



MAX4399 Evaluation System/Evaluation Kit

General Description

The MAX4399 evaluation system (EV system) consists of a MAX4399 evaluation kit (EV kit) and a companion Maxim System Management Bus (SMBus™) interface board.

The MAX4399 EV kit is an assembled and tested PC board that demonstrates the MAX4399 triple SCART switch matrix. It routes audio, video, and control signals between an MPEG decoder and the VCR/TV/AUX SCART connectors.

The EV kit also includes Windows 98/2000/XP®-compatible software, which provides a simple user interface for exercising the MAX4399's features. The program is menu-driven and offers a graphical user interface (GUI) complete with control buttons and a status display.

The Maxim SMBus interface board (MAXSMBUS) allows an IBM-compatible PC to use its parallel port to emulate an I²C™-compatible 2-wire interface. Order the MAX4399EVSYS for a complete PC-based evaluation of the MAX4399. Order the MAX4399EVKIT if you already have an SMBus interface.

SMBus is a trademark of Intel Corp.

Windows is a registered trademark of Microsoft Corp.

Purchase of I²C components of Maxim Integrated Products, Inc. or one of its sublicensed Associated Companies, conveys a license under the Philips I²C Patent Rights to use these components in an I²C system, provided that the system conforms to the I²C Standard Specification as defined by Philips.

Features

- ◆ Routes MPEG Decoder Signals to VCR/TV/AUX SCART Connectors
- ◆ On-Board SCART Connectors
- ◆ I²C-Compatible 2-Wire Serial Interface
- ◆ Easy-to-Use, Menu-Driven Software
- ◆ Completely Assembled and Tested
- ◆ Includes Windows 98/2000/XP-Compatible Software

Ordering Information

PART	TEMP RANGE	IC PACKAGE
MAX4399EVKIT	0°C to +70°C	68 QFN
MAX4399EVSYS	0°C to +70°C	68 QFN

Note: The MAX4399 EV kit software is provided with the MAX4399EVKIT; however, the MAXSMBUS board is required to interface the EV kit to the computer when using the included software.

Selector Guide

PART	IC PACKAGE	SMBus INTERFACE TYPE
MAX4399EVKIT	68 QFN	Not Included
MAX4399EVSYS	68 QFN	MAXSMBUS

Component List

DESIGNATION	QTY	DESCRIPTION
C1–C12, C14–C21	20	0.1µF ±20%, 10V X5R ceramic capacitors (0402) TDK C1005X5R1A104M
C13, C34–C41	9	0.1µF ±10%, 20V tantalum capacitors (R-Case) AVX TAJR104K020
C22	1	0.47µF ±20%, 10V X5R ceramic capacitor (0603) TDK C1608X5R1A474M
C23, C24	2	10µF ±20%, 16V X7R ceramic capacitors (1210) TDK C3225X7R1C106M
C25, C26, C27	3	10µF ±20%, 6.3V X5R ceramic capacitors (0805) TDK C2012X5R0J106M

DESIGNATION	QTY	DESCRIPTION
C28–C33, C45–C47	9	10µF ±20%, 10V 900mΩ ESR tantalum capacitors (A-Case) AVX TPSA106M010-900
C42, C43, C44	3	0.01µF ±20%, 25V X7R ceramic capacitors (0402) TDK C1005X7R1E103M
C48	1	22pF ±5%, 50V C0G ceramic capacitor (0402) TDK C1005C0G1H220J
C49	1	3–10pF NPO variable capacitor
J1	1	2 x 10 right-angle female receptacle
J2, J3, J4	3	SCART connectors Kycon K-SCART-021

Component List continued on next page.



For pricing, delivery, and ordering information, please contact Maxim/Dallas Direct! at 1-888-629-4642, or visit Maxim's website at www.maxim-ic.com.

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Component List (continued)

DESIGNATION	QTY	DESCRIPTION
J5, J6	2	Phono jacks (red)
J7, J8	2	Phono jacks (white)
J9	1	Phono jack (black)
J10	1	Phono jack (yellow)
JU1, JU2, JU3	0	Not installed (SIP-2)
JU4	1	Jumper, 3-pin header
L1	1	220nH \pm 20%, 0.67A chip inductor (1206) Coilcraft 1206CS-221XMB
L2	1	22 μ H \pm 5% shielded inductor (1210) API Delevan S1210-223K
R1–R6, R80, R81, R82	9	1M Ω \pm 5% resistors (0402)
R7–R16	10	10k Ω \pm 5% resistors (0402)
R17–R73	57	75 Ω \pm 5% resistors (0402)
R74, R75, R76	0	Not installed (0402)
R77, R78	2	1k Ω \pm 5% resistors (0402)

DESIGNATION	QTY	DESCRIPTION
R79	1	1.82k Ω \pm 1% resistor (0402)
U1	1	AV SCART multiplexer (68-pin QFN) MAX4399CTK
AUX_R/C_in, ENC_B_in, ENC_C_in, ENC_FS_in, ENC_G_in, ENC_R/C_in, ENC_Y/CVBS_in, ENC_Y_in, RF_CVBS_out, TV_R/C_in, VCR_R/C_in	11	75 Ω BNC connectors
None	1	Shunts
None	1	MAX4399 PC Board
None	1	Software disk (CD-ROM) "MAX4399 Evaluation Kit"

Component Suppliers

SUPPLIER	PHONE	FAX	WEBSITE
API Delevan	408-865-0344	408-865-0343	www.delevan.com
AVX	843-946-0238	843-626-3123	www.avxcorp.com
Kycon	888-592-6622	408-494-0325	www.kycon.com
TDK	847-803-6100	847-390-4405	www.component.tdk.com

Note: Please indicate that you are using the MAX4399 when contacting these component suppliers.

Quick Start

Recommended Equipment

- Computer running Windows 98, 2000, or XP
- Parallel printer port (this is a 25-pin socket on the back of the computer)
- Standard 25-pin, straight-through, male-to-female cable (printer extension cable) to connect the computer's parallel port to the Maxim SMBus interface board
- 12V/100mA DC power supply
- 12V/100mA DC power supply
- 5V/250mA DC power supply
- 5V/100mA DC power supply

Procedure

The MAX4399 EV kit is fully assembled and tested. Follow the steps below to verify board operation. **Do not turn on the power supply until all connections are completed:**

- 1) Carefully connect the boards by aligning the 20-pin connector of the MAX4399 EV kit with the 20-pin header of the MAXSMBUS interface board. Gently press them together.
- 2) Ensure that a shunt is on pins 1–2 of jumper JU4.
- 3) Connect a cable from the computer's parallel port to the SMBus interface board. Use a straight-through 25-pin female-to-male cable. To avoid dam-

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aging the EV kit or your computer, do not use a 25-pin SCSI port or any other connector that is physically similar to the 25-pin parallel printer port.

