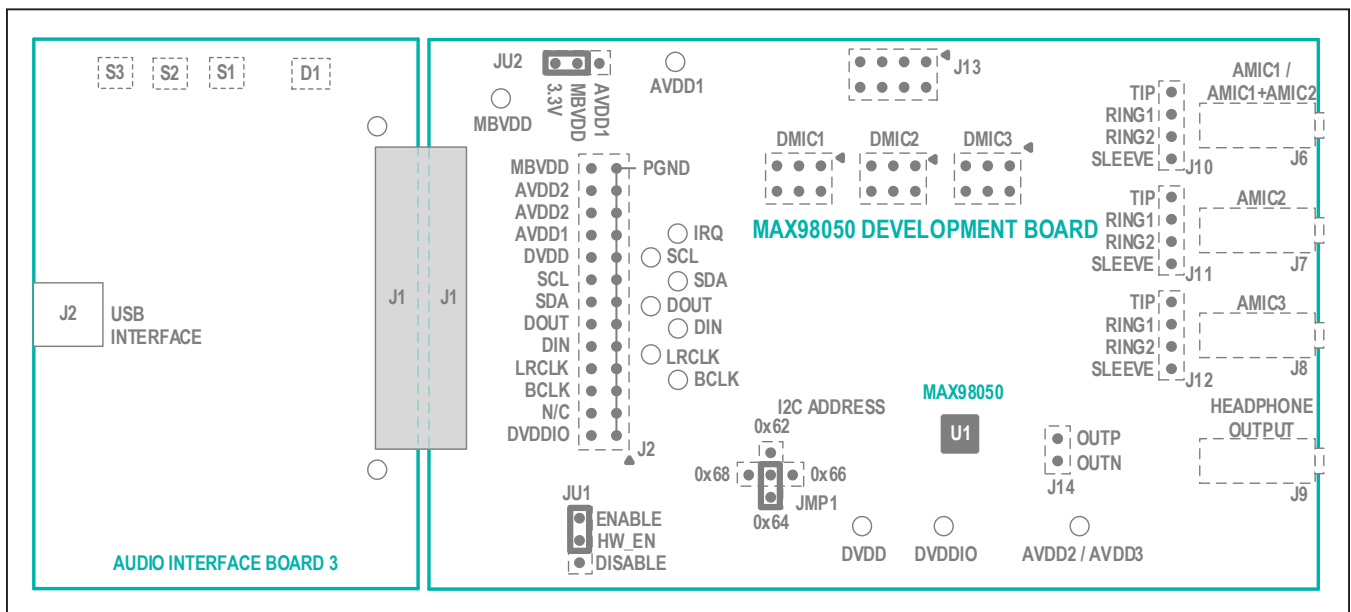
- Complete Hardware System with Easy Setup, No Tools or Special Equipment Required
- Easy-to-Use Graphical User Interfaces Software (Windows® 10 Compatible)
  - MAX98050 Evaluation Software Provides Complete Access to All Hardware Registers
  - Hearable Sound Studio Basic for Digital Filter Design and Acoustic Hardware Evaluation

## EV System Contents

- Two MAX98050 Development Boards (DEV Boards)
- Audio Interface Board III (AUDINT3)
- Dual EVKit Adapter Board
- Micro-USB cable

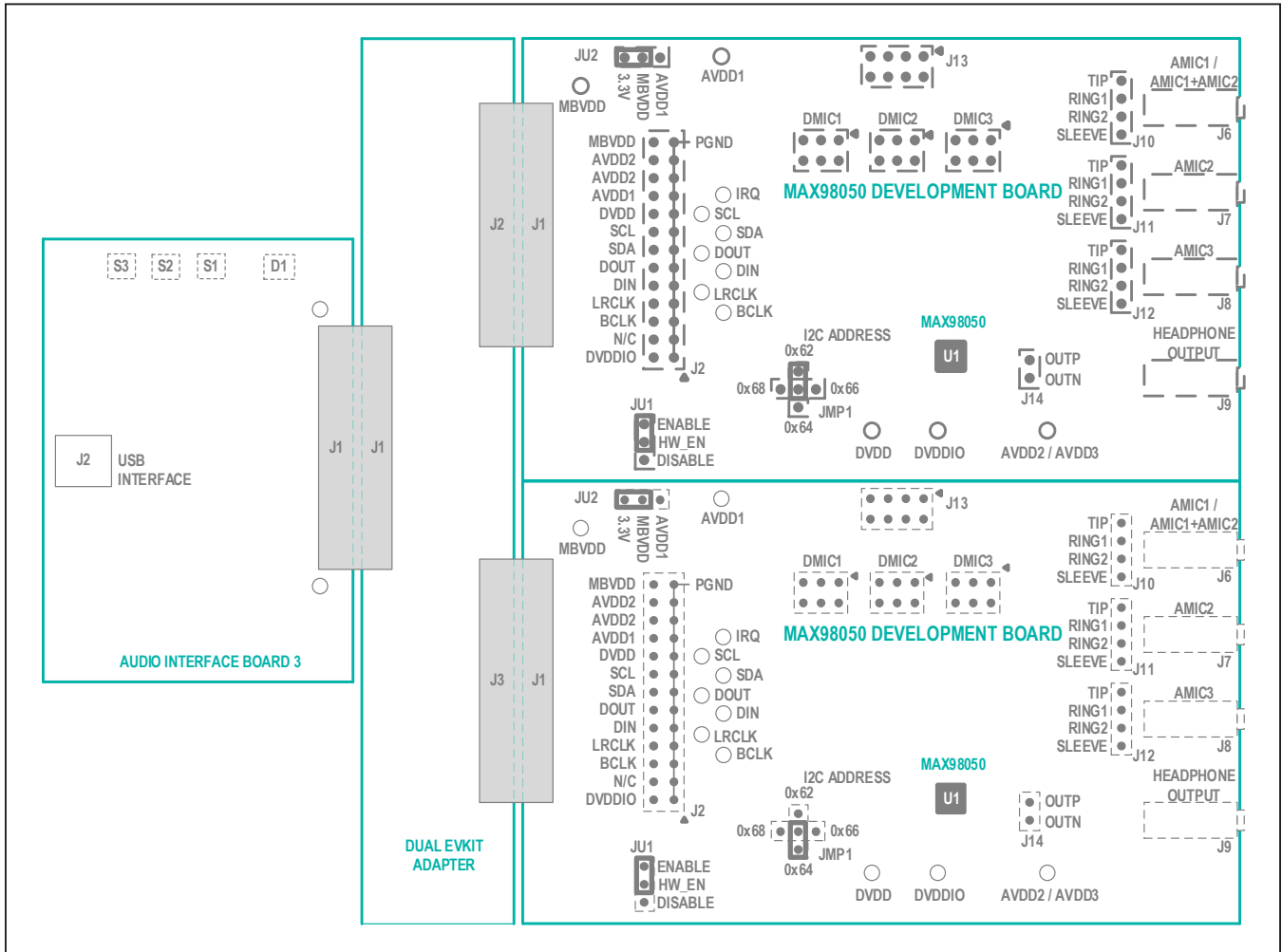
Ordering Information appears at end of data sheet.

## Simplified EV System Block Diagram for MAX98050: Mono Hardware Setup



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Simplified EV System Block Diagram for MAX98050: Stereo Hardware Setup



## Software Installation

- 1) For the latest software, login to your MyMaxim account at [maximintegrated.com](http://maximintegrated.com) and navigate to MAX98050 > Design Resources > Software. For the MAX98050, there are two GUIs available: MAX98050 Evaluation Software and Hearable Sound Studio Basic. Download each, and extract each compressed folder by first selecting the folder, click and hold (or right-click) the folder, select Extract All, and then follow the instructions.
- 2) Install the MAX98050 Evaluation Software by running the program installer. Follow the installer prompts to completion. Windows might display a message indicating that this software is from an unknown publisher. This is not an error condition and it is safe to proceed with the installation.
- 3) Install the Hearable Sound Studio Basic software on your computer by running the program installer. Follow the installer prompts to completion. Windows might display a message indicating that this software is from an unknown publisher. This is not an error condition and it is safe to proceed with the installation.

## Quick Start Guide

For the MAX98050EVSYS#, there are two GUIs available: MAX98050 Evaluation Software and Hearable Sound Studio Basic. For this Quick Start, only the MAX98050 Evaluation Software will be used.

### Required Equipment

- MAX98050EVSYS#
  - Two MAX98050 Development Boards (only one needed for this Quick Start)
  - Audio Interface Board III (AUDINT3)
  - Dual EVKit Adapter Board
  - Micro-USB cable
- Windows 10 PC with USB port and USB audio source (e.g., Windows Media Player® or Apple Music®)

### Required Software

- MAX98050 Evaluation Software application. If not already installed, see the [Software Installation](#) section.

**Note:** In the following sections, software-related items are identified by bolding. Text in **bold** refers to items directly from the evaluation software. Text in **bold and underlined** refers to items from the Windows operating system.

*Windows Media Player is a registered trademark and registered service mark of Microsoft Corporation.  
Apple Music is a registered trademark of Apple, Inc.*

## Reference Material

- MAX98050 IC data sheet

## Procedure

Follow the steps below to set up the EV system for the device evaluation.

- 1) Connect the AUDINT3 Board to either one of the MAX98050 Development Boards using the J1 connector.
- 2) Verify jumper settings: JU1 Hardware Enable jumper is set to ENABLE, JMP1 ADDR is set to 0x64, JU2 MBVDD is set to 3.3V.
- 3) Connect the USB cable from your computer to the USB port (J2) on the AUDINT3 board. The AUDINT3 board provides all necessary power to the MAX98050 Development Board through the J1 connector.
- 4) When properly set up, there should be a slow pulsing magenta on the AUDINT3's LED (D1). When first plugged in, the LED D1 initially blinks white. Once the computer registers the AUDINT3 as a USB device, D1 changes to magenta and blinks slowly.

## Test

- 1) Launch the MAX98050 Evaluation Software and wait while the software connects to the EV system.
- 2) Once the connection is established, the status bar at the bottom of the GUI window should report **Audio Interface 3** with its firmware version, and display **MAX98050** and its revision ID. After the EV system is fully connected, configure the device by loading a pre-installed configuration file. This file can be loaded from **File, Load Register Settings, Pre-Installed Configuration Files**. Scroll down to select the desired configuration file for USB playback to headphone output. Wait for the writes to complete before operating the device. Progress of the register writes can be seen in the Status Bar as a green progress bar.
- 3) Apply a headphone load to the OUTP and OUTN of J14, or OUTP and OUTN wire loops, or via the 3.5mm connector J9, see pinout in [MAX98050 EV Kit Schematic Diagrams](#).

- 4) Access the Windows Sound settings by **Settings > System > Sound**. Select the output device to be Maxim AUDINT003, it should appear as Speakers (3-Maxim AUDINT003 ADC1.0) or similar, see [Figure 2](#). On the same page, click on **Sound Control Panel > Playback** tab and ensure that the Default Device is set to Speakers (3-Maxim AUDINT003 ADC1.0) or something similar, as shown in [Figure 3](#).
- 5) Adjust the audio source volume to a low level.
- 6) Enable the audio source and verify that audio is heard through the connected headphones. Adjust the audio source volume as needed.
- 7) Quickstart is now complete.

### Hardware Options: Mono, Stereo

There are two options for Hardware Setup: Mono or Stereo.

Mono Hardware Setup is typically used for electrical bench evaluation and characterization, and requires the MAX98050 Evaluation Software for register access and control of the MAX98050.

Stereo Hardware Setup is intended for acoustic evaluation and testing using a stereo headset or similar acoustic form-factors. For stereo acoustic evaluation and design, Hearable Sound Studio Basic software is required. Hearable Sound Studio Basic is also used to design the digital filters for the MAX98050. The MAX98050 Evaluation Software is also used with Hearable Sound Studio Basic in Stereo Hardware setup mode.

#### Mono Hardware Setup (for electrical bench evaluation)

- 1) Connect the AUDINT3 Board to either one of the MAX98050 Development Boards using the J1 connector.
- 2) Verify jumper settings: JU1 Hardware Enable jumper is set to ENABLE, JMP1 ADDR is set to 0x64, JU2 MBVDD is set to 3.3V.
- 3) Connect the USB cable from your computer to the USB port (J2) on the AUDINT3 board. The AUDINT3 board provides all necessary power to the MAX98050 Development Board through the J1 connector.

- 4) When properly set up, there should be a slow pulsing magenta on the AUDINT3's LED (D1). When first plugged in, the LED D1 initially blinks white. Once the computer registers the AUDINT3 as a USB device, D1 changes to magenta and blinks slowly.

#### Stereo Hardware Setup (for acoustic testing and headset evaluation)

- 1) Connect the Dual EVKit Adapter board (J1 connector) to the AUDINT3 board (J1 connector).
- 2) Connect one of the MAX98050 Development boards (J1 connector) to the the Dual EVKit Adapter board (J2 connector).
- 3) Connect the other MAX98050 Development boards (J1 connector) to the the Dual EVKit Adapter board (J3 connector).
- 4) Verify jumper settings for each DEV Board: JU1 Hardware Enable jumper is set to ENABLE, JU2 MBVDD is set to 3.3V.
- 5) Verify that one of the DEV boards I2C device address is set to 0x62 using the jumper setting for JMP1 on that board. Verify that the other DEV boards I2C device address is set to 0x64 using the jumper setting for JMP1 on the other board, see [Simplified EV System Block Diagram for MAX98050: Stereo Hardware Setup](#) for MAX98050 for location of JMP1.
- 6) Apply a headphone load to the OUTP and OUTN connectors J14, or OUTP and OUTN wire loops, or via the 3.5mm connector J9, see pinout in [MAX98050 EV Kit Schematic Diagrams](#).
- 7) Connect the USB cable from your computer to the USB port (J2) on the AUDINT3 board. The AUDINT3 board provides all necessary power to both the MAX98050 Development Boards through the J1 connector.
- 8) When properly set up, there should be a slow pulsing magenta on the AUDINT3's LED (D1). When first plugged in, the LED D1 initially blinks white. Once the computer registers the AUDINT3 as a USB device, D1 changes to magenta and blinks slowly.

