Click here for production status of specific part numbers.

MAX98390 Evaluation System

Evaluates: MAX98390

General Description

The MAX98390 evaluation system (EV system) evaluates the MAX98390 boosted Class D audio amplifier with integrated Dynamic Speaker Management™ (DSM) IC. DSM senses the voltage and current at the load and uses patented Maxim algorithms to unlock the full potential of the speaker. The EV system comprises the MAX98390 Development Board (DEV board), Maxim's Audio Interface Board III (AUDINT3), 5V power supply, reference microspeaker, USB cable, DSM Sound Studio software, and MAX98390 evaluation software.

It is recommended that the DEV board be evaluated with the AUDINT3 board as an EV system. MAX98390 supports standard I²S, left-justified, and TDM digital audio interfaces, as well as I²C for control.

The AUDINT3 board provides 1.8V DVDD, USB-to-PCM, and USB-to-I²C interfaces that are needed to evaluate the DEV board, requiring only a single external power supply for VBAT. The *Simplified EV System Block Diagram* details the DEV board and the AUDINT3 board.

The easy-to-use DSM Sound Studio software is a simple, yet powerful GUI that breaks down the DSM design process into three basic steps: extract, tune, and evaluate. Additionally, DSM Sound Studio provides for a 7-minute quick demo to hear the DSM difference using the included reference microspeaker.

There is also the MAX98390 evaluation software that provides complete access to all hardware registers.

Features

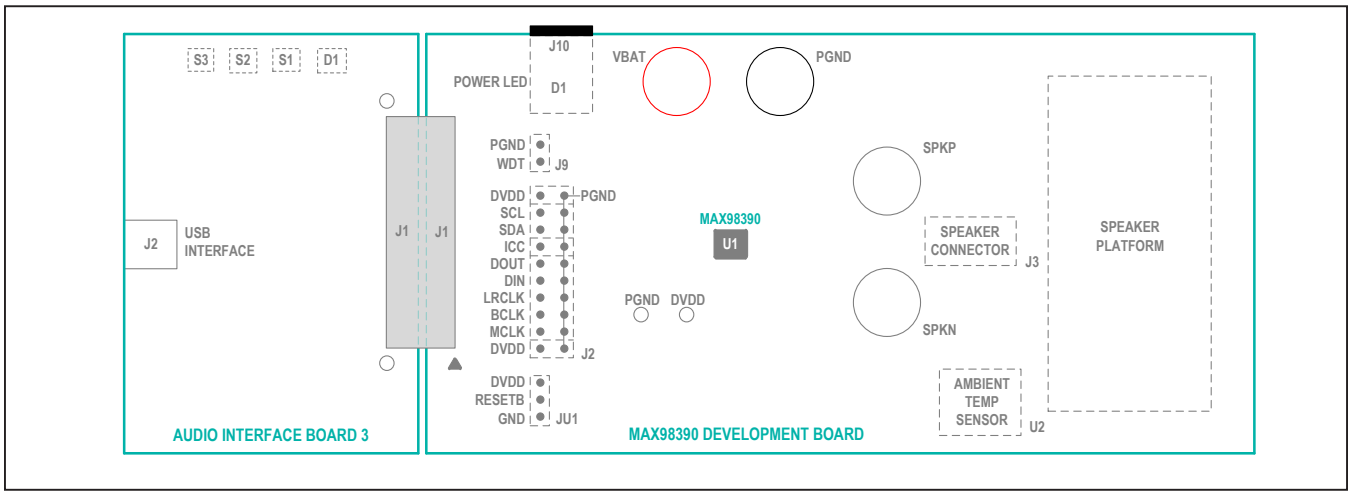
- Complete Hardware System with Easy Setup, No Tools or Special Equipment Required
- Precharacterized Reference Microspeaker Included
- Easy-to-Use Graphical User Interfaces (GUIs) Software (Windows 7/10 Compatible)
- DSM Sound Studio
  - Quick Demo Using Included Speaker
  - Extract: Speaker Parameter Extraction
  - Tune: Full Acoustic Tuning Suite
  - Evaluate: Compare Different Tunings
- MAX98390 Evaluation Software
  - Complete Access to All Hardware Registers

EV System Contents

- MAX98390 development board
- Audio Interface Board III
- 5V power supply, 100V–240V
- Micro-USB cable
- Reference micro speaker
- Temporary adhesive for mounting microspeaker to DEV board

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

Simplified EV System Block Diagram



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

Dynamic Speaker Management is a trademark of Maxim Integrated Products, Inc.

319-100366; Rev 0; 4/19

maxim integrated™

Software Installation

1) For the latest software, login to your MyMaxim account at **MaximIntegrated.com**, navigate to MAX98390 > Design Resources > MAX98390 Software. Download DSMSoundStudio_vx.x.xx.msi, and MAX98390EVSwSetupvx_x_x.exe.

   Install the DSM Sound Studio software on your computer by running the program installer DSMSoundStudio_vx.x.xx.msi. Follow the installer prompts to completion. The application icon, labeled as DSM Sound Studio, is located under **Windows | Maxim Integrated**.

2) Install the MAX98390 Evaluation Software by running the program installer MAX98390EVSwSetupvx_x_x.exe. 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. The application icon is located at **Windows | Maxim Integrated| MAX98390 Evaluation Software**.

Quick Start Guide

DSM Sound Studio GUI

It is highly recommended to start with DSM Sound Studio. DSM Sound Studio is an easy to use GUI that will walk the user through a quick DSM demo, speaker parameter extraction, acoustic tuning of all the DSM features, and provide for rapid comparison of various tuning profiles. DSM Sound Studio also shows the user how to properly set up the hardware. Refer to Application Note 6940: *DSM Sound Studio User Guide* for more information.

To launch the DSM Sound Studio application, navigate to **Windows | Maxim Integrated** and click on the **DSM Sound Studio** application icon.

To set or modify the device's hardware configurations such as sample rate, boost parameters, or brown out detection use the MAX98390 evaluation software, see the *MAX98390 Evaluation Software*.

MAX98390 Evaluation Software

Required Equipment

- MAX98390 EV system
  - Audio Interface Board III
  - 5V power supply
  - Micro-USB cable
  - Microspeaker with enclosure
- USB audio source (e.g., Windows Media Player® or iTunes®)
- User-supplied Windows 7 or Windows 10 PC with an available USB port

Required Software

- MAX98390 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.

Reference Material

- MAX98390 IC data sheet

Procedure

The MAX98390 and AUDINT3 boards are fully assembled and tested. Follow the steps below to set up the EV system for device evaluation:

AUDINT3 Board Setup

1) Connect the MAX98390 DEV board (J1 connector) to the AUDINT3 board (J1 connector).
2) With the audio source disabled, connect the USB cable from your computer to the USB port (J2) on the AUDINT3 board. The AUDINT3 board provides the power for DVDD, sourcing 1.8V to the DEV board through the J1 connector.
3) The multicolor LED D1 blinks white. When the computer registers the AUDINT3 as a USB device D1 changes to magenta and blinks slowly.

DEV Board Setup

1) With the 5V power supply unpowered, insert the DC power jack into the DC power connector (J10) located underneath the DEV board.
2) Connect the micro speaker leads across the SPKP and SPKN binding posts. Alternatively, use the spring connector terminal (J3) by pressing down the orange tab and inserting the bare speaker wire into the round holes of the connector, releasing the tab to allow the connector to grip the wire. A nonpermanent adhesive is included with the MAX98390EVSYS# and can be used to mount the microspeaker to the DEV board on the open space marked with the speaker symbol. The adhesive helps keep the speaker from rattling on the board during the evaluation. Be careful not to cover any holes in the speaker enclosure when mounting using the temporary adhesive. It is common for microspeaker enclosures to include small holes for pressure equalization.
3) Place the shunt on jumper JU1 across pins RESETB and DVDD.

iTunes is a registered trademark of Apple, Inc.

Test

1) Insert the 5V power supply into a wall receptacle.
2) Launch the MAX98390 evaluation software and wait while the software connects to the EV system (Figure 1).
3) Once the connection is established, the status bar at the bottom of the GUI window should report **USB Connected** and display the MAX98390 part number and revision ID. After the EV system is fully connected, configure the device by loading the **usb_audio.98390** configuration file. This file can be loaded from **File, Load Register Settings, Pre-Installed Configuration Files.** Scroll down to select.
4) Open the Windows' **Sound** dialog and select the **Playback** tab. A **Speakers** item similar to Figure 2 is listed as an available playback device.
5) Verify that the **Speakers** item is set as the default device.
6) Adjust the audio source volume to a low level.
7) Enable the audio source and verify that audio is heard through the connected speaker. Adjust the audio source volume as needed.
8) Quick Start of the evaluation software is now complete.

Detailed Description of Evaluation Software

The MAX98390 evaluation software is designed to be used only with the MAX98390 EV system. The software provides an intuitive graphical user interface (GUI) for programming the MAX98390 device and includes many features intended to aid evaluation.