- 4) Use the INSTALL.EXE program on the provided CD-ROM to copy the files and create icons in the Windows 98/2000/XP **Start** menu.

Do not turn on the power until all connections are made.

- 5) Connect the 12V/100mA DC power supply to the pads labeled POS9 and GND1 of the MAXSMBUS interface board.
- 6) Connect the 5V/250mA DC power supply to the V_VID and G_VID pads on the MAX4399 EV kit board.
- 7) Connect the 5V/100mA DC power supply to the V_DIG and G_DIG pads on the MAX4399 EV kit board.
- 8) Connect the second 12V/100mA DC power supply to the V12 and G_AUD pads on the MAX4399 EV kit board.
- 9) Connect the G_VID, G_DIG, and G_AUD pads together at the board.
- 10) Connect an MPEG decoder to the BNCs with the ENC prefix.
- 11) Connect a TV to the TV (J3) SCART connector.
- 12) Connect a VCR to the VCR (J4) SCART connector.
- 13) Connect an Auxiliary unit to the AUX (J2) SCART connector.
- 14) Turn on the power supplies.
- 15) Start the MAX4399 program by opening its icon in the **Start** menu.
- 16) Observe as the program automatically detects the address of the MAX4399 and starts the main program.

___Detailed Description of Software

User-Interface Panel

The user interface (Figure 1) is easy to operate; use the mouse, or press the Tab key to navigate with the arrow keys. Each of the buttons corresponds to bits in the command and configuration bytes. By clicking on them, the correct I²C-compatible write operation is generated to update the internal registers of the MAX4399. The **Interface** box indicates the current I²C-compatible bus **Status**, **Device Address**, **Register Address**, and the **Data Sent/Received**, for the last read/write operation. This data is used to confirm proper device operation.

The MAX4399 EV kit software splits and groups the functions of the MAX4399 into four separate categories. **TV**, **VCR**, **AUX**, and **Configuration** functions can be accessed by selecting the appropriate tab at the top left of the MAX4399 EV kit software main window. The **TV**, **VCR**, and **AUX** panels of the MAX4399 EV kit software are again split into two sections (Video Control and Audio Control).

The device status registers (refer to the MAX4399 datasheet for status register information) are displayed in the MAX4399 status panel at the lower right of the main window. To read the status register, click the **Read Status** button or check the **Automatic Status Read** checkbox to automatically read the status register every 250ms.

Click the **POR Reset** button to reset the MAX4399 registers and EV kit software to their power-on-reset configuration.

Enable interrupts by checking the **Enable Interrupt** checkbox in the Interrupt Status panel (Figure 1, right). The message Interrupt Detected will appear when the MAX4399 generates a valid interrupt (refer to the MAX4399 data sheet) and the **Enable Interrupt** checkbox is checked. Clear this interrupt by clicking the **Clear** button.

Note: Words in boldface are user-selectable features in the software.

Evaluates: MAX4399

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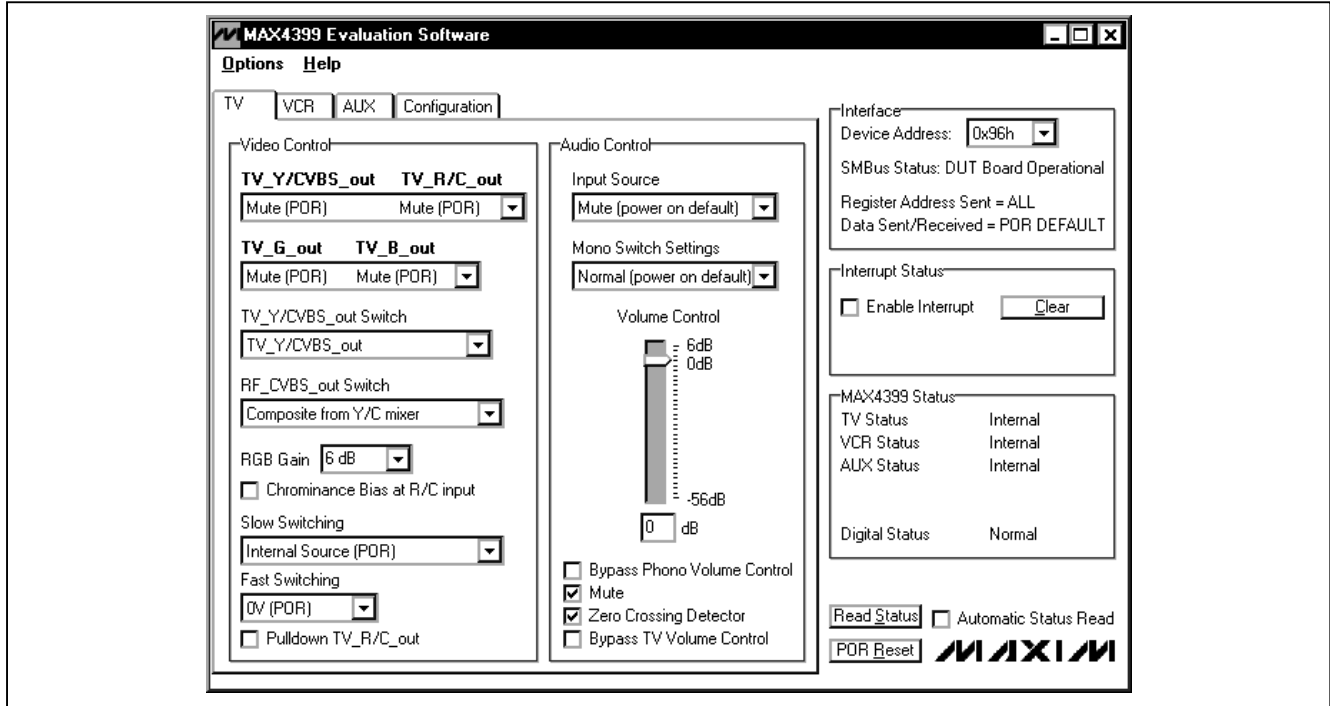


