

# MAX98396 Evaluation Kit

Evaluates: MAX98396

## General Description

The MAX98396 evaluation system (EV system) evaluates the MAX98396 Mono Class-D Audio Amplifier featuring Dynamic Headroom Tracking (DHT) and Clock-and-Data Monitoring. The EV system consists of the MAX98396 Development Board (DEV board), Audio Interface Board III (AUDINT3), a micro-USB cable, and the MAX98396 evaluation software.

It is recommended that the DEV board be evaluated with the AUDINT3 board as an EV system. The MAX98396 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 the USB-to-PCM and USB-to-I<sup>2</sup>C interfaces in addition to the 1.8V AVDD supply and the 1.2V DVDD and DVDDIO supplies that are needed to evaluate the DEV board. The IC DEV board requires two additional supply inputs, 3V to 5.5V (VBAT) and 3V to 20V (PVDD). [Figure 1](#) details the DEV board and the AUDINT3 board.

## Benefits and Features

- Complete Hardware System with Easy Setup; No Tools or Special Equipment Required
- Easy to use Graphical User Interface (GUI) Evaluation Software (Windows® 7/10 Compatible)
  - Complete Access to all Hardware Registers

## EV System Contents

- MAX98396 Development Board
- Audio Interface Board III
- Micro-USB Cable

The MAX98396 evaluation software provides complete access to all hardware registers.

[Ordering Information](#) appears at end of data sheet.

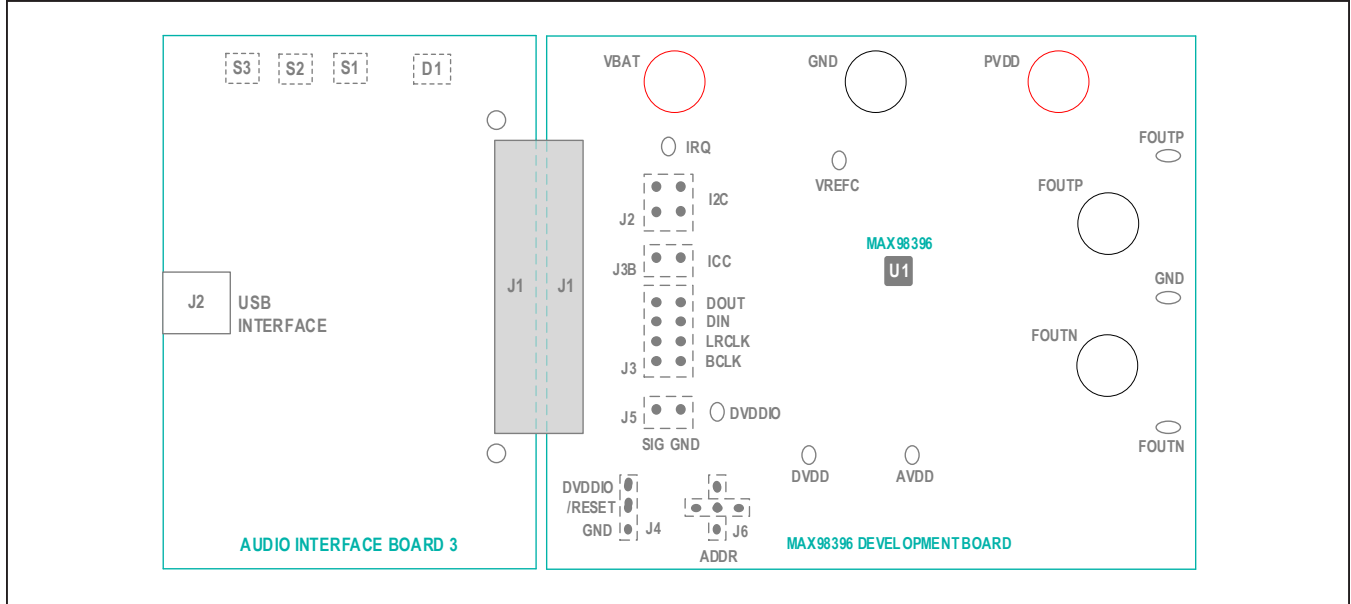


Figure 1. Simplified EV System Block Diagram

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iTunes is a registered trademark of Apple Inc.

## Quick Start

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

### Software Installation

- 1) For the latest software, login to your MyMaxim account at MaximIntegrated.com, navigate to MAX98396 | Design Resources | MAX98396 Software, download MAX98396EVSwSetupVxx.exe, and extract the downloaded folder to a temporary location.
- 2) Install the MAX98396 evaluation software by running the program installer MAX98396EVSwSetupvxx.exe and follow all installer prompts. 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 | MAX98396 Evaluation Software**.

### Required Equipment

- MAX98396 EV System
  - MAX98396 Development Board (DEV board)
  - Audio Interface Board III (AUDINT3)
  - Micro-USB cable
- Two DC power supplies
  - 3V to 20V (for PVDD)
  - 3V to 5.5V (for VBAT)
  - **Note:** PVDD must be greater than VBAT
- 4Ω to 8Ω speaker
- PC (Windows 7/10) with USB port

### Required Software

- The MAX98396 evaluation software. The MAX98396 evaluation software is compatible with Windows 7/10 and can be found on [Maxim Integrated's website](#). See the [Software Installation](#) section.
- Audio source (e.g., Windows Media Player® or iTunes®)

### Reference Material

- MAX98396 IC data sheet

### Procedure

The MAX98396 and AUDINT3 boards are fully assembled and tested. Follow the steps to set up the EV system for device evaluation.

### AUDINT3 Board Setup:

- 1) Connect the MAX98396 DEV board (J1 connector) to the AUDINT3 board (J1 connector).
- 2) With the audio source disabled, connect the micro-USB cable from the computer to the USB port (J2) on the AUDINT3 board. The AUDINT3 board provides the power for AVDD (1.8V), DVDD (1.2V), and DVDDIO (1.2V) to the DEV board through the J1 connector.
- 3) The AUDINT3 should automatically register through Windows as a USB device. When the AUDINT3 is connected and ready, the status LED (D1) changes to magenta and blinks slowly.

### DEV Board Setup

The EV kit is fully assembled and tested.

- 1) Connect the 3V to 20V power supply across the PVDD and GND binding posts.
- 2) Connect the speaker leads across the SPKP and SPKN binding posts.
- 3) Place the shunt on jumper JU4 across the  $\overline{\text{RESET}}$  and DVDDIO pins.

### Test

- 1) Enable the supply voltages across each of the supply pins.
- 2) Launch the MAX98396 evaluation software and wait until the software registers connection to the EV system. Once the connection has been properly established, the status bar at the bottom of the GUI window reports that the USB is connected, displays the MAX98396 part number and its revision ID, Audio Interface 3 with its firmware version, and "EV System Ready". See [Figure 3](#).
- 3) After the EV system is connected, configure the device by loading the "I2S\_48kHz\_IVADCs.98396" configuration file. This file can be loaded from **File | Load Register Settings | Preinstalled Configuration Files**.
- 4) Open the Windows' **Sound** dialog and select the **Playback** tab. A **Speakers** item similar to [Figure 2](#) should be 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. When audio is streaming, the D1 LED on the AUDINT3 should change to yellow.
- 8) Quick start of the evaluation software is now complete.