The MAX98390 evaluation software main window (Figure 1) 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 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 0x2000–0x23FF, as well as to the revision ID register, 0x24FF. The **EQ/DRC Registers** tab provides access to the registers for the 8-band equalizer and the dynamic range compression. The **Log** tab provides a log of the I^2C transactions and a tool to read specific registers.

The MAX98390 evaluation software is compatible with Windows 7 and Windows 10 and can be found on Maxim's website. Refer to the MAX98390 data sheet for device register information.

Communication Tool Bar

The tool bar consists of seven buttons, a drop-down combo box, and a display box. These controls are always accessible, regardless of the active tabbed page. The tool bar is shown in Figure 3 and Table 1 provides details about each control.

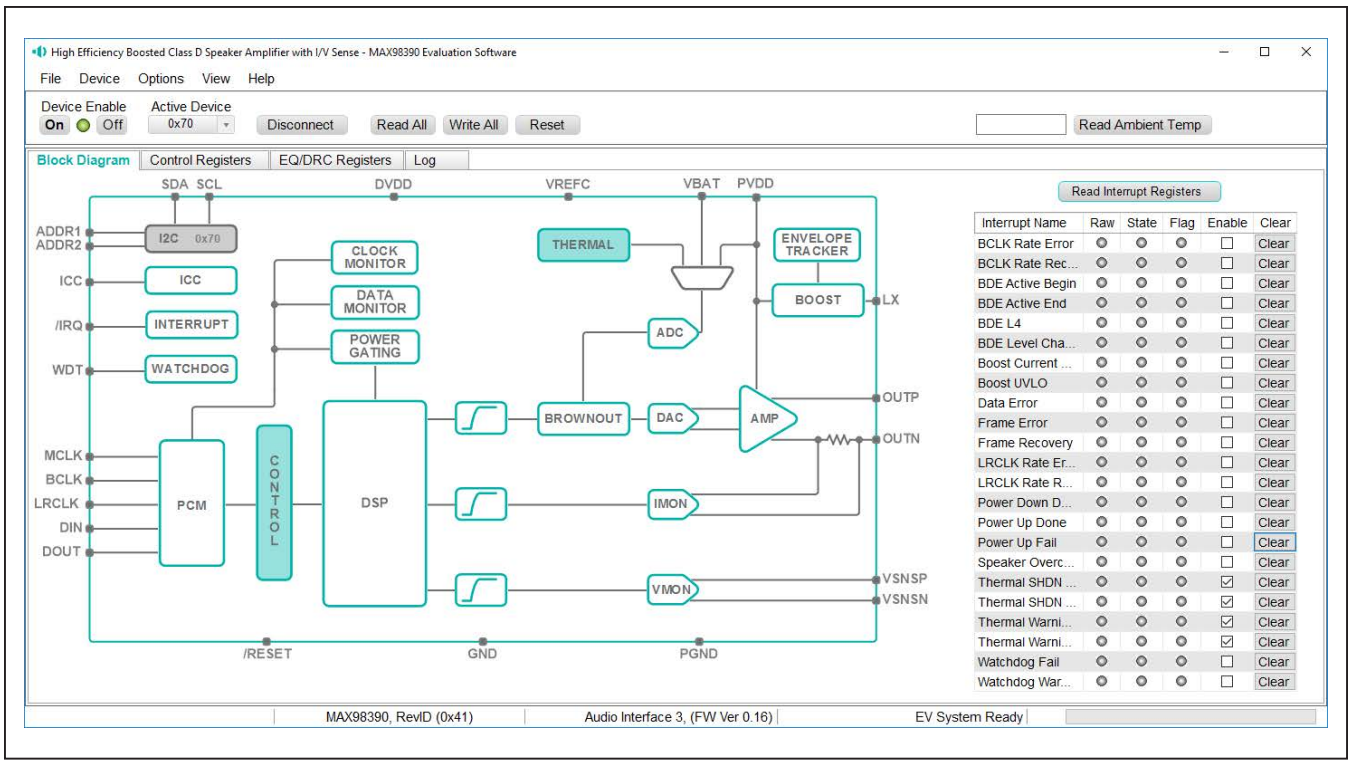


Figure 1. MAX98390 Evaluation Software



Figure 2. 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 (USB) interface on the AUDINT3 board first. Once that connection is established, it searches for all I²C addresses associated with the MAX98390 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 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.

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 click 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 (0x2002–0x200A). When the image is red, it indicates that the associated interrupt bit has been set.

The panel also includes checkboxes for each interrupt that 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:

- 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 3. Communication Tool 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. **Note:** The software can communicate with a disabled device, as long as its I^2C interface remains active.
Active Device	Provides a list of detected I^2C addresses. The displayed address is the active device.
Connect/Disconnect	See the *Hardware Connection* section for additional details.
Connect	Detected addresses are shown in the **Active Device** drop-down list.
Disconnect	Press to disconnect from the USB control interface.
Read All	Press to initiate a read of all device registers. The **Control Registers** and **Block Diagram** tabs are updated to reflect the read data.
Write All	Press to initiate a write to all device registers, using the settings shown on the **Control Registers** tab.
Reset	Press to reset device registers to their power-on-reset (POR) state.
Read Ambient Temperature	Press to read the ambient temperature of the application board from external temperature sensor U2. The temperature in degrees Celsius is displayed in the display box to the left. This sensor measures the ambient temperature of the board and is used by the DSM Sound Studio software to set the room temperature value of a tested speaker.

Block Diagram Tab

The evaluation software uses an interactive block diagram to facilitate the programming of the MAX98390 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 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 4 shows the block diagram with the MAX98390 configured for DAI (USB audio) input and 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.

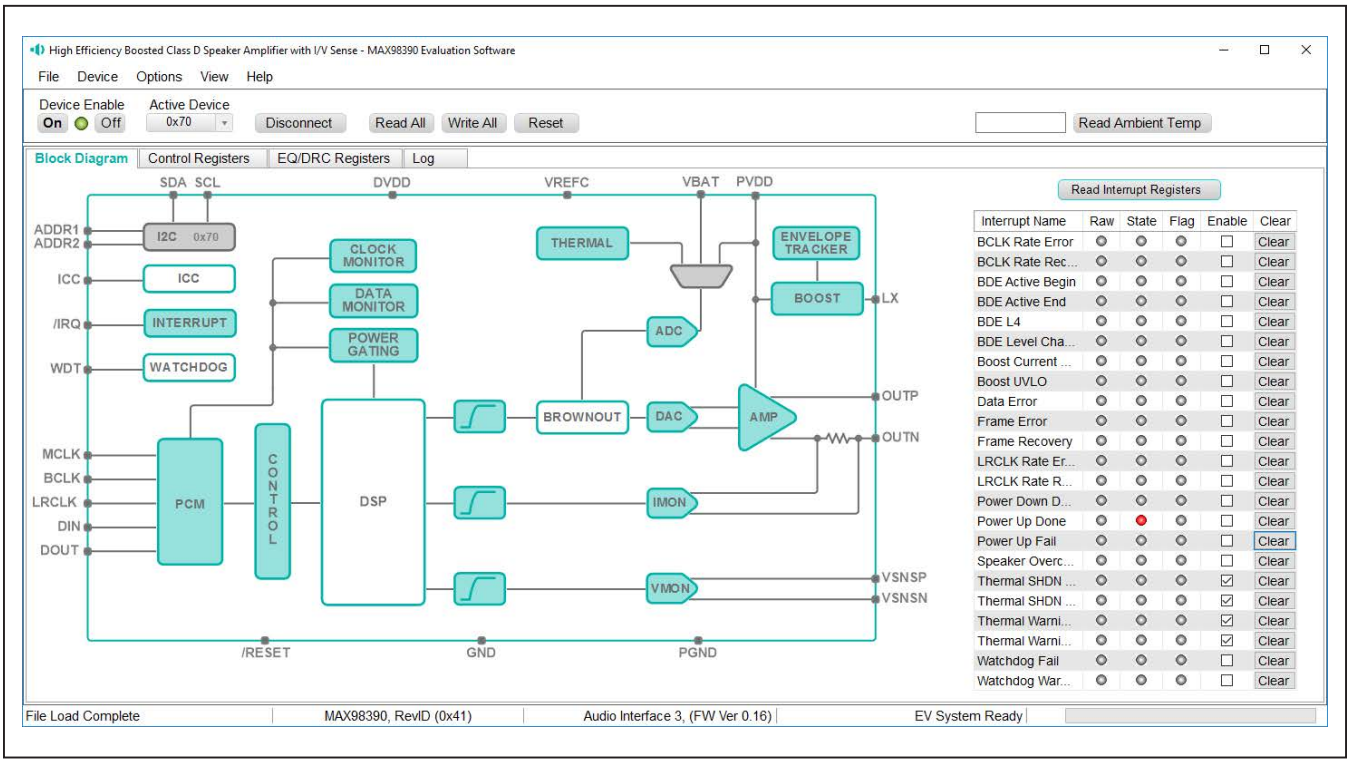


Figure 4. MAX98390 Block Diagram (USB Audio Input to Speaker Output)

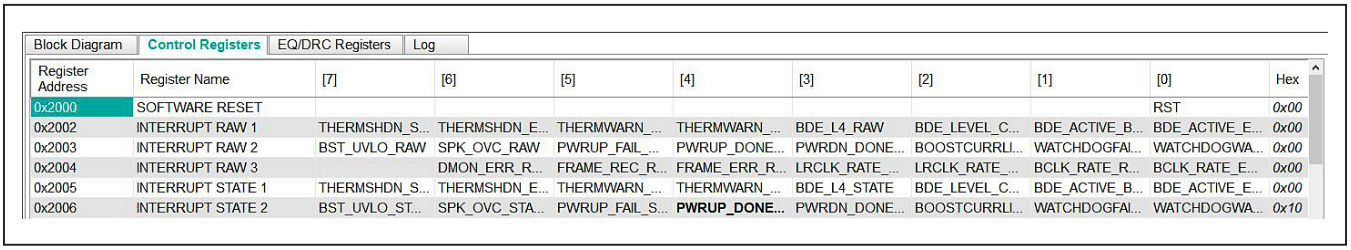


Figure 5. Control Register Tab

Control Registers Tab

The **Control Registers** tab provides two methods for configuring the device. As an example, Figure 5 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.