Figure 1. MAX4399 EV Kit Software Main Window

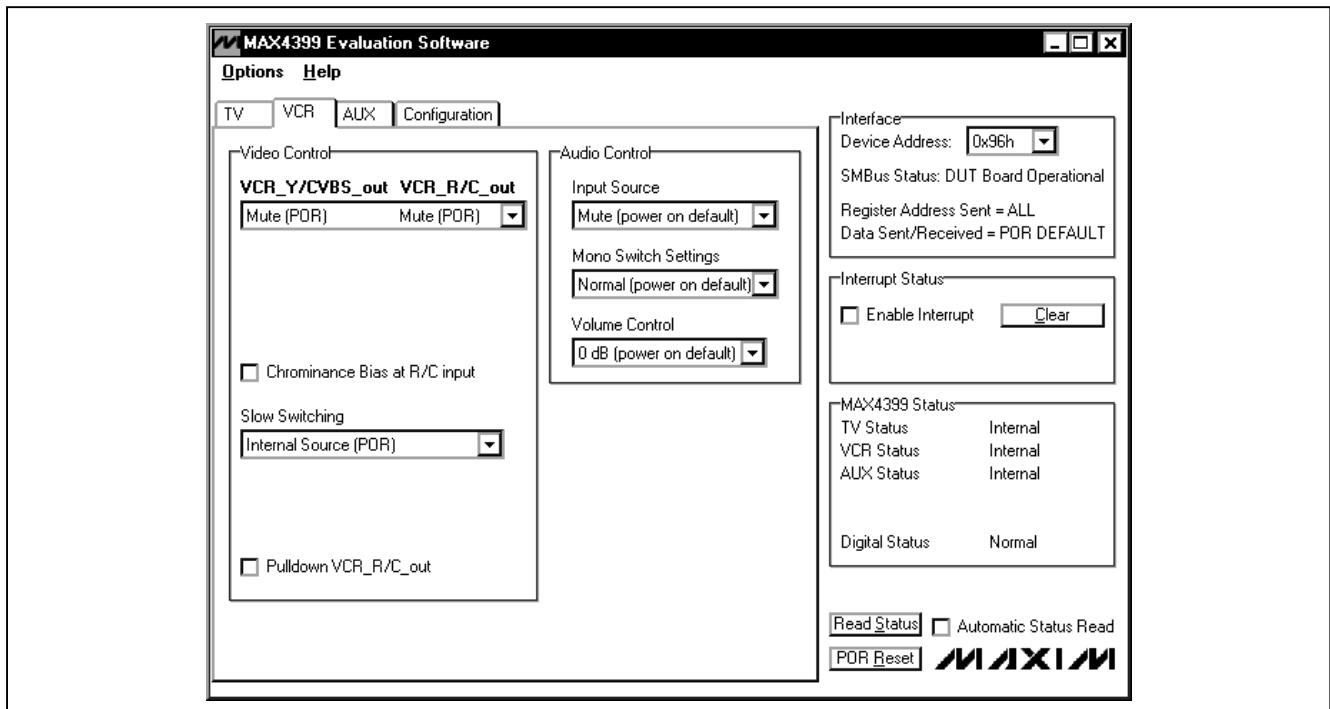


Figure 2. MAX4399 EV Kit Software Main Window (VCR Control Panel)

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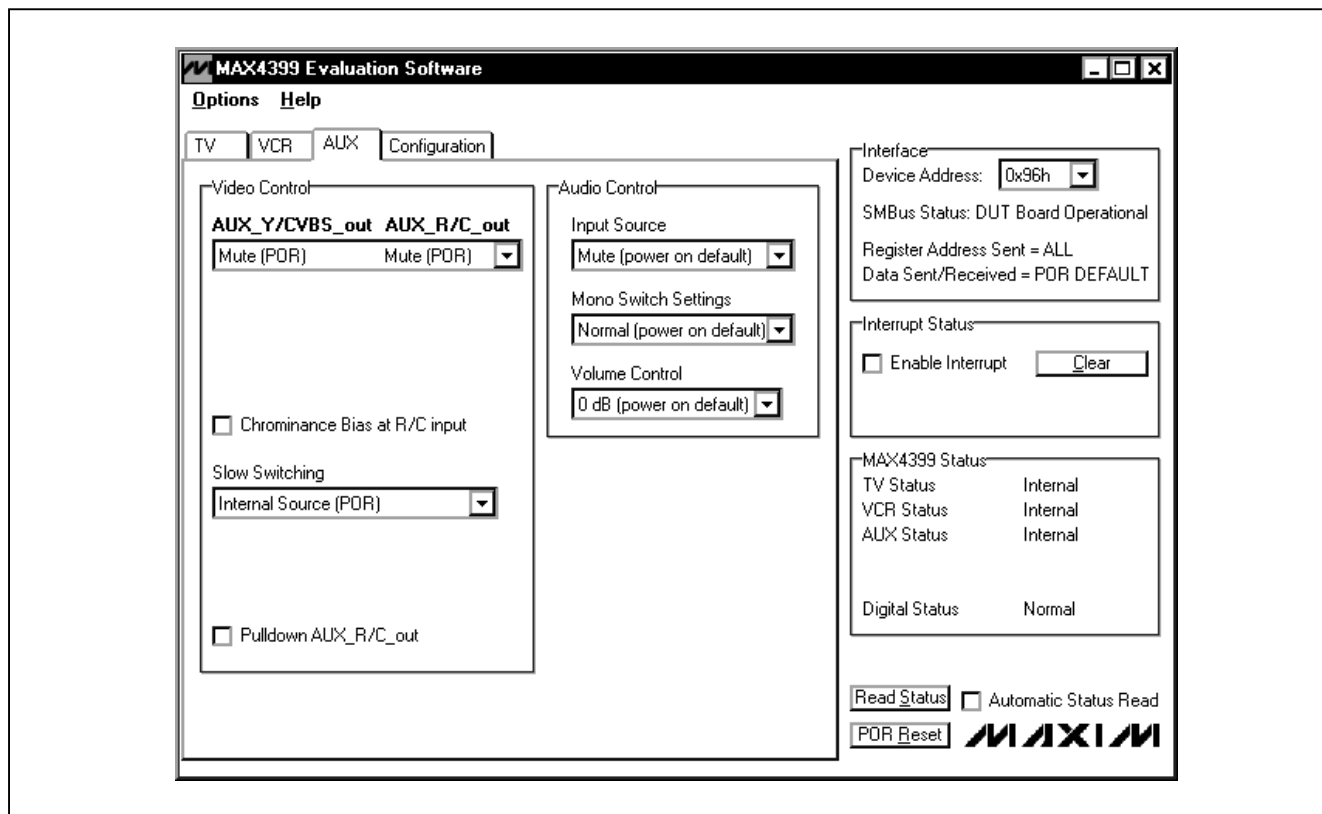


Figure 3. MAX4399 EV Kit Software Main Window (AUX Control Panel)

TV Controls (Video Control)

The Video Control panel of the MAX4399 EV kit software (Figure 1) allows the user to route selected signals to the TV SCART connector. Other functions such as **RGB Gain**, **Chrominance Bias at R/C Input**, **Fast Switching**, **Slow Switching**, and **Pulldown TV_R/C_Out** can also be changed through the Video Control panel. Manipulate the pulldown menus and checkboxes to achieve the desired result.

TV Controls (Audio Control)

The Audio Control panel of the MAX4399 EV kit software allows the user to adjust various audio characteristics of the TV output. Adjust the volume by moving the **Volume Control** slider, or enter a number in the edit box below the **Volume Control** slider. **Input Source** selection, **Mono Switch Settings**, a **Mute** function, the **Zero Crossing Detector**, a **Bypass Phono Volume Control**, and a **Bypass TV Volume Control** function can also be accessed from the Audio Control panel (refer to the MAX4399 datasheet for a description of each of these functions).