Figure 2. Playback Device

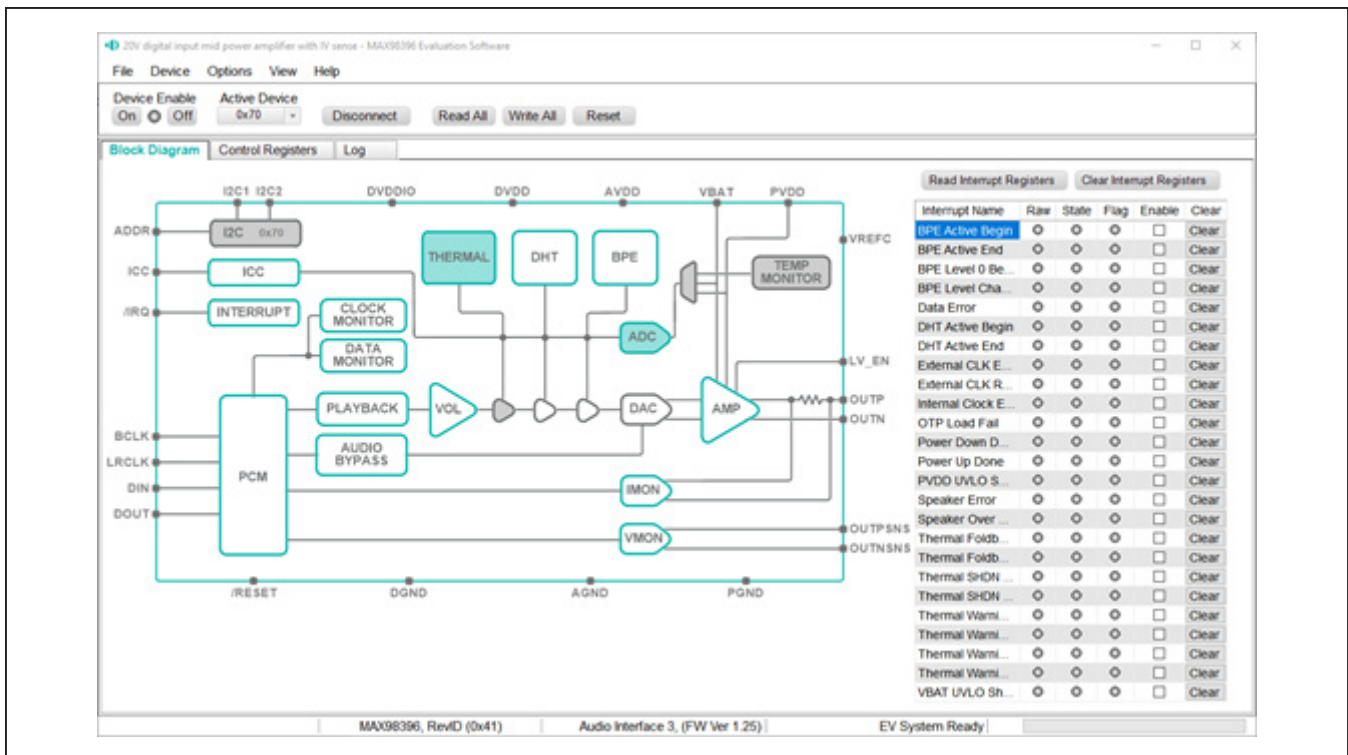


Figure 3. MAX98396 Evaluation Software

### Detailed Description of Evaluation Software

The MAX98396 evaluation software is designed to be used only with the MAX98396 EV system. The software provides an intuitive graphical user interface (GUI) for programming the MAX98396 device and includes many features intended to aid evaluation.

The MAX98396 evaluation software’s main window in [Figure 3](#) 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 **communication tool bar** provides basic functionality for communicating with the device, and the **status bar** provides information about hardware con-

nectivity 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 0x2000–0x21FE, as well as to the revision ID register, 0x21FF. The **Log** tab provides a log of the I2C transactions and a tool to read specific registers. The MAX98396 evaluation software is compatible with Windows 7/10 and can be found on [Maxim Integrated’s website](#). Refer to the MAX98396 IC data sheet for device register information.

### Communication Tool Bar

The **Communication tool bar** consists of control buttons and a drop-down menu to select the active I<sup>2</sup>C address. These controls are always accessible, regardless of the active tabbed page. The tool bar is shown in [Figure 4](#). [Table 1](#) provides details about each control.

### 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. Once the AUDINT3 connection is established, it searches for all I<sup>2</sup>C addresses associated with the MAX98396 device and populates all detected device addresses in the **Active Device** drop-down list. During this sequence, the text on the **Connect/Disconnect** button automatically changes from **Connect** to **Disconnect**, and the status bar is also updated to reflect the current state of the hardware connection. If properly connected, “EV System Ready” should be displayed on the right side of the status bar.

Once the EV System is properly connected, the button displays **Disconnect** and changes function. When clicked on, the **Disconnect** button 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 on the **Connect** button, after which the status bar (in the bottom right corner) should display “EV System Ready” and the button function changes to **Disconnect**, showing that the EV system is properly connected.

### Status Bar

The Status bar is divided into five sections, from left to right: status and alert messages, device part number and revision ID, interface name and firmware version, EV system connection status, and communication activity.

**Table 1. Tool Bar Controls**

CONTROL	FUNCTION
<b>On</b>	Sets the Global Enable bit (EN). This enables the device.
<b>Off</b>	Clears 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. Detected addresses are shown in the Active Device drop-down list.
Connect	Connects the USB Control interface to the MAX98396 DEV board.
Disconnect	Disconnects the USB Control interface from the MAX98396 DEV board.
<b>Read All</b>	Initiate a read of all device registers. The <b>Control Registers</b> tab and <b>Block Diagram</b> tab are updated to reflect the read data.
<b>Write All</b>	Initiates a write to all device registers, using the settings shown on the <b>Control Registers</b> tab.
<b>Reset</b>	Initiates a Soft Reset; resets all device registers to their power-on-reset (POR) state.

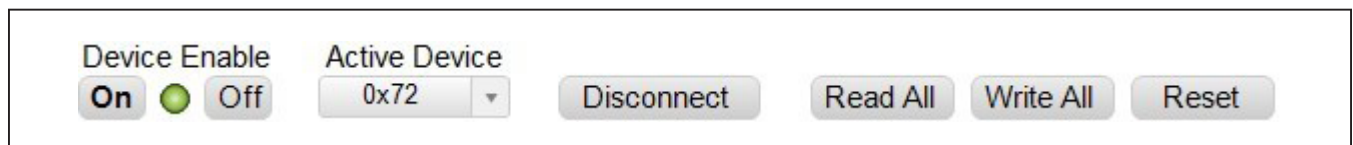


Figure 4. Communication Tool Bar

**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 to 0x200E). 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.

**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 MAX98396 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 which 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 5](#) shows the block diagram with the MAX98396 configured for DAI (USB audio) input and speaker output.

