

## MAX98374 Evaluation System

Evaluates: MAX98374

### General Description

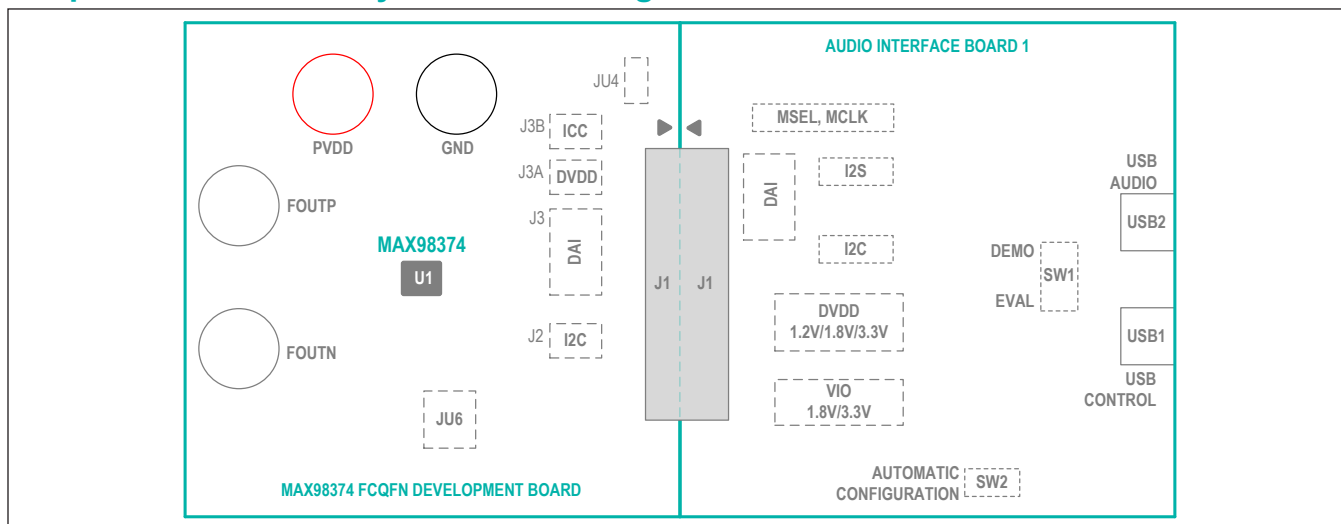
The MAX98374 evaluation system (EV system) evaluates the high-efficiency MAX98374 mono Class D audio amplifier featuring dynamic headroom tracking (DHT) and brownout protection. The EV system consists of the MAX98374 development board (DEV board), Maxim's Audio Interface 1 (AUDINT1) board, and the MAX98374 evaluation software.

The MAX98374 DEV board is fully assembled and tested and contains the necessary circuitry and connections to evaluate the MAX98374 device in the FCQFN or the WLP package. It is recommended that the DEV board be evaluated with the AUDINT1 board, as an EV system. The MAX98374 requires two supply inputs, 5.5V to 16V (PVDD) and 1.71V to 1.89V (DVDD). It is capable of delivering 16W into an 8Ω load. Additionally, the MAX98374 supports standard I<sup>2</sup>S, left-justified, TDM, and SoundWire® digital audio formats.

When evaluated as an EV system, the AUDINT1 board provides the necessary logic rails, USB-to-I<sup>2</sup>S and USB-to-I<sup>2</sup>C interfaces that are needed to evaluate the MAX98374 DEV board with only a single external power supply. The [Simplified FCQFN EV System Block Diagram](#) provides an image of the EV system, highlighting the key areas on each board.

Communication with the DEV board is facilitated by Windows® 7- and Windows 10-compatible software that provides a simple and intuitive graphical user interface (GUI). The MAX98374 evaluation software is only for use with the MAX98374 EV system.

### Simplified FCQFN EV System Block Diagram



### Features

- 5.5V to 16V Single-Supply Operation (EV System)
- USB Audio Streaming (EV System)
- Digital Audio Interface (DAI)
  - I<sup>2</sup>S, Left-Justified, Up to 16-Channel TDM
  - SoundWire Compliant
- Speaker Output (OUTP/OUTN)
- I<sup>2</sup>C-Compatible Device
- Windows 7- and Windows 10-Compatible Software
- Fully Assembled and Tested

### EV System Contents

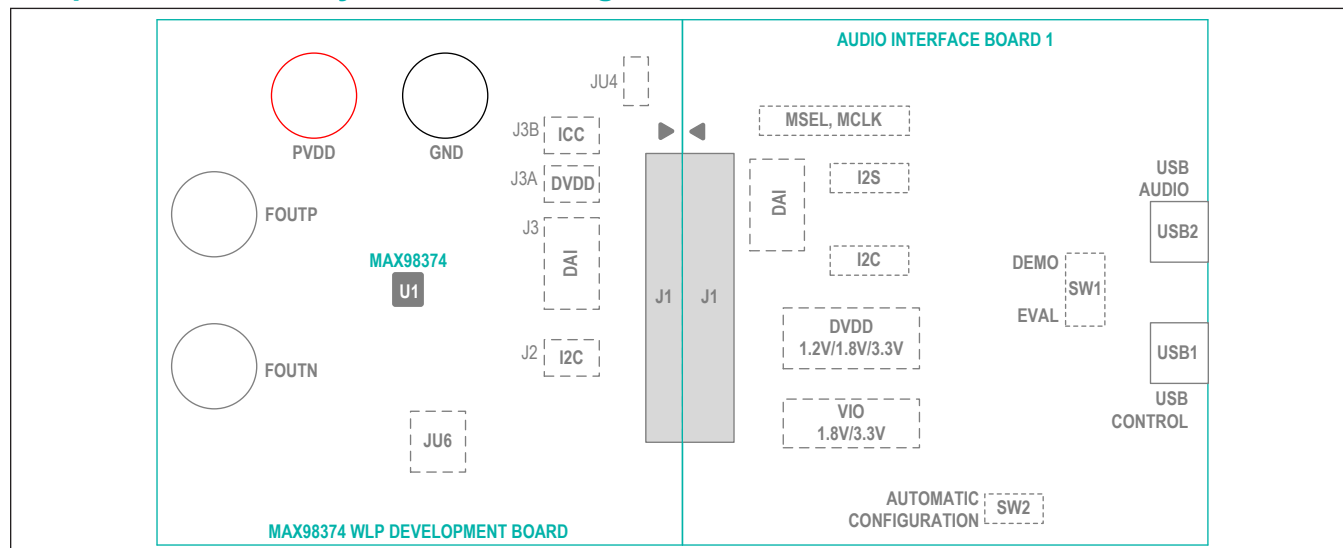
- MAX98374 Development Board
- Audio Interface 1 Board
- Two A to B Mini-USB Cables

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

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Windows is a registered trademark and registered service mark of Microsoft Corp.

## Simplified WLP EV System Block Diagram



## Quick Start

### Required Equipment

- MAX98374EVSYS#
  - MAX98374DEV#
  - MAXAUDINT001#
  - Two A to B Mini-USB cables
- 4Ω to 8Ω speaker
- 5.5V to 16V DC power supply
- USB audio source (e.g., Windows Media® Player or iTunes®)
- User-supplied Windows 7 or Windows 10 PC with two available USB ports

### Required Software

- MAX98374 evaluation software (installer: MAX98374EVSwtSetupVxx.exe)

**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.

### Reference Material

- Audio Interface 1 data sheet
- MAX98374 IC data sheet

## Procedure

The MAX98374 and AUDINT1 boards are fully assembled and tested. Follow the steps below to setup the EV System for device evaluation.

### Software Install

- 1) For the latest software, login to your MyMaxim account at [Maximintegrated.com](http://Maximintegrated.com), navigate to MAX98374 > Design Resources > MAX98374 Evaluation Software > MAX98374EVSwt-SetupVxx.zip, select to start the download. Extract the downloaded folder to a temporary location.
- 2) Install the software and USB driver on your computer by running the program installer MAX98374EVSwtSetup.exe. Program files are copied, and icons are created in the Windows Start | Programs | Maxim Integrated | MAX98374 Evaluation Software folder. Follow the installer prompts to completion. For first time installations, at the **Select Additional Tasks** page, be sure the **Install FTDI USB Driver (Audio Interface 1)** check box is selected as shown in Figure 1. The FTDI drivers are needed for I2C communication with the device through the Audio Interface 1 application board. 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.

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iTunes is a registered trademark of Apple, Inc.

**DEV Board Setup**

- 1) Set the power supply to between 5.5 and 16V and disable the power supply output.
- 2) Connect the power supply between the PVDD and GND binding posts.
- 3) Connect the 4Ω to 8Ω speaker across the OUTP and OUTN binding posts.
- 4) Adjust jumpers JU4 and JU6 as needed. See the [Jumper Selection](#) section.

**AUDINT1 Board Setup**

- 1) Connect the USB cables from your computer to the USB1 and USB2 ports on the AUDINT1 board.
- 2) Set the DVDD jumper on the AUDINT1 board to the 1.8V position.
- 3) Set the VIO jumper on the AUDINT1 board to the 1.8V position.
- 4) Configure switches I2S and I2C to the CONNECT position.
- 5) Configure the SW1 switch with its actuator in the EVAL position.