VCR/AUX Controls (Video Control)

The VCR (Figure 2) and AUX (Figure 3) panel of the MAX4399 EV kit software are identical in function with the exception of the SCART output that is being controlled. SCART output signals (**VCR_Y/CVBS_out** and **VCR_R/C_out**), **Chrominance Bias at R/C Input**, **Slow Switching**, and **Pulldown VCR_R/C_Out** functions can all be accessed through the Video Control panel.

VCR/AUX Controls (Audio Control)

Adjust the **Input Source**, **Mono Switch Settings**, and volume (**Volume Control**) through the Audio Control panel of the MAX4399 EV kit software.

Configuration Controls

Selecting the Configuration tab (Figure 4) of the MAX4399 EV kit software allows the user to adjust configuration features of the MAX4399.

Checking desired checkboxes in the Output Enable panel enables selected outputs of the MAX4399. A bias voltage may also be applied at the R/C input of the encoder (**Chrominance Bias applied at ENC_R/C_IN**).

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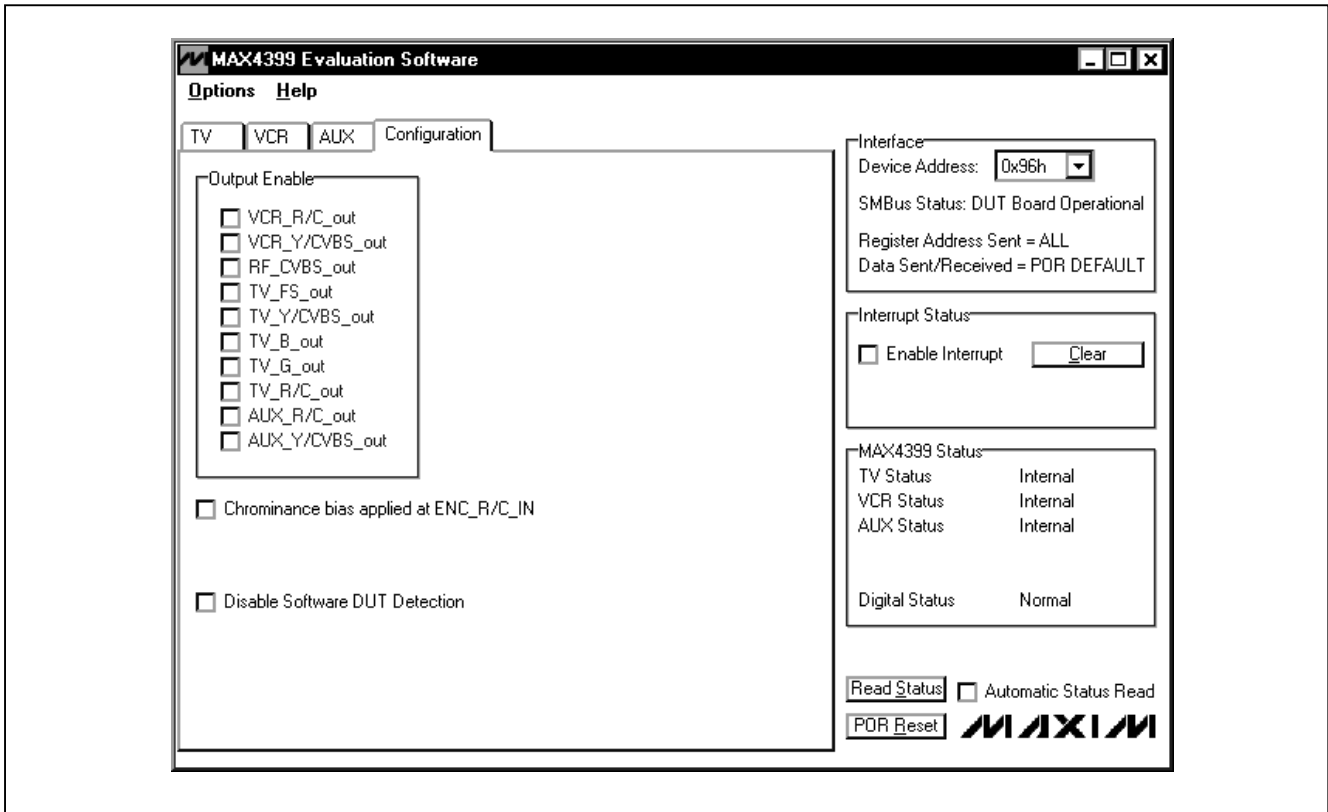


Figure 4. MAX4399 EV Kit Software Main Window (Configuration/Encoder)

The MAX4399 EV kit software continuously polls the MAX4399 to make sure that the two boards have not become inadvertently disconnected. An undesired result of this polling is constant activity on the I²C-compatible bus. This feature may make it difficult to monitor the I²C-compatible interface for desired bit patterns. Disable this feature by checking the **Disable Software DUT Detection** checkbox.

Simple I²C-Compatible Commands

There are two methods for communicating with the MAX4399: through the normal user-interface panel or through the I²C-compatible commands available by selecting the **2-Wire Interface Diagnostic** item from the **Options** pulldown menu. A display pops up that allows the SMBus/I²C-compatible protocols, such as Read Byte and Write Byte, to be executed.

The dialog boxes accept numeric data in binary, decimal, or hexadecimal. Hexadecimal numbers should be prefixed by \$ or 0x. Binary numbers must be exactly

eight digits. See Figure 5 for an example of this tool. In this example, the software is reading data (0xC0) from Device Address 0x95, Register Address 0x0E. The above sequence reads the status register of the MAX4399.

Note: In places where the slave address asks for an 8-bit value, it must be the 7-bit slave address of the MAX4399 as determined by DEV_ADDR with the last bit set to 1 for a read operation or a zero for a write. Refer to the MAX4399 datasheet for a complete list of registers and functions.

Detailed Description of Hardware

The MAX4399 EV kit is an assembled and tested PC board that demonstrates the MAX4399 triple SCART switch matrix. It routes audio, video, and control signals between an MPEG decoder and the TV, VCR, and AUX SCART connectors. All video connections are made through 75Ω controlled-impedance traces.