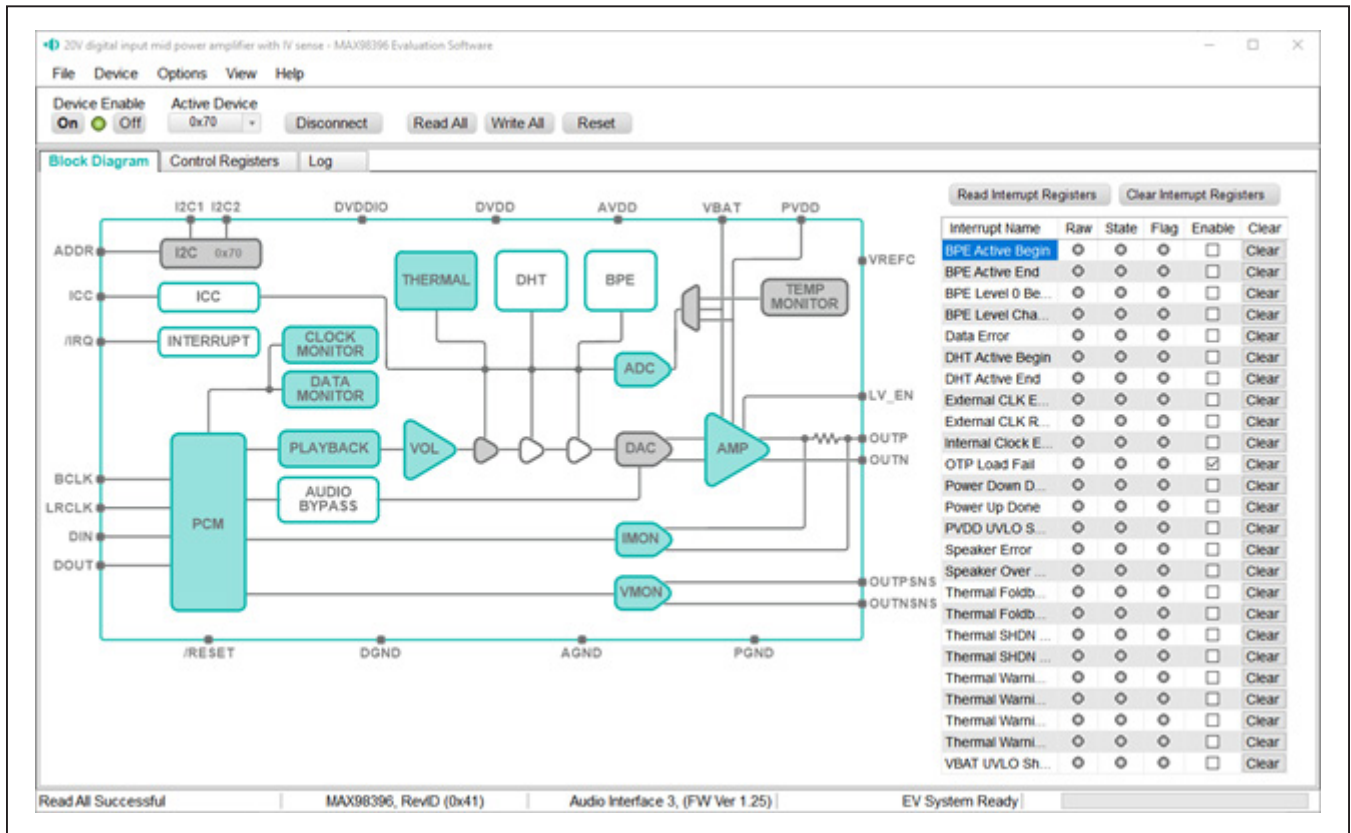


Figure 5. MAX98396 Block Diagram Tab (Configured for USB Audio Input to Speaker Output)



### 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. Clicking on a dialog block opens a dialog window. [Figure 6](#) shows the typical GUI controls that are found in a dialog window.

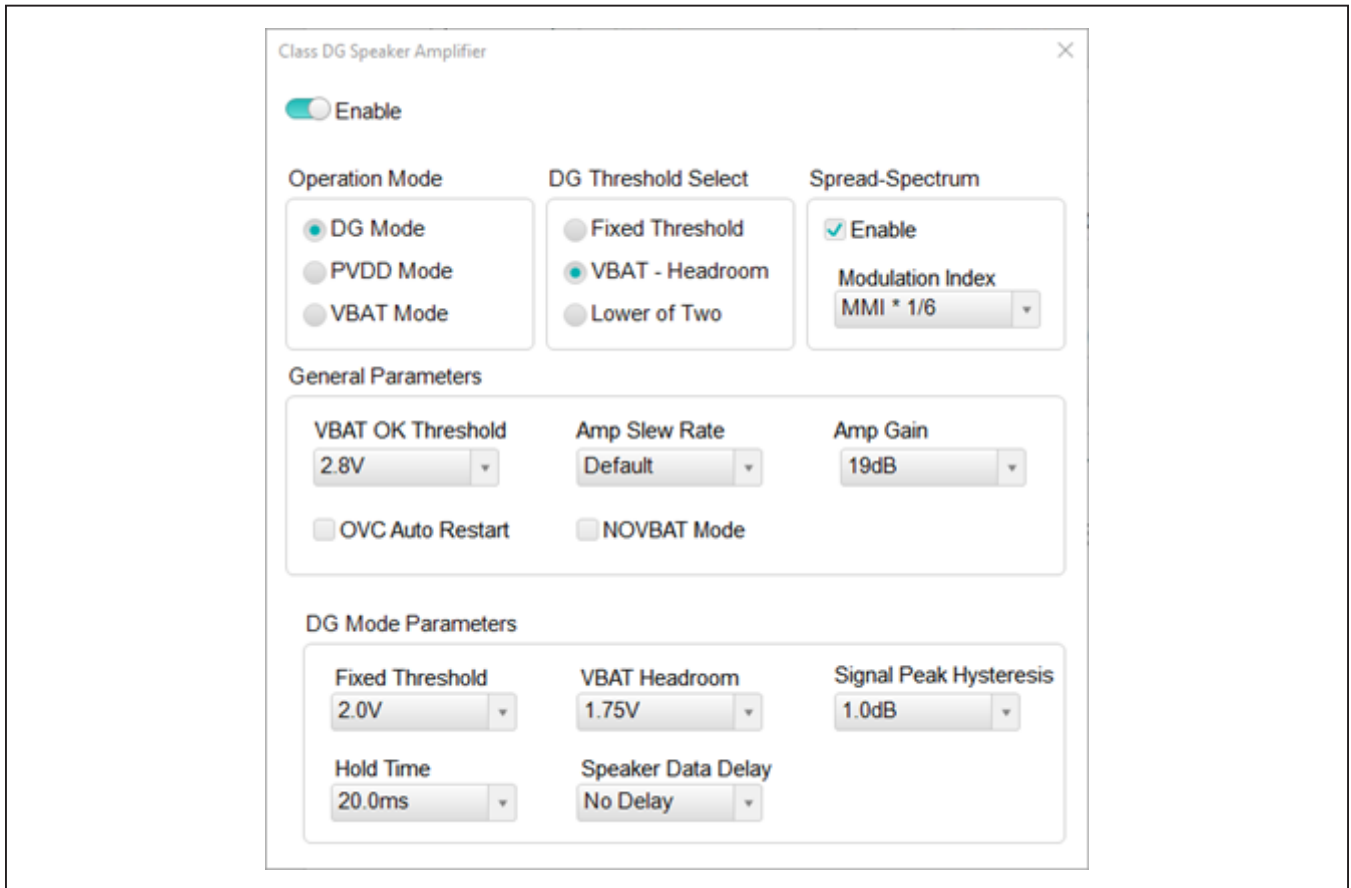


Figure 6. Typical GUI Controls

### Control Registers Tab

The **Control Registers** tab provides two methods for configuring the device. As an example, [Figure 7](#) shows the elements of the control 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 is 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 hexadecimal 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. For a complete list of read-only registers, refer to the *Write Access Restrictions* section of the MAX98396 data sheet.

### Menu Bar

All the menu bar items are described in [Table 2](#), with additional information for some menu items provided in the following sections.

