MAXIM

MAX9595 Evaluation Kit/Evaluation System

Evaluate: MAX9595

General Description

The MAX9595 evaluation system (MAX9595EVCMAXQU) is a complete dual SCART audio/video switch matrix system consisting of a MAX9595 evaluation kit (EV kit) and the Maxim CMAXQUSB command module. Order the EV kit (MAX9595EVKIT) separately if the user already has an I2C master or if the Maxim CMAXQUSB command module has already been purchased.

The MAX9595 EV kit is an assembled and tested PC board used to evaluate the MAX9595 dual SCART audio/video switch matrix. It routes audio, video, and control signals between an MPEG decoder and the VCR/TV SCART connectors. The Maxim CMAXQUSB command module provides the I2C interface and is connected to the PC through the universal serial bus (USB) port.

The EV kit also includes Windows® 98SE/2000/XP-compatible software, which provides a simple user interface for exercising the MAX9595's features. The program is menu-driven and offers a graphical user interface (GUI) complete with control buttons and a status display.

The EV kit comes with the MAX9595CTM installed.

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Features

♦ **Route MPEG Decoder Signals to VCR/TV SCART Connectors**

♦ **On-Board SCART Connectors**

♦ **I2C Interface**

♦ **Easy-to-Use, Menu-Driven Software**

♦ **Completely Assembled and Tested**

♦ **Include Windows 98SE/2000/XP-Compatible Software**

Ordering Information

PART	TYPE	INTERFACE
MAX9595EVKIT	EV kit	User-supplied I2C serial interface
MAX9595EVCMAXQU	EV system	CMAXQUSB board

Note: *The MAX9595EVKIT includes only the EV kit. The MAX9595EVCMAXQU includes both the EV kit and the CMAXQUSB command module. The MAX9595 EV kit software is provided with the MAX9595EVKIT; however, the Maxim CMAXQUSB command module is required when using the included software.*

Component List

MAX9595 EV Kit

DESIGNATION	QTY	DESCRIPTION
C1, C2	2	10µF ±20%, 16V X7R ceramic capacitors (1210) TDK C3225X7R1C106M
C3	1	0.47µF ±20%, 10V X5R ceramic capacitor (0603) TDK C1608X5R1A474M
C4–C8, C14–C21, C23–C27	18	0.1µF ±20%, 10V X5R ceramic capacitors (0402) TDK C1005X5R1A104M
C9	1	10µF ±20%, 6.3V X5R ceramic capacitor (0805) TDK C2012X5R0J106M

DESIGNATION	QTY	DESCRIPTION
C10, C12, C29, C31, C36	5	10µF ±20%, 10V, 900mΩ ESR tantalum capacitors (A-case) AVX TPSA106M010-900
C11, C13, C28, C30, C32, C34	6	0.1µF ±10%, 20V tantalum capacitors (R-case) AVX TAJR104K020
C22	1	47µF ±20%, 6.3V X5R ceramic capacitor (1206) TDK C3216X5R0J476M
J1, J2	2	SCART connectors (side-entry PC board mount) Kycon K-SCART-021

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_____Component List (continued)

DESIGNATION	QTY	DESCRIPTION
J3	1	2 x 10 right-angle female receptacle
J4	1	Phono jack (side-entry PC board mount) white CUI Inc. RCJ-043
J5	1	Phono jack (side-entry PC board mount) red CUI Inc. RCJ-042
J6	1	Phono jack (side-entry PC board mount) black CUI Inc. RCJ-041
JU1, JU2	0	Not installed, shorted PC board traces
JU3, JU4, JU6, JU7	4	2-pin headers
JU9	1	3-pin header
L1	1	220nH ±20%, 0.67A chip inductor (1206) Coilcraft 1206CS-221XMB
R1, R6, R53, R58, R71	5	1MΩ ±5% resistors (0402)
R2, R7, R11, R12, R14–R33, R35–R46, R48, R52, R57, R69, R70	41	75Ω ±5% resistors (0402)

DESIGNATION	QTY	DESCRIPTION
R3, R4, R5, R8, R9, R10, R49, R50, R51, R54, R55, R56	12	3.32kΩ ±1% resistors (0402)
R13, R47	0	Not installed, resistors (0402)
R34	1	100kΩ ±5% resistor (0402)
R59, R60	0	Not installed, resistors (0603)
R61, R62, R65, R66	4	4.75kΩ ±1% resistors (0402)
R63	1	2kΩ ±5% resistor (0402)
U1	1	AV SCART multiplexer, MAX9595CTM+ (48-pin, 7mm x 7mm x 0.8mm thin QFN)
VCR_R/C_IN, ENCIN_FS, ENC_C_IN, ENC_Y_IN, ENC_B_IN, ENC_G_IN, ENC_Y/CVBS_IN, ENC_R/C_IN, TV_R/C_IN, RF_CVBS_OUT	10	75Ω BNC female jacks, 4-pin 0.250in spacing (top mount) A/D Electronics 580-072-10
—	7	Shunts
—	1	MAX9595 PC board

_____MAX9595 EV Kit Files

FILE	DESCRIPTION
INSTALL.EXE	Installs the EV kit files on your computer
MAX9595.EXE	Application program
FTD2XX.INF	USB device driver file
UNINST.IN1	Uninstalls the EV kit software
TROUBLESHOOTING_USB.PDF	USB driver installation help file

MAX9595 EV System

PART	QTY	DESCRIPTION
MAX9595EVKIT	1	MAX9595 EV kit
CMAXQUSB	1	CMAXQUSB command module

_____Component Suppliers

SUPPLIER	PHONE	FAX	WEBSITE
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: Indicate that you are using the MAX9595 when contacting these component suppliers.

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Quick Start

Recommended Equipment

- Windows 98, 2000, or XP PC with USB port
- MAX9595EVCMAXQU

    MAX9595EVKIT

    CMAXQUSB module (includes USB cable)
- 12V/100mA DC power supply (V12)
- 5V/250mA DC power supply (VVID)
- 5V/100mA DC power supply (VAUD)
- DVD player with S-video, composite, or RGB outputs
- S-video to BNC "Y" connector

Note: In the following section(s), software-related items are identified by bolding. Text in **bold** refers to items directly from the EV kit software. Text in **bold** and **underline** refers to items from the Windows 98SE/2000/XP operating system.