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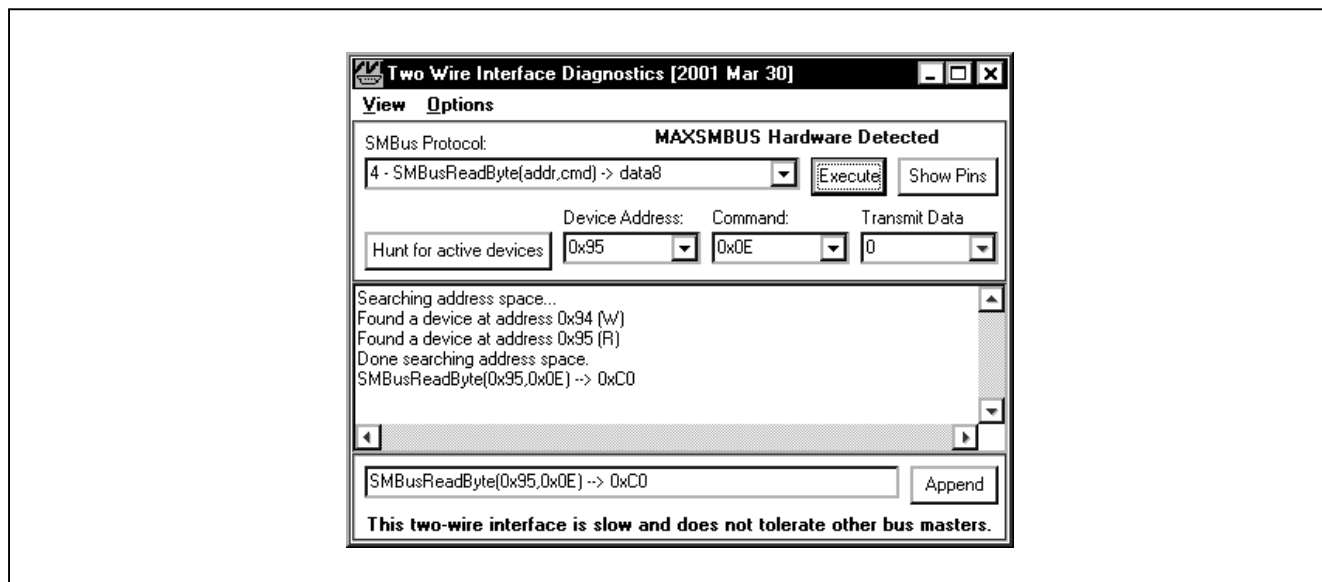


Figure 5. Simple SMBusReadByte Operation Using the Included 2-Wire Interface Diagnostics

Connect a TV, VCR, and Auxiliary unit (DVD player, 2nd VCR, camcorder, etc.) to the TV, VCR, and AUX SCART connectors, respectively (refer to the MAX4399 datasheet for SCART connector pinouts). MPEG decoder video connections are made through the 75Ω BNCs with the ENC prefix. MPEG decoder audio connections are made through the ENC LT and ENC RT (J8 and J6) RCA connectors. Monitor the phono audio outputs through the PHONO RT and PHONO LT (J5 and J7) RCA connectors.

Monitor the R/C inputs of the TV, VCR, and AUX connections through the TV_R/C_IN, VCR_R/C_IN, and AUX_R/C_IN BNCs, respectively. Apply a satellite dish tone input through the ST AUX IN (J10) RCA connector.

Monitor the RF modulator mono audio output through the RF MONO RCA connector. Monitor the RF modulator composite video output through the RF_CVBS_OUT BNC.

Address Selection

Jumper JU4 sets the MAX4399 slave address. The default address is 1001 011Y (DEV_ADDR = V_DIG). See Table 1 for a complete list of addresses.

Note: The first 7 bits shown are the address. Y (bit 0) is the SMBus read/write bit. This bit is a 1 for a read operation or a zero for a write.

Table 1. Shunt Settings for SMBus Address (JU4)

SHUNT POSITION	MAX4399 ADDRESS PIN	MAX4399 ADDRESS	
		BINARY	HEXADECIMAL
1-2*	V_DIG	1001 011Y	0x96
2-3	G_DIG	1001 010Y	0x94

*Default configuration: JU4 (1-2).

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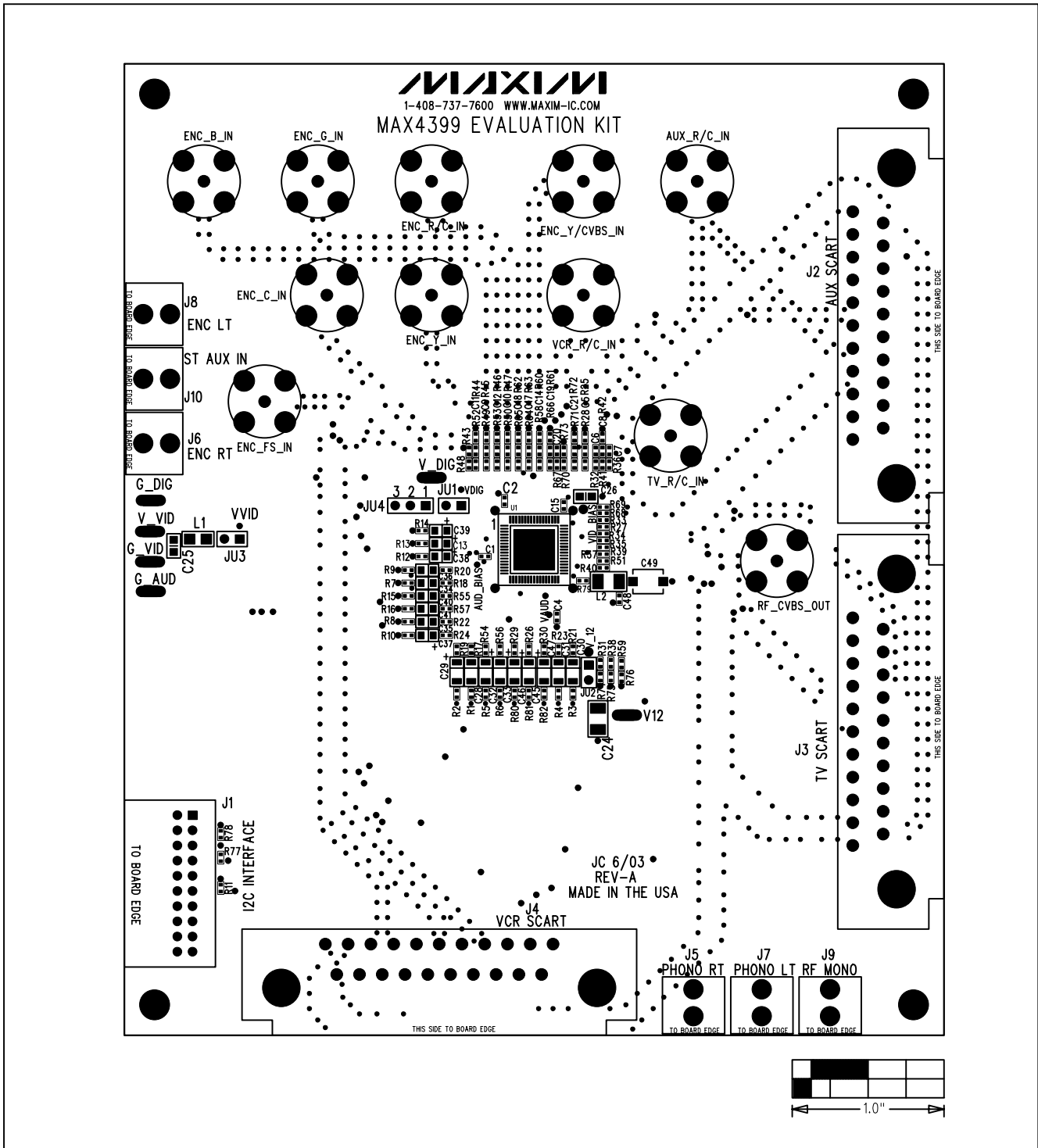