**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 pre-installed file).
Save Control Register Settings	Saves a configuration file containing the current device settings.
Exit	Closes the MAX98396 evaluation software.
<b>DEVICE</b>	
Connect	Runs a connection routine to connect to the EV system, first establishing a connection to the AUDINT3 board and then to the MAX98396 device.
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 in the <b>Control Registers</b> tab and then updates the GUI.
Read Rev ID	Reads the device's revision ID register and updates the status bar.
<b>OPTIONS</b>	
Interface Selection	Selects the I <sup>2</sup> C hardware interface to either the Audio Interface or an I <sup>2</sup> C Bridge (not supported).
Configuration Mode F4	Opens a dialog window that allows multiple MAX98396 devices to be selected for configuration through the software. This feature is available only when more than one active device is detected.
Demo Mode	Switches the software to demo mode.
<b>HELP</b>	
View Help F1	Links to technical documents.

Register Address	Register Name	[7]	[6]	[5]	[4]	[3]	[2]	[1]	[0]	Hex
0x2000	Software Reset								RST	0x00
0x2001	Interrupt Raw 1	THERMSHDN...	THERMSHDN...	THERMWARN...	THERMWARN...	THERMFB_BG...	THERMFB_EN...	OTP_FAIL_RAW	SPK_OVC_RAW	0x00
0x2002	Interrupt Raw 2	THERMWARN...	THERMWARN...	INT_SPKMON...	INT_CLK_ERR...		CLK_RECOVE...	CLK_ERR_RAW	DMON_ERR...	0x00
0x2003	Interrupt Raw 3			PWRUP_DON...	PWRDN_DON...	PVDD_UVLO...	VBAT_UVLO_S...	DHT_ACTIVE...	DHT_ACTIVE...	0x00
0x2004	Interrupt Raw 4					BPE_L0_RAW	BPE_LEVEL...	BPE_ACTIVE...	BPE_ACTIVE...	0x00
0x2006	Interrupt State 1	THERMSHDN...	THERMSHDN...	THERMWARN...	THERMWARN...	THERMFB_BG...	THERMFB_EN...	OTP_FAIL_ST...	SPK_OVC_ST...	0x00

Figure 7. Control Register Tab

**File I/O**

All menu bar items are described in [Table 2](#), with additional information for some menu items provided in the following sections.

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 MAX98396 registers as displayed on the **Register** tab. This feature makes it easy to program a device to a saved/known state and allows users to share configuration files. A best practice is to use descriptive file names when saving the configuration files.

The save and load features are functional even when the hardware is not connected; this allows configuration files to be created and opened when the 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 .98396 extension.

The software has many standard configuration files pre-installed. Load a file by selecting **File | Load Register Settings | Pre-Installed Configuration Files**, select the file using the drop-down menu, and then click **Load**.

**Detailed Description of Hardware**

The MAX98396 EV System is designed to allow for a thorough evaluation of the MAX98396 boosted Class-D audio amplifier IC. The EV system includes the MAX98396 development board (DEV board), Maxim Integrated’s Audio Interface Board III (AUDINT3), and a Micro-USB cable.

The MAX98396 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 simplify evaluation, the DEV board can be evaluated with the AUDINT3 board. This hardware combination provides an easy-to-use method for exercising the capabilities of the device without 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 MAX98396’s DVDD, DVDDIO, and AVDD supplies through connector J1. The USB-to-PCM converter accepts a USB audio stream from a USB connected computer and converts it into an I<sup>2</sup>S data stream, allowing for USB audio playback through the MAX98396 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 devices on the MAX98396 DEV and AUDINT3 boards.

**Note:** If using the external PCM interface (J3), the AUDINT3 should be unplugged from the J1 connector on the DEV board to avoid PCM conflict. The AUDINT3 can still be used for I<sup>2</sup>C communication by using external jumper wires to connect the SCL and SDA lines from the AUDINT3 to the DEV board. In this configuration, the MAX98396 evaluation software can still be used to control the device.

**Measuring Quiescent Current**

When measuring the quiescent current of the MAX98396, note that DVDD (1.2V), DVDDIO (1.2V), and AVDD (1.8V) are provided by the AUDINT3 through the J1 connector. One way to measure the quiescent current of these supplies would be to unplug the AUDINT3 (J1) and use jumper wires to connect SDA and SDL from the AUDINT3 to the MAX98396 DEV board. An external clock source needs to be provided for the PCM interface (the MAX98396 evaluation software can still be used). There are also 0Ω series resistors (R9, R10, R12) on the bottom of the DEV board to disconnect these supplies from the AUDINT3. See the [MAX98396 EV Kit Schematic](#) for more details.

**Power Supplies**

The MAX98396 DEV board requires five power supplies (PVDD, VBAT, DVDD, DVDDIO, AVDD). See [Table 3](#) for details on the power supply ranges.

**Table 3. Power Supplies**

POWER SUPPLY	RANGE (V)
VBAT	3.0 to 5.5
PVDD*	3.0 to 20.0
DVDD	1.14 to 1.89
DVDDIO	1.14 to 1.26 1.71 to 1.89
AVDD	1.71 to 1.89

\*PVDD must be greater than or equal to VBAT



When using the AUDINT3 board, the AUDINT3's on-board LDO regulators power DVDD (1.2V), DVDDIO (1.2V), and AVDD (1.8V) on the DEV board through the J1 connector. See [Table 5](#) for a detailed pinout of the J1 connector. Note that PVDD and VBAT must be supplied externally through their respective test points or binding posts.

When evaluated as a stand-alone board (i.e., without the AUDINT3), DVDD, DVDDIO, and AVDD can be tied together to a single 1.8V supply. These supplies can be connected together by soldering 0Ω resistors to R13, R14, and R31 on the bottom of the DEV board. A 1.8V regulator (powered by VBAT) is provided on the DEV board for this purpose. To use the regulator, short resistors R29 and R30 on the back of the board near the J1 connector.

### Jumper Selection

The DEV board includes jumper JU4 to facilitate a device reset. In normal operation, the (active-low)  $\overline{\text{RESET}}$  should be connected to DVDDIO. [Table 4](#) describes the JU4 configuration options. **Note:** Before starting evaluation, ensure that the jumper is configured as needed.

### Digital Audio Interface

The MAX98396 Digital Audio Interface (DAI) is routed to interface header J3 as well as J1 to connect to the AUDINT3 board.

Before using interface header J3, the AUDINT3 should be disconnected from J1 (SDA and SDL can still be connected to the DEV board through jumpers).

The J2 and J3 headers provide easy access to the device's I<sup>2</sup>C and PCM interfaces. The J1 connector is for the AUDINT3 to supply USB-to-PCM audio to the DEV board. See the [USB Audio Input](#) section for details on USB audio streaming and [Table 5](#) for the connector J1 pinout.

**Table 4. Jumper Configuration (JU4)**

HEADER	SHUNT POSITION	DESCRIPTION
JU4	$\overline{\text{RESET}}$ to DVDDIO	Normal operation
	$\overline{\text{RESET}}$ to GND	Device is reset

**Table 5. Pinout of J1 Connector (For AUDINT3 Interface)**

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

**DAI Header**

The DAI header (J3) provides access to MAX98396’s PCM bus (BCLK, LRCLK, DIN, and DOUT). These 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 MAX98396 DAI interface is routed through the DAI headers to the AUDINT3 connector.

**Speaker Output**

The MAX98396 audio output is routed to the FOUTP and FOUTN connections on the DEV board.

**EMI Filter**

When long speaker cables are used with the MAX98396, additional EMI filtering might be required at the output. Footprints are provided for EMI filtering on the DEV board. Before adding the filters to the design, the small PCB traces shorting FB1 and FB2 should be cut. Although it is best to choose filter components based on EMI test results for a specific application, a combination of 220pF capacitors (C11, C12) and ferrite beads (FB1, FB2) generally works well (see the [MAX98396 EV Kit Schematic](#) and the [MAX98396 EV Kit PCB Layout Diagrams](#)).