Procedure

The MAX9595 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) Visit the Maxim Integrated Products website (www.maxim-ic.com/evkitsoftware) to obtain the most recent revision of the EV kit software MAX9595Rxx.ZIP.

2) Carefully connect the boards by aligning the 20-pin connector of the MAX9595 EV kit with the 20-pin header of the Maxim CMAXQUSB command module. Gently press them together.

3) Verify jumper JU1 → (1-2).

4) Verify jumper JU2 → (1-2).

5) Verify jumper JU3 → (Open).

6) Verify jumper JU4 → (1-2).

7) Verify jumper JU6 → (Open).

8) Verify jumper JU7 → (1-2).

9) Verify jumper JU9 → (1-2).

10) Run the INSTALL.EXE program to copy the files and create icons in the Windows 98SE/2000/XP **Start** menu.

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

11) Connect the second 12V/100mA DC power supply to the V12 and GNDAUD pads on the MAX9595 EV kit board.

12) Connect the 5V/250mA DC power supply to the VVID and GNDVID pads on the MAX9595 EV kit board.

13) Connect the 5V/100mA DC power supply to the VAUD and GNDAUD pads on the MAX9595 EV kit board.

14) Connect the GNDVID and GNDAUD pads together at the board.

15) Connect the DVD player output to the appropriate ENC input(s).

16) Connect a TV to the TV (J1) SCART connector.

17) Connect a VCR to the VCR (J2) SCART connector.

18) Turn on the power supplies.

19) Verify that the CMAXQUSB command module's jumper JU1 is in the 5V position.

20) Connect the included USB cable from the PC to the CMAXQUSB command module. A **Building Driver Database** window should pop up in addition to a **New Hardware Found** message. If you do not see any window that is similar to the one described above after 30 seconds, try removing the USB cable from the CMAXQUSB command module and reconnect it. Administrator privileges are required to install the USB device driver on Windows 2000 and XP. Refer to the document TROUBLESHOOTING_USB.pdf included with the software if more help is needed regarding the USB driver.

21) Follow the directions of the **Add New Hardware Wizard** to install the USB device driver. Choose the **Search for the best driver for your device** option. Specify the location of the device driver to be **C:\Program Files\MAX9595** using the **Browse** button.

22) Start the MAX9595 EV kit software by opening its icon in the **Start** Menu.

23) Observe as the program automatically detects the address of the MAX9595 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 I^{2}C-compatible write operation is generated to update the internal registers of the MAX9595. The **Interface** box indicates the current I^{2}C-compatible **Device Address**, **Register Address**, and the **Data Sent/Received**, for the last read/write operation. This data is used to confirm proper device operation.
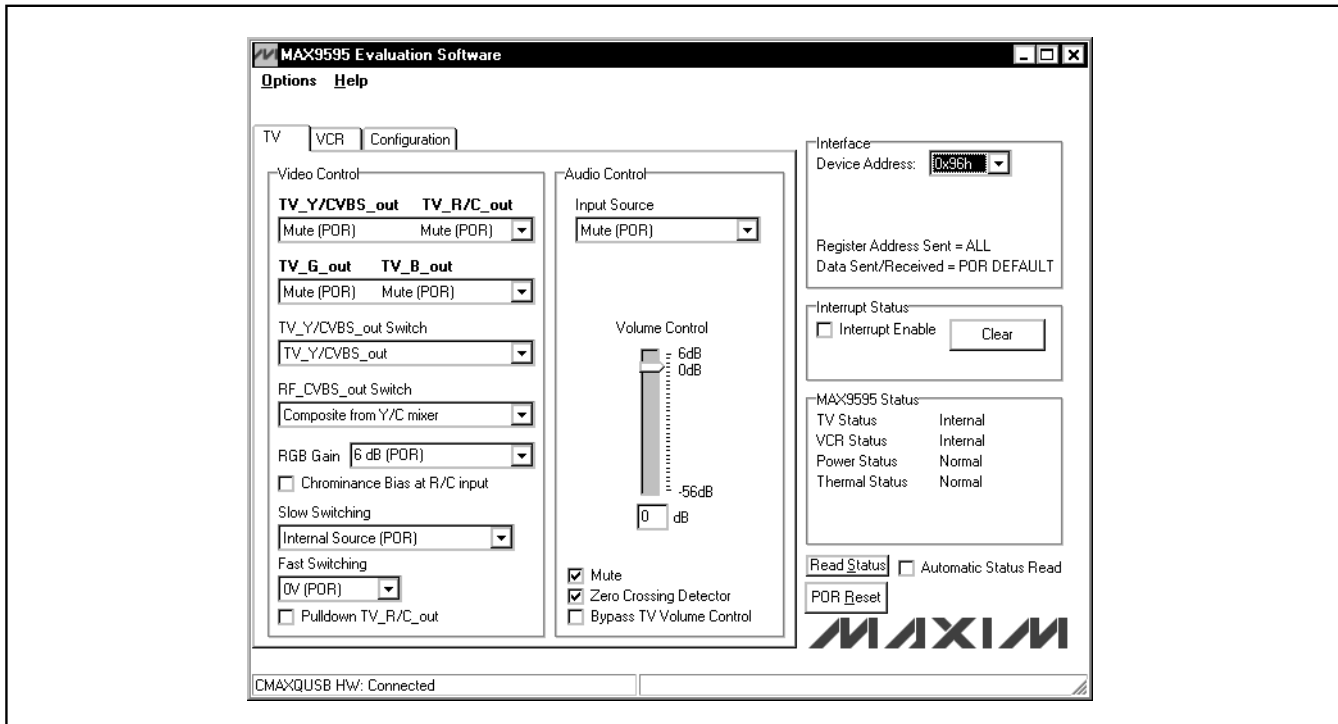
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Figure 1. MAX9595 EV Kit Software Main Window

The MAX9595 EV kit software splits and groups the functions of the MAX9595 into three separate categories. **TV**, **VCR**, and **Configuration** functions can be accessed by selecting the appropriate tab at the top left of the MAX9595 EV kit software main window. The **TV** and **VCR** panels of the MAX9595 EV kit software are again split into two sections (**Video Control** and **Audio Control**).