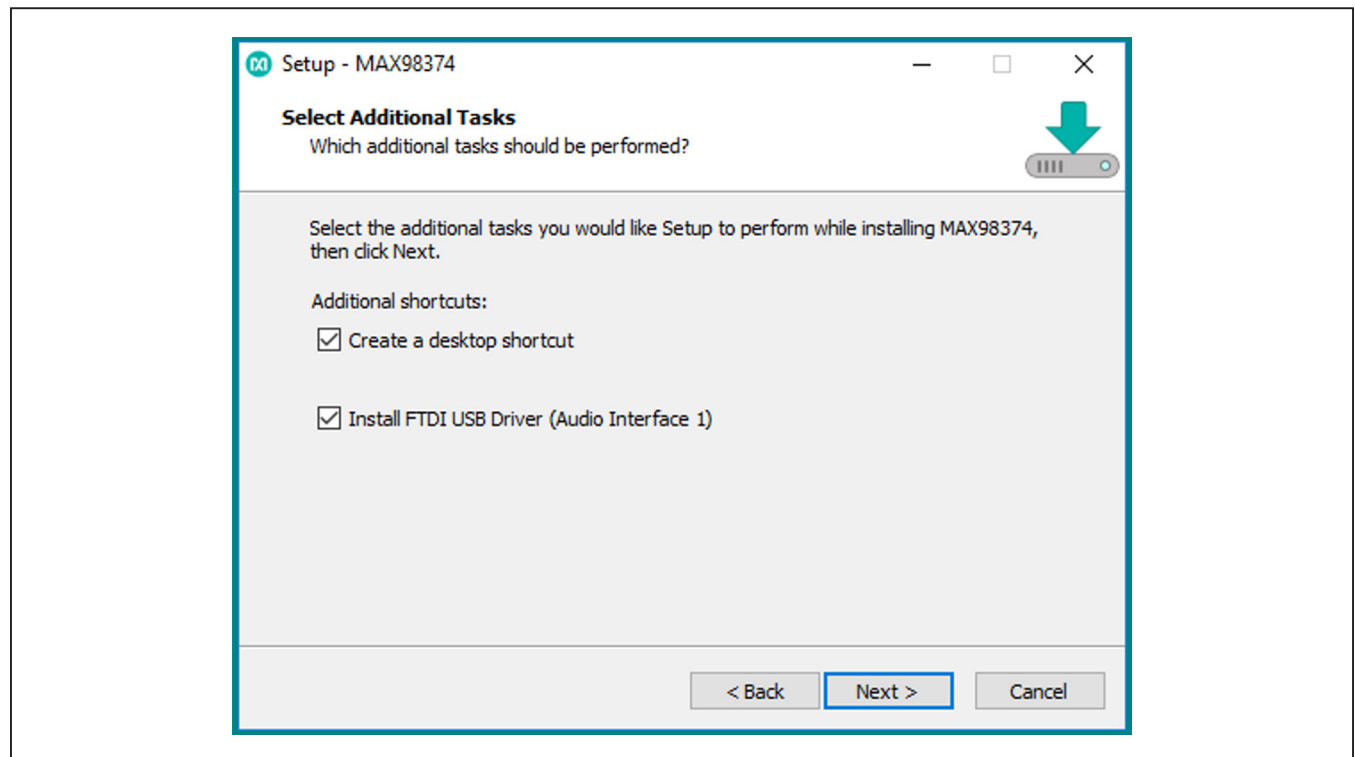


Figure 1. Software Installer, FTDI USB Driver Selection

Test

- 1) With the audio source disabled, connect the DEV board (J1 connector) to the AUDINT1 board (J1 connector). Only the bottom two rows of pins on the DEV board J1 connector need to connect with the AUDINT1 board J1 connector.

2) Enable the power supply output (PVDD).

3) Start the MAX98374 evaluation software and wait while the software connects to the EV system.

4) Once the connection is established, the **status bar** at the bottom of the GUI window reports **USB Connected** and displays the MAX98374 part number and revision ID.
- 5) After the EV system is fully connected, configure the device by loading the “usb\_audio.98374” configuration file. This file is located in the “config\_files” folder that was created in the installation directory.

6) Open the Windows’ **Sound** dialog and select the **Playback** tab. A **USB Audio DAC** item, similar to [Figure 3](#), should be listed as an available playback device.

7) Verify that the **USB Audio DAC** item is set as the default device.

8) Adjust the audio source volume to a low level.

9) Enable the audio source and verify that audio is heard through the connected speaker. Adjust the audio source volume as needed. Quick Start is complete.

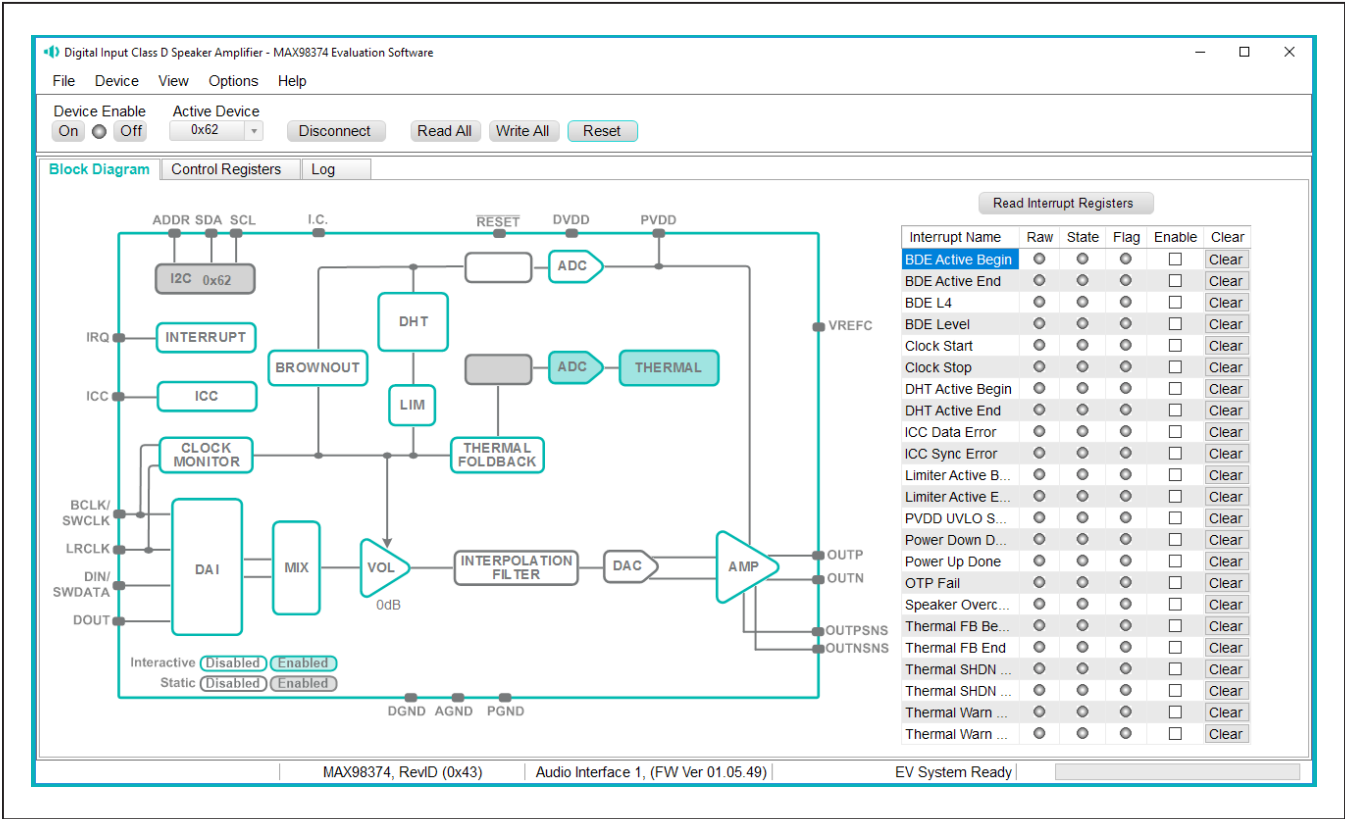


Figure 2. MAX98374 Evaluation Software—Main Window

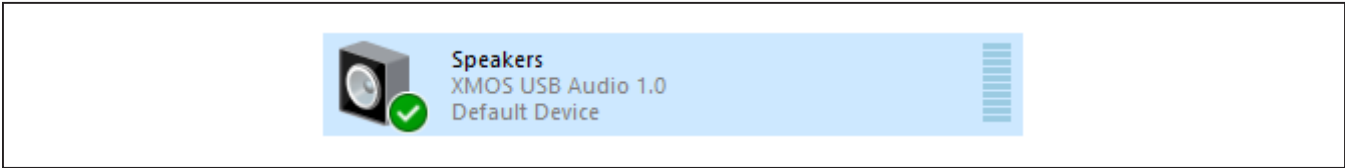


Figure 3. Playback Device

Detailed Description of Software

The MAX98374 evaluation software is designed to be used only with the MAX98374 EV system. The software provides an intuitive graphical user interface (GUI) for programming the MAX98374 device and also includes a handful of features to aid evaluation.

The MAX98374 evaluation software main window (Figure 2) is composed of four main sections: menu bar, communication tool bar, 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 MAX98374 device registers.

The **Block Diagram** tab provides access to all device registers through the use of 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 access to the valid registers in the range from 0x2000–0x20FF as well as to the revision ID register, 0x21FF.

The MAX98374 evaluation software is compatible with Windows 7 and Windows 10 and can be obtained by

contacting Maxim Integrated for the latest installation file. Refer to the MAX98374 IC data sheet for device register information.

Communication Toolbar

The toolbar consists of six buttons and a drop-down combo box. These controls are always accessible, regardless of the active tabbed page. The tool bar is shown in Figure 4 and Table 1 provides details about each control.