## Software for MAX98050

For the MAX98050EVSYS#, there are two GUIs available: MAX98050 Evaluation Software and Hearable Sound Studio Basic.

The MAX98050 Evaluation Software GUI gives direct access to all of the control registers inside the MAX98050, and is recommended for all electrical bench testing of the IC. Mono Hardware Setup is recommended for electrical bench testing of the MAX98050. The main interface of the MAX98050 Evaluation Software is an interactive functional block diagram of the MAX98050. For more information, see the [Detailed Description of MAX98050 Evaluation Software](#) section.

Hearable Sound Studio Basic GUI is an acoustic design tool, and is for use in design of the digital filters in the MAX98050 (Digital Filter 1, Digital Filter 2, Playback Compensation Filter, Digital Filter DRC, EQ). Hearable Sound Studio Basic GUI is also used to evaluate filter designs with hardware, using the MAX98050EVSYS# connected to acoustic form-factors such as headsets etc.

### Hearable Sound Studio Basic GUI

The intended purpose of the Hearable Sound Studio Basic GUI is to aid in the design of digital filters for the MAX98050, and help with the evaluation of those digital filter designs using the MAX98050EVSYS#. For digital filter design, hardware is not required with Hearable Sound Studio Basic. For acoustic hardware evaluation, however, the MAX98050EVSYS# is required (in Stereo Hardware Setup mode). The Hardware Evaluation section of Hearable Sound Studio Basic shows how to properly set up the MAX98050EVSYS# in stereo mode. For acoustic hardware evaluation, a headset or similar acoustic form-factor can be connected to each of the DEV Boards. Each DEV Board can support multiple transducers - up to three microphones (ECM, MEMS, Analog, Digital, etc) and one dynamic headphone speaker. Refer to the [Detailed Description of Hardware](#) section in this datasheet, as well as the [MAX98050 IC Datasheet](#) for information on how to properly configure and connect the DEV Boards for the desired transducers.

Hearable Sound Studio Basic is also designed to be used in conjunction with the MAX98050 Evaluation Software (see the [Detailed Description of MAX98050 Evaluation Software](#)). During acoustic hard-

ware evaluation, MAX98050 Evaluation Software is used to adjust the required filter path gain settings, set desired audio channels, switch filter banks, enable/disable the ICs etc. MAX98050 Evaluation Software can also be used to enable the Group Write Address feature in the MAX98050, where commands can be written to both DEV Boards simultaneously.

To launch the Hearable Sound Studio Basic application, navigate to **Windows > Maxim Integrated** and click on the **Hearable Sound Studio Basic application** icon.

## Detailed Description of MAX98050 Evaluation Software

The MAX98050 Evaluation Software is designed to be used only with the MAX98050 EV system. The software provides an intuitive GUI for programming the device and includes many features intended to aid in evaluation.

The MAX98050 Evaluation Software main window ([Figure 1](#)) is composed of four main sections: menu bar, communication toolbar, device registers control tabbed pages, and a status bar. The menu bar provides additional features to aid evaluation, the toolbar provides basic functionality for communicating with the device, and the status bar provides information about hardware connectivity and communication status. The tabbed pages make up the bulk of the GUI and provide the controls for programming the device's hardware registers.

The **Block Diagram** tab provides access to all the device registers using dialog windows, which contain GUI controls for configuring the device. The dialog windows are opened by clicking on the blocks in the block diagram. The **Control Registers** tab provides direct access to the valid registers from 0x2000–0x20FF, as well as to the revision ID register, 0x28FF. The **Filter Registers** tab provides access to the registers for the 5-band equalizer, the dynamic range compression, and the digital filters. The **Log** tab provides a log of the I<sup>2</sup>C transactions and a tool to read specific registers.

The MAX98050 Evaluation Software is compatible with Windows 10 and can be found on Maxim's website. Refer to the [MAX98050 data sheet](#) for device register information.

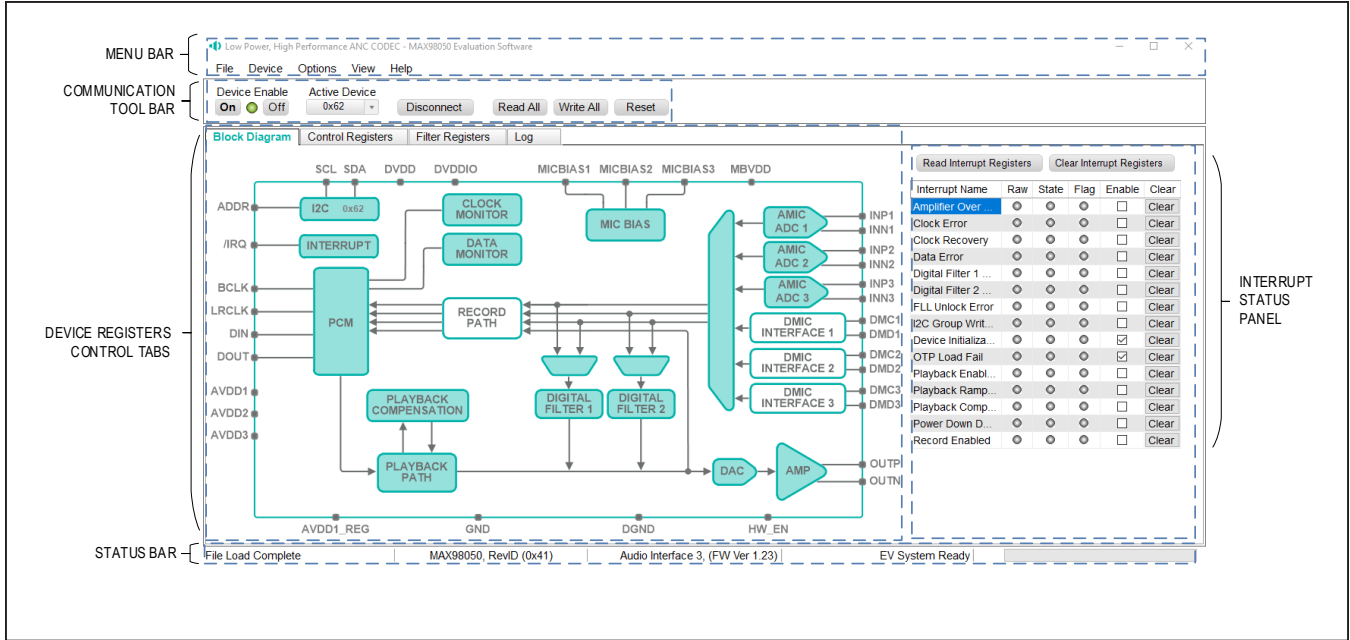


Figure 1. MAX98050 Evaluation Software

The screenshot shows the Windows Sound Settings application. Under the 'Output' section, the selected device is 'Speakers (3- Maxim AUDINT003...'. Below this, there is a 'Master volume' slider set to 100. A 'Troubleshoot' button is visible. On the right side, there are links for 'Related Settings' including 'Bluetooth and other devices', 'Sound Control Panel', 'Microphone privacy settings', and 'Ease of Access audio settings'. At the bottom right, there are links for 'Have a question?' including 'Fixing sound problems' and 'Setting up a microphone', along with 'Get help' and 'Give feedback' buttons.

Figure 2. Windows Sound Settings

The screenshot shows the 'Sound' application window with the 'Playback' tab selected. It prompts the user to 'Select a playback device below to modify its settings:'. The selected device is 'Speakers 3- Maxim AUDINT003 ADC1.0', which is marked as the 'Default Device' with a green checkmark.

Figure 3. Playback Device

### Connect Sequence

When the evaluation software starts for the first time, the program automatically connects to the EV system and attempts to connect to the USB control interface on the AUDINT3 board first. Once that connection is established, it searches for all I<sup>2</sup>C addresses associated with the MAX98050 device and populates all detected device addresses in the **Active Device** drop-down list. During this sequence, the text on the Connect button automatically changes from **Connect** to **Disconnect**, and the status bar is also updated to reflect the current state of the hardware connection.

Once the EV system is fully connected, the button displays **Disconnect**, and when clicked, it disconnects the software from the hardware. The software can also be disconnected from the hardware by selecting **Device | Disconnect** from the menu bar.

There are two methods to re-establish a connection with the hardware. The first is by selecting **Device | Connect** from the menu bar. This instructs the program to connect to the EV system. The second method is to click the **Connect** button until it displays **Disconnect**, which signifies that the EV system is fully connected.

### Communication Tool Bar

The toolbar consists of six buttons and a drop-down combo box. These controls are always accessible, regardless of

the active tabbed page. The toolbar is shown in [Figure 4](#), and [Table 1](#) provides details about each control.

### Status Bar

The Status bar is divided into four sections. From left to right: status and alert messages, device part number and revision ID, interface name and firmware version, and evaluation system connection status.

### Interrupt Status Panel

The Interrupt Status panel (not to be confused with the Status bar) displays the state of the **Raw**, **State**, and **Flag** interrupts. This data is read from the Raw\_, State\_, and Flag\_ interrupt registers (0x2001–0x200A). When the image is red, it indicates that the associated interrupt bit has been set.

The panel also includes checkboxes for each interrupt that is used to enable the link between an interrupt’s Flag bit and State bit. When enabled, the Flag bit is set whenever the State bit is set. To clear the State and Flag bits, click on the interrupt’s associated **Clear** button.

#### Notes:

- Each interrupt source must be enabled for the FLAG column (i.e., flag bits) to be set.
- The IRQ\_EN bit needs to be set for the interrupt to be output on the IRQ pin.

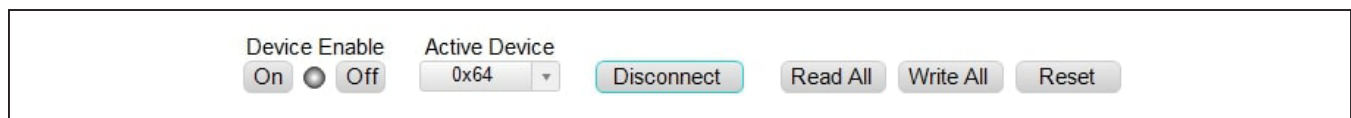


Figure 4. Communication Tool Bar

Table 1. Communication Tool Bar Controls

| CONTROL                   | FUNCTION   |
|---------------------------|--|
| <b>On</b>                 | Press to set the Global Enable bit (EN). This enables the device.  |
| <b>Off</b>                | Press to clear the Global Enable bit (EN). This disables the device. <b>Note:</b> The software can communicate with a disabled device, as long as its I <sup>2</sup> C interface remains active. |
| <b>Active Device</b>      | Provides a list of detected I <sup>2</sup> C addresses. The displayed address is the active device.  |
| <b>Connect/Disconnect</b> | See the <a href="#">Connect Sequence</a> section for additional details.   |
| • <b>Connect</b>          | Press to connect to the USB control interface. Detected addresses are shown in the <b>Active Device</b> drop-down list.  |
| • <b>Disconnect</b>       | Press to disconnect from the USB control interface.  |
| <b>Read All</b>           | Press to initiate a read of all device registers on the active device. The <b>Control Registers</b> and <b>Block Diagram</b> tabs are updated to reflect the read data.                          |
| <b>Write All</b>          | Press to initiate a write to all device registers on the active device, using the settings shown on the <b>Control Registers</b> tab.  |
| <b>Reset</b>              | Press to reset device registers to their power-on-reset (POR) state on the active device.  |

**Block Diagram Tab**

The evaluation software uses an interactive block diagram to facilitate the programming of the device. The block diagram also provides a visual representation of the device's functions and current configuration.

There are three types of blocks in the block diagram, and they are identified by the cursor image. The cursor changes to a pointing hand when over a block that opens a dialog window and a full hand to toggle a function. If the cursor does not change when over a block, then it is an inactive block and is only provided for illustrational purposes.

The color of a diagram block changes depending on the enabled state of the device function(s) associated with that block. An inactive block is grey, a disabled block is white, and an enabled block is teal. Figure 5 shows the block diagram with the device configured for digital audio interface (DAI) (USB audio) input and headphone output.

**Dialog Windows**

Dialog windows are associated with specific blocks in the block diagram and contain the controls for configuring the registers associated with that functional block. Open a dialog window by clicking on a dialog block. Figure 7 shows the typical GUI controls that are found on a dialog window.