The device status registers (refer to the MAX9595 data sheet for status register information) are displayed in the **MAX9595 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 MAX9595 registers and EV kit software to their power-on-reset configuration.

TV Controls (Video Control)
The **Video Control** panel of the MAX9595 EV kit software (see Figure 1) allows the user to reroute 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 pulldowns and checkboxes to achieve the desired result.

TV Controls (Audio Control)
The **Audio Control** panel of the MAX9595 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 MAX9595 data sheet for a description of each of these functions).

VCR Controls (Video Control)
The **VCR** tab of the MAX9595 EV kit software is shown in Figure 2. 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.

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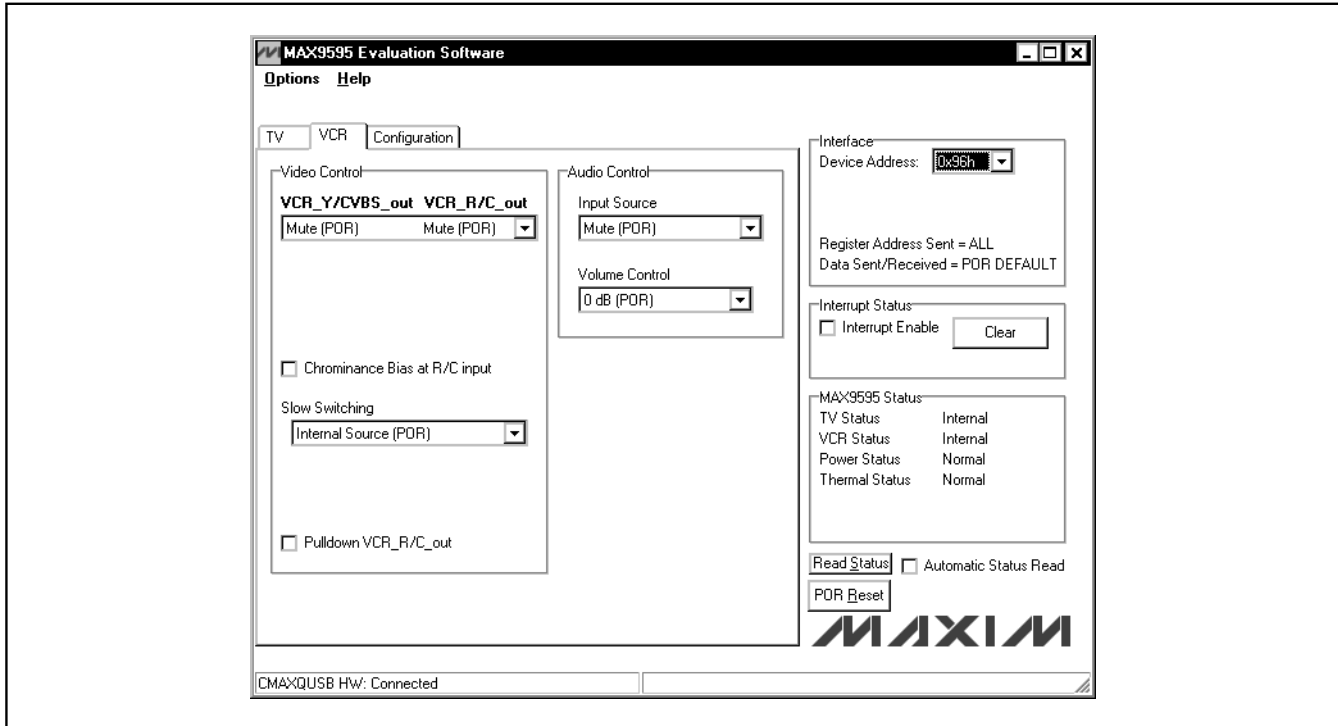
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Figure 2. MAX9595 EV Kit Software Main Window (VCR Control Panel)

VCR Controls (Audio Control)

Adjust the **Input Source** and **Volume Control** through the **Audio Control** panel of the MAX9595 EV kit software.

Configuration Controls

Selecting the **Configuration** tab (Figure 3) of the MAX9595 EV kit software allows the user to adjust configuration features of the MAX9595.

Checking desired checkboxes in the **Output Enable** panel will enable selected outputs of the MAX9595. A bias voltage may also be applied at the R/C input of the encoder (**Chrominance bias applied at ENC_R/C_IN**).

Simple I²C Commands

There are two methods for communicating with the MAX9595: through the normal user-interface panel or through the I²C commands available by selecting the

2-Wire interface diagnostic item from the **Options** pull-down menu. A display pops up that allows the SMBus™/I²C-compatible protocols, such as Read Byte and Write Byte, to be executed. The only SMBus/I²C-compatible protocols used by the MAX9595 are:

- 1: SMBusWriteByte(addr,cmd,data8)

- 3: SMBusReadByte(addr,cmd) → data8

The dialog boxes accept numeric data in hexadecimal and should be prefixed by 0x. See Figure 4 for an example of this tool.