Connect Sequence

When the evaluation software starts for the first time the program attempts to automatically connect to the EV system. It first attempts to connect to the USB control (USB1) interface on the AUDINT1 board. Once that connection is established, it searches for all the I<sup>2</sup>C addresses associated with the MAX98374 device and populate 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 pushed, it disconnects the software from the hardware. The software can also be disconnected from the hardware by selecting **Device | Disconnect** from the menu bar.

Table 1. Tool Bar Controls

CONTROL	FUNCTION
On	Press to set the Global Enable bit (EN). This enables the device.
Off	Press to clear the Global Enable bit (EN). This disables the device. <i>Note:</i> The software can communicate with a disabled device, being that its I <sup>2</sup> C interface remains active.
Active Device	Provides a list of detected I <sup>2</sup> C addresses. The displayed address is the active device.
Connect/Disconnect	
Connect	Press to connect to the USB Control (USB1) interface on the AUDINT1 board and to search for I <sup>2</sup> C devices. Detected addresses are shown in the <b>Active Device</b> drop-down list.
Disconnect	Press to disconnect from the USB Control (USB1) interface.
Read All	Press to initiate a read of all device registers of active device. The <b>Control Registers</b> and <b>Block Diagram</b> tabs are updated to reflect the read data.
Write All	Press to initiate a write to all device registers of active device, using the settings shown on the <b>Control Registers</b> tab.
Reset	Press to reset active device registers to their power-on-reset (POR) state.

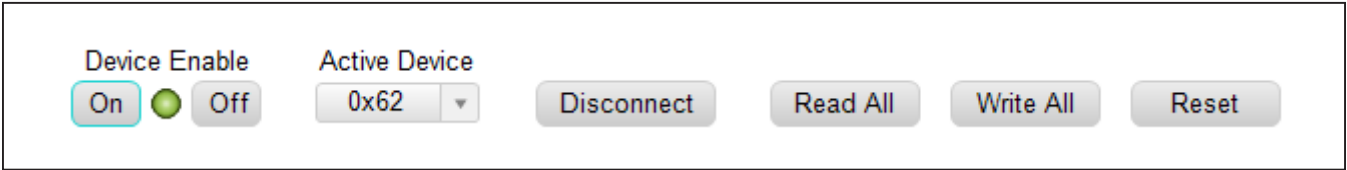


Figure 4. Communication Tool Bar

There are two methods to reestablish 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 manually push the **Connect** button until it displays **Disconnect**, which signifies that the EV system is fully connected.

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.

Status Panel

The 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 (0x2001–0x2009). When the image is red, it indicates that the associated interrupt bit has been set.

The panel also includes checkboxes for each interrupt that are 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.

- Note:** 1) Each interrupt source must be enabled for the **FLAG** column (i.e., Flag bits) to be set.
- 2) The IRQ\_EN bit needs to be set for the interrupt to be output on the IRQ pin.

Block Diagram Tab

The evaluation software uses an interactive block diagram to facilitate the programming of the MAX98374 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 hand when over a block that opens a dialog window and changes to a solid arrow when over a block that toggles a specific device setting. If the cursor does not change when over a block, then it is not an active 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 MAX98374 configured for DAI (USB audio) input and speaker output.

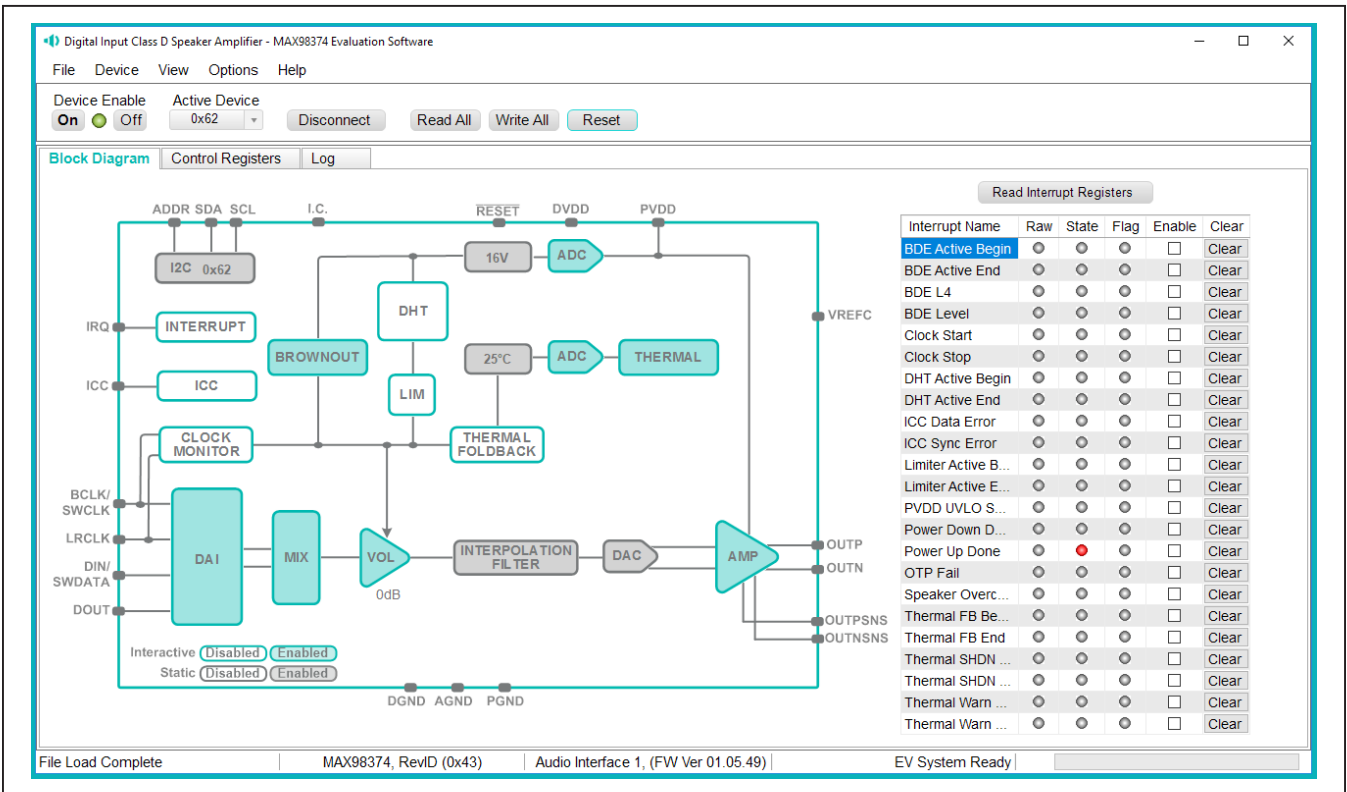


Figure 5. MAX98374 Block Diagram—USB Audio Input to Speaker Output



Dialog Windows

Dialog windows are associated with specific blocks in the block diagram and they contain the controls for configuring the registers associated with that functional block. A dialog window is opened by clicking on a dialog block. Figure 6 shows the typical GUI controls that are found on a dialog window.

Control Registers Tab

The **Control Registers** tab provides two methods for configuring the device. As an example, Figure 7 shows the elements of the Interrupt registers.

The first configuration method involves clicking on the register's bit labels. A greyed-out 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 hexadecimal 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.