**Table 6. Pinout of External DAI Header (Portion of Header J3)**

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

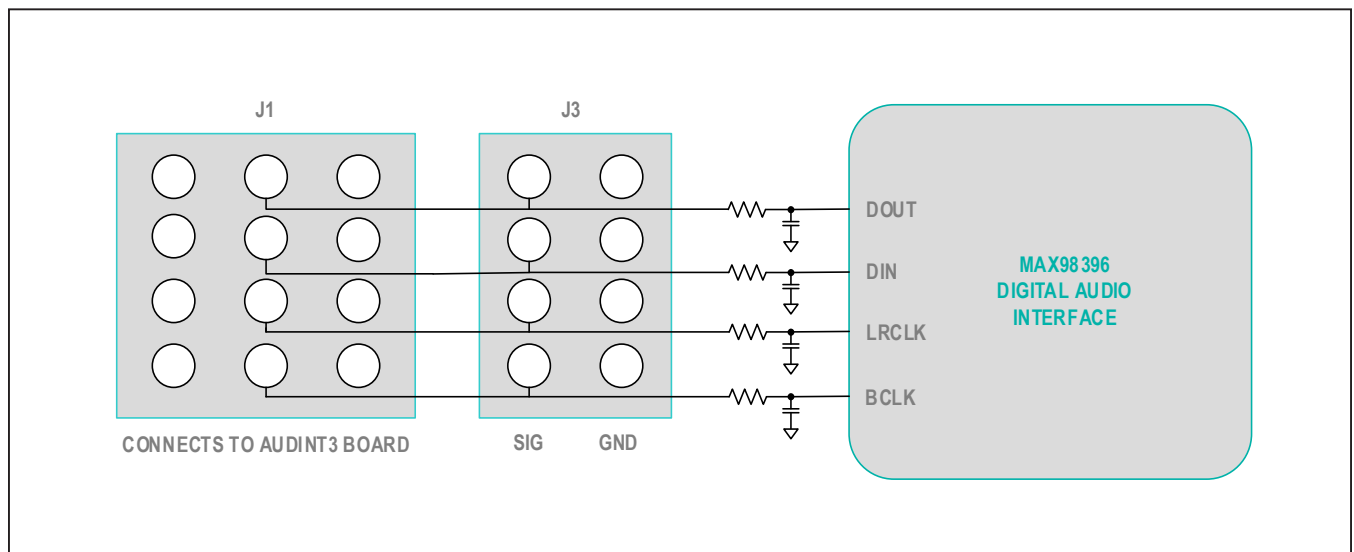


Figure 8. MAX98396 DAI Interface Headers (PCM)

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

The MAX98396's I<sup>2</sup>C interface is routed to connectors J1 and J2. J1 is used for connecting to the AUDINT3 and allows the MAX98396 evaluation software to read and write to the device. See [Table 5](#).

J2 can be used for an external I<sup>2</sup>C controller. See [Table 7](#).

## Device Address

The MAX98396 I<sup>2</sup>C device address can be configured to one of eight values: 0x70 (default), 0x72, 0x74, 0x76, 0x78, 0x7A, 0x7C, or 0x7E. The device address is set by connecting the device's ADDR1 pin to GND, SDA, SCL, or DVDDIO and the ADDR2 pin to DVDD or GND. This is accomplished by installing a 0Ω resistor in either the R6 and R7 locations or the R22 and R23 locations. For proper address programming, only one resistor is used for each ADDR pin. R6, R7, R22, and R23 are located on the bottom side of the board and are identified by the silkscreen. See [Table 8](#) for all I<sup>2</sup>C slave address options.

**Table 7. I<sup>2</sup>C Header (J2)**

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

**Table 8. I<sup>2</sup>C Address Resistors**

R6 AND R7	R22 AND R23	ADDR PIN	I <sup>2</sup> C SLAVE ADDRESS
0Ω	OPEN	GND	0x70*
0Ω	OPEN	DVDDIO	0x72
0Ω	OPEN	SDA	0x74
0Ω	OPEN	SCL	0x76
OPEN	0Ω	GND	0x78
OPEN	0Ω	DVDD	0x7A
OPEN	0Ω	SDA	0x7C
OPEN	0Ω	SCL	0x7E

\*Default position

## Ordering Information

PART	TYPE
MAX98396EVSYS#	Complete Evaluation System

#Denotes RoHS compliant.

## Audio Interface Board III

Maxim Integrated's Audio Interface Board III (AUDINT3) was designed for quick and easy evaluation of the DEV board using the MAX98396 evaluation software. The AUDINT3 provides a set of features that can be used to exercise the capabilities of the DEV board without the need for additional audio equipment. No special drivers are required as the AUDINT3 is automatically recognized as a Windows plug-and-play audio device.

The main components of the AUDINT3 board are LDO supply voltages (DVDD, DVDDIO, and AVDD) and USB-to-I<sup>2</sup>C and USB-to-PCM interfaces. The supply voltages allow the DEV board to be evaluated with a minimal amount of external supplies. The USB-to-PCM converter allows any 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 MAX98396 evaluation software.

The MAX98396 DEV board connects to the AUDINT3 board through connector J1. The pinout for J1 is listed in [Table 5](#).

## USB Audio Input

To use the USB streaming feature of the AUDINT3 board, connect the AUDINT3 to the PC using a micro-USB cable. When properly connected, the D1 LED on the AUDINT3 slowly blinks magenta; while audio is streaming, the LED changes to yellow.

See the [Quick Start](#) section for more details.