Note: In places where the slave address asks for an 8-bit value, it must be the 7-bit slave address of the MAX9595 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 MAX9595 data sheet for a complete list of registers and functions.
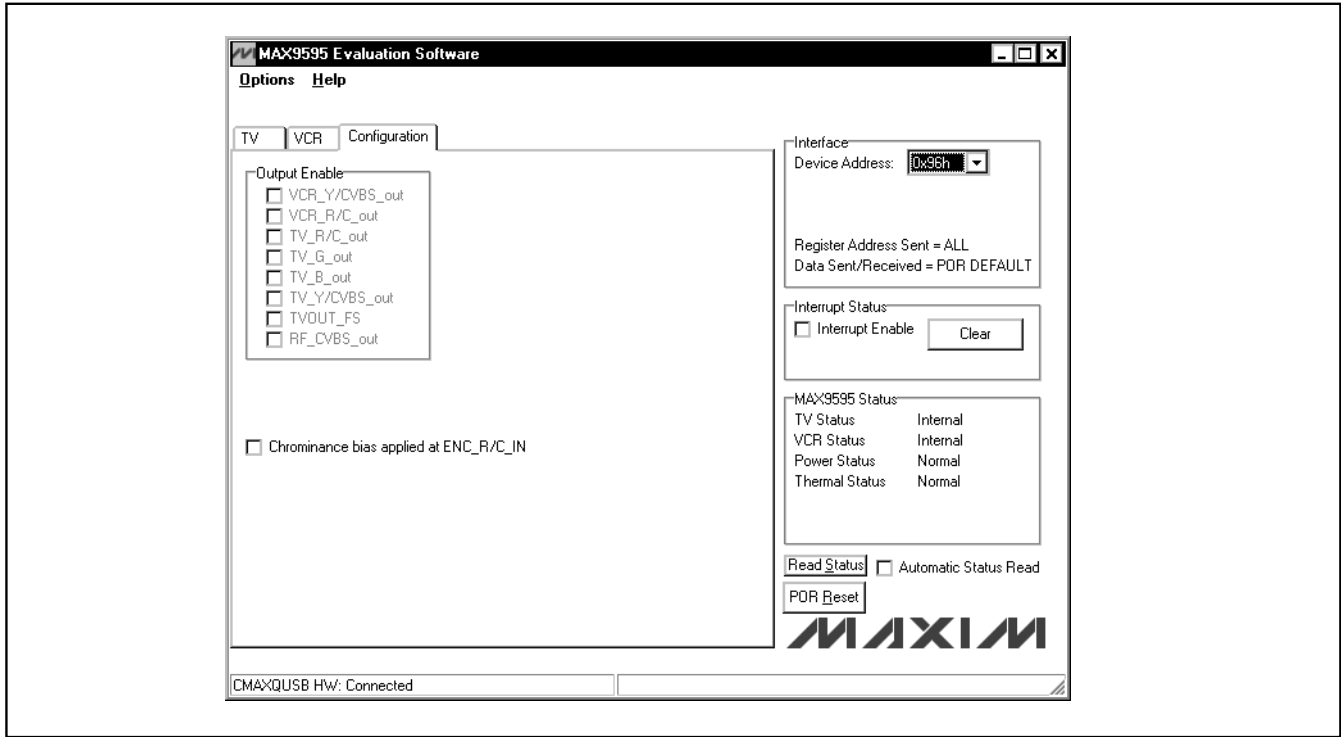
SMBus is a trademark of Intel Corp.

Figure 3. MAX9595 EV Kit Software Main Window (Configuration/Encoder)
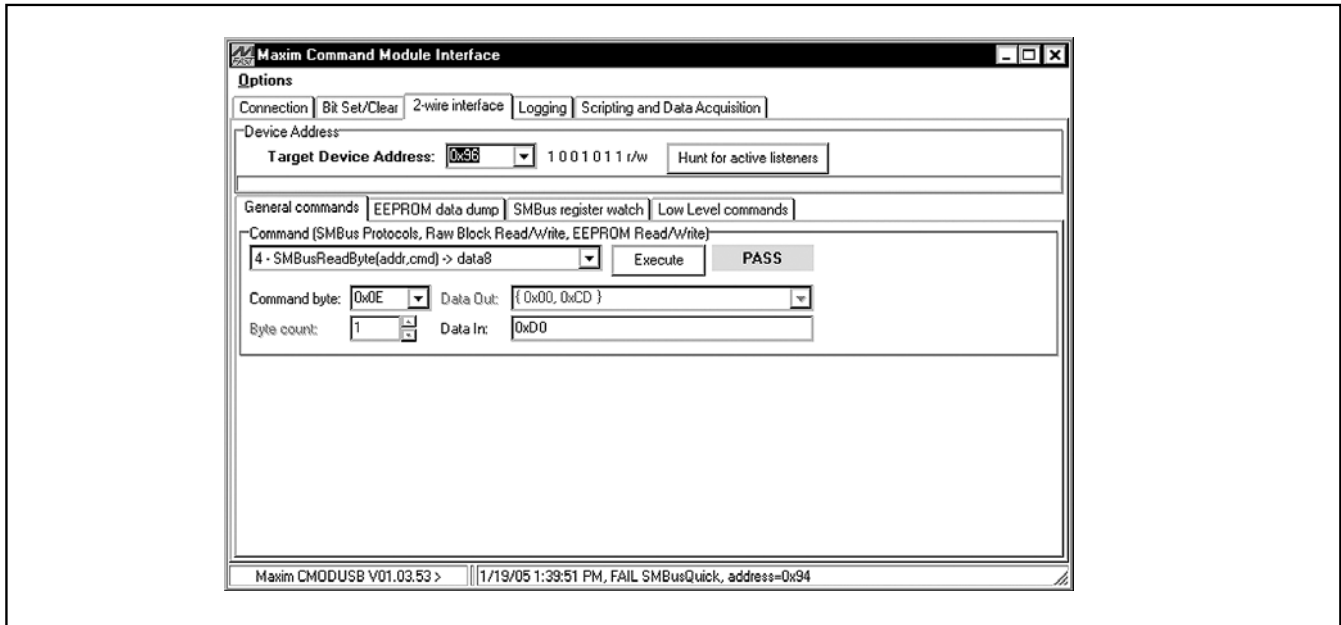

Figure 4. The above example shows a simple SMBusReadByte operation using the included Two-Wire Interface Diagnostics. In this example the software is reading from Device Address 1001011 (r/w) binary, Register Address 0x0E.

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Detailed Description of Hardware

The MAX9595 EV kit is an assembled and tested PC board that demonstrates the MAX9595 dual SCART switch matrix. It routes audio, video, and control signals between an MPEG decoder and the TV and VCR SCART connectors. All video connections are made through 75Ω controlled-impedance traces.

Connect a TV and VCR to the corresponding SCART connectors. The MPEG decoder video connections are made through the 75Ω BNCs with the ENC prefix. MPEG decoder audio connections are made through the ENC LI and ENC RI (J4 and J5) RCA connectors.

Table 1. Audio Encoder Input Circuitry (JU3–JU8)

JUMPER	MAX9595 SINGLE-ENDED (DEFAULT)
JU3	Open
JU4	1-2
JU6	Open
JU7	1-2

Monitor the R/C inputs of the TV and VCR connections through the TV_R/C_IN and VCR_R/C_IN BNCs, respectively.