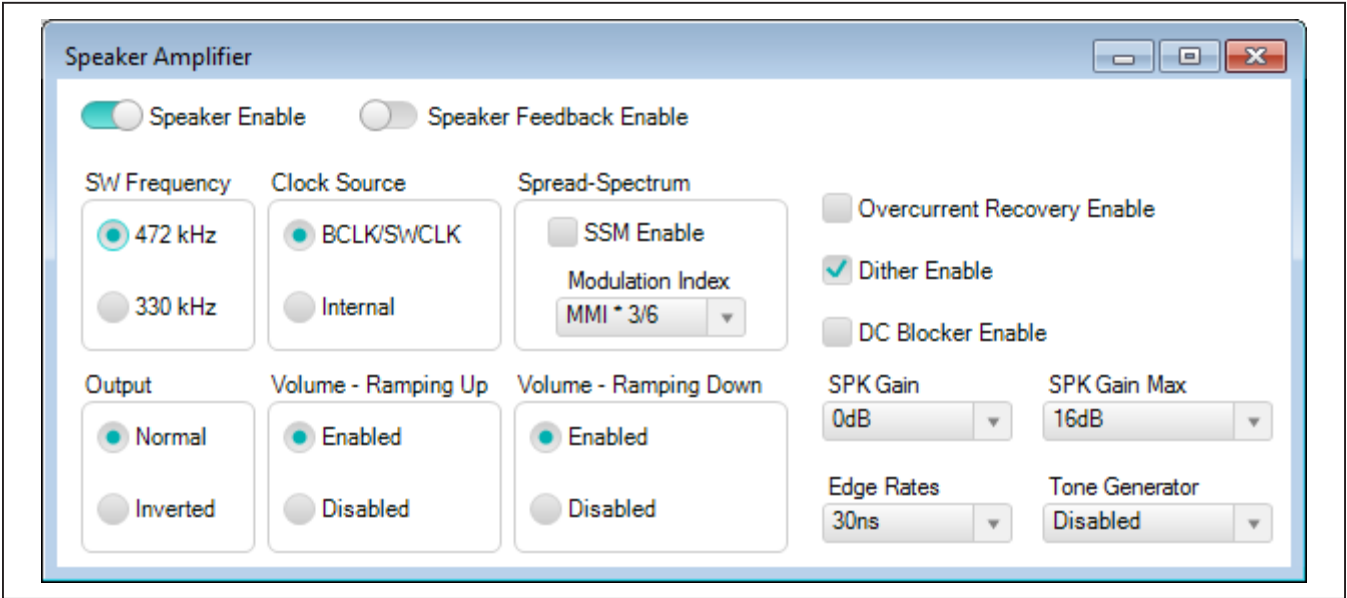


Figure 6. Typical GUI Controls

Block Diagram Control Registers Log										
Register Address	Register Name	[7]	[6]	[5]	[4]	[3]	[2]	[1]	[0]	Hex
0x2000	Software Reset								RST	0x00
0x2001	Interrupt Raw 1	THERMSHDN...	THERMSHDN...	THERMWAR...	THERMWAR...	BDE_L4_RAW	BDE_LEVEL...	BDE_ACTIVE...	BDE_ACTIVE...	0x00
0x2002	Interrupt Raw 2	PWRUP_DO...	PWRDN_DO...	OTP_FAIL_R...	SPK_OVC_R...	CLKSTART...	CLKSTOP_R...	ICC_SYNC_E...	ICC_DATA_E...	0x00
0x2003	Interrupt Raw 3	PVDD_UVLO...		THERMFB_B...	THERMFB_E...	DHT_ACTIVE...	DHT_ACTIVE...	LMTR_ACTIV...	LMTR_ACTIV...	0x00
0x2004	Interrupt State 1	THERMSHDN...	THERMSHDN...	THERMWAR...	THERMWAR...	BDE_L4_STA...	BDE_LEVEL...	BDE_ACTIVE...	BDE_ACTIVE...	0x00
0x2005	Interrupt State 2	PWRUP_DO...	PWRDN_DO...	OTP_FAIL_S...	SPK_OVC_S...	CLKSTART...	CLKSTOP_S...	ICC_SYNC_E...	ICC_DATA_E...	0x00
0x2006	Interrupt State 3	PVDD_UVLO...		THERMFB_B...	THERMFB_E...	DHT_ACTIVE...	DHT_ACTIVE...	LMTR_ACTIV...	LMTR_ACTIV...	0x00

Figure 7. Control Registers Tab

## Menu Bar

All the menu bar items are described in [Table 2](#). Additional information for some menu items is 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 MAX98374'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 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, 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 .98374 extension.

The software has many standard sample rate configuration files pre-installed. A file can be loaded by selecting **File | Load Register Settings | Pre-Installed Configuration Files**, use the drop-down menu to select file, then click load.

**Table 2. Menu Bar Items**

MENU ITEM	DESCRIPTION
<b>File</b>	
<b>Load Register Settings</b>	Loads a configuration file (as saved by the <b>Save Control Register Settings</b> option or a factory pre-installed file).
<b>Save Control Register Settings</b>	Saves a configuration file containing the current device settings.
<b>Exit</b>	Closes the MAX98374 software.
<b>Device</b>	
<b>Connect</b>	Runs a connection routine to connect to the Evaluation System. First establishing a connection to the AUDINT board and then to the MAX98374 device.
<b>Disconnect</b>	Disconnects the PC from the EV System.
<b>Reset</b>	Resets all control registers to their power-on-reset states.
<b>Read All</b>	Performs a read from all registers and updates the GUI.
<b>Write All</b>	Performs a write to all writeable registers, using the values show on the <b>Control Registers</b> tab and then updates the GUI.
<b>Read Rev ID</b>	Reads the device's revision ID register and updates the status bar.
<b>View</b>	
<b>Communication Log</b>	Toggles the display of the <b>Log</b> tab in the tabbed pages. The <b>Log</b> tab shows the log of communications with the MAX98374 and allows for a specific register to be read back.
<b>Options</b>	
<b>Interface Selection</b>	Selects the I <sup>2</sup> C hardware interface to either the Audio Interface or a I <sup>2</sup> C Bridge (not supported).
<b>Configuration Mode F4</b>	Opens a dialog that allows multiple MAX98374 devices to be selected for configuration through the software.
<b>Demo Mode</b>	Puts the software in demo mode.
<b>Help</b>	
<b>View Help</b>	Links to technical documentation
<b>About</b>	Provides information about the MAX98374 evaluation software.



Detailed Description of Hardware

The MAX98374 EV system is designed to allow for a thorough evaluation of the MAX98374 mono Class D audio amplifier. The EV system includes the MAX98374 development board (DEV board) and Maxim’s Audio Interface 1 (AUDINT1) board.

The MAX98374 DEV board can be evaluated as a stand-alone 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 facilitate evaluation, it is recommended that the DEV board be evaluated with the AUDINT1 board. This hardware combination provides an easy-to-use method for exercising the capabilities of the device, with the need for only one external supply and no additional audio equipment.

The AUDINT1 board provides on-board LDO regulators, USB-to-I<sup>2</sup>S and USB-to-I<sup>2</sup>C interfaces. The AUDINT1 LDO regulator can be used to power the MAX98374’s DVDD supply rail. The USB-to-I<sup>2</sup>S 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 MAX98374 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 MAX98374 DEV and AUDINT1 boards.

Power Supplies

The MAX98374 DEV board requires at least two external power supplies when evaluated as a standalone 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 and/or binding posts. Note that header J3A provides both a ground and DVDD connection. Care should be taken when powering DVDD through this J3A header.

When used with the AUDINT1 board only one external power supply is needed. The external power supply provides the PVDD input voltage and the DVDD input is powered by the LDO regulators on the AUDINT1 board.

Jumper Selection

The DEV board includes 2 jumpers to adjust various hardware configuration options. [Table 4](#) describes all the jumpers available on the EV kit. **Note:** Before starting evaluation, ensure that all jumpers are configured as needed.

Digital Audio Interface

The MAX98374 digital audio interface (DAI) is routed to interface header J3 as well as the AUDINT1 connector, J1. The interface header (J3) provides easy access to the device’s I<sup>2</sup>S bus and the AUDINT1 connector allows for USB audio to be streamed onto the DEV board. See the [USB Audio Input](#) section for details on USB audio streaming.

DAI Headers

The DAI headers provide access to the MAX98374’s clock inputs as well as its PCM interface: BCLK, LRCLK, DIN, and DOUT. These two DAI headers facilitate evaluation with audio equipment I/O. See [Table 5](#) for the pinout of the DAI headers and [Figure 8](#) for an illustration of how the MAX98374 DAI interface is routed through the DAI headers to the AUDINT1 connector.

Table 3. Power Supplies

POWER SUPPLY	RANGE (V)
PVDD	5.5 to 16
DVDD	1.71 to 1.89

Table 4. Jumper Configuration

HEADER	SHUNT POSITION	DESCRIPTION
JU4 (RESET)	1-2* (DVDD)	Normal device operation
	2-3 (GND)	Hardware reset (digital blocks and registers)
JU6 (ADDR)	1-2	Connected to SDA
	1-3*	Connected to DVDD
	1-4	Connected to SCL
	1-5	Connected to GND

\*Default position.

Interchip Communication (ICC) Bus

The MAX98374 features an interchip communication (ICC) bus that facilitates synchronized gain adjustments between groups of MAX98374 devices when using the device’s brownout detection engine (BDE). The ICC feature is only supported when using the PCM interface and connections to the ICC interface are made through the J3B header. See [Table 6](#) for pinout.

USB Audio Input

The AUDINT1 board’s USB-to-I<sup>2</sup>S interface allows USB audio to be streamed onto the MAX98374 DEV board. This facilitates evaluation by providing a quick method for playing audio through the device. To utilize the USB streaming feature of the AUDINT1 board make the following hardware configurations:

- Connect the USB cables from your computer to the USB1 (USB CONTROL) and USB2 (USB AUDIO) ports on the AUDINT1 board.
- Configure the I<sup>2</sup>S and I<sup>2</sup>C switches on the AUDINT board to the CONNECT position.
- Set the VIO and DVDD headers on the AUDINT1 board to the 1.8V position and set SW1 to DEMO.
- Ensure the AUDINT1 board is connected to the DEV board.

Once the hardware is ready use the MAX98374 evaluation software to configure and enable the device for DAI audio playback. Refer to the *Audio Interface 1* data sheet for more information.

Speaker Output

The MAX98374 audio output is routed to the FOUTP and FOUTN connections on the DEV board. The DEV board is, by default, assembled to allow the MAX98374 output to connect directly to a speaker load without the need for filtering.