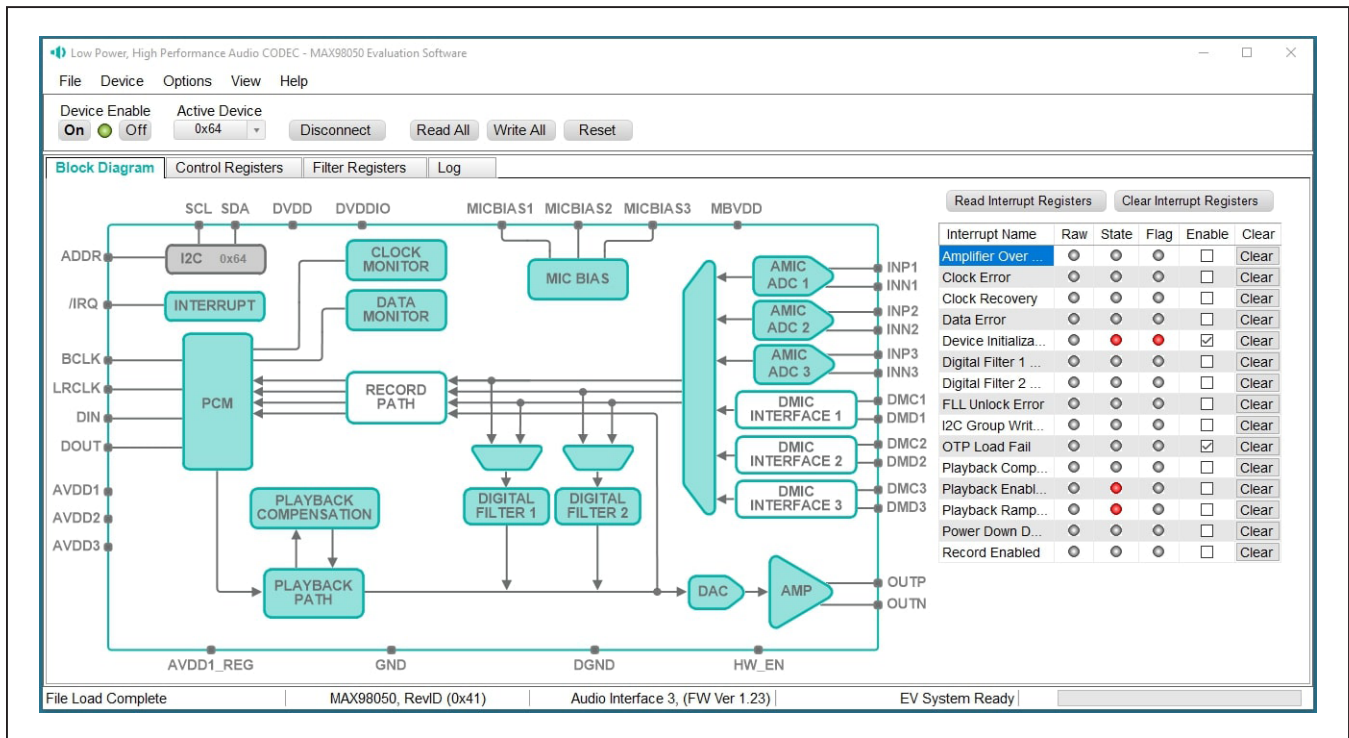


Figure 5. MAX98050 Block Diagram (USB Audio Input to Headphone Output)

| Register Address | Register Name      | [7]            | [6]            | [5]          | [4]           | [3]          | [2]          | [1]          | [0]           | Hex  |
|------------------|--------------------|----------------|----------------|--------------|---------------|--------------|--------------|--------------|---------------|------|
| 0x2000           | Software Reset     |                |                |              |               |              |              |              | RST           | 0x00 |
| 0x2001           | Interrupt Raw 1    | INIT_DONE_R... | OTP_FAIL_RAW   | PWRDN_DON... | PB_PWRUP_...  | REC_PWRUP... | CLOCK_ERR... | CLOCK_REC... | DATA_ERR_R... | 0x00 |
| 0x2002           | Interrupt Raw 2    | FLL_ERR_RAW    | I2C_GW_DON...  |              | AMP_OCP_R...  | PBC_RMP_D... | DF2_RMP_D... | DF1_RMP_D... | PB_RMP_DO...  | 0x00 |
| 0x2003           | Interrupt State 1  | INIT_DONE_...  | OTP_FAIL_ST... | PWRDN_DON... | PB_PWRUP_...  | REC_PWRUP... | CLOCK_ERR... | CLOCK_REC... | DATA_ERR_S... | 0x90 |
| 0x2004           | Interrupt State 2  | FLL_ERR_ST...  | I2C_GW_DON...  |              | AMP_OCP_ST... | PBC_RMP_D... | DF2_RMP_D... | DF1_RMP_D... | PB_RMP_DO...  | 0x10 |
| 0x2005           | Interrupt Flag 1   | INIT_DONE_F... | OTP_FAIL_FL... | PWRDN_DON... | PB_PWRUP_...  | REC_PWRUP... | CLOCK_ERR... | CLOCK_REC... | DATA_ERR_F... | 0x80 |
| 0x2006           | Interrupt Flag 2   | FLL_ERR_FLAG   | I2C_GW_DON...  |              | AMP_OCP_FL... | PBC_RMP_D... | DF2_RMP_D... | DF1_RMP_D... | PB_RMP_DO...  | 0x00 |
| 0x2007           | Interrupt Enable 1 | INIT_DONE_EN   | OTP_FAIL_EN    | PWRDN_DON... | PB_PWRUP_...  | REC_PWRUP... | CLOCK_ERR... | CLOCK_REC... | DATA_ERR_EN   | 0xC0 |
| 0x2008           | Interrupt Enable 2 | FLL_ERR_EN     | I2C_GW_DON...  |              | AMP_OCP_EN    | PBC_RMP_D... | DF2_RMP_D... | DF1_RMP_D... | PB_RMP_DO...  | 0x00 |

Figure 6. Control Register Tab



### Control Registers Tab

The Control Registers tab provides two methods for configuring the device. As an example, [Figure 6](#) shows the elements of the interrupt registers.

The first configuration method involves clicking on the register's bit labels. A non-bold bit label indicates that the bit is currently set low. A bold bit label indicates that the bit is currently set high. Clicking on a bit toggles its state and results in a write to that register. This action also updates the value displayed in the register's edit box, located to the right of the bit labels.

The second configuration method involves entering a hex value in the register's edit box and then pressing the **Enter** key; the software automatically configures the device register once the **Enter** key is pressed. The state of the bit labels are then updated to reflect the value shown in the edit box.

**Note:** Trying to write to a read-only bit by clicking/toggling its label or entering a hex value in its edit box updates the GUI, but it does not affect the bit's value in the device. All read-only bits are updated to reflect their current value in the device by performing a read all operation.

All changes made on this tab are reflected on the [Block Diagram Tab](#) and on any open dialog windows.

### Menu Bar

[Table 2](#) describes all menu bar items with additional information for some menu items provided in the following sections.

### File I/O

The software's save and load features are accessed from the File menu. The **Save Control Register Settings** feature saves the data currently displayed on the [Control Registers Tab](#).

A configuration file's main purpose is to capture the current state of the device's registers, as displayed on the register tab. This feature makes it easy to program a device to a saved/known state and allows for the sharing of configuration files between users. To facilitate usage, use descriptive file names when saving a configuration file.

The save and load features are functional even when the hardware is not connected. This allows configuration files to be created and opened when hardware is not available. Since the configuration file is automatically generated by the software, it is not meant to be manually formatted, and doing so can cause file loading issues. To open a configuration file for viewing purposes only, use a plain text editor.

Select **File > Save Control Register Settings** to create a configuration file. The register address and its data are saved as tab-delimited values and the file is saved with a \*.98050 extension.

The software has some standard configuration files pre-installed. A file can be loaded by selecting **File > Load Register Settings > Pre-Installed Configuration Files**, and using the drop-down menu, selecting the file, then clicking **Load**.

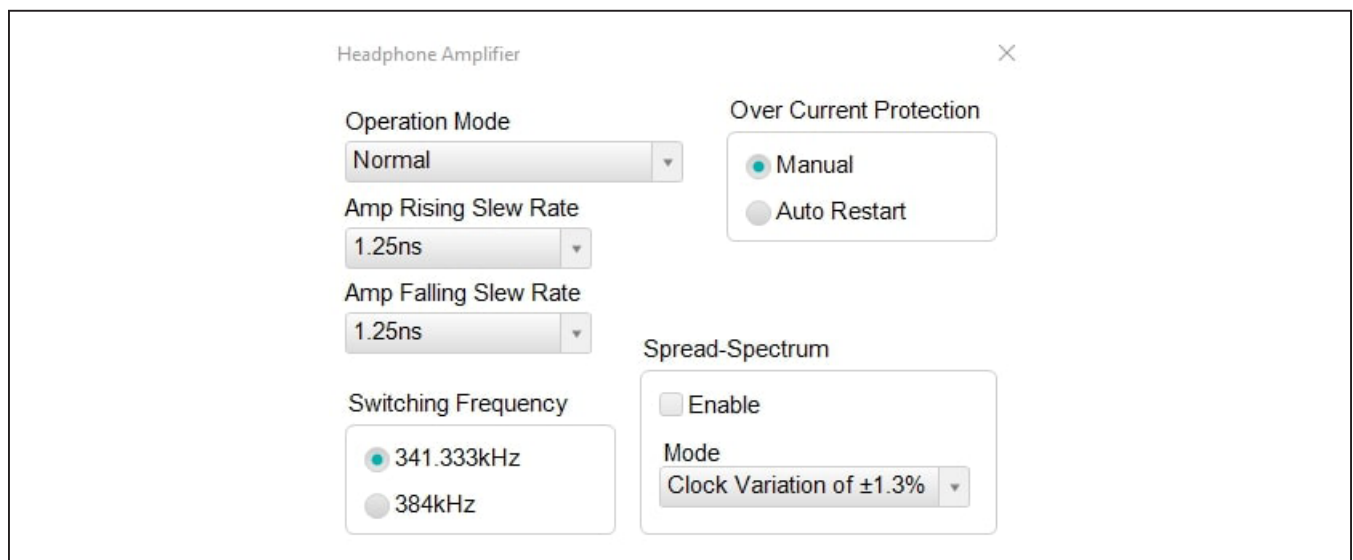


Figure 7. Typical GUI Controls

**Table 2. Menu Bar Items**

| MENU ITEM                             | DESCRIPTION  |
|---------------------------------------|--|
| <b>FILE</b>                           |  |
| Load Register Settings                | Loads a configuration file (as saved by the <b>Save Control Register Settings</b> option or a factory preinstalled file).  |
| Save Control Register Settings        | Saves a configuration file containing the current device settings.   |
| Exit                                  | Closes the MAX98050 evaluation software.   |
| <b>DEVICE</b>                         |  |
| Connect                               | Runs a connection routine to connect to the evaluation system. First, establish a connection to the AUDINT3 board, and then establish a connection to the MAX98050.  |
| Disconnect                            | Disconnects the PC from the EV system.   |
| Reset                                 | Resets all control registers to their power-on-reset (POR) states.   |
| Read All                              | Performs a read from all registers and updates the GUI.  |
| Write All                             | Performs a write to all writeable registers, using the values shown on the <a href="#">Control Registers Tab</a> , and then updates the GUI.   |
| Read Rev ID                           | Reads the device’s revision ID register and updates the status bar.  |
| <b>OPTIONS</b>                        |  |
| Audio Interface 3 (Advanced Users) F3 | Opens an advanced user interface dialog window for the AUDINT3, allowing the user to control the digital clocks and applied voltages to the DEV board. By disabling the AUDINT3’s clocks, external clocks can be applied to the MAX98050 without conflicting with the clocks from the AUDINT3. |
| Interface Selection                   | Selects the I <sup>2</sup> C hardware interface to either the Audio Interface 3 (AUDINT3) or an I <sup>2</sup> C bridge (not supported).   |
| Activate Demo Mode                    | Puts the software in demo mode.  |
| <b>VIEW</b>                           |  |
| Communication Log                     | Toggles the Log sheet display in the Device Registers Control Tabbed Pages.  |
| <b>HELP</b>                           |  |
| View Help                             | Links to technical documents.  |
| About                                 | Provides information about the MAX98050 evaluation software.   |

### Detailed Description of Hardware

The MAX98050 EV system is designed to allow for a thorough evaluation of the MAX98050 low-power, high-performance audio CODEC with integrated low-latency digital filters for wireless hearables, headsets, and headphones. The EV system includes two MAX98050 development boards (DEV board), Maxim’s Audio Interface Board III (AUDINT3), Dual EV Kit Adapter board, and USB cable.

The DEV board can be evaluated as a standalone board that is driven directly by audio test equipment, powered by multiple external supplies, and configured by an external I<sup>2</sup>C capable controller. To simplify the evaluation, the DEV boards can be evaluated with just the AUDINT3 board, or the AUDINT3 board and the Dual EV Kit Adapter board for stereo applications. This symplified hardware combination provides an easy-to-use method for exercising the capabilities of the device with no additional audio equipment.

The AUDINT3 board provides on-board LDO regulators, USB-to-PCM, and USB-to-I<sup>2</sup>C interfaces. The AUDINT3 LDO regulators are used to power the device’s supply rails through connector J1. The USB-to-PCM converter accepts a USB audio stream from a USB connected computer and converts that into an I<sup>2</sup>S data stream, allowing for USB audio playback through the MAX98050 device. The USB-to-I<sup>2</sup>C interface is the bridge that allows the evaluation software to configure, monitor, and control the I<sup>2</sup>C capable devices on the DEV and AUDINT3 boards.