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 JU9 sets the MAX9595 slave address. The default address is 1001 011Y (DEV_ADDR = V_DIG). See Table 2 for a complete list of addresses.

Table 2. Shunt Settings for SMBus Address (JU9)

SHUNT POSITION	MAX9595 ADDRESS PIN	MAX9595 ADDRESS	
		BINARY	HEXADECIMAL
1-2*	V_DIG	1001 011Y	0x96
2-3	G_DIG	1001 010Y	0x94

*Default configuration: JU9 (1-2)

Note: The first 7 bits shown are the address. Y (bit 0) is the I^2C read/write bit. This bit is a 1 for a read operation or a zero for a write.
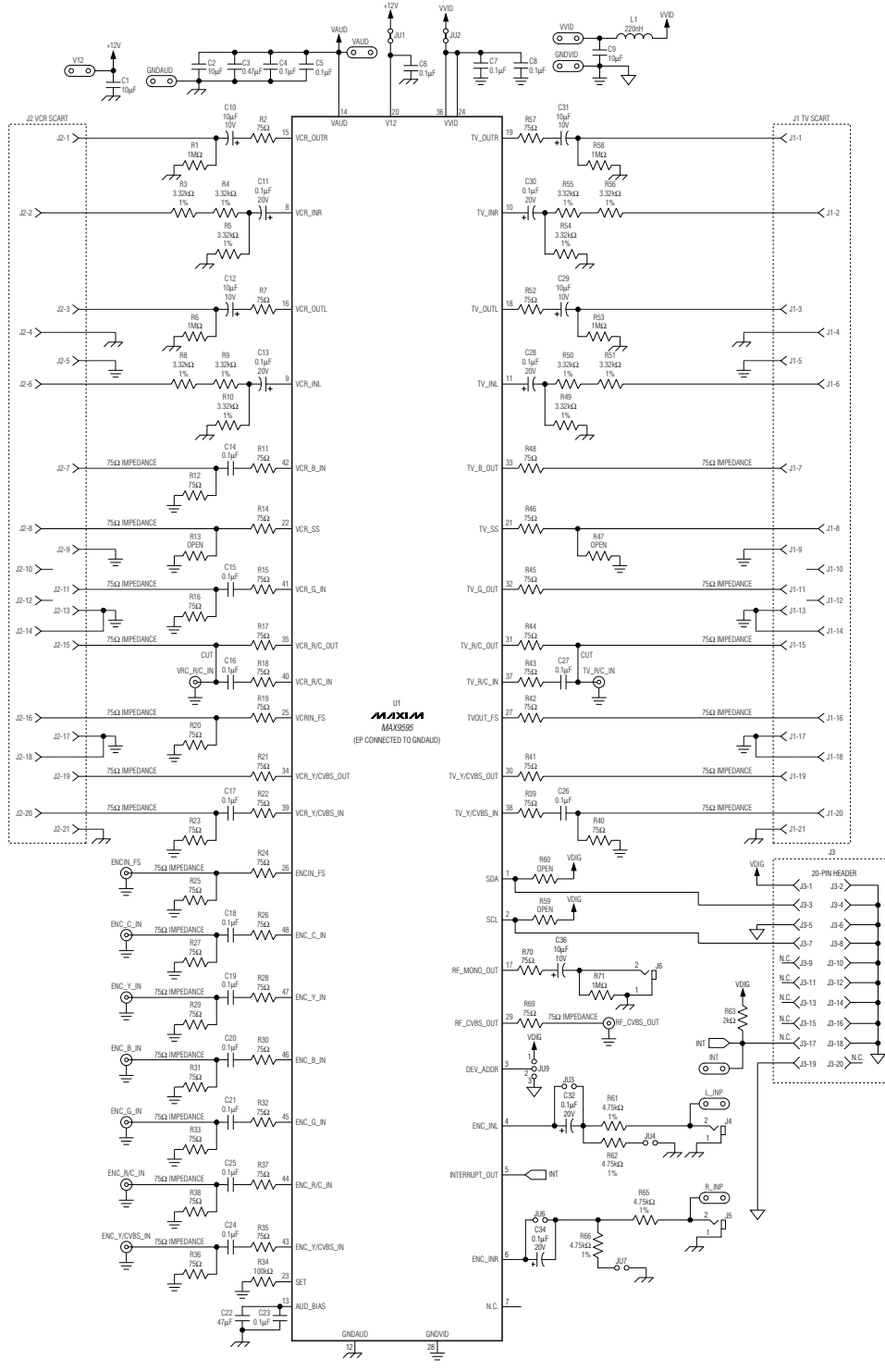
Figure 5. MAX9595 EV Kit Schematic