MAX98396 EV Kit Bill of Materials

ITEM	REF_DES	DNI/DNP	QTY	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION	COMMENTS
1	ADDR, ICC, RESET, VREFC	—	4	5002	KEYSTONE	N/A	TEST POINT; PIN DIA=0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; WHITE; PHOSPHOR BRONZE WIRE SILVER;	
2	AVDD, DVDD, DVDDIO	—	3	5010	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; RED; PHOSPHOR BRONZE WIRE SIL;	
3	BCLK, DIN, DOUT, IRQ, LRCLK	—	5	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;	
4	C4, C5, C19, C20	—	4	GRM033R60J105MEA2; C0603X5R0J105M030; CL03A105MQ3CSN	MURATA;TDK;SAMSUNG	1UF	CAP; SMT (0201); 1UF; 20%; 6.3V; X5R; CERAMIC	
5	C6	—	1	EMZA350ADA221MHA0G	UNITED CHEMI-CON	220UF	CAP; SMT (CASE_HA0); 220UF; 20%; 35V; ALUMINUM-ELECTROLYTIC	
6	C7, C28	—	2	C1005X5R1E105K050; GRM155R61E105KA12	TDK;MURATA	1UF	CAP; SMT (0402); 1UF; 10%; 25V; X5R; CERAMIC	
7	C8	—	1	C1608X5R1E106M080AC; CL10A106MA8NRNC; GRM188R61E106MA73; ZRB18AR61E106ME01; GRT188R61E106ME13	TDK;SAMSUNG ELECTRONICS; MURATA;MURATA	10UF	CAP; SMT (0603); 10UF; 20%; 25V; X5R; CERAMIC	
8	C13, C29	—	2	C0603X5R1E104K030BB; GRM033R61E104KE14	TDK;MURATA	0.1UF	CAP; SMT (0201); 0.1UF; 10%; 25V; X5R; CERAMIC	
9	C15, C16	—	2	C3216X5R1E476M160AC	TDK	47UF	CAP; SMT (1206); 47UF; 20%; 25V; X5R; CERAMIC	
10	C22	—	1	GRM155R61A106ME44; GRM155R61A106ME11; 0402ZD106MAT2A; CL05A106MP5NUNC	MURATA;MURATA;AVX; SAMSUNG	10UF	CAP; SMT (0402); 10UF; 20%; 10V; X5R; CERAMIC	
11	C23	—	1	CL03A105M03NRN	SAMSUNG ELECTRONICS	1UF	CAP; SMT (0201); 1UF; 20%; 16V; X5R; CERAMIC	
12	FOUTN, FOUTP, GND, PVDD, VBAT	—	5	111-2223-001	EMERSON NETWORK POWER	111-2223-001	MACHINE SCREW; THUMBSCREW; BANANA; 1/4-32IN; 11/32IN; NICKEL PLATED BRASS	
13	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	
14	J2	—	1	PEC02DAAN	SULLINS ELECTRONIC CORP.	PEC02DAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 4PINS	
15	J3	—	1	PEC04DAAN	SULLINS ELECTRONICS CORP.	PEC04DAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 8PINS	
16	J3B, J5	—	2	PEC02SAAN	SULLINS	PEC02SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 2PINS	
17	J4, J6, X1-X4, X6	—	7	9020 BUSS	WEICO WIRE	MAXIMPAD	EVK KIT PARTS; MAXIM PAD; WIRE; NATURAL; SOLID; WEICO WIRE; SOFT DRAWN BUS TYPE-S; 20AWG	
18	JU4	—	1	PEC03SAAN	SULLINS	PEC03SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 3PINS	
19	JU6	—	1	PBC05SAAN	SULLINS ELECTRONICS CORP.	PBC05SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 5PINS; -65 DEGC TO +125 DEGC	
20	LV_EN, OUTN, OUTP	—	3	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;	
21	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;	
22	MTH1-MTH4	—	4	MCH_SO_F_HEX_4-40X1/2	GENERIC PART	N/A	STANDOFF; FEMALE-THREADED; HEX; 4-40; 1/2IN; ALUMINUM	
23	R1-R10, R12, R18, R23, R25	—	14	RC0402JR-070RL; CR0402-16W-000RJT	YAGEO PHYCOMP; VENKEL LTD.	0	RES; SMT (0402); 0; 5%; JUMPER; 0.0630W	
24	R11, R27	—	2	CRCW04024K70FK; MCR01MZPF4701	VISHAY DALE;ROHM SEMICONDUCTOR	4.7K	RES; SMT (0402); 4.7K; 1%; +/-100PPM/DEGC; 0.0630W	
25	R28	—	1	ERJ-2RKF2102	PANASONIC	21K	RES; SMT (0402); 21K; 1%; +/-100PPM/DEGC; 0.1000W	

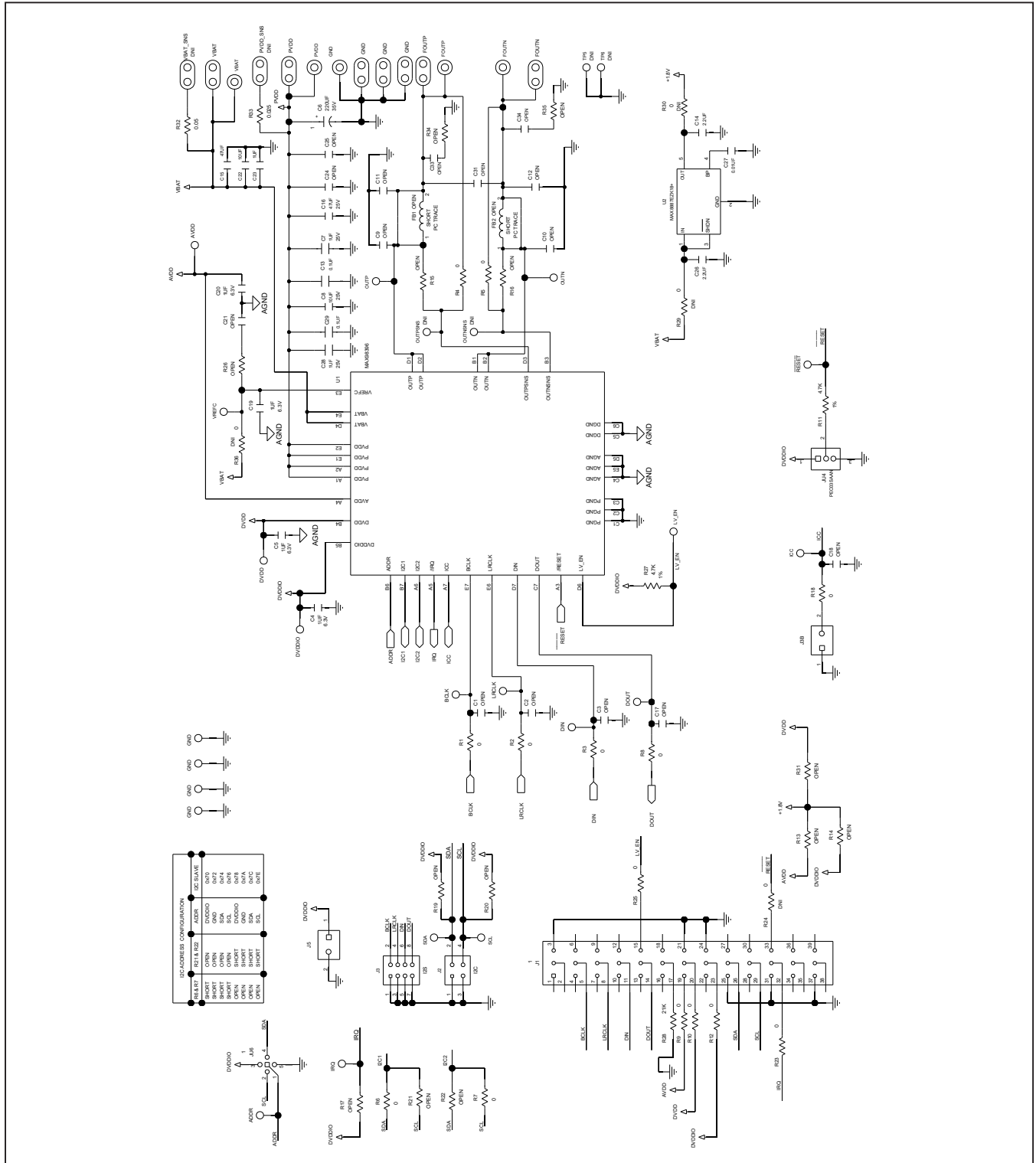
MAX98396 EV Kit Bill of Materials (continued)