**Table 3. Power Supplies**

| POWER SUPPLY | RANGE (V)      |
|--------------|----------------|
| MBVDD        | 1.3V to 4.8V   |
| AVDD1        | 1.71V to 1.95V |
| AVDD2        | 1.1V to 1.3V   |
| DVDDIO       | 1.1V to 1.95V  |
| DVDD         | 1.1V to 1.3V   |

**Table 4. Microphone Bias Input Supply Selection Using JU2**

| HEADER | SHUNT POSITION | DESCRIPTION                                     |
|--------|----------------|---|
| JU2    | 3.3V to MBVDD  | Microphone bias input supply connected to 3.3V  |
|        | AVDD1 to MBVDD | Microphone bias input supply connected to AVDD1 |

### Power Supplies

The DEV board requires at least three external power supplies when evaluated as a stand-alone board. The power supplies and their ranges are listed in [Table 3](#). The external supply voltages can be connected at the respective supply test points (see the [Simplified EV System Block Diagram for MAX98050: Stereo Hardware Setup](#)). When using the AUDINT3 board, its LDO regulators are used to power the device’s supply rails through connector J1. The Dual EV Kit Adapter board is used in stereo applications to distribute the AUDINT3’s power outputs and digital clocks. See the [Digital Audio Interface \(DAI\)](#) section.

Jumper JU2 is used to select the input voltage for MBVDD, the microphone bias supply generator in the MAX98050 (see [Table 4](#)). Using JU2, MBVDD can be connected to either 1.8V (AVDD1) or 3.3V, both supplied by the AUDINT3. Alternatively, an external voltage can be applied to MBVDD by leaving JU2 open, and connecting the external supply to test pin MBVDD.

### Hardware Enable

The DEV board includes jumper JU1 to control HW\_EN, the device hardware enable. [Table 5](#) describes the JU1 configuration options.

**Note:** Before starting evaluation, ensure that the jumper is configured as needed.

### Device Address

The MAX98050 I<sup>2</sup>C device address can be configured to one of four values: 0x62, 0x64, 0x66, and 0x68. The device address is set by using jumper JMP1 (see [Table 6](#)).

**Table 5. Jumper Configuration**

| HEADER | SHUNT POSITION  | DESCRIPTION      |
|--------|-----------------|------------------|
| JU1    | HW_EN to DVDDIO | Normal operation |
|        | HW_EN to GND    | Device is reset  |

**Table 6. I<sup>2</sup>C Address Selection Using JMP1**

| SIGNAL | PIN | PIN | SIGNAL | I <sup>2</sup> C ADDRESS |
|--------|-----|-----|--------|--------------------------|
| ADDR   | 1   | 3   | DVDDIO | 0x62                     |
|        |     | 5   | GND    | 0x64                     |
|        |     | 4   | SDA    | 0x66                     |
|        |     | 2   | SCL    | 0x68                     |

**Note:** Only one jumper should be used on JMP1.

When both DEV boards are being used in a stereo configuration, be sure that each board has a different I<sup>2</sup>C address set. When used with Hearable Sound Studio Basic, one DEV board should be set to 0x62, and the other DEV board should be set to 0x64.

In a stereo application, both devices can be written to at the same time using the Group Write Address feature in the MAX98050. To enable this feature, click on the I<sup>2</sup>C block in the block diagram in the MAX98050 evaluation software, and click on I<sup>2</sup>C Group Write Address, which can only be made active when two I<sup>2</sup>C addresses are detected. To write to both devices at the same time, change the address in the Active Device pulldown to 0x6A, so that both devices can be written to synchronously. When Group Write Address mode is enabled, and address 0x6A is selected, both devices are simultaneously written any time a control/register is changed.

**Table 7. AUDINT3 Connector (J1)**

| SIGNAL | PIN | SIGNAL       | PIN | SIGNAL | PIN |
|--------|-----|--------------|-----|--------|-----|
| —      | 1   | AUDINT_MCLK  | 2   | GND    | 3   |
| BCLK2  | 4   | AUDINT_BCLK  | 5   | GPIO1  | 6   |
| LRCLK2 | 7   | AUDINT_LRCLK | 8   | GPIO2  | 9   |
| DAC2   | 10  | AUDINT_DIN   | 11  | GPIO3  | 12  |
| ADC2   | 13  | AUDINT_DOUT  | 14  | GPIO4  | 15  |
| —      | 16  | ID           | 17  | 3.3V   | 18  |
| AVDD   | 19  | DVDD         | 20  | GND    | 21  |
| HPVD   | 22  | VDDIO        | 23  | GND    | 24  |
| GND    | 25  | SDA          | 26  | 5V     | 27  |
| —      | 28  | SCL          | 29  | 5V     | 30  |
| GND    | 31  | IRQ          | 32  | RESET  | 33  |
| —      | 34  | DMD2         | 35  | DMC1   | 36  |
| GND    | 37  | DMD1         | 38  | DMD3   | 39  |

**Table 8. DAI Header (Portion of J2)**

| SIGNAL | PIN | PIN | SIGNAL |
|--------|-----|-----|--------|
| GND    | 5   | 6   | BCLK   |
| GND    | 7   | 8   | LRCLK  |
| GND    | 9   | 10  | DIN    |
| GND    | 11  | 12  | DOUT   |

**Digital Audio Interface (DAI)**

The device DAI is routed to interface header J2 as well as the AUDINT3 connector J1. The interface headers provide easy access to the device’s PCM bus, and the AUDINT3 connector allows for USB audio to be streamed onto the DEV board. See the [USB Audio Input](#) section for details on USB audio streaming and [Table 7](#) for the connector J1 pinout.

**DAI Header**

The DAI header (J2) provides access to the MAX98050 PCM bus (BCLK, LRCLK, DIN, and DOUT). This DAI header facilitates evaluation with audio equipment I/O. See [Table 8](#) for the pinout of the DAI headers and [Figure 8](#) for an illustration of how the MAX98050 DAI interface is routed through the DAI headers to the AUDINT3 connector.

**Microphone Inputs**

The MAX98050 allows three microphone input channels to operate concurrently. The three microphone input channels can accept any combination of digital microphone or analog microphone as input sources. There are three analog microphone interface inputs available using 3.5mm sockets (J6-J8) or headers (J10-J12) and three digital microphone interface inputs available using headers (J3-J5). See the [MAX98050 EV Kit Schematic Diagrams](#) for detailed connection options on the microphone inputs.

**Three Digital Microphone (DMIC) Inputs**

Each of the headers J3 to J5 provides the following connections:

- DVDDIO supply as power supply for external DMIC
- DMC to connect the MAX98050 DMIC clock output to external DMIC clock input
- DMD to connect the MAX98050 DMIC data input to external DMIC data output

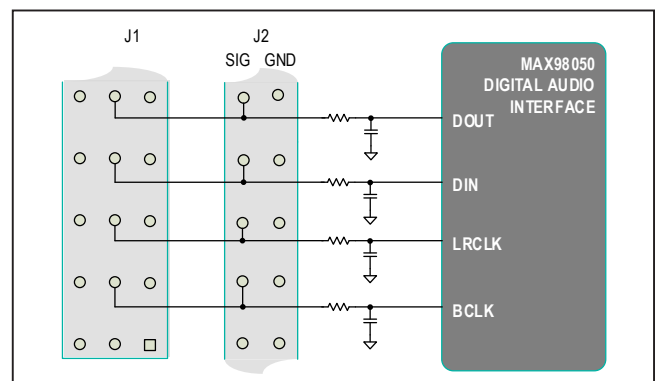


Figure 8. MAX98050 DAI Interface Headers (PCM)

[Table 9](#), [Table 10](#), and [Table 11](#) show the connections for each of the DMIC input channels.

See the [MAX98050 EV Kit Schematic Diagrams](#) for details of how the DMIC input channels are routed to the DMIC headers.

### Three Analog Microphone (AMIC) Inputs

The MAX98050 features three differential AMIC inputs which can connect to differential or single-ended external analog microphones. The 3.5mm 4-pole TRRS sockets J6, J7, and J8 allow analog microphones to be connected to the MAX98050 analog microphone inputs. The J6 socket can be configured for up to two AMIC inputs. The single-ended or a differential external microphone connections can be routed to the MAX98050 AMIC inputs using resistor selection on the board. See the [MAX98050 EV Kit Schematic Diagrams](#) for detailed connection options on the microphone inputs.

The J6 socket allows the following connections:

- Differential microphone connection to AMIC1 inputs on the MAX98050
- A single-ended microphone connection to AMIC1 inputs
- Two single-ended microphone connection to AMIC1 and AMIC2 analog microphone inputs

#### Table 9. DMIC1 Header (J3)

| SIGNAL | PIN | PIN | SIGNAL |
|--------|-----|-----|--------|
| GND    | 1   | 2   | DMC1   |
| GND    | 3   | 4   | DMD1   |
| GND    | 5   | 6   | DVDDIO |

#### Table 10. DMIC2 Header (J4)

| SIGNAL | PIN | PIN | SIGNAL |
|--------|-----|-----|--------|
| GND    | 1   | 2   | DMC2   |
| GND    | 3   | 4   | DMD2   |
| GND    | 5   | 6   | DVDDIO |

#### Table 11. DMIC3 Header (J5)

| SIGNAL | PIN | PIN | SIGNAL |
|--------|-----|-----|--------|
| GND    | 1   | 2   | DMC3   |
| GND    | 3   | 4   | DMD3   |
| GND    | 5   | 6   | DVDDIO |

The J7 socket allows the following connections:

- Differential microphone connection to AMIC2 inputs on the MAX98050
- A single-ended microphone connection to AMIC2 inputs

The J8 socket allows the following connections:

- Differential microphone connection to AMIC3 inputs on the MAX98050
- A single-ended microphone connection to AMIC3 inputs

The external analog microphone needs a 3.5mm 4-pole TRRS plug with the following connections for proper microphone operation:

- AMIC Single-Ended:
  - Mic Output Connected to Tip
  - Mic GND to Ring2
  - Mic Power Supply to Sleeve (MEMS Mic Only)
- AMIC Differential:
  - Mic Output + Connected to Tip
  - Mic Output - Connected to Ring1
  - Mic GND to Ring2
  - Mic Power Supply to Sleeve (MEMS Mic Only)

[Table 12](#), [Table 13](#), and [Table 14](#) show how the AMIC input channels on the MAX98050 connect to each of the DEV board's 3.5mm sockets.

The connections from the 3.5mm sockets can be monitored on J10-J12 headers. Alternatively, external AMICs can also be connected to the MAX98050 DEV board using these headers. [Table 15](#), [Table 16](#), and [Table 17](#) show the connections of the header pins to the associated 3.5mm socket pins.

#### Table 12. J6 Socket

| SIGNAL                  | PIN    |
|-------------------------|--------|
| INP1                    | Tip    |
| INN1/INP2               | Ring1  |
| GND                     | Ring2  |
| MICBIAS1/MICBIAS2/AVDD1 | Sleeve |

#### Table 13. J7 Socket

| SIGNAL                  | PIN    |
|-------------------------|--------|
| INP2                    | Tip    |
| INN2                    | Ring1  |
| GND                     | Ring2  |
| MICBIAS1/MICBIAS2/AVDD1 | Sleeve |

**Table 14. J8 Socket**

| SIGNAL                  | PIN    |
|-------------------------|--------|
| INP3                    | Tip    |
| INN3                    | Ring1  |
| GND                     | Ring2  |
| MICBIAS1/MICBIAS3/AVDD1 | Sleeve |

**Table 15. J10 Header**

| SIGNAL                  | PIN |
|-------------------------|-----|
| INP1                    | 1   |
| INN1/INP2               | 2   |
| GND                     | 3   |
| MICBIAS1/MICBIAS2/AVDD1 | 4   |

**Single-Ended/Differential Input Connection**

In addition to the 3.5mm socket connections, [Table 18](#) shows recommended resistor options to connect the MAX98050 AMIC inputs to both single-ended and differential external analog microphones.

The DEV board includes 2.2µF DC blocking capacitors on C18-C23 by default. The DC blocking corner frequency can be adjusted by changing the value of the C18-C23 capacitors. See the [MAX98050 EV Kit Schematic Diagrams](#) for more details.

**Electret Condensor Microphone (ECM)**

The microphone bias outputs of the MAX98050 and the pullup and pulldown resistors on the MAX98050 DEV board allow easy connections to external ECM-type ana-

**Table 16. J11 Header**

| SIGNAL                  | PIN |
|-------------------------|-----|
| INP2                    | 1   |
| INN2                    | 2   |
| GND                     | 3   |
| MICBIAS1/MICBIAS2/AVDD1 | 4   |

**Table 17. J12 Header**

| SIGNAL                  | PIN |
|-------------------------|-----|
| INP3                    | 1   |
| INN3                    | 2   |
| GND                     | 3   |
| MICBIAS1/MICBIAS3/AVDD1 | 4   |

log microphones. See [Table 18](#) for typical components that need to be installed for single-ended or differential ECM microphone connections. The microphone bias output level, R\_PULLUP, and R\_PULLDOWN resistor selection is determined by the ECM microphone supplier's recommended bias point selection.

**Analog Micro-Electro-Mechanical System (MEMS) Microphone**

The MAX98050 DEV board provides simple connections to connect external analog MEMS microphones to the AMIC inputs of the MAX98050. See [Table 18](#) for typical components that need to be installed for single-ended or differential analog MEMS microphone connections. The microphone bias output level is determined by the MEMS microphone supplier's recommended supply level.