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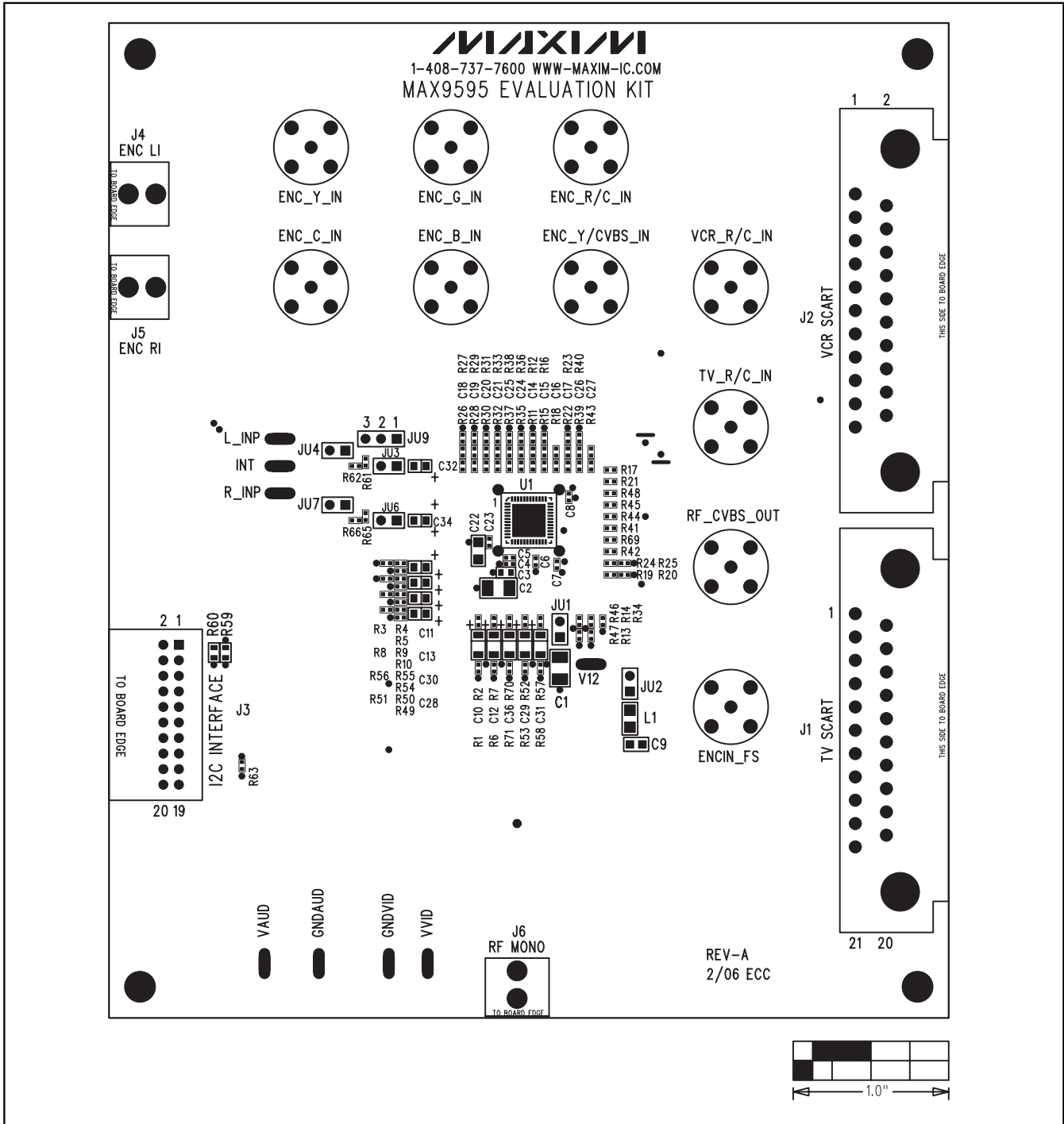
Figure 6. MAX9595 EV Kit Component Placement Guide—Component Side
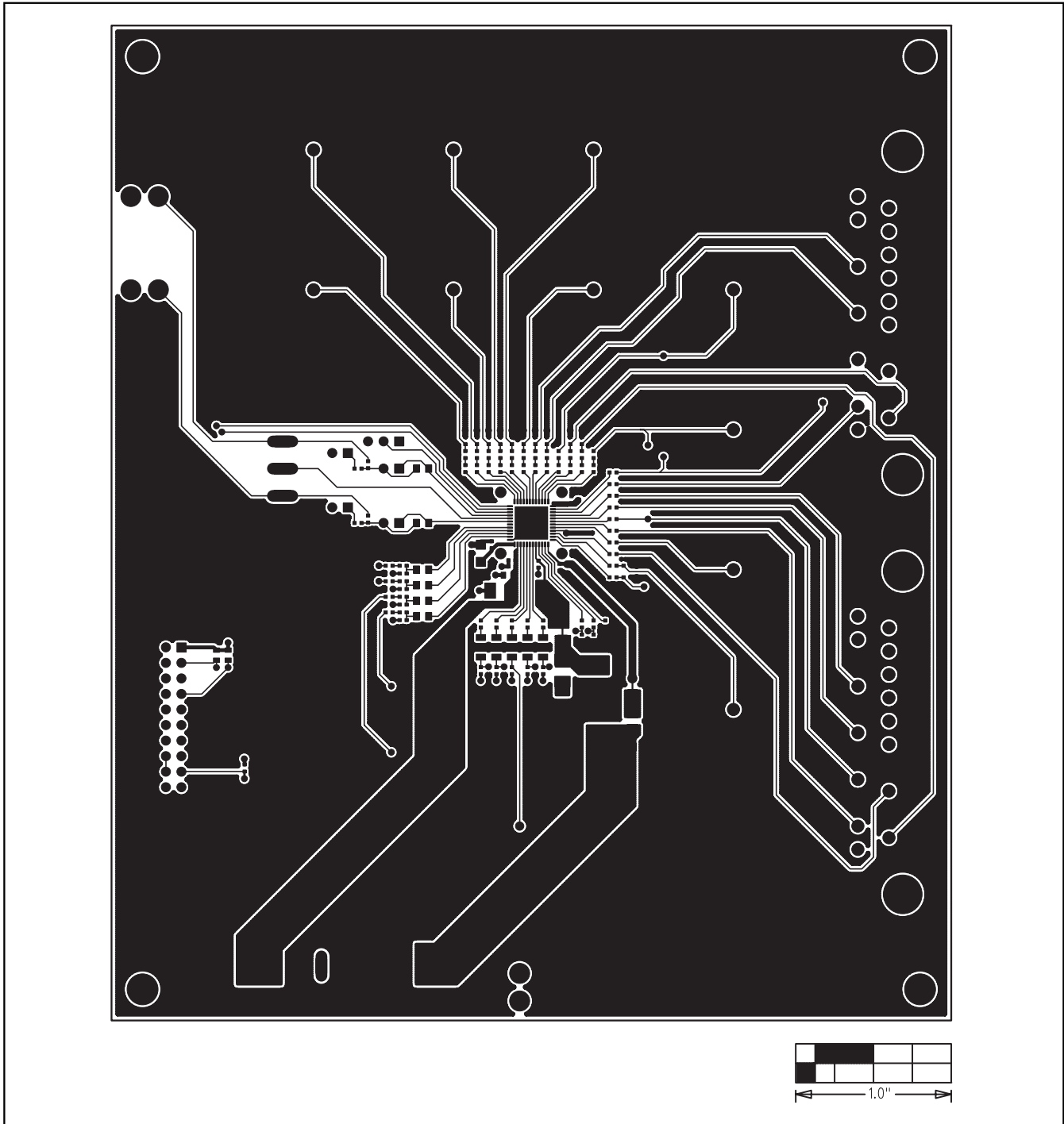
Figure 7. MAX9595 EV Kit PC Board Layout—Component Side