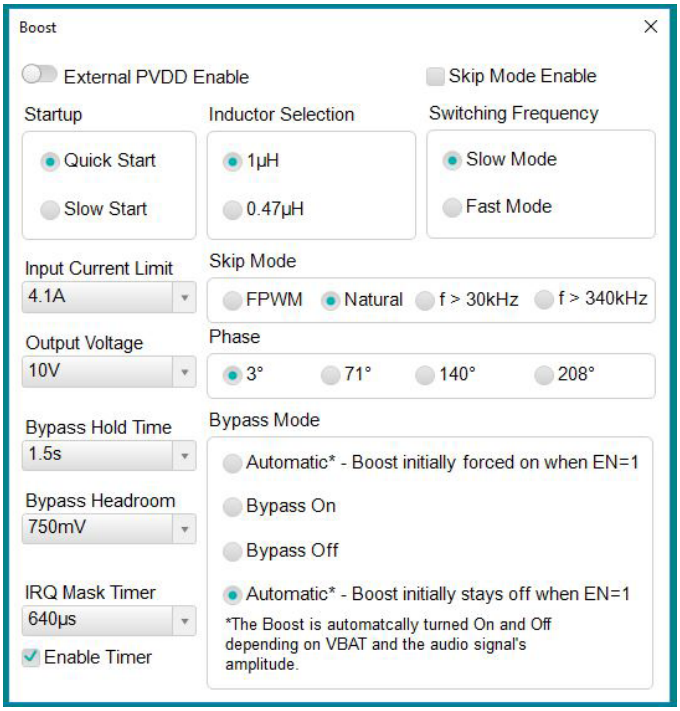


Figure 6. Typical GUI Controls

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 Setting**s 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 MAX98390'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 may 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 .98390 extension.

The software has many 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, select the file, then clicking **Load**.

Table 2. Menu Bar Items

MENU ITEM	DESCRIPTION
FILE	
Load Register Settings	Loads a configuration file (as saved by the **Save Control Register Settings** option or a factory preinstalled file).
Save Control Register Settings	Saves a configuration file containing the current device settings.
Exit	Closes the MAX98390 Evaluation software.
DEVICE	
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 MAX98390.
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 show on the **Control Registers** tab and then updates the GUI.
Read Rev ID	Reads the device's revision ID register and updates the status bar.
OPTIONS	
Interface Selection	Selects the I^2C hardware interface to either the audio interface or an I^2C bridge (not supported).
Configuration Mode F4	Opens a dialog that allows multiple MAX98390 devices to be selected for configuration through the software. This feature is available only when more than one active device is detected.
Demo Mode	Puts the software in demo mode.
HELP	
View Help F1	Links to technical documents.
About	Provides information about the MAX98390 evaluation software.

Detailed Description of Hardware

The MAX98390 EV system is designed to allow for a thorough evaluation of the MAX98390 boosted Class D audio amplifier IC with integrated Dynamic Speaker Management. The EV dystem includes the MAX98390 development board (DEV board), Maxim's Audio Interface Board III (AUDINT3), 5V power supply, and a microspeaker.

The MAX98390 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 I2C capable controller. To simplify the evaluation, the DEV board can be evaluated with the AUDINT3 board and the included 5V power supply. This hardware combination provides an easy-to-use method for exercising the capabilities of the device with no additional audio equipment.

The AUDINT3 board provides an on-board LDO regulator, USB-to-PCM, and USB-to-I2C interfaces. The AUDINT3 LDO regulator is used to power the MAX98390's DVDD supply rail through connector J1. The USB-to-PCM converter accepts a USB audio stream from a USB connected computer and converts that into an I2S data stream, allowing for USB audio playback through the MAX98390 device. The USB-to-I2C interface is the bridge that allows the evaluation software to configure, monitor, and control the I2C capable devices on the MAX98390 DEV and AUDINT3 boards.

Ambient Temperature Sensor

A temperature sensor, DS7505, is included on the DEV Board. The sensor is connected to the I2C bus, permanently set to address 0x90, and is used by the DSM Sound Studio software to measure the ambient room temperature.

Measuring Quiescent Current

To accurately measure the quiescent current of the MAX98390, the power LED and temperature sensors can be temporarily disabled by removing resistors R25 and R29. The AUDINT3 should be disconnected from J1 and DVDD (1.8V) must then be powered by an external power supply. I2C control and PCM audio can then be connected using J2 on the DEV board. To return to normal operation, reinstall R25 and R29.

Power Supplies

The MAX98390 DEV board requires at least two 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 and/or binding posts.

When using the AUDINT3 board, connect the included 5V power supply to VBAT (J10). The AUDINT3's on-board LDO regulator powers DVDD on the DEV board. This power is routed to the DEV board through the J1 connector. See the *Digital Audio Interface* section.

Jumper Selection

The DEV board includes jumper JU1 to facilitate a device reset. Table 4 describes the JU1 configuration options. **Note:** Before starting evaluation, ensure that the jumper is configured as needed.

Digital Audio Interface

The MAX98390 digital audio interface (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 6 for the connector J1 pinout.

DAI Header

The DAI header (J2) provide access to MAX98390's master clock (MCLK) input, as well as its PCM bus (BCLK, LRCLK, DIN, and DOUT). This DAI header facilitates evaluation with audio equipment I/O. See Table 5 for the pinout of the DAI headers and Figure 7 for an illustration of how the MAX98390 DAI interface is routed through the DAI headers to the AUDINT3 connector.

Table 3. Power Supplies

POWER SUPPLY	RANGE (V)
VBAT	2.65V to 5.5V
DVDD	1.71V to 1.89V

Table 4. Jumper Configuration

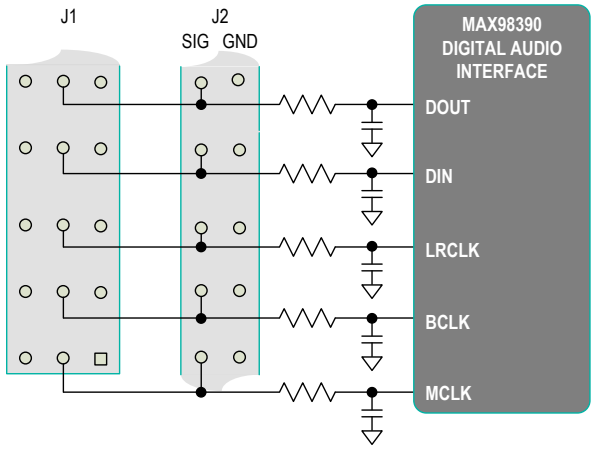
HEADER	SHUNT POSITION	DESCRIPTION
JU1	RESETB to DVDD	Normal operation
	RESETB to GND	Device is reset

Table 5. DAI Header (Portion of J2)

SIGNAL	PIN	PIN	SIGNAL
GND	3	4	MCLK
GND	5	6	BCLK
GND	7	8	LRCLK
GND	9	10	DIN
GND	11	12	DOUT

Table 6. AUDINT3 Connector (J1)

SIGNAL	PIN	SIGNAL	PIN	SIGNAL	PIN
—	1	MCLK	2	GND	3
BCLK2	4	BCLK1	5	GPIO1	6
LRCLK2	7	LRCLK1	8	GPIO2	9
DAC2	10	DAC1	11	GPIO3	12
ADC2	13	ADC1	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	RST	33
—	34	—	35	—	36
GND	37	—	38	—	39



NOTE: MCLK IS NOT REQUIRED FOR OPERATION AND IS ONLY USED IN MASTER MODE.

Figure 7. MAX98390 DAI Interface Headers (PCM)

Speaker Output

The MAX98390 audio output is routed to the SPKP and SPKN connections on the DEV board. The DEV board is, by default, assembled to allow the MAX98390 output to connect directly to a speaker load without the need for filtering.