ITEM	REF_DES	DNI/DNP	QTY	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION	COMMENTS
26	R32	—	1	FCSL32R050FE	OHMITE MANUFACTURING CORP	0.05	RES; SMT (0612); 0.05; 0.5%; +/-50PPM/DEGC; 1.5W	
27	R33	—	1	FCSL32R025FE	OHMITE MANUFACTURING CORP	0.025	RES; SMT (0612); 0.025; 0.5%; +/-50PPM/DEGC; 1.5W	
28	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;	
29	SU1, SU2	—	2	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	
30	TP1-TP4	—	4	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;	GND
31	U1	—	1	MAX98396	MAXIM	MAX98396	EVKIT PART - IC; MAX98396; PACKAGE OUTLINE DRAWING: 21-100482; PACKAGE CODE: N352A3Z+1	
32	PCB	—	1	MAX98396_WLP_APPS_A	MAXIM	PCB	PCB; MAX98396_WLP_APPS_A	
33	C1-C3, C9-C12, C17, C21, C18	DNP	0	N/A	N/A	OPEN	CAPACITOR; 0402 PACKAGE; GENERIC	
34	C24, C25	DNP	0	N/A	N/A	OPEN	PACKAGE OUTLINE 1206 NON-POLAR CAPACITOR	
35	C26, C14	—	2	C1005X5R1E225K050	TDK	2.2UF	CAP; SMT (0402); 2.2UF; 10%; 25V; X5R; CERAMIC	
36	C27	—	1	NMC0402X7R103K16TRP; GRM155R71C103KA01; CC0402KRX7R7BB103	NIC COMPONENTS CORP.; MURATA; YAGEO	0.01UF	CAP; SMT (0402); 0.01UF; 10%; 16V; X7R; CERAMIC	
37	FB1, FB2	DNP	0	N/A	N/A	N/A	INDUCTOR; 0603 PACKAGE; FERRITE-BEAD; GENERIC	
38	J8, J9	DNP	0	9020 BUSS	WEICO WIRE	MAXIMPAD	EVK KIT PARTS; MAXIM PAD; WIRE; NATURAL; SOLID; WEICO WIRE; SOFT DRAWN BUS TYPE-S; 20AWG	DNI
39	OUTNSNS, OUTPSNS	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;	DNI
40	R13, R14, R21, R22, R31, R34, R35	DNP	0	N/A	N/A	OPEN	RESISTOR; 0402; OPEN; FORMFACTOR	
41	R15-R17, R19, R20	DNP	0	N/A	N/A	OPEN	RESISTOR; 0402 PACKAGE; GENERIC	
42	R24, R29, R30, R36	DNP	0	RC0402JR-070RL; CR0402-16W-000RJT	YAGEO PHYCOMP; VENKEL LTD.	0	RES; SMT (0402); 0; 5%; JUMPER; 0.0630W	DNI
43	R26	DNP	0	N/A	N/A	OPEN	PACKAGE OUTLINE 0201 RESISTOR	
44	TP5, TP6	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;	DNI
45	U2	—	1	MAX8887EZK18+	MAXIM	MAX8887EZK18+	IC; VREG; LOW-DROPOUT; 0.3A LINEAR REGULATOR; SOT23-5	
46	C31	DNP	0	N/A	N/A	OPEN	CAPACITOR; SMT (0603); OPEN; FORMFACTOR	
47	C33, C34	DNP	0	N/A	N/A	OPEN	CAPACITOR; SMT (0402); OPEN; FORMFACTOR	
TOTAL			89					