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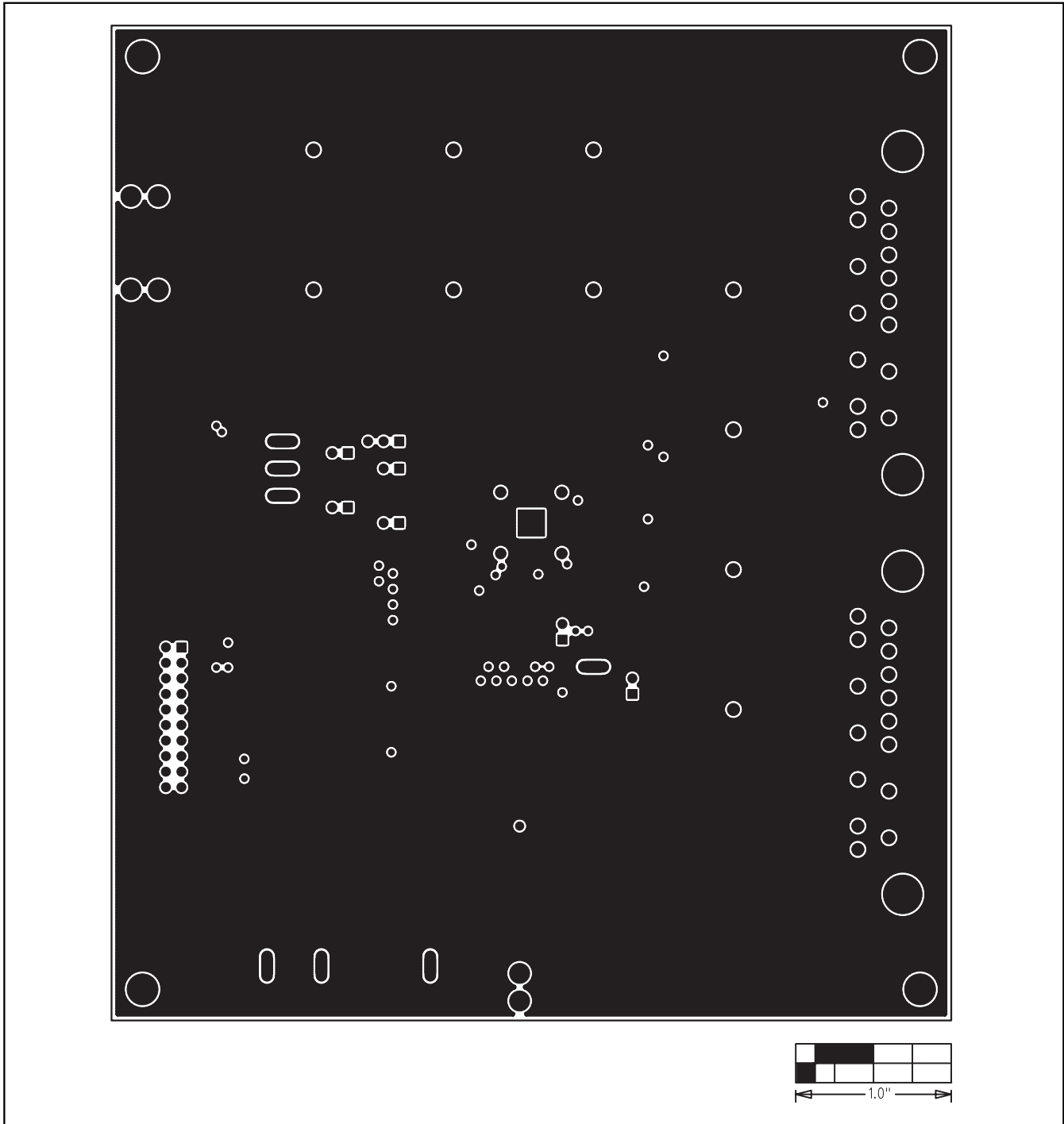
Figure 8. MAX9595 EV Kit PC Board Layout—Inner Layer 2
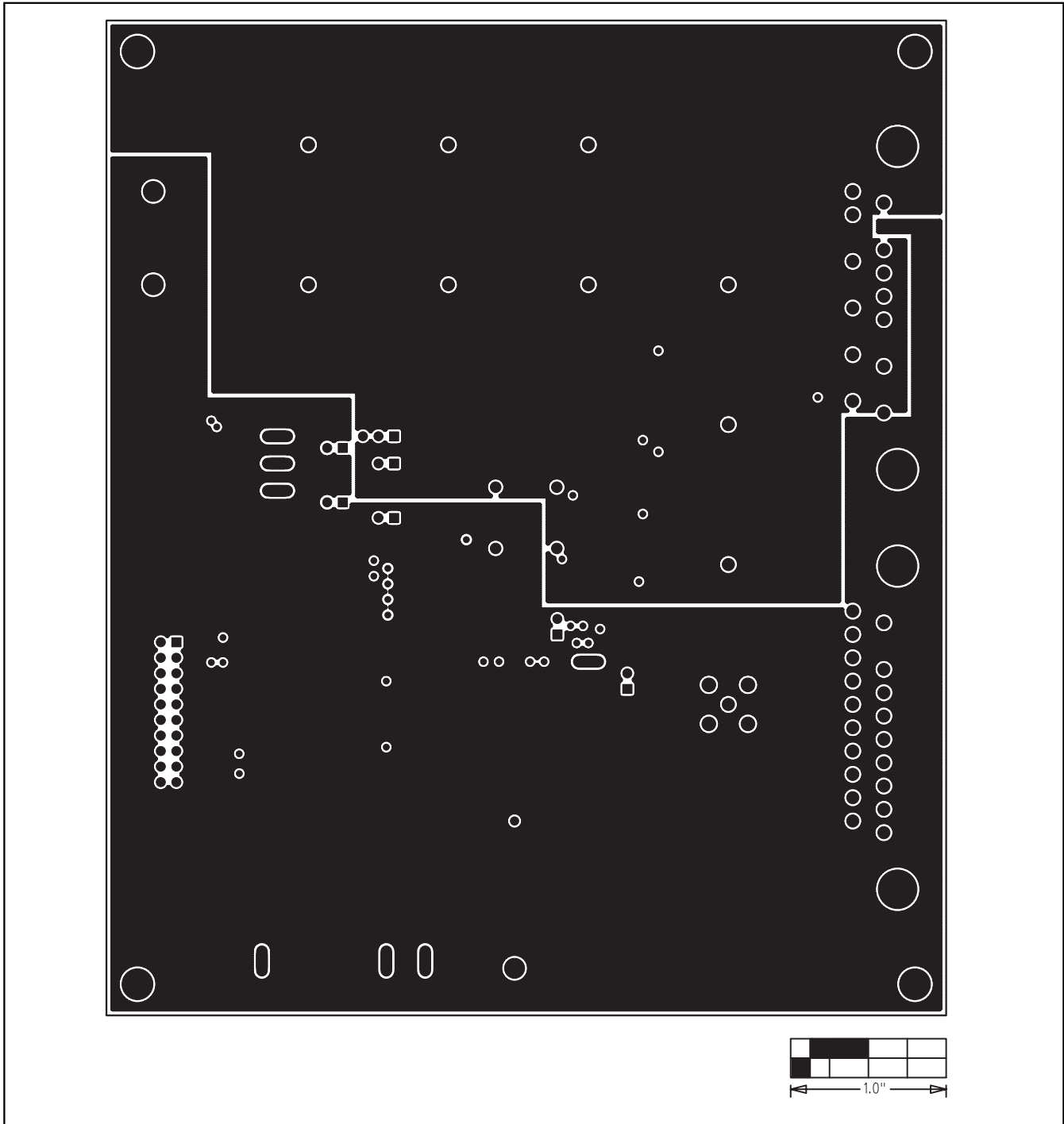
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Figure 9. MAX9595 EV Kit PC Board Layout—Inner Layer 3