EMI Filter

When long speaker cables are used with the MAX98390 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 (C11, C12) and Murata BLM18SG331TN1 ferrite beads (FB1, FB2) generally work well. Before adding the filters to the design, first remove the small PCB traces shorting FB1 and FB2 (see the *MAX98390 EV Kit Schematic* and the *MAX98390 EV Kit PCB Layout Diagrams*).

I²C Interface

The MAX98390's I²C interface is routed to header J2 and connector J1. The J1 connector is for the AUDINT3 board and connects the device's I²C interface to the I²C interface of the AUDINT3 board. This connection allows the MAX98390 evaluation software to read and write to the device. See Table 6.

A portion of header J2 allows for an external I²C controller to connect to the device's I²C bus. See Table 6.

Device Address

The MAX98390 I²C device address can be configured to one of eight values: 0x70 (default), 0x72, 0x74, 0x76, 0x78, 0x7A, 0x7C, 0x7E. The device address is set by connecting the device's ADDR1 pin to GND, SDA, SCL, or DVDD and ADDR2 pin to DVDD or GND. This is accomplished by installing a 0Ω resistor in one of the R13–R16 locations for ADDR1 and installing a 0Ω resistor in one of the R20–R21 locations for ADDR2. For proper address programming, only one resistor is used for each ADDR pin. R13–R16 and R20–R21 are located on the bottom side of the board and are identified with silk screen. See Table 8 for all I²C slave address options.

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 its LDO supply voltages, its USB-to-I2C and USB-to-PCM interfaces. The supply voltages allow the DEV board to be evaluated with minimal amount of external supplies. The USB-to-PCM converter allows any computer to be used as an audio source for the DEV board's digital audio PCM interface, and the USB-to-I²C interface allows for the use of the MAX98390 evaluation software, making device configuration and monitoring a lot simpler.

The MAX98390 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 6.

USB Audio Input

To utilize the USB streaming feature of the AUDINT3 board, connect the USB cables from your computer to the USB connector J2 on the AUDINT3 board and ensure that the AUDINT3 board is connected to the DEV board.

Once the hardware is ready, use the MAX98390 evaluation software to configure and enable the device for DAI audio playback.

Table 7. I²C Header (Portion of J2)

SIGNAL	PIN	PIN	SIGNAL
GND	15	16	SDA
GND	17	18	SCL

Table 8. I²C Address Resistors

RESISTOR (ADDR1)	RESISTOR (ADDR2)	I²C ADDRESS
R16 (GND)	R21 (GND)	0x70*
R13 (DVDD)	R21 (GND)	0x72
R15 (SDA)	R21 (GND)	0x74
R14 (SCL)	R21 (GND)	0x76
R16 (GND)	R20 (DVDD)	0x78
R13 (DVDD)	R20 (DVDD)	0x7A
R15 (SDA)	R20 (DVDD)	0x7C
R14 (SCL)	R20 (DVDD)	0x7E

**Default position.*

***Note:** Only one resistor for each ADDR column should be populated.*

Stereo Configuration

For stereo evaluations, a stereo auxiliary kit is available that includes a modified DEV board (stereo companion board), microspeaker, power supply, and 20-pin ribbon cable. See the *Ordering Information* section.

The Stereo Companion Board differs from the DEV board in the following ways:

- I²C address is set to 0x72.
- Ambient temperature sensor is not installed.
- J1 is not installed.

Stereo Boards Setup

1) Configure the Stereo Companion board the same as the DEV board. See the *DEV Board Setup* section.
2) Insert the keyed 20-pin ribbon cable into the J2 connector on the Stereo Companion board, then connect the other end of the ribbon cable to the J2 connector on the fully configured DEV board. The ribbon cable bridges the DVDD power to the Stereo Companion board as well as connect DAI, I²C, and ICC; no additional AUDINT3 board is required.
3) Connect the MAX98390 DEV board (J1 connector) to the AUDINT3 board (J1 connector).
4) Insert the DC power jack from one power supply into the DC power connector (J10) located underneath the Stereo Companion board.
5) Insert the DC power jack from the remaining power supply into the DC power connector (J10) located underneath the DEV board.

Stereo Testing

1) Insert both 5V power supplies into wall receptacles.
2) With the audio source disabled, connect the USB cable from your computer to the USB port (J2) on the AUDINT3 board.
3) The multicolor LED D1 on the AUDINT3 blinks white. When the computer registers the AUDINT3 as a USB device D1 changes to magenta and blinks slowly.
4) Launch DSM Sound Studio and follow the prompts.
5) For further refinement of the hardware configuration launch the MAX98390 evaluation software. To select a device to configure, use the **Active Device** pulldown menu located in the top banner of the GUI. Once a device is selected, click the **Read All** button to refresh the settings of the GUI.

Ordering Information

PART	TYPE
MAX98390EVSYS#	Complete Evaluation System
MAX98390-ST-AUX#	Add-on board and supplies for stereo applications. Requires MAX98390EVSYS#.

#Denotes RoHS compliant.