**Table 18. Analog Microphone Configuration**

| HEADER | AMIC ECM DIFFERENTIAL                                      | AMIC ECM SINGLE-ENDED                 | AMIC MEMS DIFFERENTIAL | AMIC MEMS SINGLE-ENDED |
|--------|--|---------------------------------------|------------------------|------------------------|
| J6     | R1, R2, R4 = 0Ω,<br>R7 = R_PULLUP,<br>R57 = R_PULLDOWN     | R1, R4, R57 = 0Ω,<br>R7 = R_PULLUP    | R1, R2, R4 = 0Ω        | R1, R4, R57 = 0Ω       |
| J7     | R10, R11, R13 = 0Ω,<br>R15 = R_PULLUP,<br>R59 = R_PULLDOWN | R10, R13, R59 = 0Ω,<br>R15 = R_PULLUP | R10, R11, R13 = 0Ω     | R10, R13, R59 = 0Ω     |
| J8     | R17, R18, R20 = 0Ω,<br>R22 = R_PULLUP,<br>R61 = R_PULLDOWN | R20, R17, R61 = 0Ω,<br>R22 = R_PULLUP | R17, R18, R20 = 0Ω     | R17, R20, R61 = 0Ω     |

**Microphone Bias**

The MAX98050 provides three microphone bias outputs (MICBIAS1, MICBIAS2, and MICBIAS3) to connect external microphones to the microphone inputs of the device. The microphone bias outputs use the MBVDD pin on the MAX98050 as the input supply for the MICBIAS generator. The MBVDD pin is supplied either from AUDINT3 board supplies through JU2 or supplied externally using the MBVDD test point. In addition to providing power for ECM microphones, the MICBIAS can also be used as a power supply for MEMS microphones. The MICBIAS output voltage level is programmable (1.2V to 3V), and can be set through register control using the MAX98050 Evaluation Software.

The microphone bias outputs are routed to the "Sleeve" connection on the J6-J8 sockets and are resistor selectable for that external AMIC connection. [Table 12](#), [Table 13](#), and [Table 14](#) show which microphone bias outputs are routed to each 3.5mm socket on the MAX98050 DEV board. See the [MAX98050 EV Kit Schematic Diagrams](#) for resistor selection information on a particular analog microphone path.

**Headphone Output**

The MAX98050 differential headphone output, OOTP/OUTN, is routed to the J14 header, wire loops, and the J9 socket on the DEV board. The DEV board is, by default, assembled to allow the MAX98050 output to connect directly to a headphone load without the need for filtering. To ensure proper operation of an external headset, always disable the DEV board before connecting or disconnecting the headset. The 3.5mm 4-pole TRRS socket J9 is preconfigured for the differential OOTP/OUTN headphone outputs. See [Table 19](#).

For quick evaluation, a standard 3.5mm mono headphone (without a microphone) can be used with socket J9 if resistor shorts R62 and R63 are removed, allowing Ring2 and Sleeve to float, see the [MAX98050 EV Kit Schematic Diagrams](#).

**EMI Filter**

In some applications, when a very long headphone cable is used with the MAX98050 headphone output, an output filter (i.e., ferrite bead or inductor, plus capacitor) can be installed to help prevent excessive EMI radiation. It is best to choose filter components based on EMI test results. PCB footprints have been provided. Before adding the filters to the design, first remove the 0Ω short installed in the L1 and L2 locations (see the [MAX98050 EV Kit Schematic Diagrams](#) and the [MAX98050 EV Kit PCB Layout Diagrams](#)).

**I<sup>2</sup>C Interface**

The MAX98050's I<sup>2</sup>C interface is routed to header J2 and connector J1. The J1 connector is for the AUDINT3 board and connects the device's I<sup>2</sup>C interface to the I<sup>2</sup>C interface of the AUDINT3 board. This connection allows the MAX98050 evaluation software to read and write to the device. The AUDINT3 board has I<sup>2</sup>C pullup resistors. See [Table 7](#).

A portion of header J2 allows for an external I<sup>2</sup>C controller to connect to the device's I<sup>2</sup>C bus as well as test points SDA and SCL. See [Table 20](#) for more information about J2.

**Audio Interface Board III**

Maxim's Audio Interface Board III (AUDINT3 board) facilitates the evaluation of the DEV board by providing a set of features that can be used to exercise the capabilities of the DEV board without the need for additional audio equipment. The main components of the AUDINT3 board are LDO supply voltages and USB-to-I<sup>2</sup>C and USB-to-PCM interfaces. All the necessary supply voltages for the MAX98050 are supplied by the AUDINT3 board. No external supplies are needed for evaluation. The USB-to-PCM converter allows any Windows 10 PC to be used as an audio source for the DEV board's digital audio PCM interface, and the USB-to-I<sup>2</sup>C interface allows for the use of the MAX98050 evaluation software, making device configuration and monitoring simpler.

The DEV board connects to the AUDINT3 board through connector J1. The physical connections made between the DEV board and AUDINT3 board are listed in [Table 7](#).

**USB Audio Input**

To utilize the USB streaming feature of the AUDINT3 board, connect the USB cable from the computer to the micro USB connector J2 on the AUDINT3 board and ensure that the AUDINT3 board is connected to the DEV board directly, for mono, or through the Dual EV Kit Adapter for a stereo DEV board configuration.

Once the hardware is ready, use the MAX98050 Evaluation Software to configure and enable the device for DAI audio playback.

**Table 19. J9 Socket**

| SIGNAL | PIN    |
|--------|--------|
| FOUTP  | Tip    |
| FOUTN  | Ring1  |
| GND    | Ring2  |
| GND    | Sleeve |

Table 20. I<sup>2</sup>C Header (Portion of J2)

| SIGNAL | PIN | PIN | SIGNAL |
|--------|-----|-----|--------|
| GND    | 13  | 14  | SDA    |
| GND    | 15  | 16  | SCL    |

Ordering Information

| PART           | TYPE  |
|----------------|---|
| MAX98050EVSYS# | Complete Evaluation System for the MAX98050 |

#Denotes RoHS compliant.

MAX98050 EV Kit Bill of Materials

| ITEM | QTY | REF DES  | MAXINV                | MFG PART #  | MANUFACTURER                     | VALUE              | DESCRIPTION  |
|------|-----|--|-----------------------|---|----------------------------------|--------------------|--|
| 1    | 24  | ADDR, AVDD1_REG, D3, DMC1-DMC3, DMD1-DMD3, INN1-INN3, INN1_M-INN3_M, INP1-INP3, INP1_M-INP3_M, MICBIAS1-MICBIAS3 | 02-TPMINI5002-00      | 5002  | KEYSTONE                         | N/A                | TEST POINT; PIN DIA=0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; WHITE; PHOSPHOR BRONZE WIRE SILVER; NOT FOR COLD TEST  |
| 2    | 5   | AVDD1, AVDD2/AVDD3, DVDD, DVDDIO, MBVDD  | 02-TPMINI5010-00      | 5010  | KEYSTONE                         | N/A                | TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; RED; PHOSPHOR BRONZE WIRE SIL; NOT FOR COLD TEST  |
| 3    | 5   | BCLK, DIN, DOUT, IRQ, LRCLK  | 02-TPMINI5003-00      | 5003  | KEYSTONE                         | N/A                | TEST POINT; PIN DIA=0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; ORANGE; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH; RECOMMENDED FOR BOARD THICKNESS=0.062IN; NOT FOR COLD TEST |
| 4    | 1   | C8   | 20-000U1-D5           | C0201C104K9PAC; GRM033R60J104KE19; C0603X5R0J104K030BC; C0201X5R6R3-104KNP                      | KEMET; MURATA; VENKEL; TDK       | 0.1UF              | CAP; SMT (0201); 0.1UF; 10%; 6.3V; X5R; CERAMIC  |
| 5    | 5   | C9-C12, C14  | 20-0001U-AA20         | GRM033R61A105ME15   | MURATA                           | 1UF                | CAP; SMT (0201); 1UF; 20%; 10V; X5R; CERAMIC   |
| 6    | 1   | C15  | 20-002U2-61           | GRM033R61A225KE47   | MURATA                           | 2.2UF              | CAP; SMT (0201); 2.2UF; 10%; 10V; X5R; CERAMIC   |
| 7    | 2   | C16, C17   | 20-00U01-6            | C0603X7R1A103K030BA; GRM033R71A103KA01; GCM033R71A103KA03; CGA1A2X7R1A103K030BA; 0201ZC103KAT2A | TDK; MURATA; MURATA; TDK; AVX    | 0.01UF             | CAP; SMT (0201); 0.01UF; 10%; 10V; X7R; CERAMIC  |
| 8    | 6   | C18-C23  | 20-002U2-BA97         | GRM188C71E225KE11   | MURATA                           | 2.2UF              | CAP; SMT (0603); 2.2UF; 10%; 25V; X7S; CERAMIC   |
| 9    | 8   | GND1-GND6, OUTN, OUTP  | 01-9020BUSS20AWG-00   | 9020 BUSS   | WEICO WIRE                       | MAXIMPAD           | EVK KIT PARTS; MAXIM PAD; WIRE; NATURAL; SOLID; WEICO WIRE; SOFT DRAWN BUS TYPE-S; 20AWG   |
| 10   | 1   | HW_EN  | 02-TPMINI5116-00      | 5116  | KEYSTONE                         | N/A                | TEST POINT; PIN DIA=0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; GREEN; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH; RECOMMENDED FOR BOARD THICKNESS=0.062IN; NOT FOR COLD TEST  |
| 11   | 1   | J1   | 01-TSW11308GTRA39P-19 | TSW-113-08-G-T-RA   | SAMTEC                           | TSW-113-08-G-T-RA  | EVKIT PART; CONNECTOR; MALE; THROUGH HOLE; 0.025IN SQ POST HEADER; RIGHT ANGLE; 39PINS; MODIFY PIN NUMBERING ARRANGEMENT   |
| 12   | 1   | J2   | 01-303266002HB26P-19  | 30326-6002HB  | 3M ELECTRONIC SOLUTIONS DIVISION | 30326-6002HB       | CONNECTOR; MALE; THROUGH HOLE; LOW PROFILE HEADER; STRAIGHT; 26PINS  |
| 13   | 3   | J3-J5  | 01-PEC03DAAN6P-21     | PEC03DAAN   | SULLINS ELECTRONICS CORP.        | PEC03DAAN          | CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT THROUGH; 6PINS; -65 DEGC TO +125 DEGC   |
| 14   | 1   | J6   | EH111000003862        | SJ-43516-SMT-TR-PI  | CUI INC                          | SJ-43516-SMT-TR-PI | CONNECTOR; FEMALE; SMT; 3.5 MM AUDIO JACKS; RIGHT ANGLE; 6PINS; PINK   |
| 15   | 1   | J7   | EH111000003861        | SJ-43516-SMT-TR-GR  | CUI INC                          | SJ-43516-SMT-TR-GR | CONNECTOR; FEMALE; SMT; 3.5 MM AUDIO JACKS; RIGHT ANGLE; 6PINS; GREEN  |
| 16   | 1   | J8   | EH111000003860        | SJ-43516-SMT-TR-BE  | CUI INC                          | SJ-43516-SMT-TR-BE | CONNECTOR; FEMALE; SMT; 3.5 MM AUDIO JACKS; RIGHT ANGLE; 6PINS; BLUE   |
| 17   | 1   | J9   | 01-SJ43514SMT6P-80    | SJ-43514-SMT  | CUI INC.                         | SJ-43514-SMT       | CONNECTOR; FEMALE; SMT; 3.5 MM AUDIO JACKS; RIGHT ANGLE; 6PINS   |
| 18   | 3   | J10-J12  | 01-TSW10423GS4P-17    | TSW-104-23-G-S  | SAMTEC                           | TSW-104-23-G-S     | CONNECTOR; THROUGH HOLE; SINGLE ROW; STRAIGHT; 4PINS   |