Table 5. DAI Header (J3)

SIGNAL	PIN	PIN	SIGNAL
GND	1	2	BCLK/SWCLK
GND	3	4	LRCLK
GND	5	6	DIN/SWDATA
GND	7	8	DOUT

Table 6. ICC Header (J3B)

SIGNAL	PIN
ICC	2
GND	1

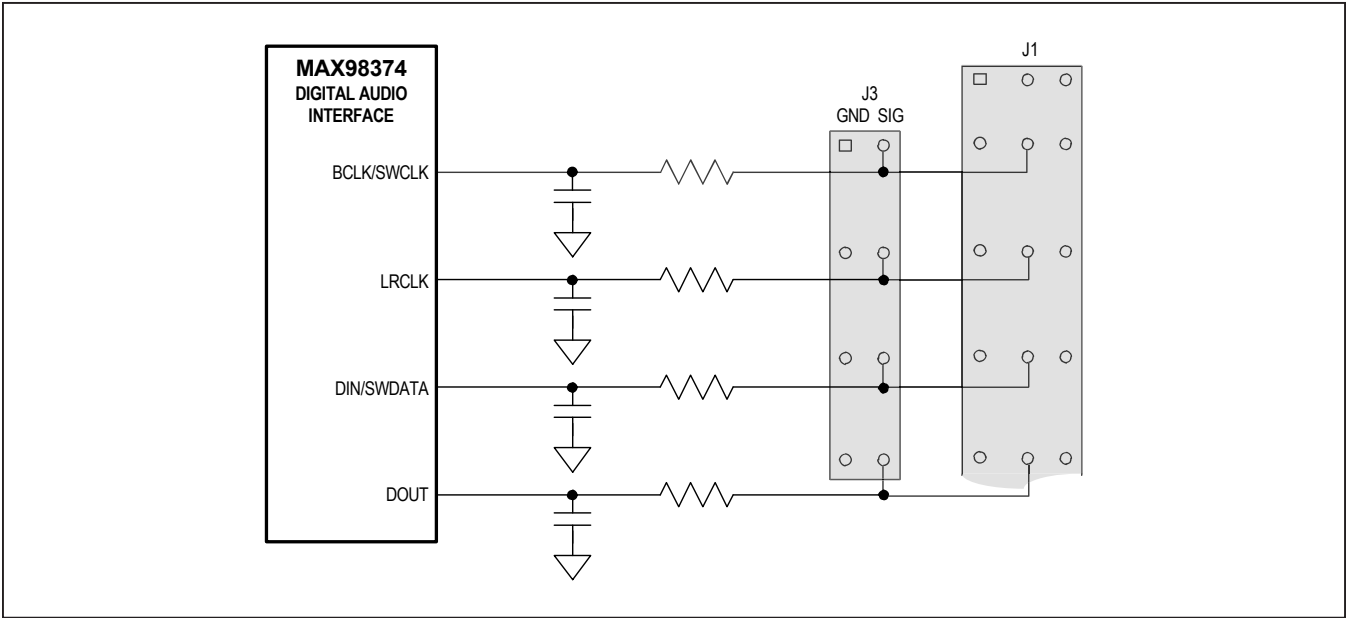


Figure 8. DAI Interface Headers—I<sup>2</sup>S

### EMI Filter

When long speaker cables are used with the MAX98374 output, a ferrite bead plus capacitor filter can be installed to prevent excessive EMI radiation. Although it is best to choose filter components based on EMI test results, the combination of 680pF capacitors (C9, C10) and Murata BLM18SG331TN1 ferrite beads (FB1, FB2) generally work well. Before adding the filters to the design, first remove the short PCB traces shorting FB1 and FB2 (see the [MAX98374 EV Kit Development Board Schematic](#) and the [MAX98374 EV Kit Development Board PCB Layout Diagrams](#)).

### SoundWire Interface

The SoundWire slave Interface on the MAX98374 is compliant with version 1.1 of the MIPI SoundWire specification. The SoundWire slave interface supports both audio and control data transport over the shared 2-wire bus comprising a clock input (SWCLK) and a bidirectional data input/output (SWDATA). The SoundWire slave device identification number is set by 0Ω resistors

R9, R21, R22, and R25 (see [Table 7](#)). The SoundWire clock and data inputs are connected to DEV board header J3. See [Table 5](#).

For SoundWire evaluation, the AUDINT1 board is only used for powering DVDD, an external SoundWire compliant master needs to be applied to the DEV board. To utilize the LDO regulator that drives DVDD on the AUDINT1 board make the following hardware configurations:

- Connect the USB cable to the USB1 port on the AUDINT1 board.
- Set the VIO and DVDD headers on the AUDINT1 board to the 1.8V position.
- Slide the AUDINT1 board's SW1 switch actuator to the EVAL position.
- Slide the AUDINT1 board's I2S, I2C, MSEL, and MCLK switch actuator to the DISCONNECT position.
- Ensure the AUDINT1 board is connected to the DEV board.

**Table 7. SoundWire Slave Device Unique ID Configuration**

JU6 (ADDR) JUMPER	SDA	SCL	DEVICE ID
DGND	R21	R25	0001
DGND	R9	R25	0002
DGND	R21	R22	0003
DGND	R9	R22	0004
DVDD	R9	R22	0005
DVDD	R9	R25	0006
DVDD	R21	R22	0007
DVDD	R21	R25	0008

I<sup>2</sup>C Interface

The MAX98374's I<sup>2</sup>C interface is routed to header J2 and connector J1. The J1 connector is for the AUDINT1 board and connects the device's I<sup>2</sup>C interface to the MAXQ2000's I<sup>2</sup>C interface on the AUDINT1 board. This connection allows the MAX98374 evaluation software to read and write to the device. See [Table 8](#). The I<sup>2</sup>C interface should only be used when not in SoundWire mode.

Header J2 allows for an external I<sup>2</sup>C controller to connect to the device's I<sup>2</sup>C bus. When using an external I<sup>2</sup>C controller, and still connecting to the AUDINT1 board, ensure that the I<sup>2</sup>C switch (on the AUDINT1 board) is in the DISCONNECT position.

Device Address (I<sup>2</sup>C)

The MAX98374 I<sup>2</sup>C device address can be configured to one of four values by configuring jumper JU6 (see [Table 9](#)).

Table 8. I<sup>2</sup>C Header (J2)

SIGNAL	PIN	PIN	SIGNAL
GND	1	2	SDA
GND	3	4	SCL

Audio Interface 1 Board

Maxim's Audio Interface 1 board (AUDINT1 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 AUDINT1 board are its LDO supply voltages, its USB-to-I<sup>2</sup>C and USB-to-I<sup>2</sup>S interfaces. The supply voltages allow the DEV board to be evaluated with minimal amount of external supplies. The USB-to-I<sup>2</sup>S converter allows any computer to be used as an audio source for the DEV board's digital audio I<sup>2</sup>S interface and the USB-to-I<sup>2</sup>C interface allows for the use of the MAX98374 evaluation software, making device configuration and monitoring a lot simpler. Refer to the Maxim *Audio Interface 1* data sheet for additional information.

The MAX98374 DEV board connects to the AUDINT1 board through connector J1. The physical connections made between the DEV board and AUDINT1 board are listed in [Table 10](#).

Table 9. I<sup>2</sup>C Address Jumper Settings (JU6)

JU6 (ADDR) JUMPER	I <sup>2</sup> C ADDRESS
DVDD	0x62*
GND	0x64
SDA	0x66
SCL	0x68

\*Default

**Table 10. AUDINT1 Connector (J1)**

PIN	SIGNAL	PIN	SIGNAL	PIN	SIGNAL
1	—	2	—	3	GND
4	—	5	BCLK/SWCLK	6	IRQ
7	—	8	LRCLK	9	ADDR
10	—	11	DIN/SWDATA	12	RESET
13	—	14	DOUT	15	I.C.
16	—	17	—	18	—
19	—	20	DVDD*	21	GND
22	—	23	—	24	GND
25	GND	26	SDA	27	—
28	—	29	SCL	30	—
31	GND	32	—	33	—
34	—	35	—	36	—
37	GND	38	—	39	—

\*Configured on the AUDINT1 board: DVDD (1.2V, 1.8V, 3.3V)

## Ordering Information

PART	TYPE
MAX98374FEVSYS#	Evaluation System for FCQFN Package
MAX98374EVSYS#	Evaluation System for WLP Package

#Denotes RoHS compliant.