Figure 7. MAX4399 EV Kit Component Placement Guide—Component Side

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Evaluates: MAX4399

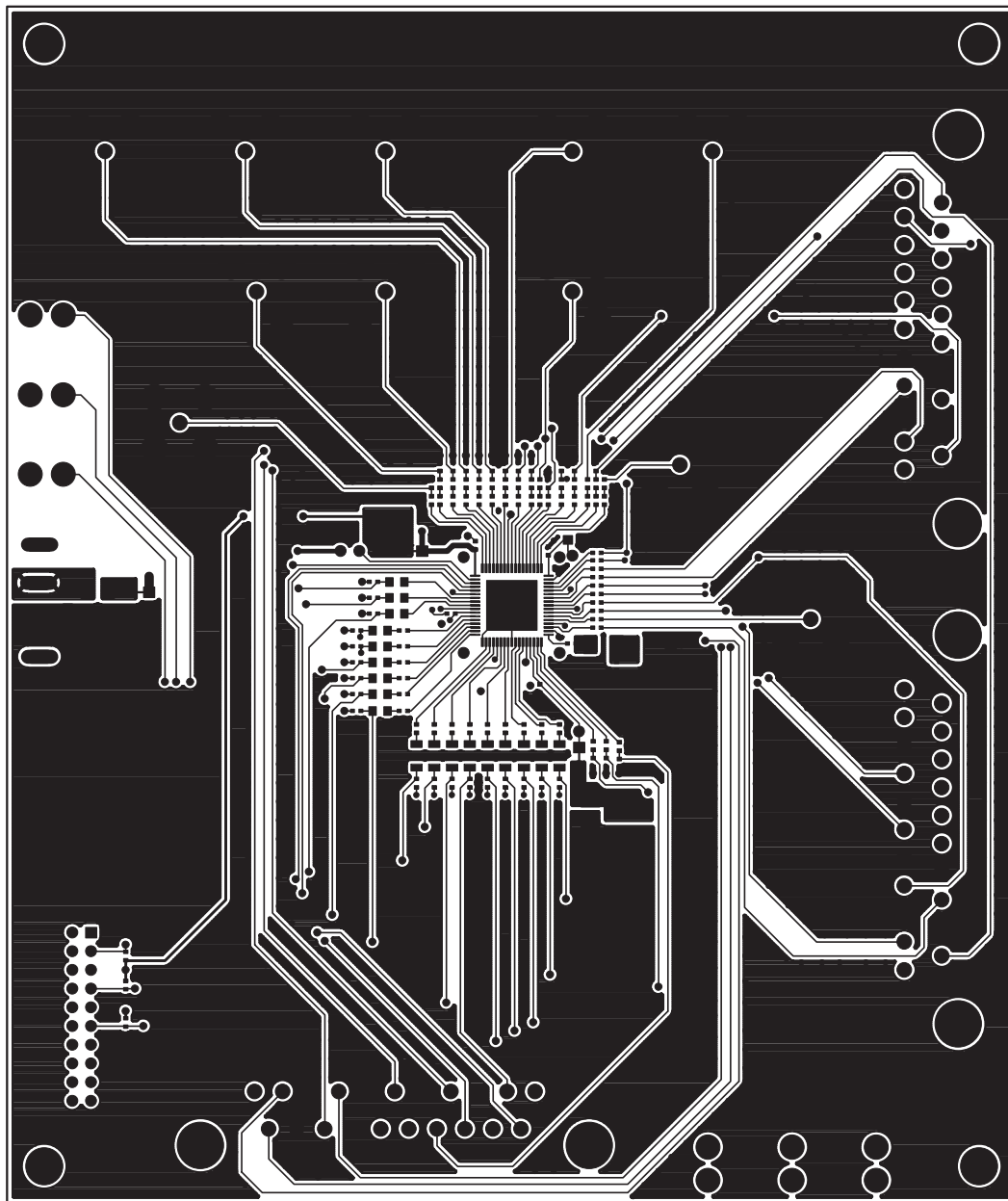


Figure 8. MAX4399 EV Kit PC Board Layout—Component Side

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Evaluates: MAX4399

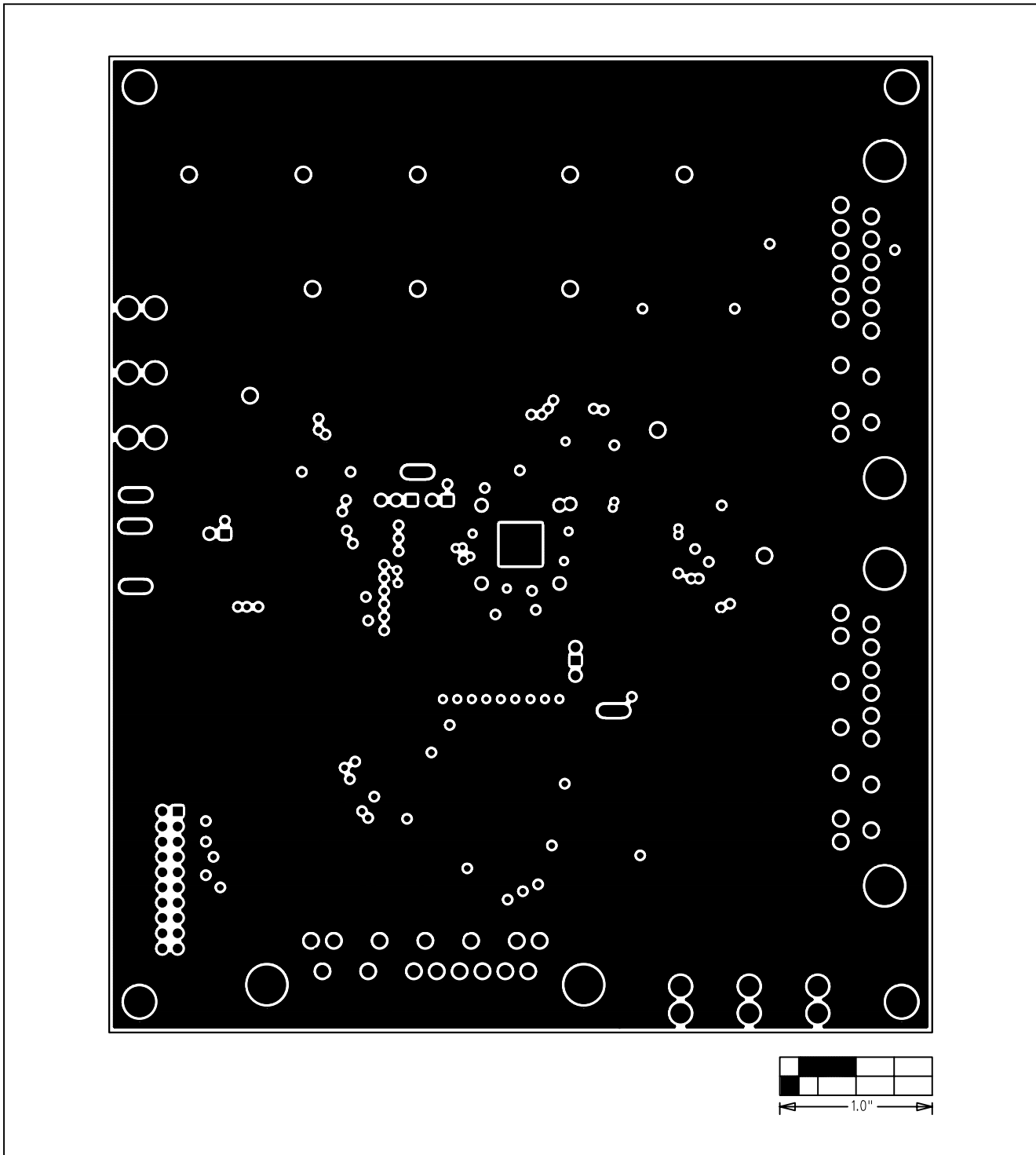