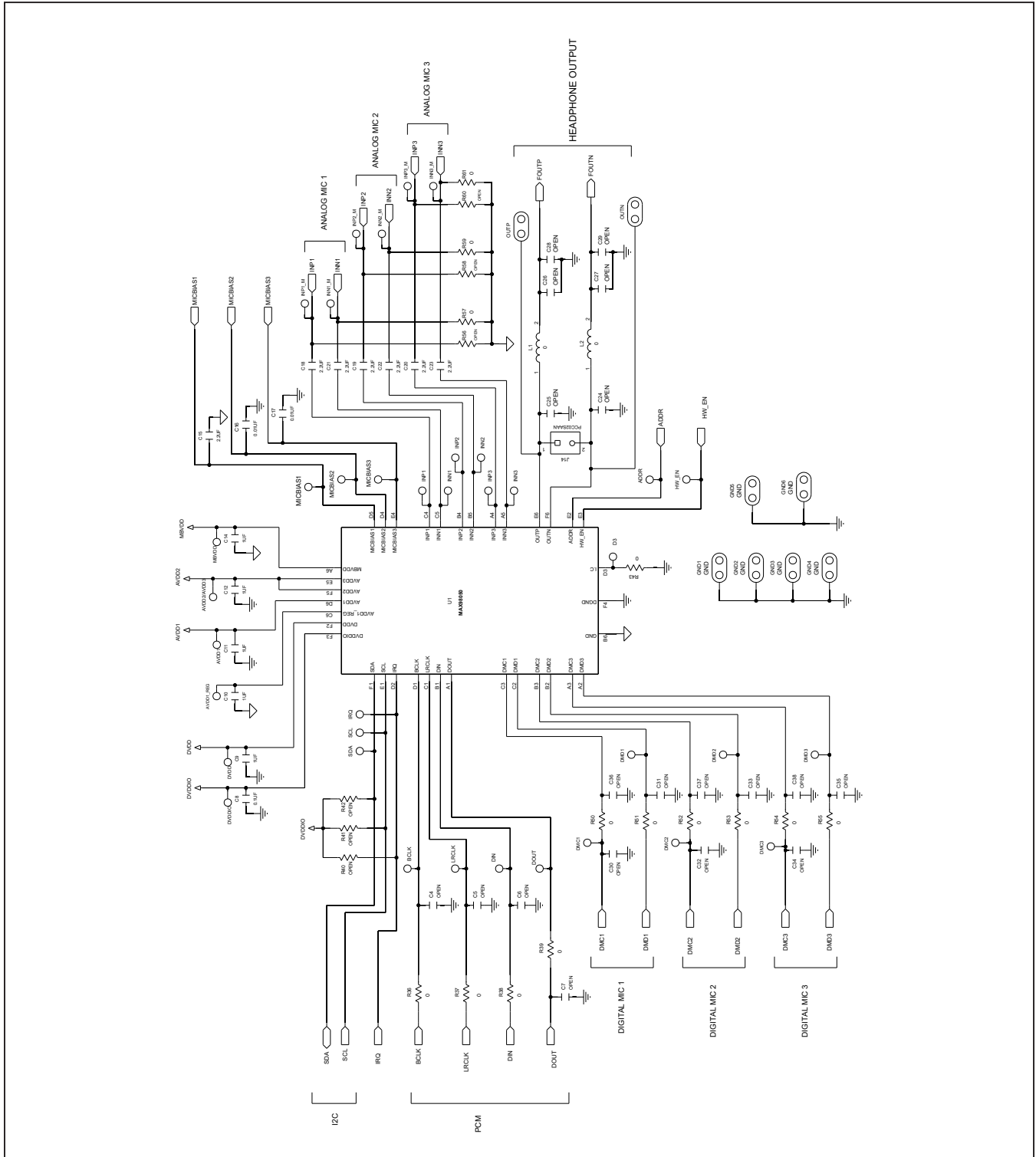


**MAX98050 EV Kit Bill of Materials (continued)**

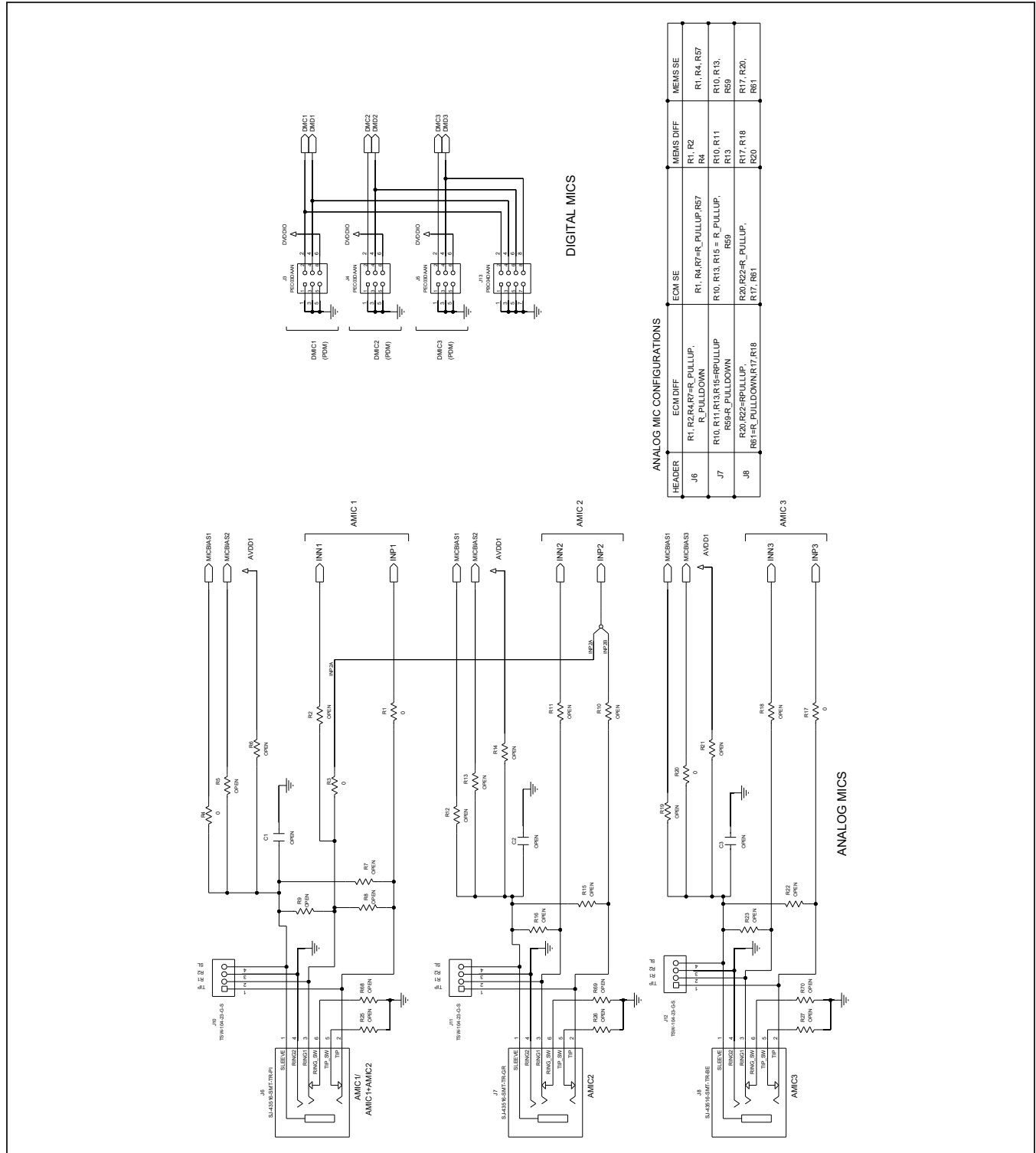
| ITEM         | QTY        | REF DES   | MAXINV            | MFG PART #   | MANUFACTURER                            | VALUE     | DESCRIPTION  |
|--------------|------------|---|-------------------|--|---|-----------|--|
| 19           | 1          | J13   | 01-PBC04DAAN8P-21 | PBC04DAAN  | SULLINS ELECTRONICS CORP.               | PBC04DAAN | CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 8PINS; -65 DEGC TO +125 DEGC   |
| 20           | 1          | J14   | 01-PCC02SAAN2P-21 | PCC02SAAN  | SULLINS                                 | PCC02SAAN | CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT THROUGH; 2PINS; -65 DEGC TO +125 DEGC   |
| 21           | 1          | JMP1  | 01-PBC05SAAN5P-21 | PBC05SAAN  | SULLINS ELECTRONICS CORP.               | PBC05SAAN | CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 5PINS; -65 DEGC TO +125 DEGC   |
| 22           | 2          | JU1, JU2  | 01-PBC03SAAN3P-21 | PBC03SAAN  | SULLINS                                 | PBC03SAAN | CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 3PINS; -65 DEGC TO +125 DEGC   |
| 23           | 2          | L1, L2  | ER111000005900    | CR1206-JI-000ELF   | BOURNS                                  | 0         | RES; SMT (1206); 0; 5%; JUMPER; 0.2500W; NOTE: THIS PART HAS AN SPECIAL INDUCTOR ALTERWATE SCHEMATIC SYMBOL  |
| 24           | 32         | R1, R3, R4, R17, R20, R29, R31-R34, R36-R39, R43, R44, R49-R55, R57, R59, R61-R67 | 80-0000R-26A      | ERJ-2GE0R00  | PANASONIC                               | 0         | RES; SMT (0402); 0; JUMPER; JUMPER; 0.1000W  |
| 25           | 1          | R28   | 80-004K7-18       | ERJ-2RKF4701   | PANASONIC                               | 4.7K      | RES; SMT (0402); 4.7K; 1%; +/-100PPM/DEGC; 0.1000W   |
| 26           | 1          | R30   | 80-016K9-18       | CRCW040216K9FK; ERJ-2RKF1692                             | VISHAY DALE; PANASONIC                  | 16.9K     | RES; SMT (0402); 16.9K; 1%; +/-100PPM/DEGC; 0.1000W  |
| 27           | 2          | SCL, SDA  | 02-TPMINI5004-00  | 5004   | KEYSTONE                                | N/A       | TEST POINT; PIN DIA=0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; YELLOW; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH; RECOMMENDED FOR BOARD THICKNESS=0.062IN; NOT FOR COLD TEST |
| 28           | 4          | SPACER1-SPACER4   | 02-MS440038P-02   | 91772A108; PHILLIPS-PAN 4-40X3/8IN; PMSSS4400038PH; 9901 | GENERIC PART                            | N/A       | MACHINE SCREW; PHILLIPS; PAN; 4-40; 3/8IN; 18-8 STAINLESS STEEL; NOTE: SET TO OBSOLETE FOR PART NUMBER CORRECTION. KINDLY REFER TO PART NUMBER 91772A108;9901                  |
| 29           | 4          | SPACER1-SPACER4   | 02-SO440012H-01   | MCH_SO_F_HEX 4-40X1/2                                    | GENERIC PART                            | N/A       | STANDOFF; FEMALE-THREADED; HEX; 4-40; 1/2IN; ALUMINUM  |
| 30           | 3          | SU1-SU3   | 02-JMPFS1100B-00  | S1100-B;SX1100-B; STC02SYAN                              | KYCON; KYCON; SULLINS ELECTRONICS CORP. | SX1100-B  | TEST POINT; JUMPER; STR; TOTAL LENGTH=0.24IN; BLACK; INSULATION=PBT;PHOSPHOR BRONZE CONTACT=GOLD PLATED  |
| 31           | 1          | U1  | 00-SAMPLE-01      | MAX98050   | MAXIM                                   | MAX98050  | EVKIT PART - IC; MAX98050; LOW POWER; HIGH PERFORMANCE ANC AUDIO CODEC; PACKAGE OUTLINE DRAWING: 21-100435; PACKAGE CODE: N362E2+1   |
| 32           | 1          | PCB   | N/A               | MAX98050_DEV_APPS_A                                      | MAXIM                                   | PCB       | PCB:MAX98050_DEV_APPS_A  |
| <b>TOTAL</b> | <b>126</b> |   |                   |  |   |           |  |

| DO NOT PURCHASE(DNP) |           |   |        |            |              |       |  |
|----------------------|-----------|---|--------|------------|--------------|-------|--|
| ITEM                 | QTY       | REF DES   | MAXINV | MFG PART # | MANUFACTURER | VALUE | DESCRIPTION                                      |
| 1                    | 2         | C26, C27  | N/A    | N/A        | N/A          | OPEN  | PACKAGE OUTLINE 0603 NON-POLAR CAPACITOR - EVKIT |
| 2                    | 3         | C36-C38   | N/A    | N/A        | N/A          | OPEN  | PACKAGE OUTLINE 0201 NON-POLAR CAPACITOR - EVKIT |
| 3                    | 30        | R2, R5-R16, R18, R19, R21-R23, R25-R27, R40-R42, R56, R58, R60, R68-R70 | N/A    | N/A        | N/A          | OPEN  | PACKAGE OUTLINE 0402 RESISTOR - EVKIT            |
| 4                    | 17        | C1-C7, C24, C25, C28-C35  | N/A    | N/A        | N/A          | OPEN  | PACKAGE OUTLINE 0402 NON-POLAR CAPACITOR - EVKIT |
| <b>TOTAL</b>         | <b>52</b> |   |        |            |              |       |  |