## MAX98374 FCQFN EV Kit Development Board Bill of Materials

REF DES	QTY	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION
ICC, IRQ, ADDR, I.C., RESET, VREFC, OUTSNS, OUTPSNS	8	5002	KEystone	N/A	TEST POINT; PIN DIA=0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; WHITE; PHOSPHOR BRONZE WIRE SILVER;
DIN, BCLK, DOUT, LRCLK	4	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;
C5	1	GRM033R60J105MEA2;C0603X5R0J10 5M030;CL03A105MQ3CSN	MURATA;TDK;SAMSUNG	1UF	CAPACITOR; SMT (0201); CERAMIC CHIP; 1UF; 6.3V; TOL=20%; MODEL=GRM SERIES; TG=-55 DEGC TO +85 DEGC; TC=X5R
C6	1	EMZA350ADA221MHA0G	UNITED CHEMI-CON	220UF	CAPACITOR; SMT (CASE_HA0); ALUMINUM-ELECTROLYTIC; 220UF; 35V; TOL=20%; MODEL=MZA SERIES
C7, C16	2	TMK105BJ104KV; GRM155R61E104KA87	TAIYO YUDEN;MURATA	0.1UF	CAPACITOR; SMT (0402); CERAMIC CHIP; 0.1UF; 25V; TOL=10%; TG=-55 DEGC TO +85 DEGC; TC=X5R
C8, C15	2	GRM188R61E106MA73	MURATA	10UF	CAPACITOR; SMT (0603); CERAMIC CHIP; 10UF; 25V; TOL=20%; TG=-55 DEGC TO +85 DEGC; TC=X5R; GRM SERIES; MURATA
C19	1	GRM155R61A106ME44; GRM155R61A106ME11; 0402D106MAT2A	MURATA;MURATA;AVX	10UF	CAPACITOR; SMT (0402); CERAMIC CHIP; 10UF; 10V; TOL=20%; TG=-55 DEGC TO +85 DEGC; TC=X5R
DVDD	1	5010	N/A	5010	TESTPOINT WITH 1.80MM HOLE DIA, RED, MULTIPURPOSE
GND, PVDD, FOUTN, FOUTP	4	111-2223-001	EMERSON NETWORK POWER	111-2223-001	MACHINE SCREW; THUMBSCREW; BANANA; 1/4-32IN; 11/32IN; NICKEL PLATED BRASS
J1	1	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
J2	1	PEC02DAAN	SULLINS ELECTRONIC CORP.	PEC02DAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 4PINS
J3	1	PEC04DAAN	SULLINS ELECTRONICS CORP.	PEC04DAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 8PINS
J3A, J3B	2	PEC02SAAN	SULLINS	PEC02SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 2PINS
JU4	1	PEC03SAAN	SULLINS ELECTRONICS CORP.	PEC03SAAN	EVKIT PART-CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 3PINS; -65 DEGC TO +125 DEGC;
JU6	1	PBC05SAAN	SULLINS ELECTRONICS CORP.	PBC05SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 5PINS; -65 DEGC TO +125 DEGC
MTH1-MTH4	4	91772A108; PHILLIPS-PAN_4- 40X3/8IN; PMS54400038PH; 9901	GENERIC PART	N/A	MACHINE SCREW; PHILLIPS; PAN; 4-40; 3/8IN; 18-8 STAINLESS STEEL
MTH1-MTH4	4	MCH_SO_F_HEX_4-40X1/2	GENERIC PART	N/A	STANDOFF; FEMALE-THREADED; HEX; 4-40; 1/2IN; ALUMINUM
R1-R5, R8, R12, R13, R18	9	RC0402JR-070RL; CR0402-16W-000RJT	YAGEO PHYCOMP;VENKEL LTD.	0	RESISTOR; 0402; 0 OHM; 5%; JUMPER; 0.063W; THICK FILM
R6, R11	2	CRCW04024K70FK	VISHAY DALE	4.7K	RESISTOR, 0402, 4.7K OHM, 1%, 100PPM, 0.0625W, THICK FILM
R7	1	RC0201FR-0730RL	YAGEO	30	RESISTOR; 0201; 30 OHM; 1%; 200PPM; 0.05W; THICK FILM
SCL, SDA	2	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;
SU1, SU2	2	STC02SYAN	SULLINS ELECTRONICS CORP.	STC02SYAN	TEST POINT; JUMPER; STR; TOTAL LENGTH=0.256IN; BLACK; INSULATION=PBT CONTACT=PHOSPHOR BRONZE; COPPER PLATED TIN OVERALL
TP1, TP2, TP4	3	5011	N/A	5011	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; BLACK; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;
U1	1	MAX98374EFF+	MAXIM	MAX98374EFF+	EVKIT PART -IC; MAX98374; 22 FCQFN 3X3
X1-X6	6	9020 BUSS	WEICO WIRE	MAXIMPAD	EVK KIT PARTS; MAXIM PAD; WIRE; NATURAL; SOLID; WEICO WIRE; SOFT DRAWN BUS TYPE-S; 20AWG
PCB	1	MAX98374_FCQFN_DEV_APPS_A	MAXIM	PCB	PCB:MAX98374_FCQFN_DEV_APPS_A
C1-C3, C9-C14, C17, C18	0	N/A	N/A	OPEN	CAPACITOR; 0402 PACKAGE; GENERIC
FB1, FB2	0	N/A	N/A	N/A	INDUCTOR; 0402 PACKAGE; FERRITE-BEAD; GENERIC
OUTN, OUTP	0	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;
R15-R17, R19, R20	0	N/A	N/A	OPEN	RESISTOR; 0402 PACKAGE; GENERIC
C4	0	N/A	N/A	OPEN	CAPACITOR; SMT (0402); OPEN; FORMFACTOR
R9, R21, R22, R25	0	N/A	N/A	OPEN	RESISTOR; 0402; OPEN; FORMFACTOR



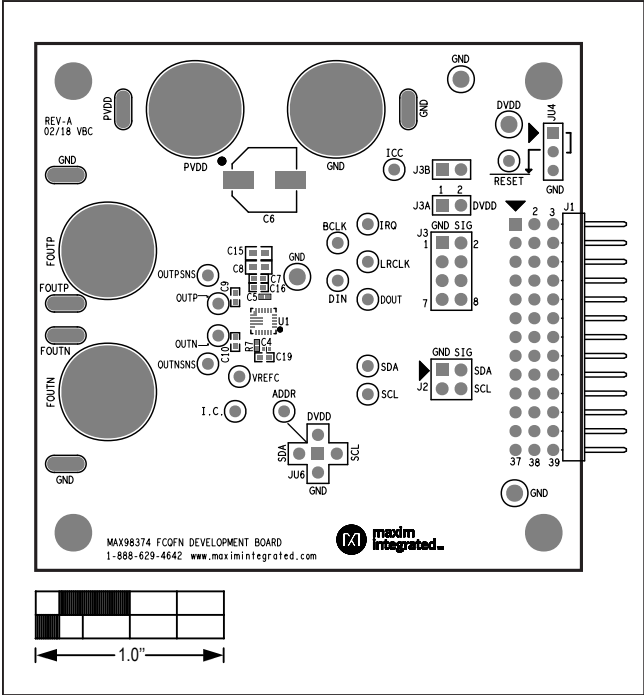


## MAX98374 WLP EV Kit Development Board Bill of Materials

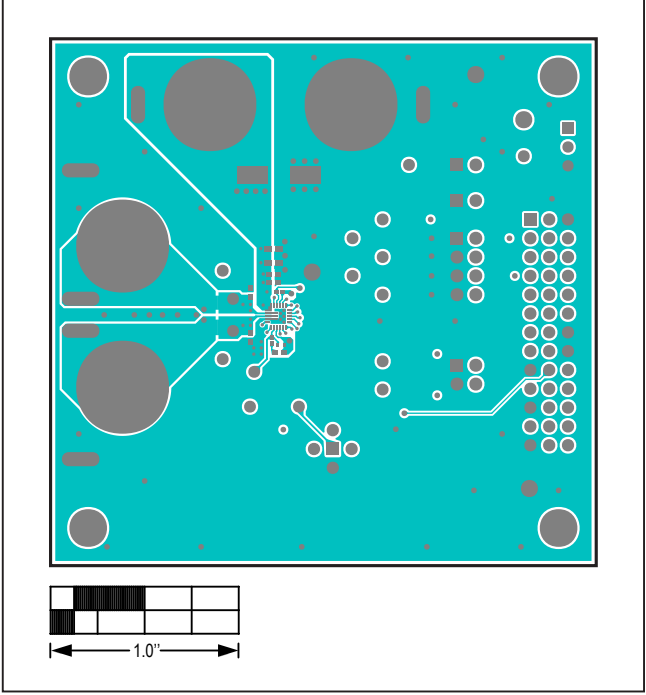
REF_DES	QTY	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION
ADDR, I.C., ICC, IRQ, OUTSNS, OUTPSNS, RESET, VREFC	8	5002	KEystone	N/A	TEST POINT; PIN DIA=0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; WHITE; PHOSPHOR BRONZE WIRE SILVER;
BCLK, DIN, DOUT, LRCLK	4	5003	KEystone	N/A	TEST POINT; PIN DIA=0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; ORANGE; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;
C5	1	GRM033R60J105MEA2;CO603X5R0J105M030;CL03A105MQ3CSN	MURATA;TDK;SAMSUNG	1UF	CAPACITOR; SMT (0201); CERAMIC CHIP; 1UF; 6.3V; TOL=20%; MODEL=GRM SERIES; TG=-55 DEGC TO +85 DEGC; TC=X5R
C6	1	EMZA350ADA221MHA0G	UNITED CHEMI-CON	220UF	CAPACITOR; SMT (CASE_HA0); ALUMINUM-ELECTROLYTIC; 220UF; 35V; TOL=20%; MODEL=MZA SERIES
C7, C16	2	TMK105BJ104KV; GRM155R61E104KA87	TAIYO YUDEN;MURATA	0.1UF	CAPACITOR; SMT (0402); CERAMIC CHIP; 0.1UF; 25V; TOL=10%; TG=-55 DEGC TO +85 DEGC; TC=X5R
C8, C15	2	GRM188R61E106MA73	MURATA	10UF	CAPACITOR; SMT (0603); CERAMIC CHIP; 10UF; 25V; TOL=20%; TG=-55 DEGC TO +85 DEGC; TC=X5R; GRM SERIES; MURATA
C19	1	GRM155R61A106ME44; GRM155R61A106ME11; 0402ZD106MAT2A	MURATA;MURATA;AVX	10UF	CAPACITOR; SMT (0402); CERAMIC CHIP; 10UF; 10V; TOL=20%; TG=-55 DEGC TO +85 DEGC; TC=X5R
DVDD	1	5010	N/A	5010	TESTPOINT WITH 1.80MM HOLE DIA, RED, MULTIPURPOSE
FOUTN, FOUTP, GND, PVDD	4	111-2223-001	EMERSON NETWORK POWER	111-2223-001	MACHINE SCREW; THUMBSCREW; BANANA; 1/4-32IN; 11/32IN; NICKEL PLATED BRASS
J1	1	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
J2	1	PEC02DAAN	SULLINS ELECTRONIC CORP.	PEC02DAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 4PINS
J3	1	PEC04DAAN	SULLINS ELECTRONICS CORP.	PEC04DAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 8PINS
J3A, J3B	2	PEC02SAAN	SULLINS	PEC02SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 2PINS
JU4	1	PEC03SAAN	SULLINS ELECTRONICS CORP.	PEC03SAAN	EVKIT PART-CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 3PINS; -65 DEGC TO +125 DEGC;
JU6	1	PBC05SAAN	SULLINS ELECTRONICS CORP.	PBC05SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 5PINS; -65 DEGC TO +125 DEGC
MTH1-MTH4	4	91772A108; PHILLIPS-PAN_4-40X3/8IN; PMSSS4400038PH; 9901	GENERIC PART	N/A	MACHINE SCREW; PHILLIPS; PAN; 4-40; 3/8IN; 18-8 STAINLESS STEEL
MTH1-MTH4	4	MCH_SO_F_HEX_4-40X1/2	GENERIC PART	N/A	STANDOFF; FEMALE-THREADED; HEX; 4-40; 1/2IN; ALUMINUM
R1-R5, R8, R12, R13, R18	9	RC0402JR-070RL; RC0402-16W-000RJT	YAGEO PHYCOMP;VENKEL LTD.	0	RESISTOR; 0402; 0 OHM; 5%; JUMPER; 0.063W; THICK FILM
R6, R11	2	CRCW04024K70FK	VISHAY DALE	4.7K	RESISTOR, 0402, 4.7K OHM, 1%, 100PPM, 0.0625W, THICK FILM
R7	1	RC0201FR-0730RL	YAGEO	30	RESISTOR; 0201; 30 OHM; 1%; 200PPM; 0.05W; THICK FILM
SCL, SDA	2	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;
SU1, SU2	2	STC02SYAN	SULLINS ELECTRONICS CORP.	STC02SYAN	TEST POINT; JUMPER; STR; TOTAL LENGTH=0.256IN; BLACK; INSULATION=PBT CONTACT=PHOSPHOR BRONZE; COPPER PLATED TIN OVERALL
TP1, TP2, TP4	3	5011	N/A	5011	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; BLACK; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;
U1	1	MAX98374EWA+	MAXIM	MAX98374	EVKIT PART - IC; MAX98374; 25 WLP; PACKAGE CODE: W252C2+2; PACKAGE OUTLINE: 21-100162
X1-X6	6	9020 BUSS	WEICO WIRE	MAXIMPAD	EVK KIT PARTS; MAXIM PAD; WIRE; NATURAL; SOLID; WEICO WIRE; SOFT DRAWN BUS TYPE-S; 20AWG
PCB	1	MAX98374_WLP_DEV_AP PS_A	MAXIM	PCB	PCB:MAX98374_WLP_DEV_APPS_A
C1-C3, C9-C14, C17, C18	0	N/A	N/A	OPEN	CAPACITOR; 0402 PACKAGE; GENERIC
FB1, FB2	0	N/A	N/A	N/A	INDUCTOR; 0402 PACKAGE; FERRITE-BEAD; GENERIC
OUTN, OUTP	0	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;
R15-R17, R19, R20, R9, R21, R22, R25	0	N/A	N/A	OPEN	RESISTOR; 0402 PACKAGE; GENERIC
C4	0	N/A	N/A	OPEN	CAPACITOR; SMT (0402); OPEN; FORMFACTOR