Figure 9. MAX4399 EV Kit PC Board Layout—Inner Layer 2

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Evaluates: MAX4399

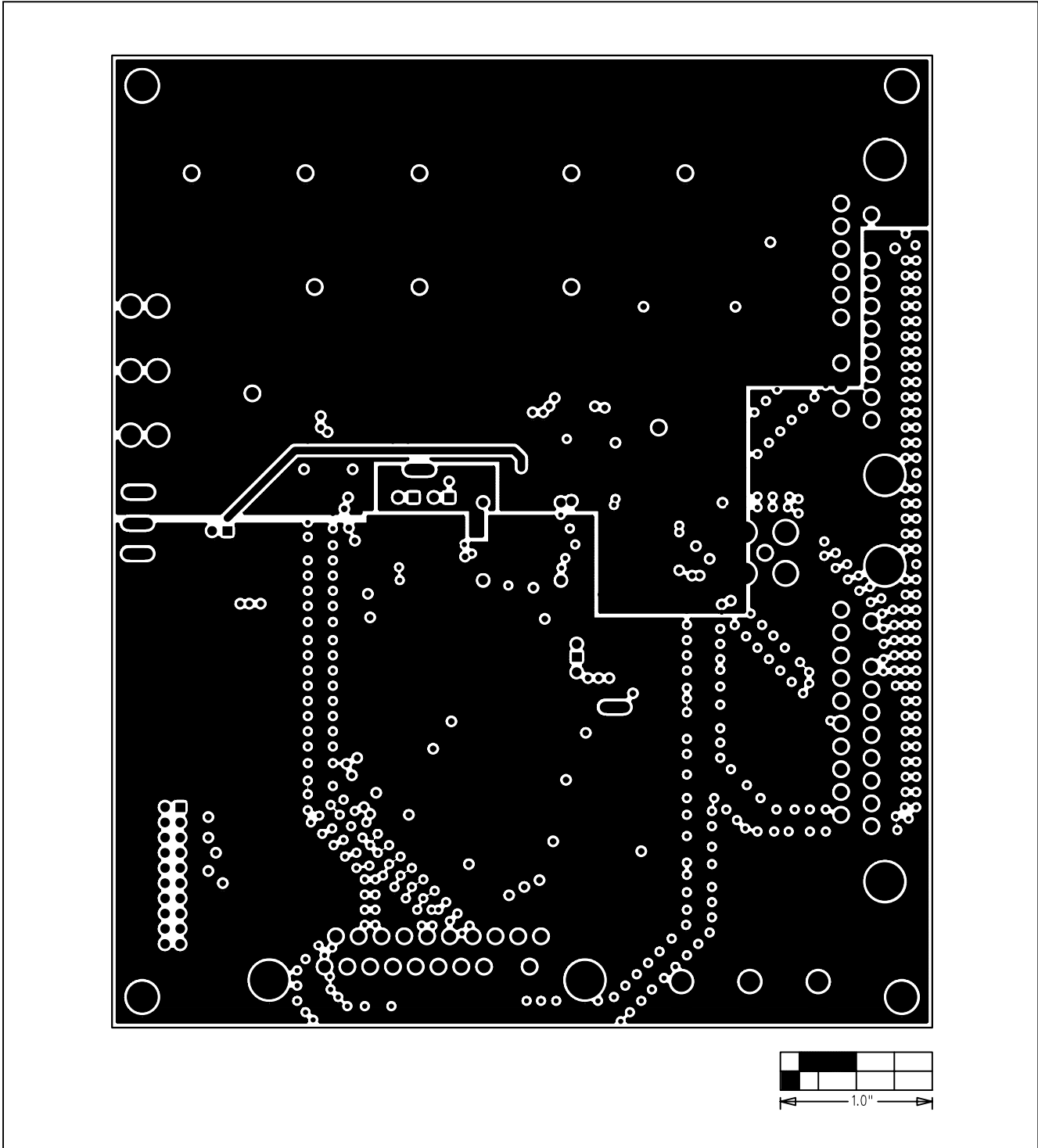


Figure 10. MAX4399 EV Kit PC Board Layout—Inner Layer 3

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Evaluates: MAX4399

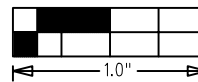