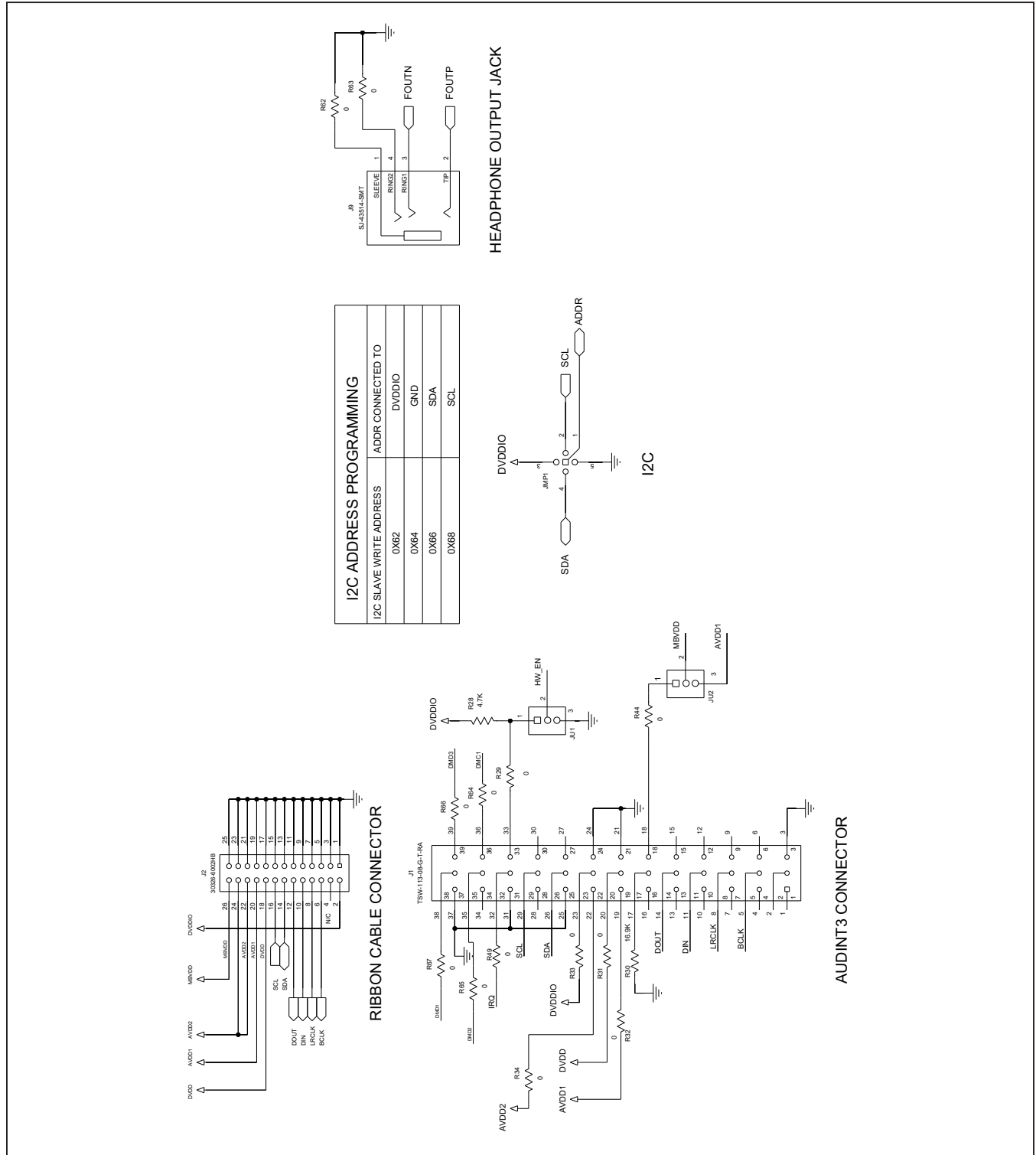
MAX98050 EV Kit Schematic Diagrams



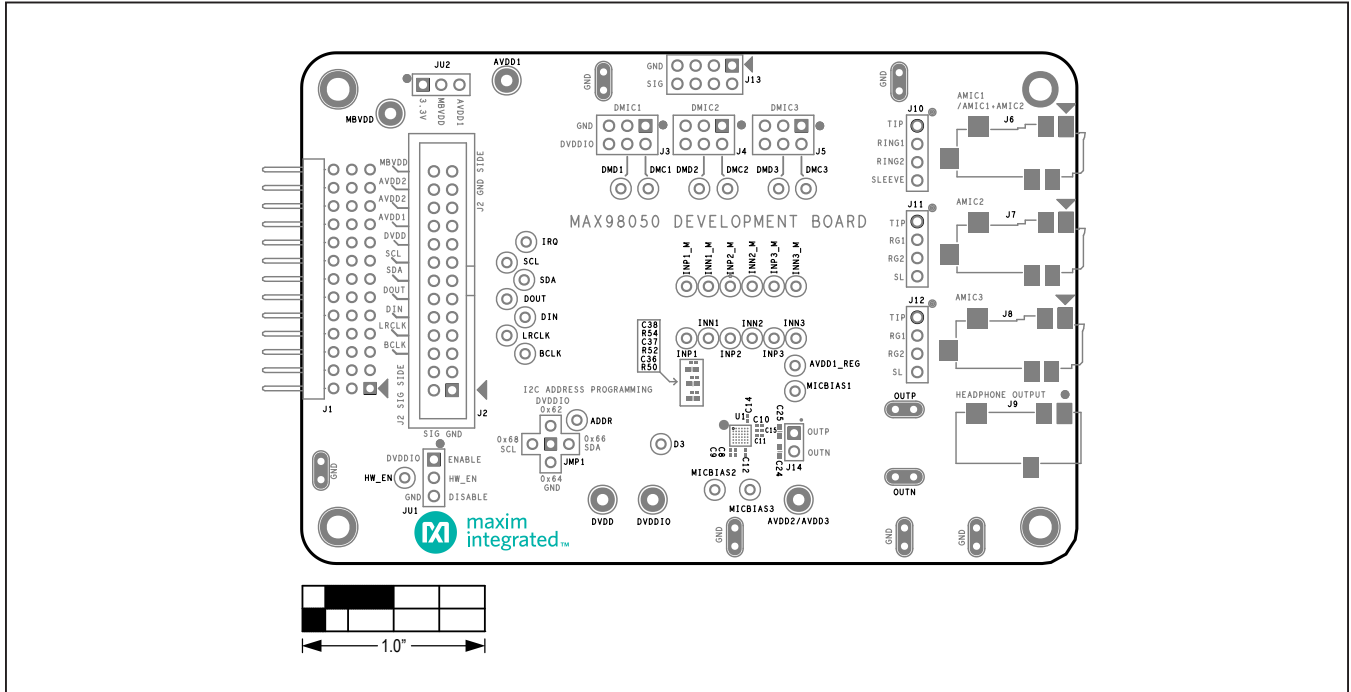
MAX98050 EV Kit Schematic Diagrams (continued)



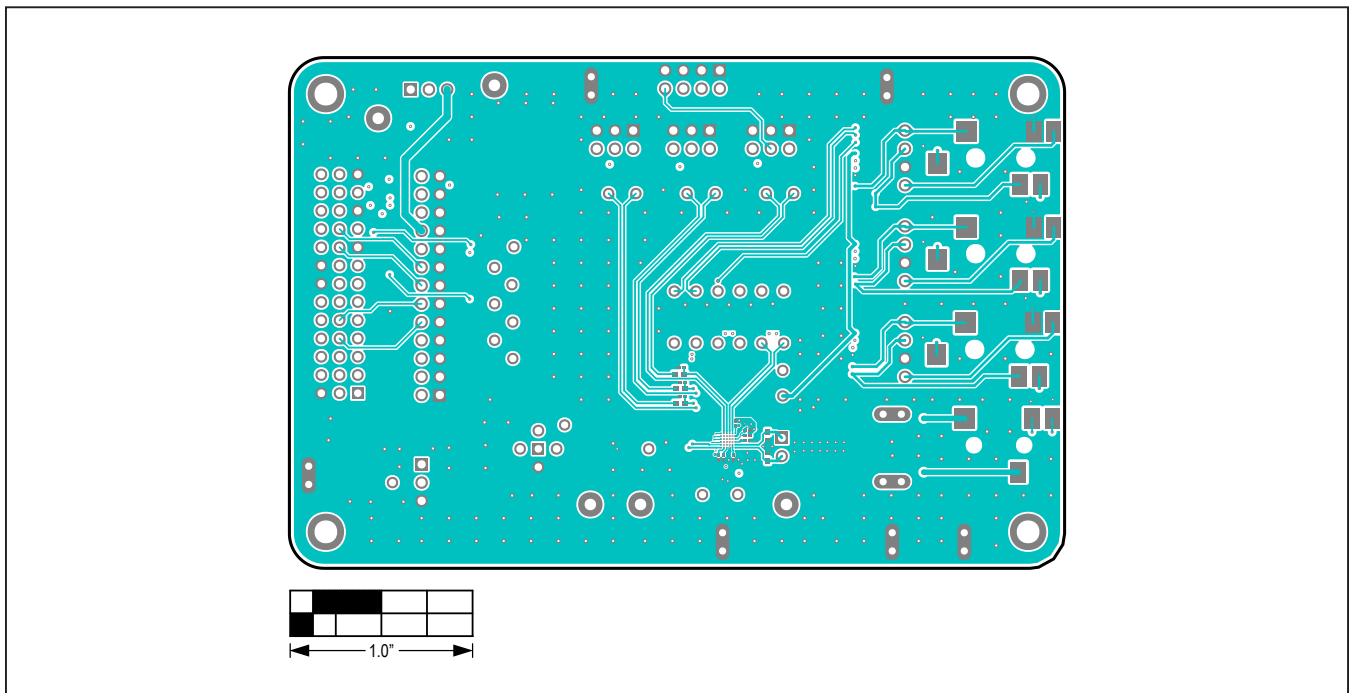
MAX98050 EV Kit Schematic Diagrams (continued)