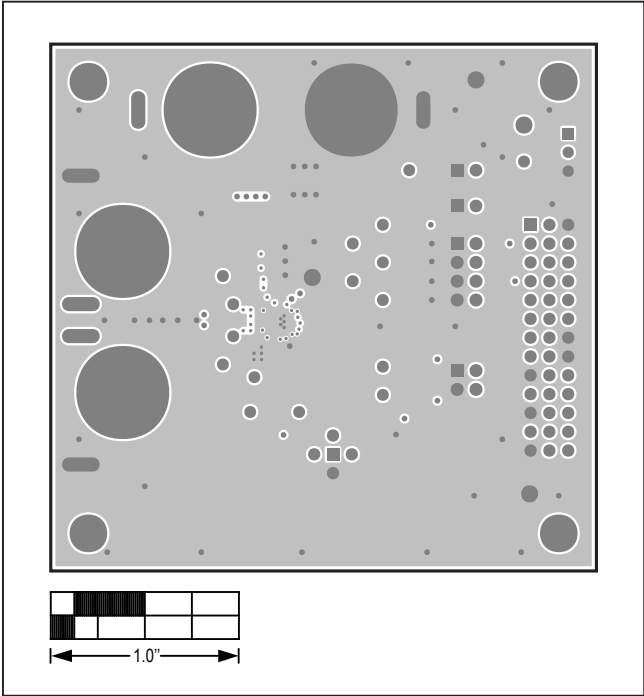
MAX98374 FCQFN EV Kit Development Board PCB Layout Diagrams



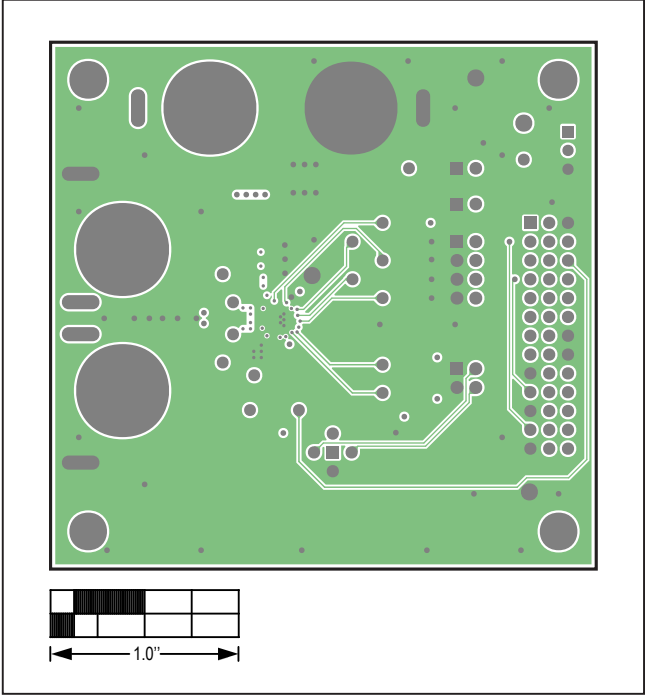
MAX98374 EV Kit Component Placement Guide—Top Silkscreen



MAX98374 EV Kit PCB Layout—Top

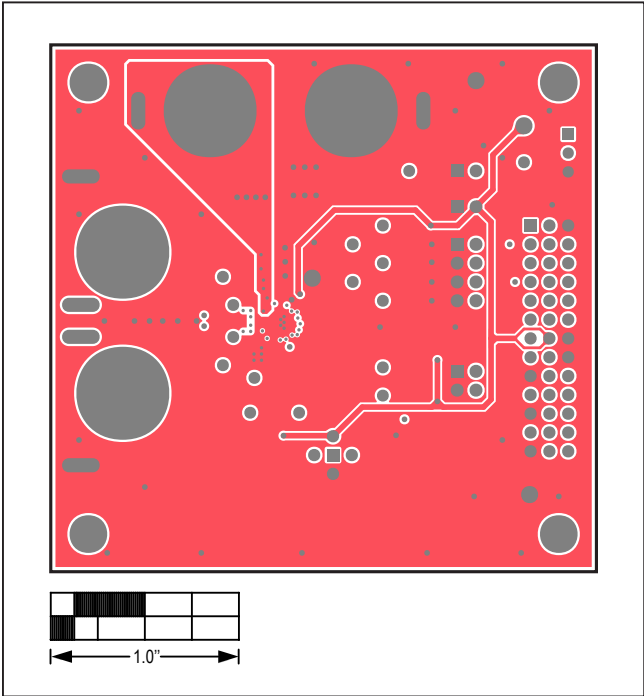


MAX98374 EV Kit PCB Layout—GND L2

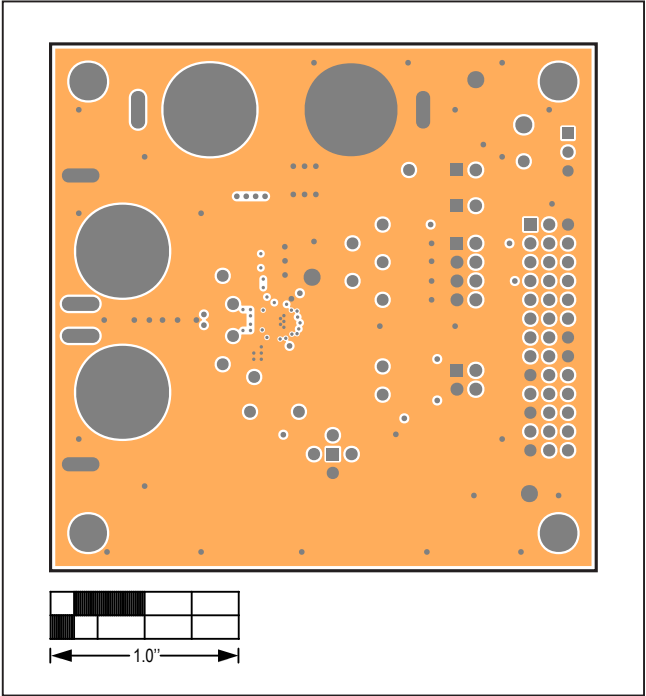


MAX98374 EV Kit PCB Layout—Signal GND L3

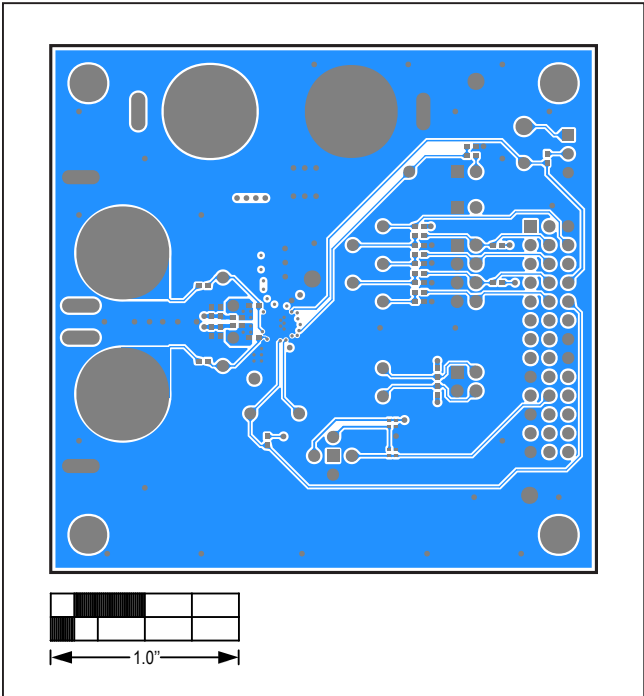
MAX98374 FCQFN EV Kit Development Board PCB Layout Diagrams (continued)