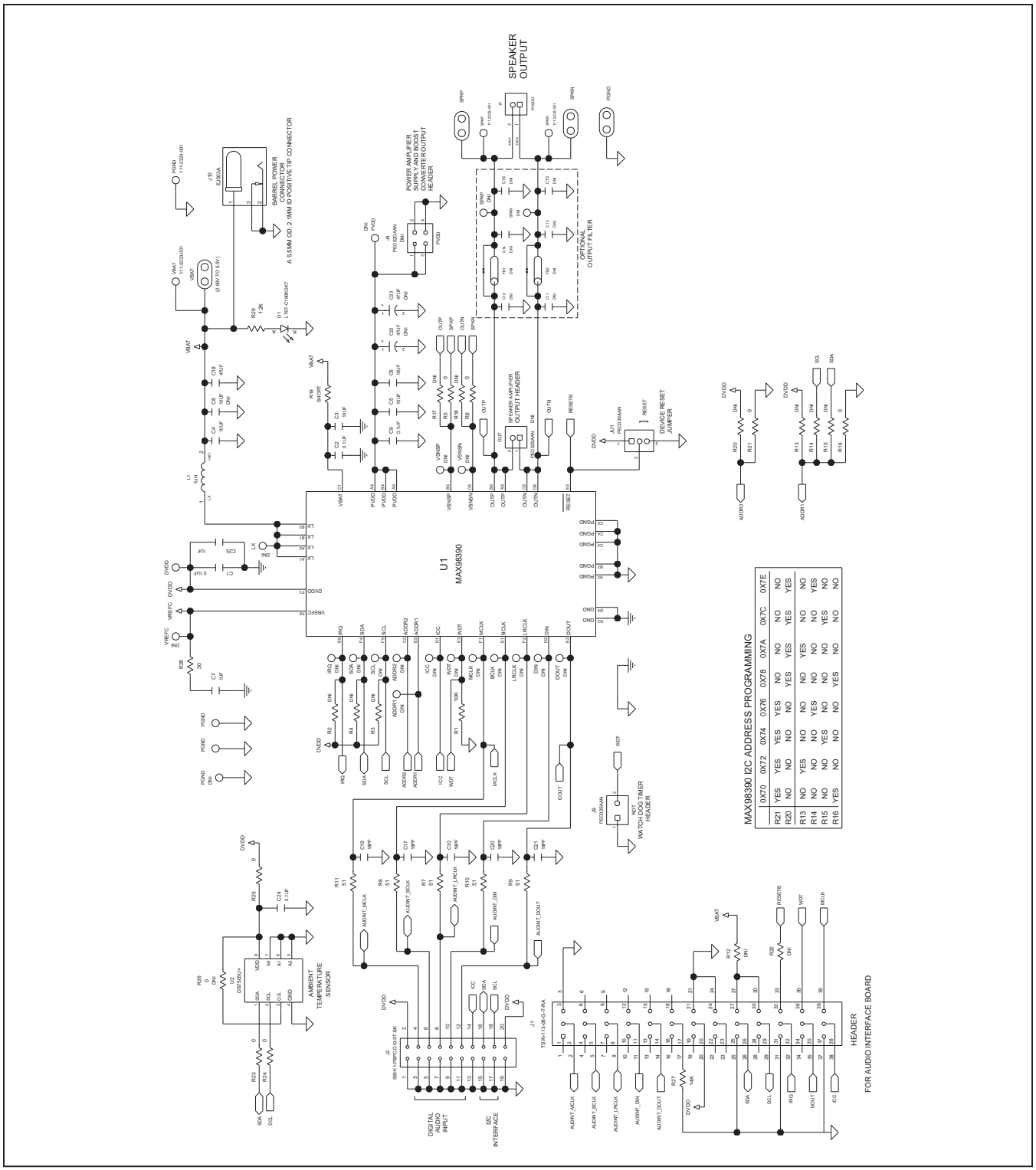
MAX98390 EV Kit Bill of Materials

ITEM	REF_DES	DNI/DNP	QTY	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION
1	C1, C24	—	2	C0201C104K9PAC; GRM033R60J104KE19; C0603X5R0J104K030BC; C0201X5R6R3-104KNP	KEMET;MURATA; VENKEL;TDK	0.1UF	CAPACITOR; SMT (0201); CERAMIC CHIP; 0.1µF; 6.3V; TOL=10%; MODEL = X5R; TG = -25°C TO +85°C; TC = +/
2	C2	—	1	GRM033R61A104KE15; LMK063BJ104KP	MURATA;TAIYO YUDEN	0.1UF	CAPACITOR; SMT (0201); CERAMIC CHIP; 0.1UF; 10V; TOL = 10%; MODEL = ; TG = -55°C TO +125°C; TC = X5R
3	C3, C4	—	2	GRM155R61A106ME44; GRM155R61A106ME11; 0402ZD106MAT2A; CL05A106MP5NUNC	MURATA;MURATA; AVX;SAMSUNG	10UF	CAPACITOR; SMT (0402); CERAMIC CHIP; 10UF; 10V; TOL = 20%; TG = -55°C TO +85°C; TC = X5R
4	C5, C6	—	2	C1608X5R1E106M080AC; CL10A106MA8NRNC; GRM188R61E106MA73; ZRB18AR61E106ME01	TDK; SAMSUNG ELECTRONICS; MURATA;MURATA	10UF	CAPACITOR; SMT (0603); CERAMIC CHIP; 10UF; 25V; TOL = 20%; TG = -55°C TO +85°C; TC = X5R
5	C7	—	1	C0402X5R6R3-105KNP; C1005X5R0J105K050BB; GRM155R60J105KE19; JMK105BJ105KV-F; JMK105BJ105KVHF	VENKEL LTD;TDK;MURATA; TAIYO YUDEN;TAIYO YUDEN	1UF	CAPACITOR; SMT (0402); CERAMIC CHIP; 1UF; 6.3V; TOL = 10%; TG = -55°C TO +85°C; TC = X5R;
6	C9	—	1	GRM033C71C104KE14	MURATA	0.1UF	CAPACITOR; SMT (0201); CERAMIC CHIP; 0.1UF; 16V; TOL = 10%; TG = -55°C TO +125°C; TC = X7S
7	C10, C17, C19-C21	—	5	C0402C180J5GAC; GRM1555C1H180JA01; C1005C0G1H180J050BA	KEMET;MURATA;TDK	18PF	CAPACITOR; SMT (0402); CERAMIC CHIP; 18PF; 50V; TOL = 5%; TG = -55°C TO +125°C; TC = C0G
8	C18	—	1	GRM32ER61C476KE15	MURATA	47UF	CAPACITOR; SMT (1210); CERAMIC CHIP; 47UF; 16V; TOL = 10%; MODEL = GRM SERIES; TG = -55°C TO +85°C; TC = X5R
9	C25	—	1	GRM033R60J105MEA2; C0603X5R0J105M030; CL03A105MQ3CSN	MURATA;TDK;SAMSUNG	1UF	CAPACITOR; SMT (0201); CERAMIC CHIP; 1UF; 6.3V; TOL=20%; MODEL = GRM SERIES; TG = -55°C TO +85°C; TC = X5R
10	D1	—	1	LTST-C190KGKT	LITE-ON ELECTRONICS INC.	LTST-C190KGKT	DIODE; LED; SMT (0603); PIV = 5V; IF = 0.03A
11	DVDD, PGND3, PGND4	—	3	5023	KEYSTONE	N/A	TEST POINT; PIN DIA = 0.100IN; TOTAL LENGTH = 0.200IN; BOARD HOLE = 0.0725IN; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH
12	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
13	J2	—	1	SBH11-PBPC-D10-ST-BK	SULLINS ELECTRONICS CORP	SBH11-PBPC-D10-ST-BK	CONNECTOR; MALE; THROUGH HOLE; HEADER; STRAIGHT; 20PINS
14	J3	—	1	1790283	PHOENIX CONTACT	1790283	CONNECTOR; FEMALE; THROUGH HOLE; GREEN TERMINAL BLOCK; PUSH-IN SPRING CONNECTION; RIGHT ANGLE; 2PINS
15	J9	—	1	PEC02SAAN	SULLINS	PEC02SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 2PINS
16	J10	—	1	EJ503A	MEMORY PROTECTION DEVICES INC	EJ503A	CONNECTOR; FEMALE; THROUGH HOLE; DC JACK; 5.5MM OD; 2.1MM ID; POSITIVE TIP CONNECTOR; RIGHT ANGLE; 3PINS
17	JU1	—	1	PEC03SAAN	SULLINS	PEC03SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 3PINS
18	L1	—	1	PIFE32251B-1R0MS	CYNTEC	1UH	INDUCTOR; SMT (1210); FERRITE BOBBIN CORE; 1µH; TOL = ±20%; 4.7A
19	MH1-MH4	—	4	METAL_STANDOFF_4-40_1/2_6.3	MAXIM	METAL_STANDOFF_ 4-40_1/2_6.3	KIT; ASSY-STANDOFF 1/2IN; FEMALE-THREADED; HEX; 4-40; 1/2IN; ALUMINUM WITH SCREW; PHILLIPS; PAN; 4-40; 1/4IN; 18-8 STAINLESS STEEL
20	PGND, SPKN, SPKP, VBAT	—	4	111-2223-001	EMERSON NETWORK POWER	111-2223-001	MACHINE SCREW; THUMBSCREW; BANANA; 1/4-32IN; 11/32IN; NICKEL PLATED BRASS
21	PGND6, SPKN2, SPKP2, VBAT1	—	4	9020 BUSS	WEICO WIRE	MAXIMPAD	EVK KIT PARTS; MAXIM PAD; WIRE; NATURAL; SOLID; WEICO WIRE; SOFT DRAWN BUS TYPE-S; 20AWG

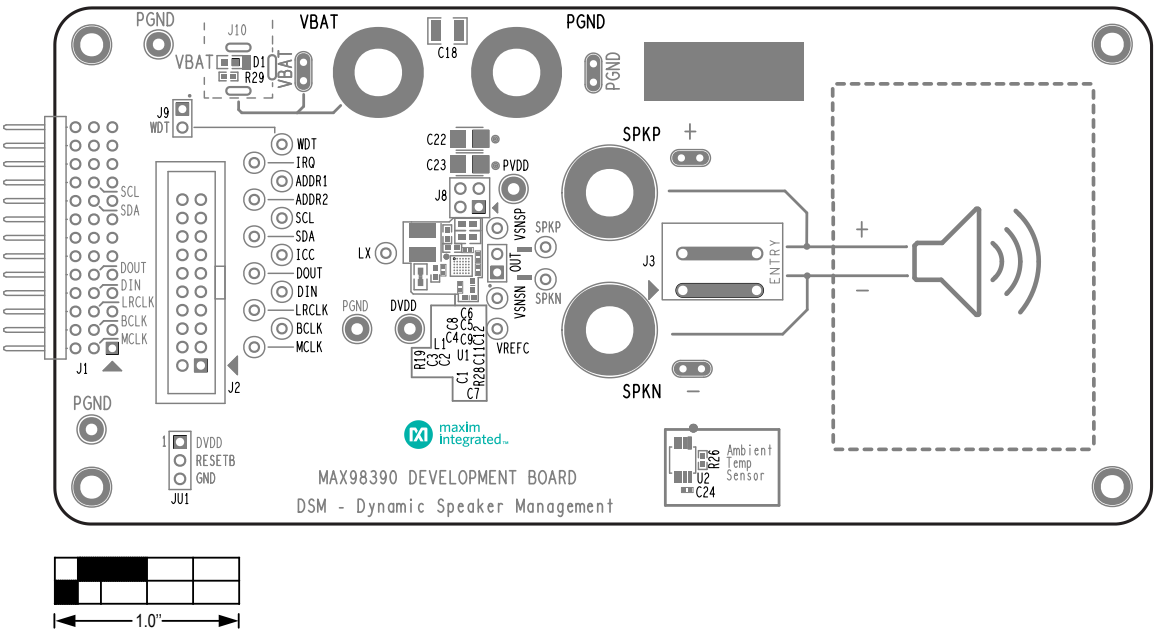
MAX98390 EV Kit Bill of Materials (continued)