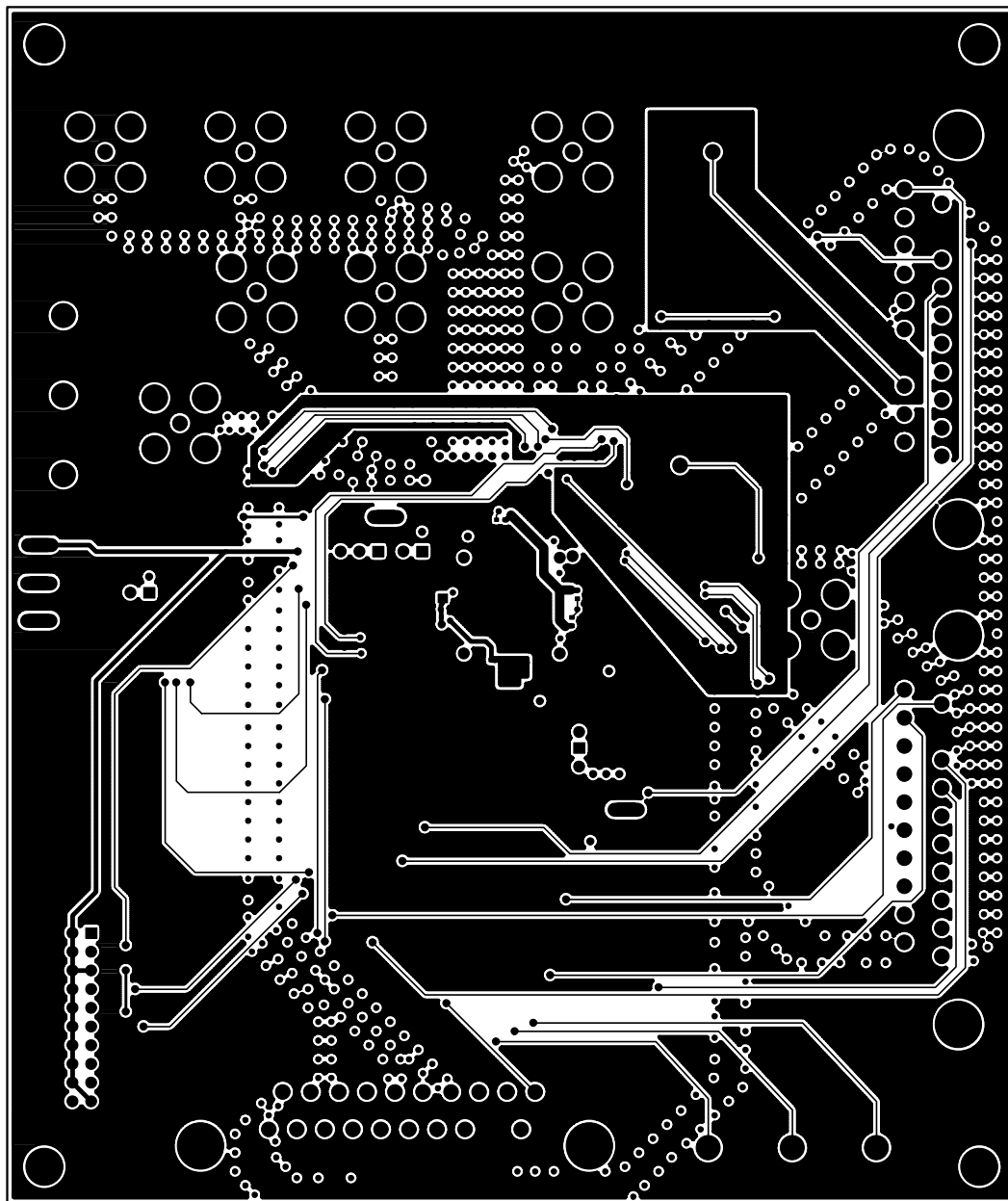


Figure 11. MAX4399 EV Kit PC Board Layout—Solder Side

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Evaluates: MAX4399

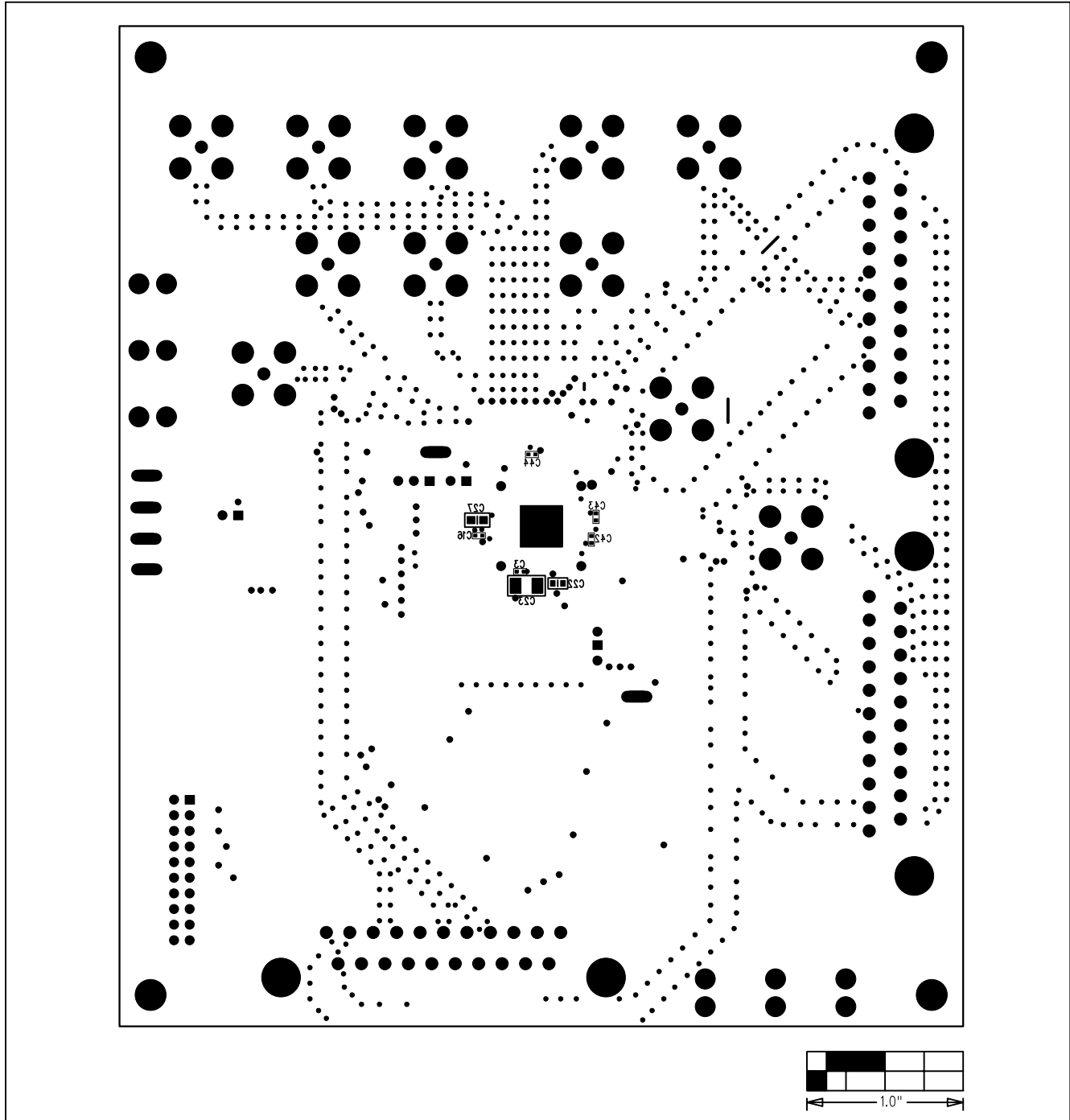


Figure 12. MAX4399 EV Kit Component Placement Guide—Solder Side

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