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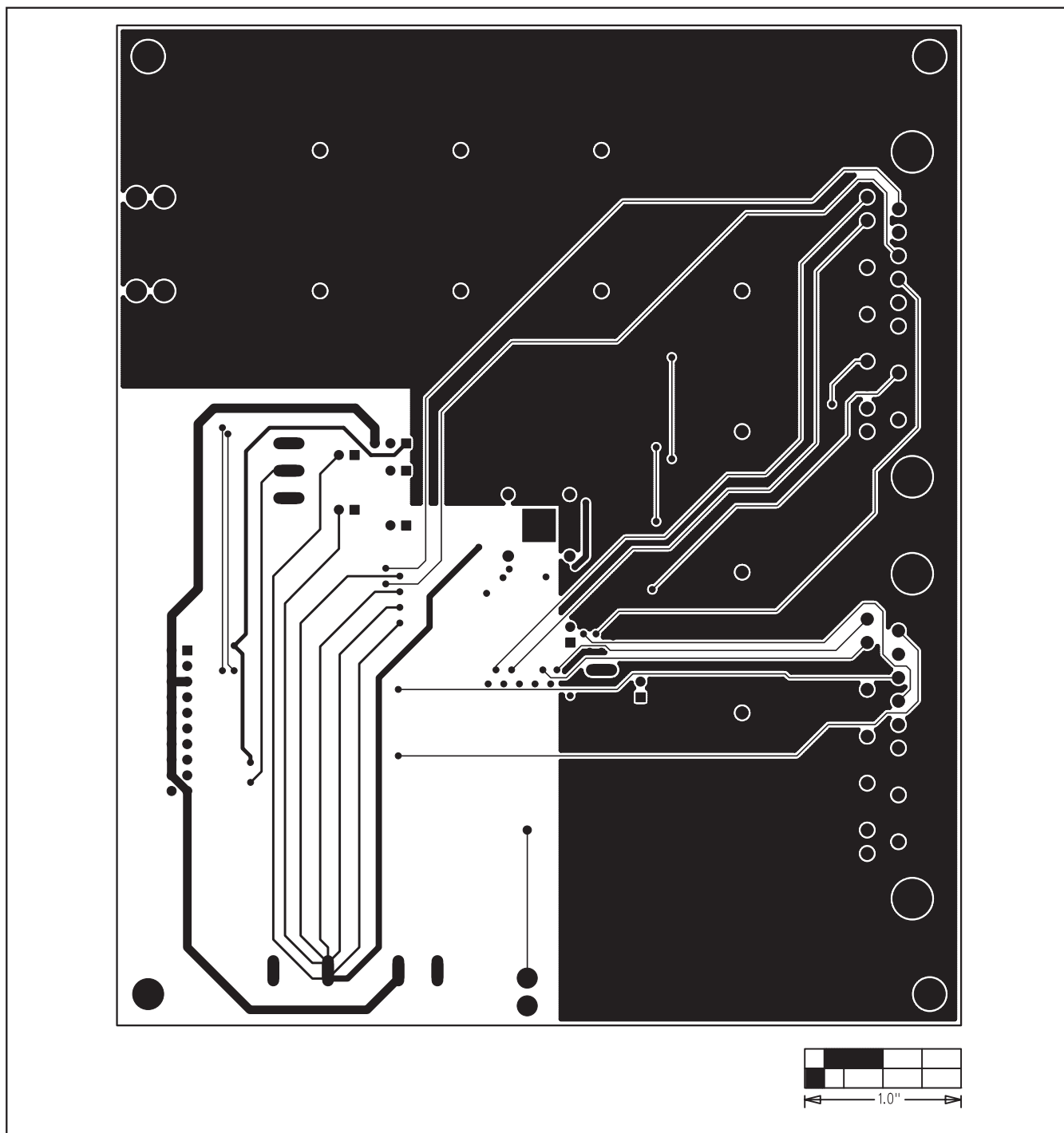
Figure 10. MAX9595 EV Kit PC Board Layout—Solder Side