ITEM	REF_DES	DNI/DNP	QTY	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION
22	R1	—	1	CRCW040210K0JN	VISHAY DALE	10K	RESISTOR; 0402; 10K ; 5%; 200PPM; 0.063W; THICK FILM
23	R5, R6, R16, R21, R23-R25	—	7	ERJ-2GE0R00	PANASONIC	0	RESISTOR; 0402; 0Ω; 0%; JUMPER; 0.10W; THICK FILM
24	R7-R11	—	5	CRCW040251R0JN	VISHAY DALE	51	RESISTOR; 0402; 51Ω; 5%; 200PPM; 0.063W; THICK FILM
25	R27	—	1	ERJ-2RKF1402	PANASONIC	14K	RESISTOR; 0402; 14KΩ; 1%; 100PPM; 0.10W; THICK FILM
26	R28	—	1	ERJ-2RKF30R0	PANASONIC	30	RESISTOR; 0402; 30Ω; 1%; 100PPM; 0.1W; THICK FILM
27	R29	—	1	CRCW04021K20FK; 9C04021A1201LF; MCR01MZPF1201	VISHAY DALE; VISHAY DALE; ROHM SEMICONDUCTOR	1.2K	RESISTOR; 0402; 1.2K; 1%; 100PPM; 0.0625W; THICK FILM
28	SU1	—	1	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
29	U1	—	1	MAX98390	MAXIM	MAX98390	EVKIT PART - IC; MAX98390; PACKAGE CODE: W362G2+1; PACKAGE OUTLINE: 21-100287
30	U2	—	1	DS7505U+	MAXIM	DS7505U+	IC; DTHM; DIGITAL THERMOMETER AND THERMOSTAT; UMAX8
31	PCB	—	1	MAX98390_APPS_A	MAXIM	PCB	PCB:MAX98390_APPS_A
32	MH1-MH4	DNI	4	MCH_SO_F_HEX_4-40X1/2	GENERIC PART	N/A	STANDOFF; FEMALE-THREADED; HEX; 4-40; 1/2IN; ALUMINUM
33	MH1-MH4	DNI	4	4C25MXPS; PMSSS4400025PH; 9900; 91735A102	GENERIC PART	N/A	MACHINE SCREW; PHILLIPS; PAN; 4-40; 1/4IN; 18-8 STAINLESS STEEL
34	ADDR1, ADDR2, IRQ, SCL, SDA	DNP	0	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;
35	BCLK, DIN, DOUT, ICC, LRCLK, MCLK	DNP	0	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;
36	C8	DNP	0	GRM155R61A106ME44; GRM155R61A106ME11; 0402ZD106MAT2A; CL05A106MP5NUNC	MURATA;MURATA; AVX;SAMSUNG	10UF	CAPACITOR; SMT (0402); CERAMIC CHIP; 10UF; 10V; TOL = 20%; TG = -55°C TO +85°C; TC = X5R
37	C11-C14	DNP	0	N/A	N/A	OPEN	PACKAGE OUTLINE 0201 NON-POLAR CAPACITOR
38	C15, C16	DNP	0	N/A	N/A	OPEN	PACKAGE OUTLINE 0402 NON-POLAR CAPACITOR
39	C22, C23	DNP	0	PSLB31A476M55HF; 10TPE47MAZB	NEC TOKIN;PANASONIC	47UF	CAPACITOR; SMT (3528); TANTALUM CHIP; 47UF; 10V; TOL = 20%; TG = -55°C TO +105°C
40	FB1, FB2	DNP	0	N/A	N/A	OPEN	PACKAGE OUTLINE 0402 FERRITEBEAD
41	J8	DNP	0	PEC02DAAN	SULLINS ELECTRONIC CORP.	PEC02DAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 4PINS
42	L1A	DNP	0	74406042010	WURTH ELECTRONICS INC.	1UH	INDUCTOR; SMT; SHIELDED; 1UH; 30%; 4.47A ;
43	LX, VREFC, VSNSN, VSNSP, WDT	DNP	0	5002	KEYSTONE	N/A	TEST POINT; PIN DIA = 0.1IN; TOTAL LENGTH = 0.3IN; BOARD HOLE = 0.04IN; WHITE; PHOSPHOR BRONZE WIRE SILVER;
44	OUT	DNP	0	PEC02SAAN	SULLINS	PEC02SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 2PINS
45	PGND2	DNP	0	5011	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH = 0.445IN; BOARD HOLE = 0.063IN; BLACK; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;
46	PVDD	DNP	0	5010	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH = 0.445IN; BOARD HOLE = 0.063IN; RED; PHOSPHOR BRONZE WIRE SIL;
47	R2-R4, R13-R15, R17, R18, R20	DNP	0	N/A	N/A	OPEN	PACKAGE OUTLINE 0402 RESISTOR
48	R19	DNP	0	N/A	N/A	SHORT	PACKAGE OUTLINE 0603 RESISTOR
49	R22, R12	DNP	0	N/A	N/A	OPEN	PACKAGE OUTLINE 0603 RESISTOR
50	R26	DNP	0	ERJ-2GE0R00	PANASONIC	0	RESISTOR; 0402; 0 ; 0%; JUMPER; 0.10W; THICK FILM
51	SPKN1	DNP	0	5001	KEYSTONE	N/A	TEST POINT; PIN DIA = 0.1IN; TOTAL LENGTH = 0.3IN; BOARD HOLE = 0.04IN; BLACK; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;
52	SPKP1	DNP	0	5000	KEYSTONE	N/A	TEST POINT; PIN DIA = 0.1IN; TOTAL LENGTH = 0.3IN; BOARD HOLE = 0.04IN; RED; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;
TOTAL			67				