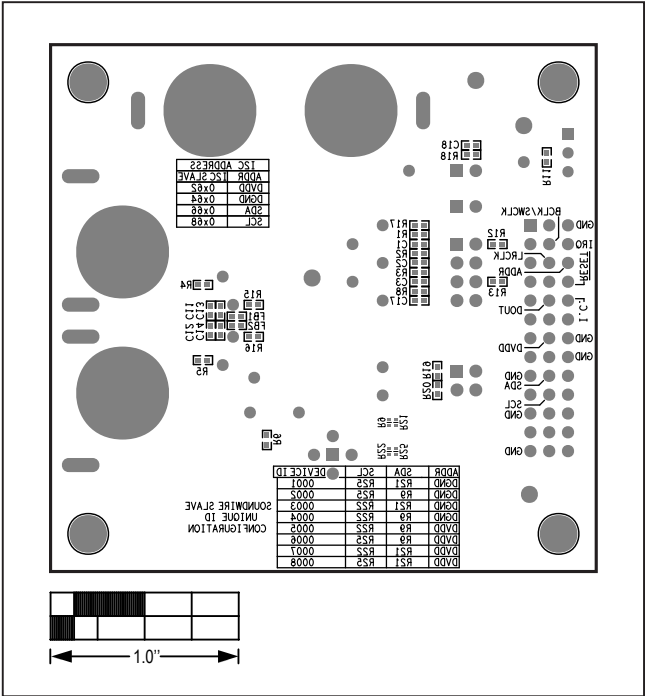
MAX98374 EV Kit PCB Layout—Power L4



MAX98374 EV Kit PCB Layout—GND L5



MAX98374 EV Kit PCB Layout—Bottom



MAX98374 EV Kit Component Placement Guide—Bottom Silkscreen

MAX98374 WLP DEVELOPMENT BOARD  
1-888-629-4642 www.maximintegrated.com

REV-A 03/16 KA

MAXIM INTEGRATED

1.0"

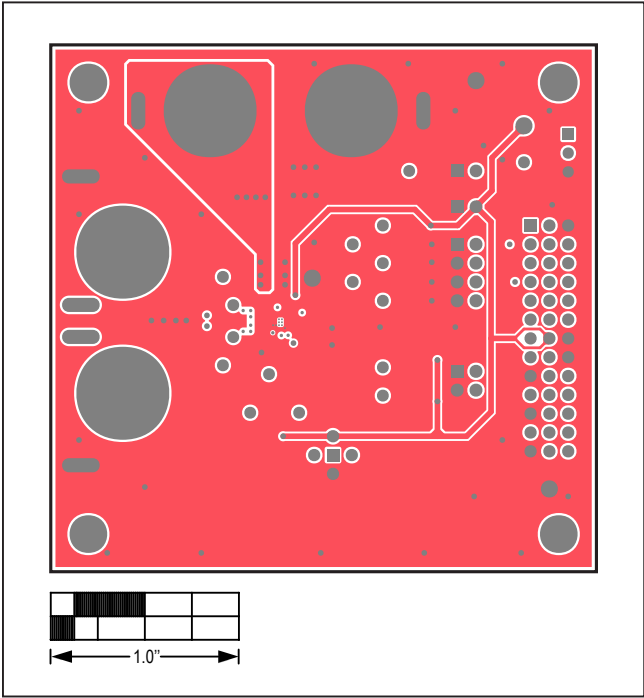
Figure 1 shows a photograph of a printed circuit board (PCB) with a green solder mask. The board is populated with various components, including several large circular pads, a central microcontroller or IC, and various other components. A scale bar at the bottom indicates 1.0 inch.

Figure 1 shows a grayscale image of a printed circuit board (PCB) layout. The board is populated with various components, including large circular pads, smaller circular pads, rectangular pads, and a dense array of small circular pads on the right side. A scale bar at the bottom indicates a length of 1.0 inch.

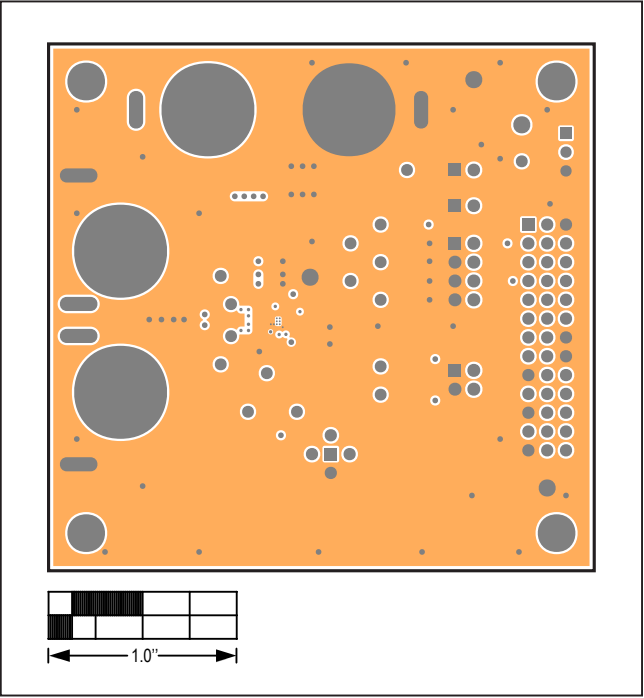
Maxim Integrated | 20



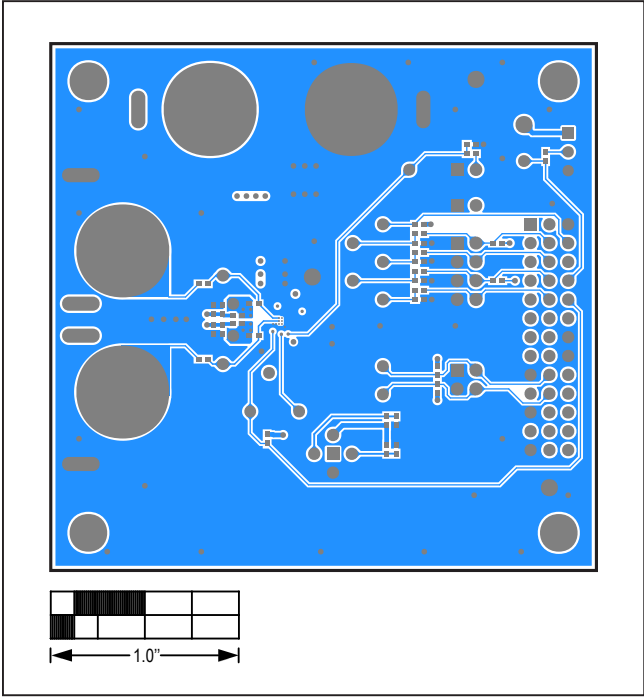
MAX98374 WLP EV Kit Development Board PCB Layout Diagrams (continued)



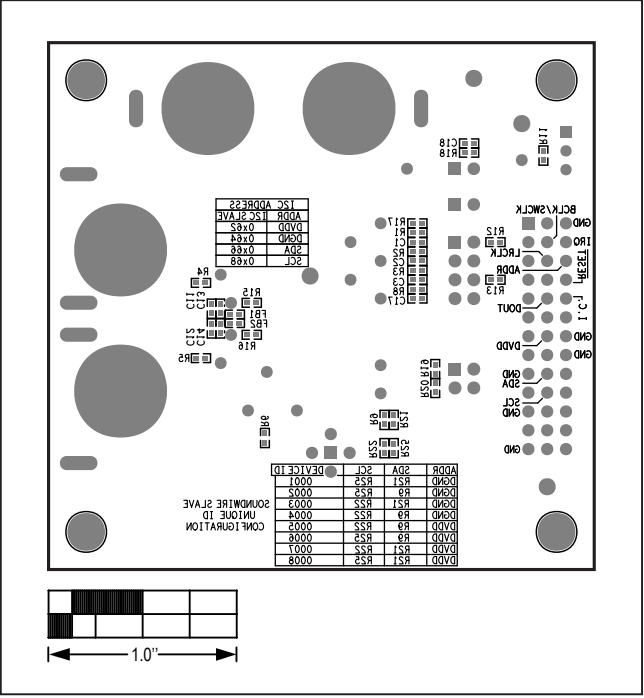
MAX98374 EV Kit PCB Layout—Power L4



MAX98374 EV Kit PCB Layout—GND L5



MAX98374 EV Kit PCB Layout—Bottom



MAX98374 EV Kit Component Placement Guide—Bottom Silkscreen

## Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	5/18	Initial release	—

For pricing, delivery, and ordering information, please contact Maxim Direct at 1-888-629-4642, or visit Maxim Integrated's website at [www.maximintegrated.com](http://www.maximintegrated.com).

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- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

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- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.