MAX98050 EV Kit PCB Layout Diagrams

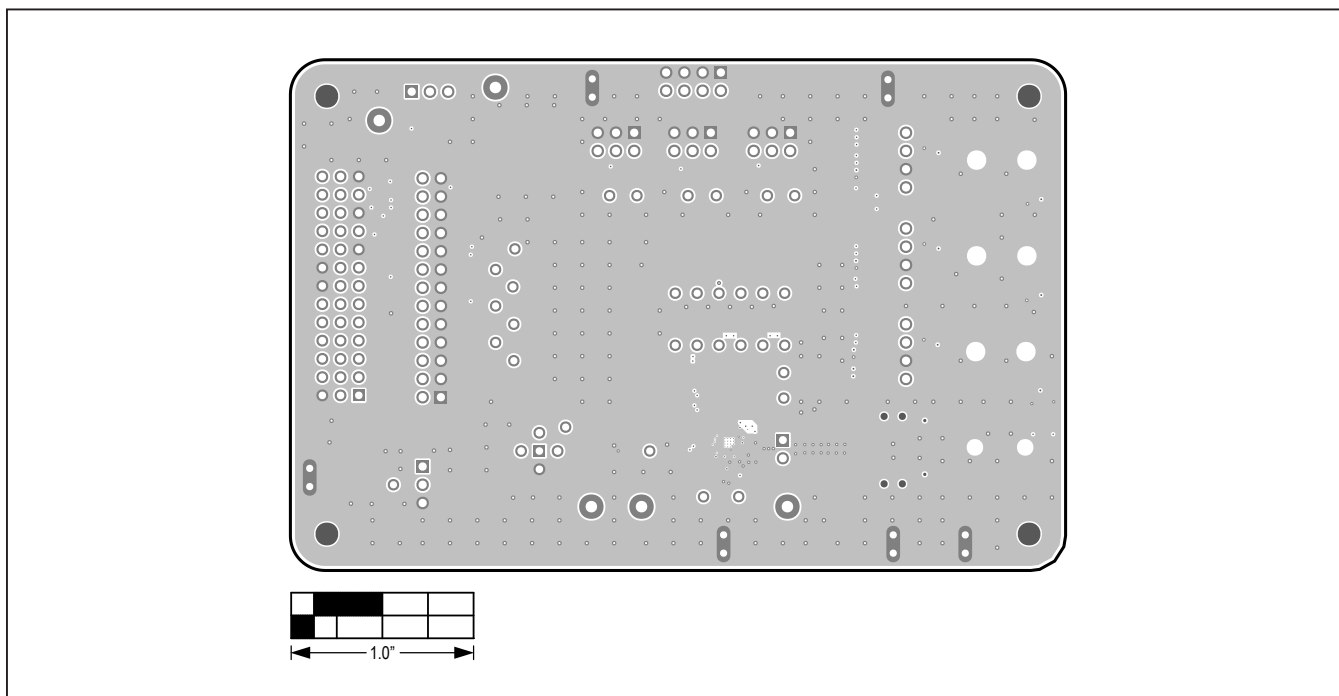


MAX98050 EV Kit PCB Layout Diagrams—Top Silkscreen

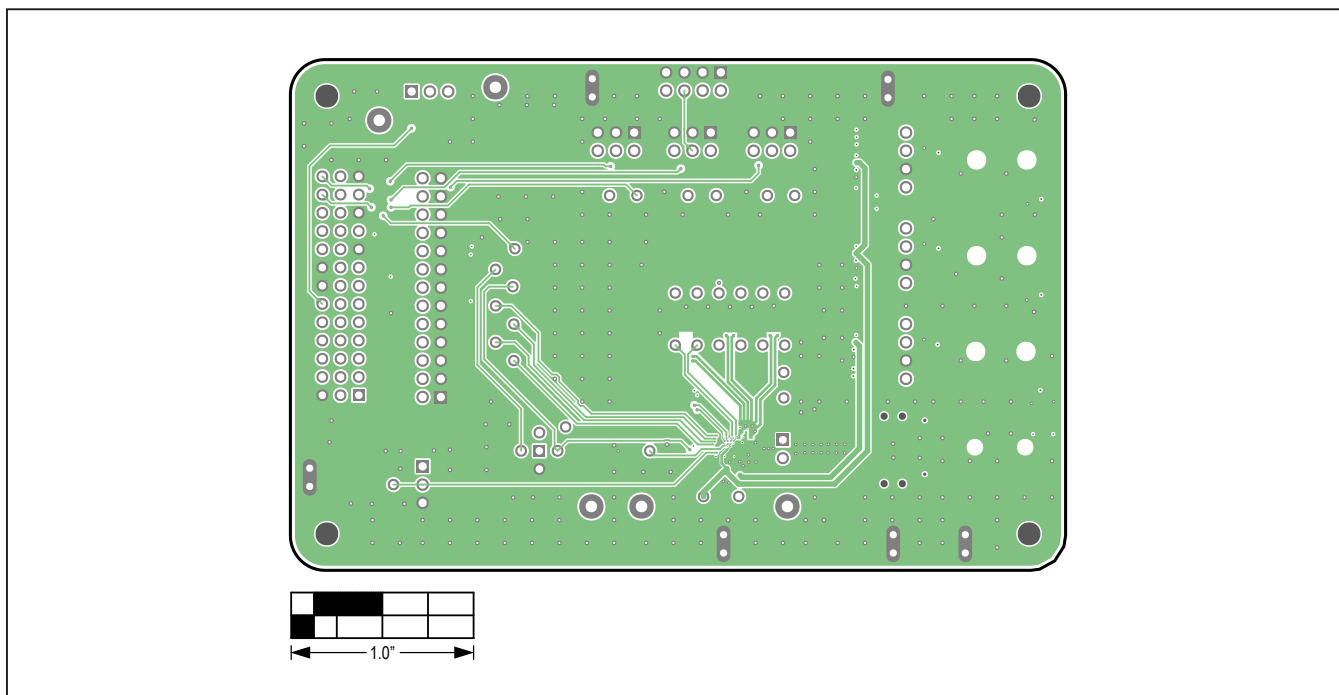


MAX98050 EV Kit PCB Layout Diagrams—Top View

**MAX98050 EV Kit PCB Layout Diagrams (continued)**

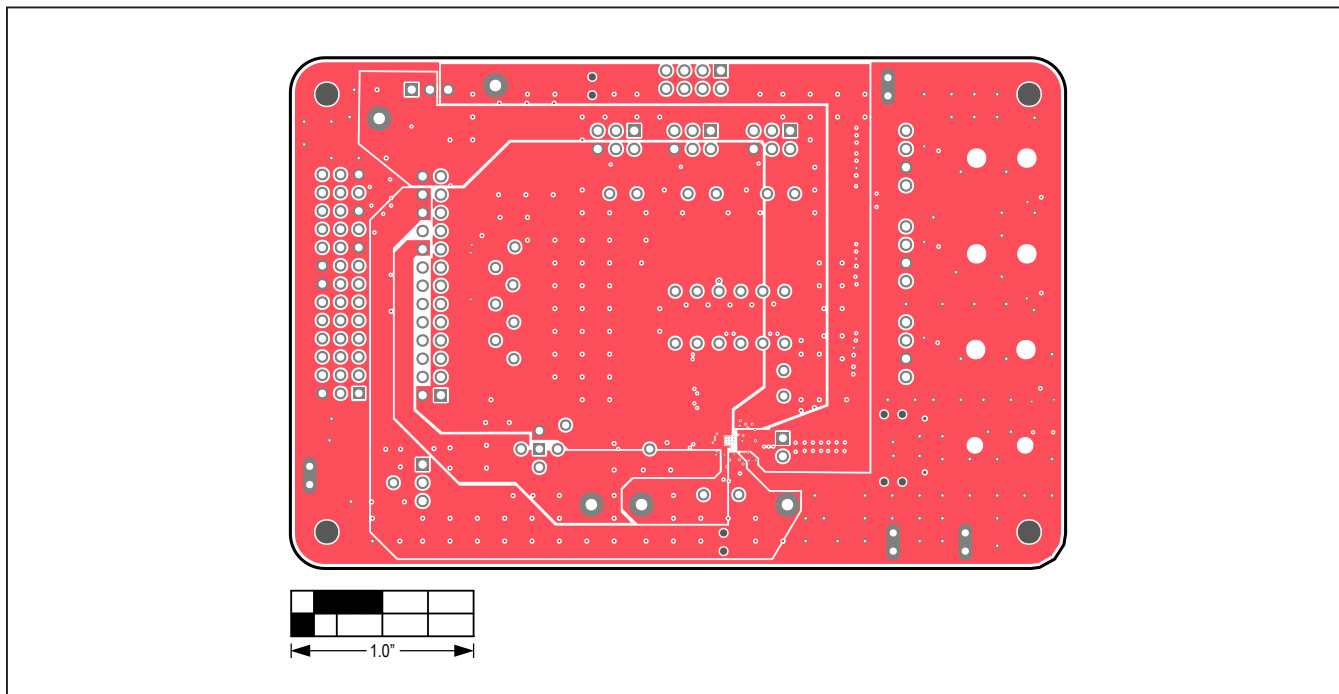


MAX98050 EV Kit PCB Layout Diagrams—Internal 2 (Ground)

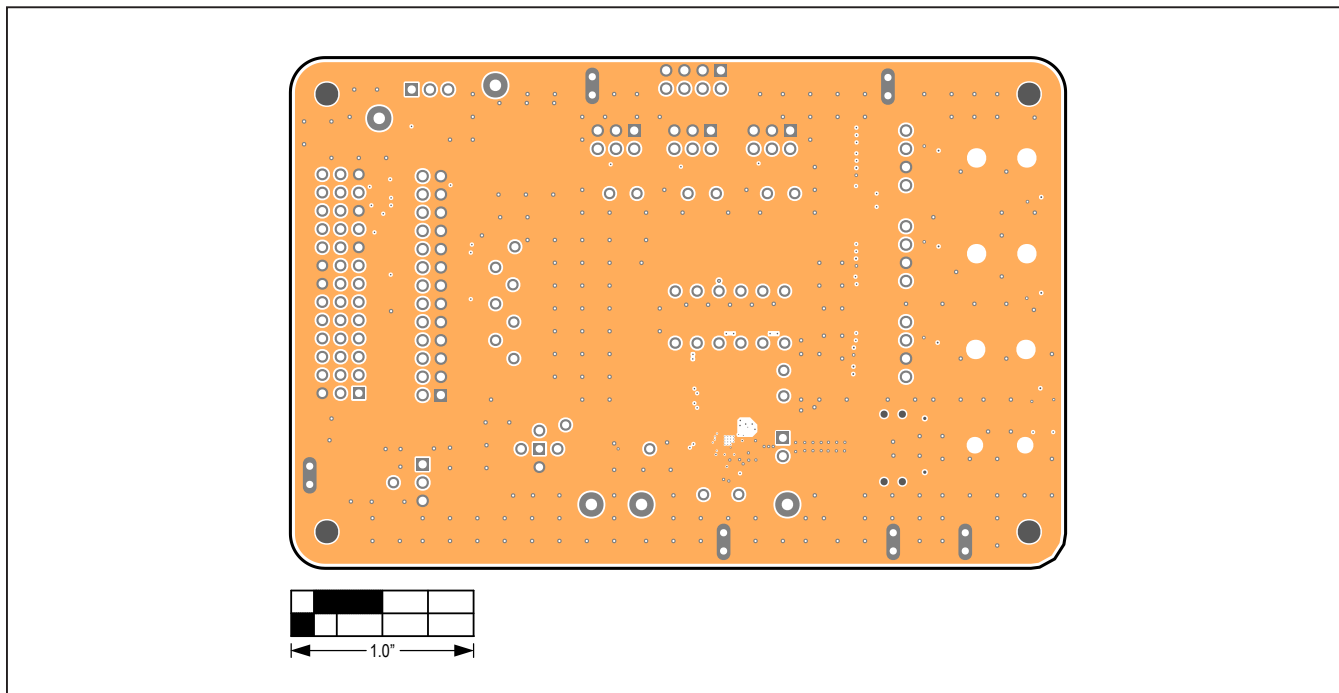


MAX98050 EV Kit PCB Layout Diagrams—Internal 3 (Signals)

MAX98050 EV Kit PCB Layout Diagrams (continued)

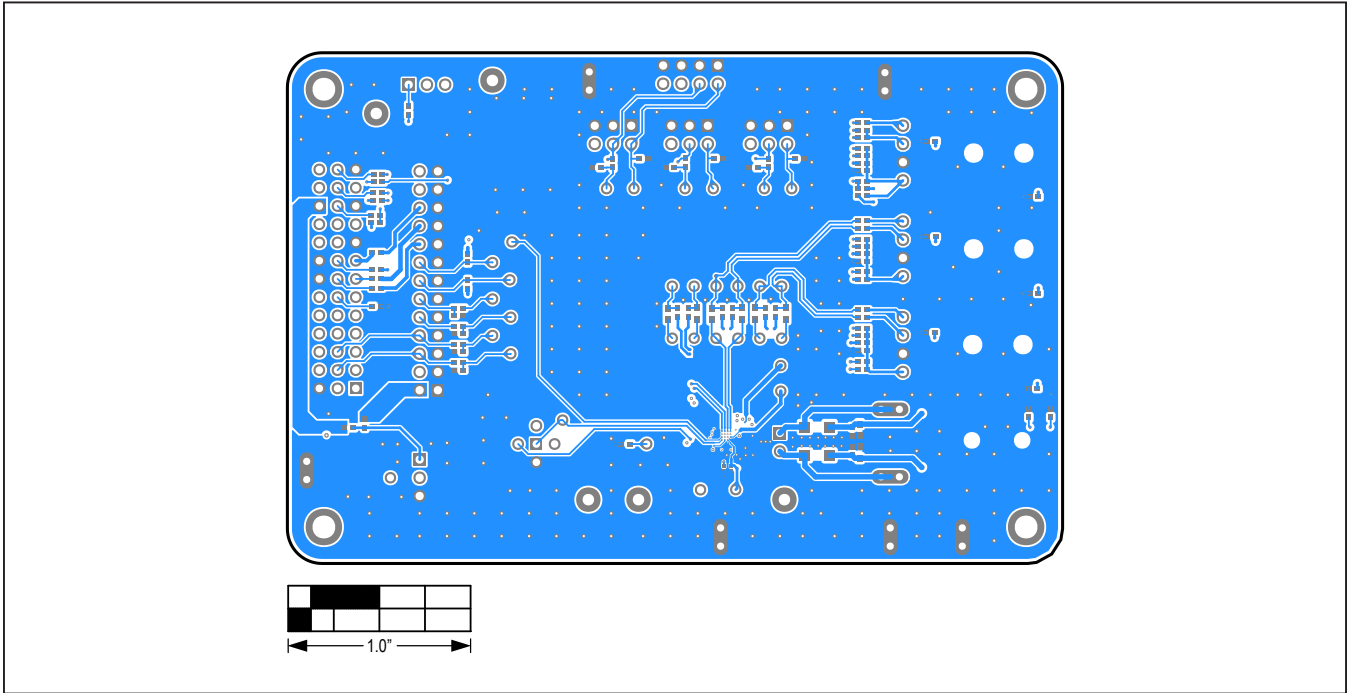


MAX98050 EV Kit PCB Layout Diagrams—Internal 4 (Power)

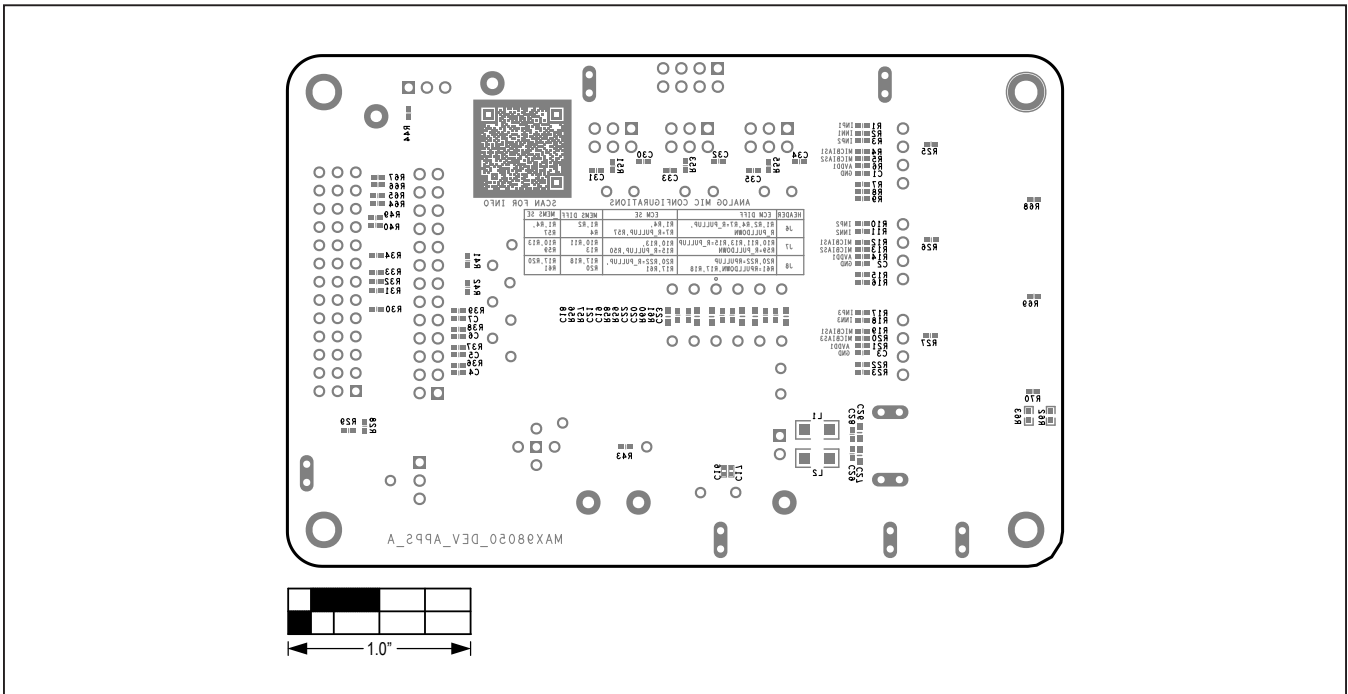


MAX98050 EV Kit PCB Layout Diagrams—Internal 5 (Ground)

MAX98050 EV Kit PCB Layout Diagrams (continued)



MAX98050 EV Kit PCB Layout Diagrams—Bottom View



MAX98050 EV Kit PCB Layout Diagrams—Bottom Silkscreen



## Revision History

| REVISION NUMBER | REVISION DATE | DESCRIPTION     | PAGES CHANGED |
|-----------------|---------------|-----------------|---------------|
| 0               | 11/20         | Initial release | —             |

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