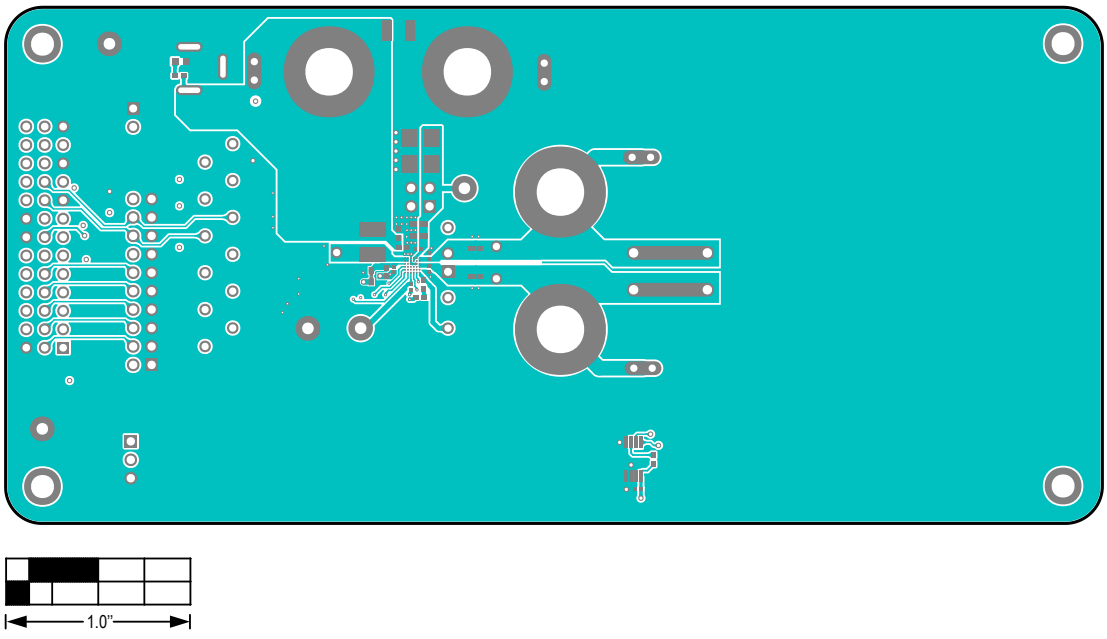
MAX98390 EV Kit Schematic



MAX98390 EV Kit PCB Layout Diagrams

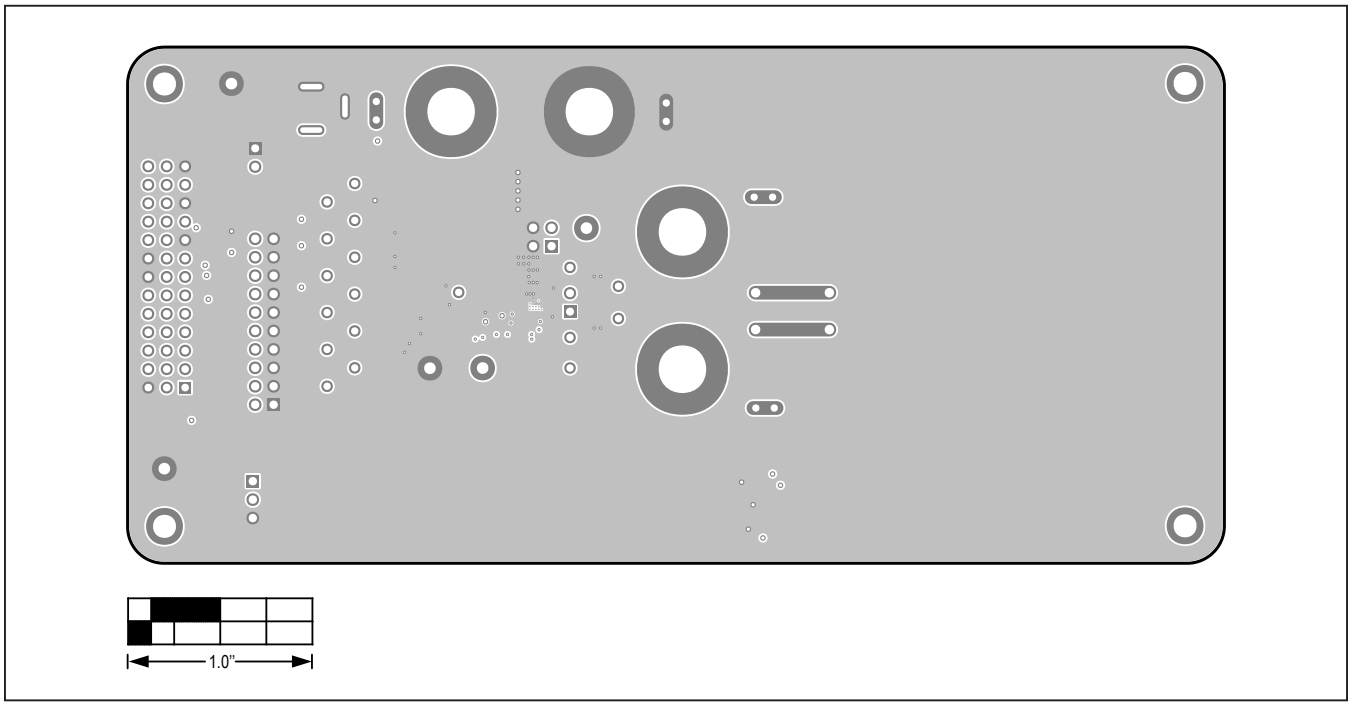


MAX98390 EV Kit Component Placement Guide—Top Silkscreen

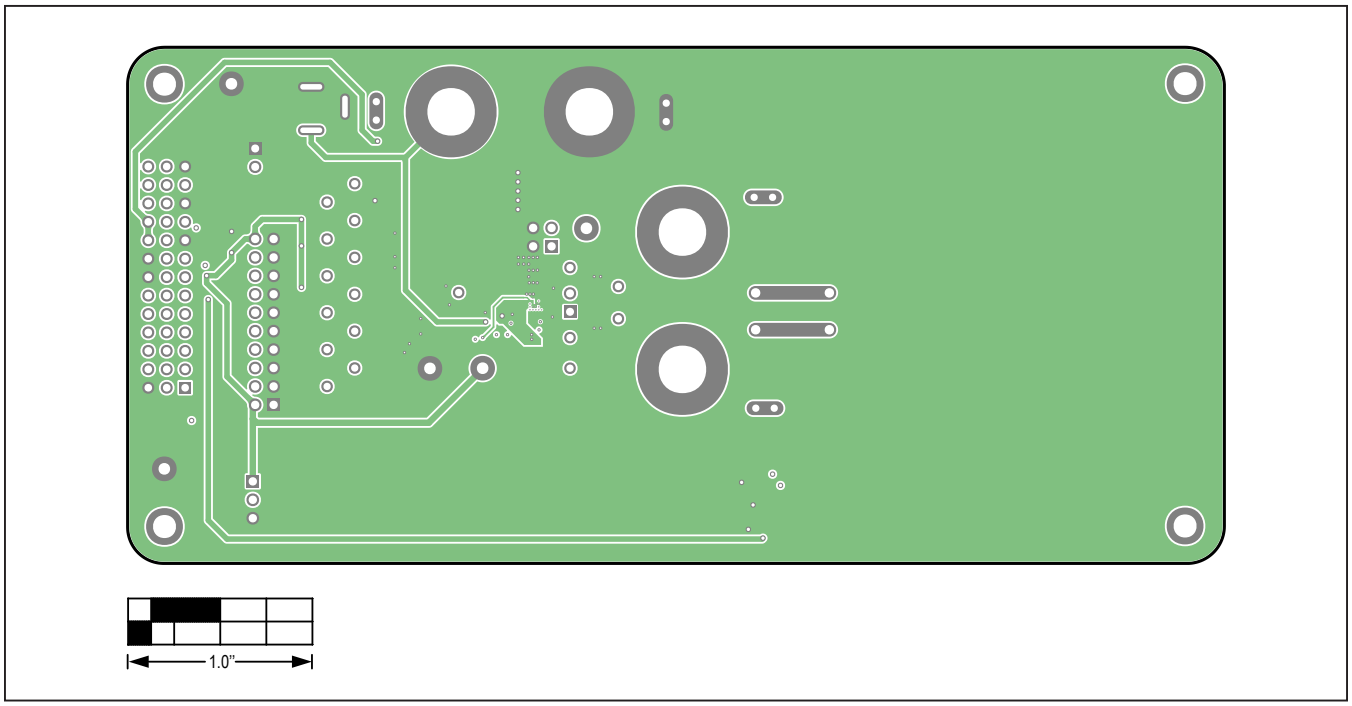


MAX98390 EV Kit PCB Layout—Top View

MAX98390 EV Kit PCB Layout Diagrams (continued)