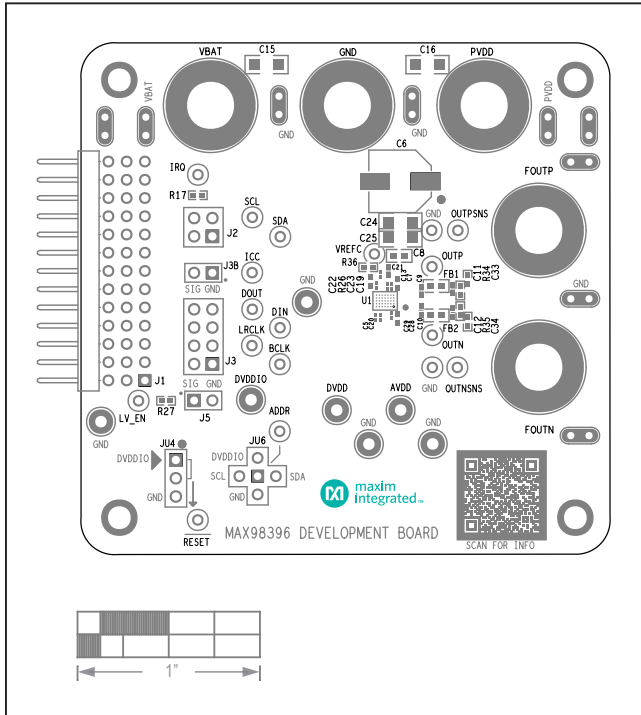
(PACKOUT) ; DNP--> DO NOT PROCURE



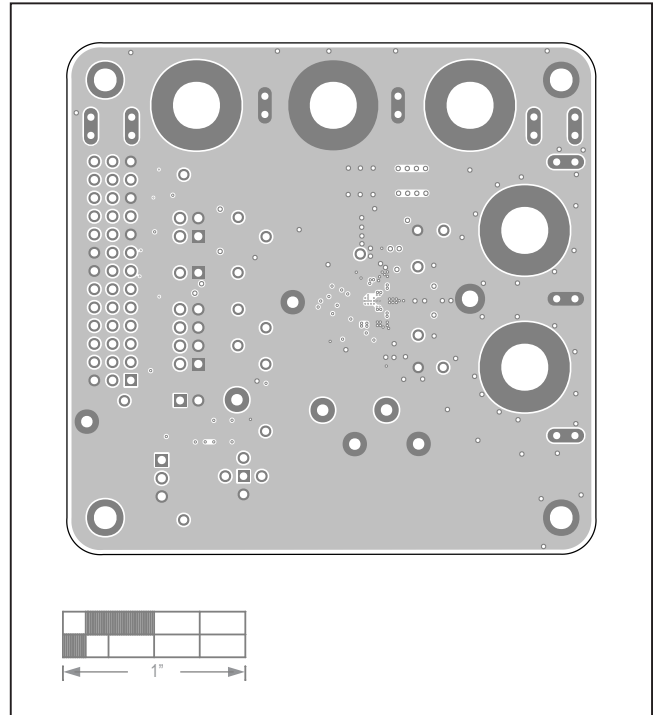
MAX98396 EV Kit Schematic



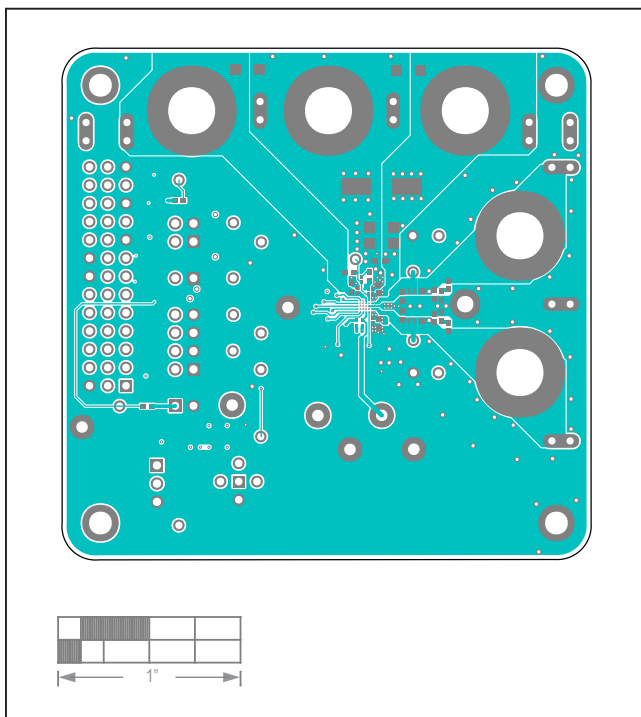
MAX98396 EV Kit PCB Layout Diagrams



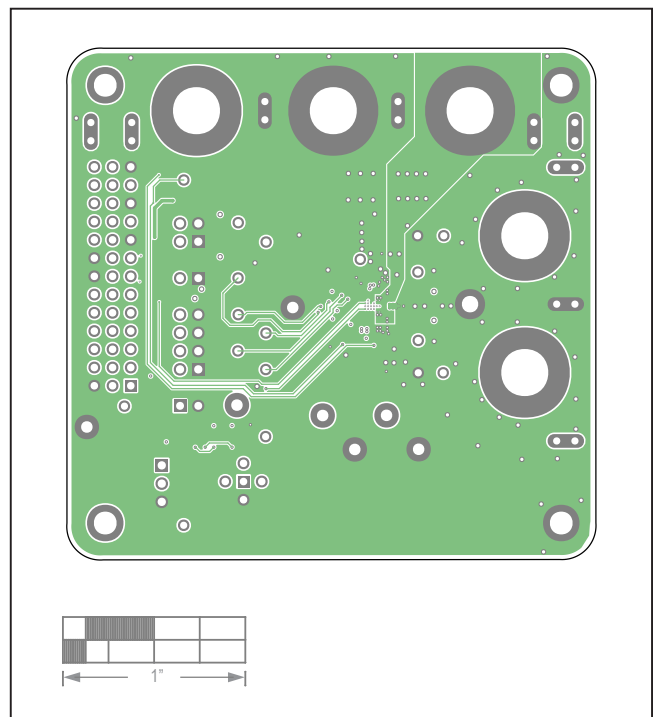
MAX98396 EV System Component Placement Guide—Top Silkscreen



MAX98396 EV System PCB Layout—GND L2

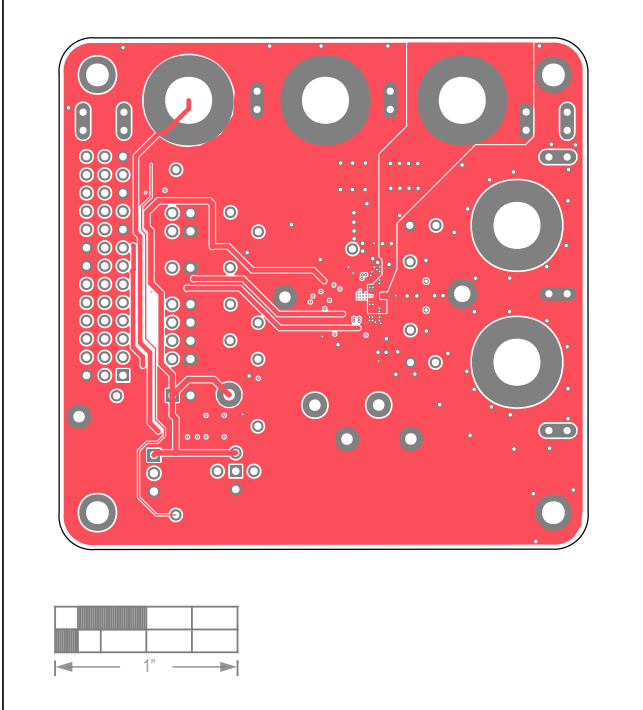


MAX98396 EV System PCB Layout—Top Layer

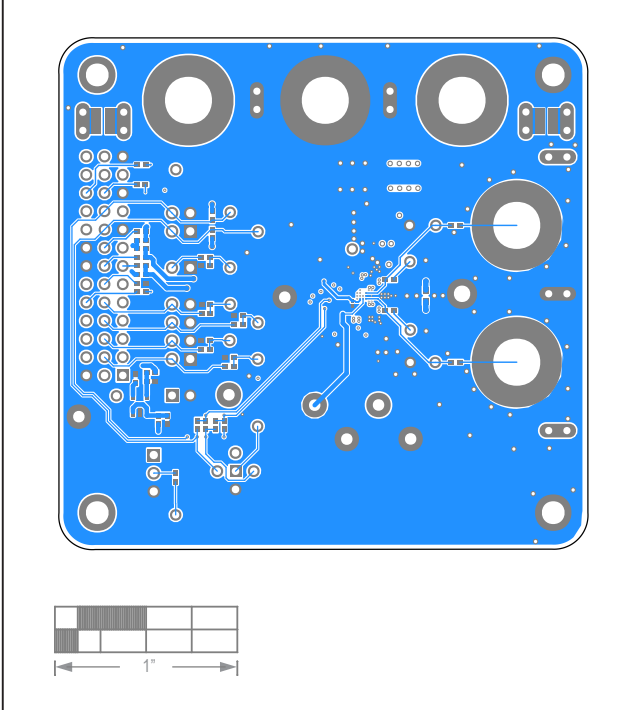


MAX98396 EV System PCB Layout—Signal GND L3

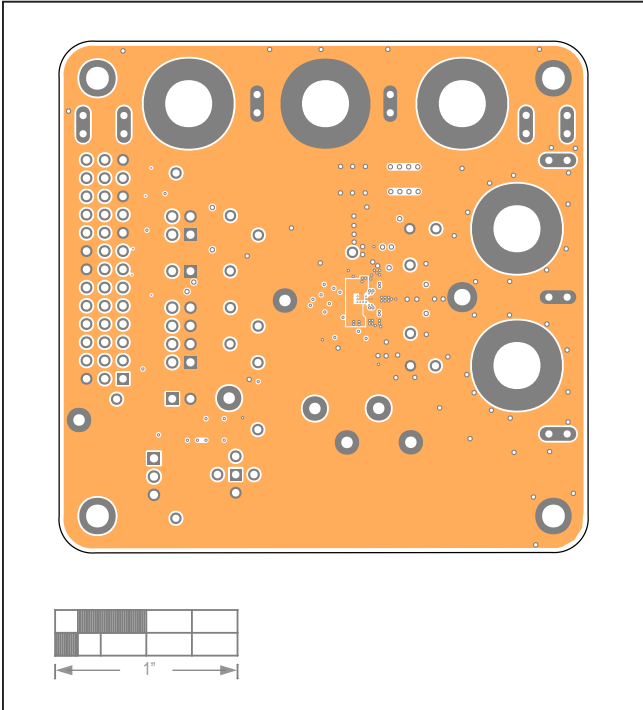
**MAX98396 EV Kit PCB Layout Diagrams (continued)**



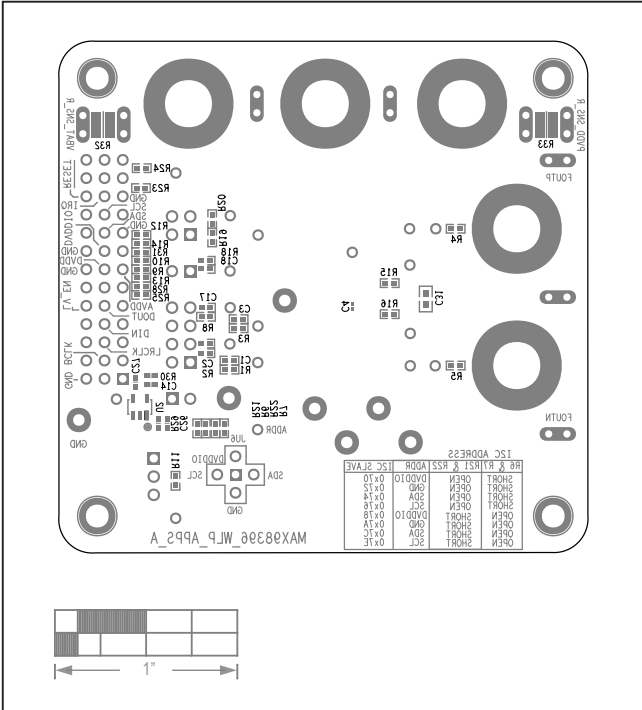
MAX98396 EV System PCB Layout—Power L4



MAX98396 EV System PCB Layout—Bottom View



MAX98396 EV System PCB Layout—GND L5



MAX98396 EV System Component Placement Guide—Bottom Silkscreen