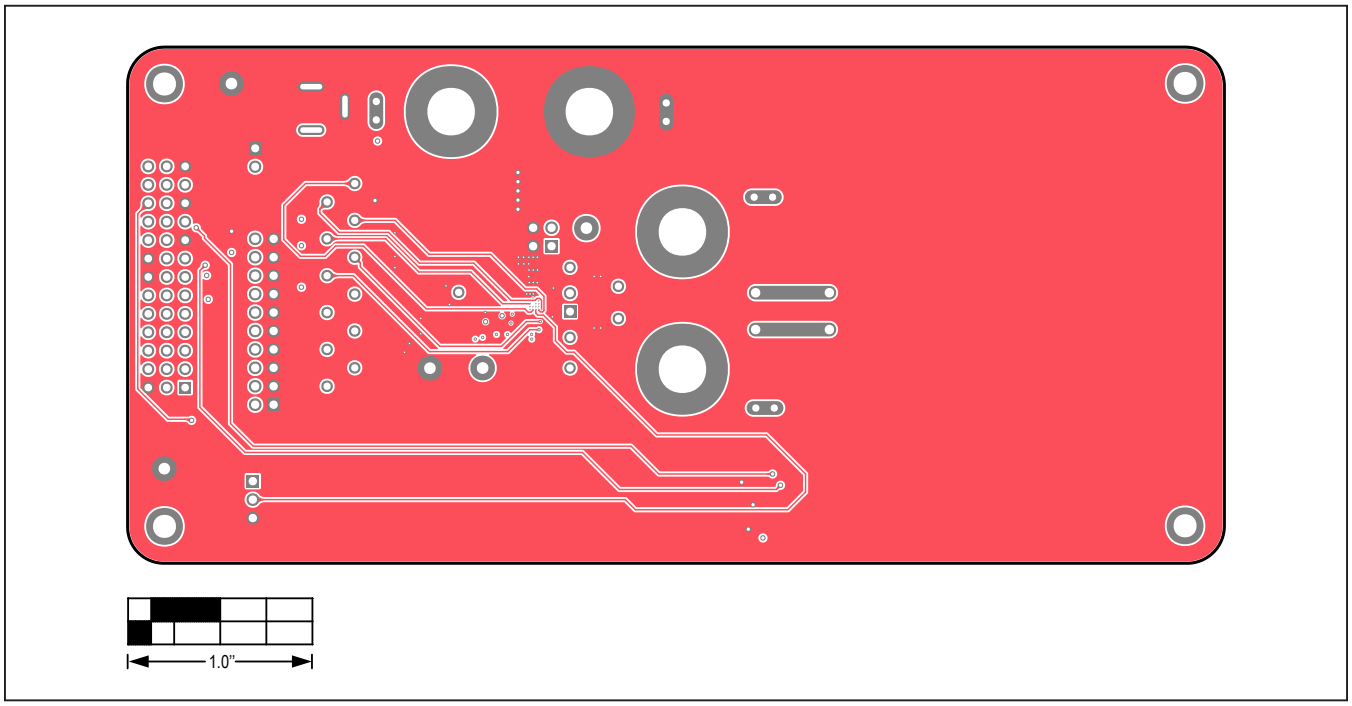


MAX98390 EV Kit PCB Layout—Inner 1

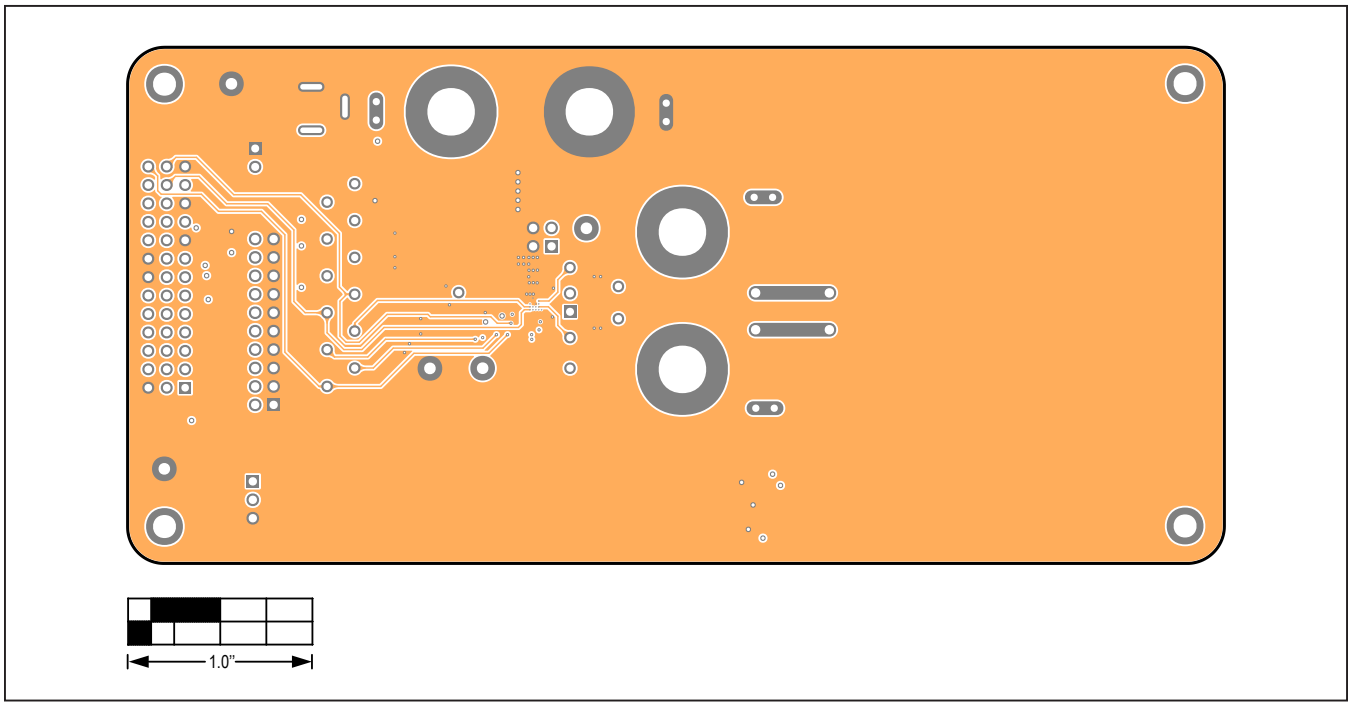


MAX98390 EV Kit PCB Layout—Inner 2

MAX98390 EV Kit PCB Layout Diagrams (continued)

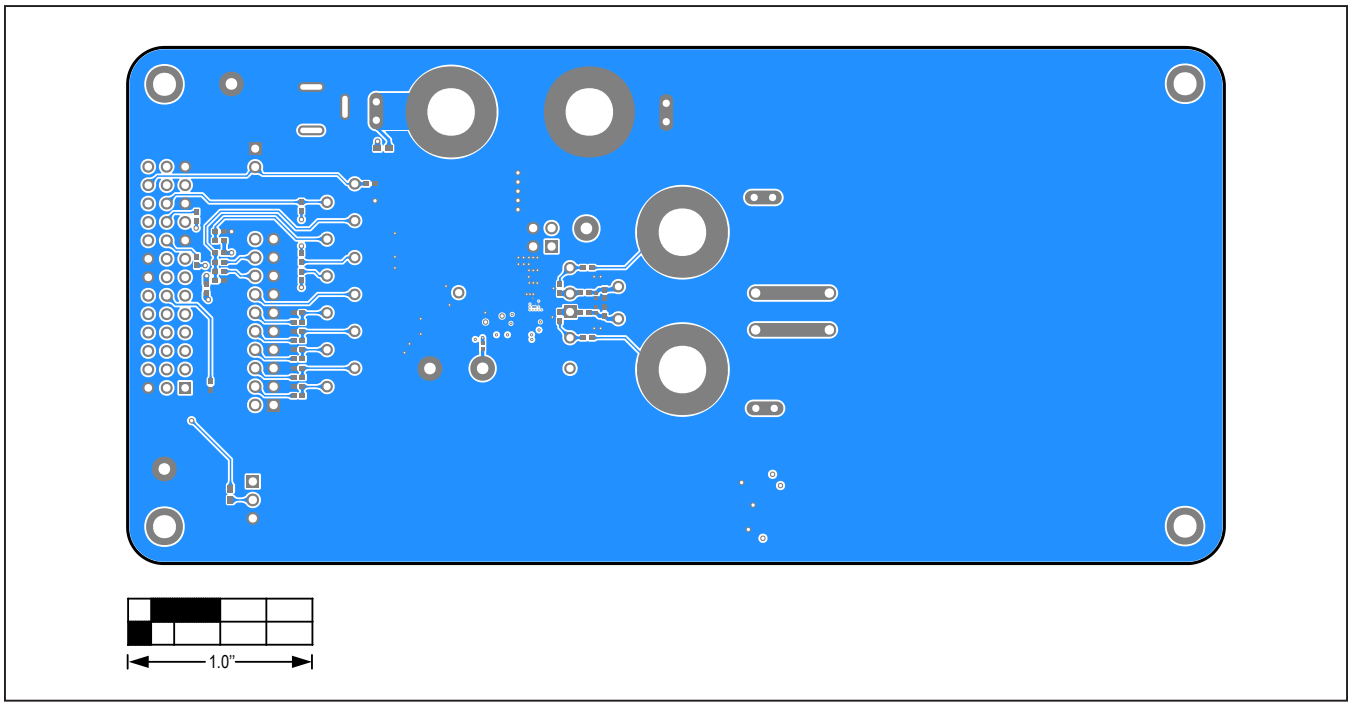


MAX98390 EV Kit PCB Layout—Inner 3

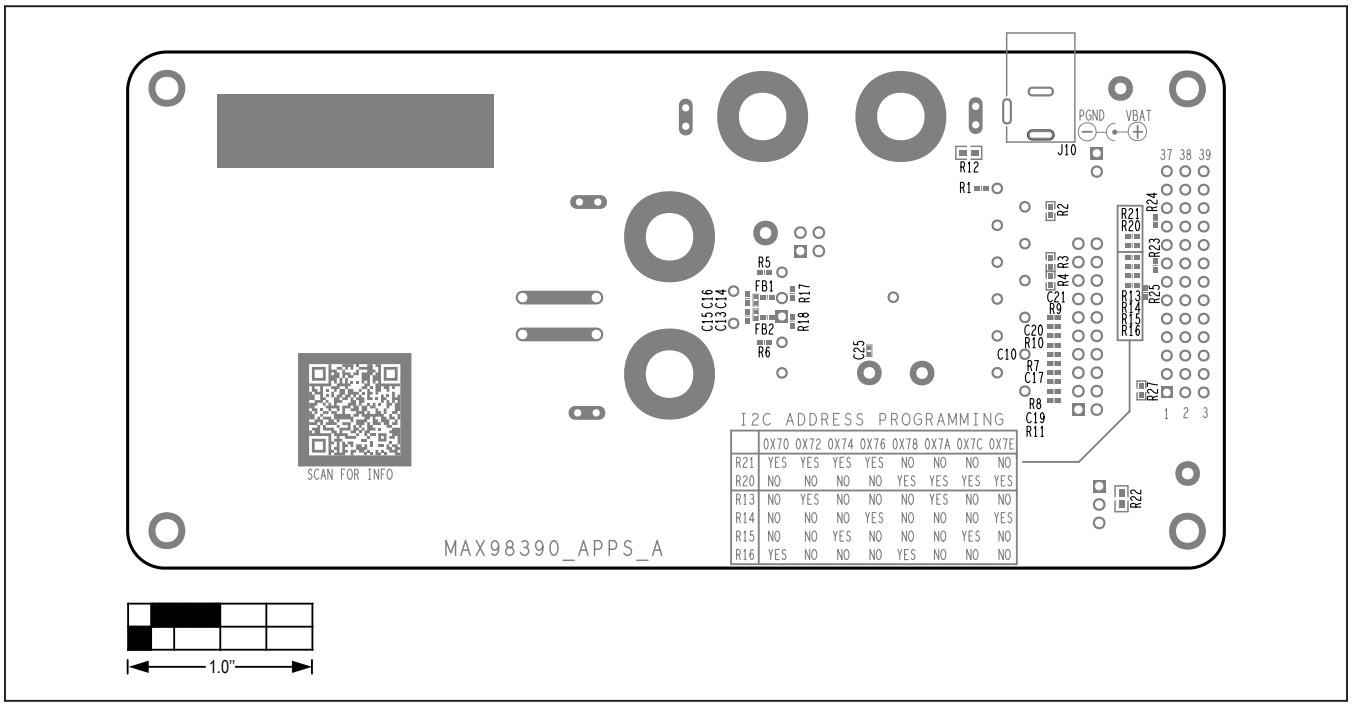


MAX98390 EV Kit PCB Layout—Inner 4

MAX98390 EV Kit PCB Layout Diagrams (continued)



MAX98390 EV Kit PCB Layout—Bottom View



MAX98390 EV Kit Component Placement Guide—Bottom Silkscreen

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	4/19	Initial release	—

For pricing, delivery, and ordering information, please visit Maxim Integrated's online storefront at https://www.maximintegrated.com/en/storefront/storefront.html.

Maxim Integrated cannot assume responsibility for use of any circuitry other than circuitry entirely embodied in a Maxim Integrated product. No circuit patent licenses are implied. Maxim Integrated reserves the right to change the circuitry and specifications without notice at any time.