MAXIM

MAX9526 Evaluation Kit

Evaluates: MAX9526

General Description

The MAX9526 evaluation kit (EV kit) is a fully assembled and tested surface-mount PCB that contains a MAX9526 IC. The MAX9526 is a low-power, high-performance multistandard video decoder. The EV kit also includes Windows® 2000/XP®- and Windows Vista®-compatible software that provides a simple graphical user interface (GUI) for exercising the features of the MAX9526.

Ordering Information

PART	TYPE
MAX9526EVKIT+	EV Kit

+Denotes lead(Pb)-free and RoHS compliant.

Features

♦ **AC-Coupled Video Inputs**

♦ **3.3V ITU-R BT.656 Bit-Parallel Outputs**

♦ **DC-Coupled Reconstruction DAC Outputs**

♦ **Standard 75Ω Input/Output Terminations**

♦ **Windows 2000/XP- and Windows Vista (32-Bit)-Compatible Software**

♦ **USB-PC Connection (Cable Included)**

♦ **USB Powered**

♦ **On-Board Regulators**

♦ **Lead(Pb)-Free and RoHS Compliant**

♦ **Support Optional D1 Serializer**

♦ **Proven PCB Layout**

♦ **Surface-Mount Components**

♦ **Fully Assembled and Tested**

Component List

DESIGNATION	QTY	DESCRIPTION
C1, C2, C3, C5–C14, C17, C18, C24–C29, C32–C37, C41–C44, C48, C53, C54, C55	35	0.1µF ±10%, 16V X7R ceramic capacitors (0603) TDK C1608X7R1C104K
C4	1	0.033µF ±10%, 16V X5R ceramic capacitor (0603) Taiyo Yuden EMK107BJ333KA
C15, C16	2	10pF ±5%, 50V C0G ceramic capacitors (0603) Murata GCM1885C1H100J
C19, C20, C30, C31	4	22pF ±5%, 50V C0G ceramic capacitors (0603) Murata GCM1885C1H220J
C21, C39, C45, C46, C52	5	1µF ±10%, 16V X5R ceramic capacitors (0603) TDK C1608X5R1C105K
C22, C23, C38, C40, C47	5	10µF ±20%, 16V X5R ceramic capacitors (1206) Murata GCM31CR71C106KA64
C49, C50, C51	3	0.01µF ±10%, 16V X7R ceramic capacitors (0402) Taiyo Yuden EMK105BJ103KV

DESIGNATION	QTY	DESCRIPTION
EXTCLK, SDO, $\overline{SDO}$, U/BLUE, Y/GREEN, V/RED	6	75Ω BNC jacks
H1	1	26-pin (2 x 13) header
H2	1	4-pin header
H3	1	5-pin header
H4, H5, JU5, JU6, JU7	5	2-pin headers
IN1A, IN1B, IN2	3	Right-angle RCA jacks
J1	1	USB type-B receptacle connector
J3	0	Not installed, 10-pin (2 x 5) header
JU1, JU8, JU9, JU10, JU13	5	3-pin headers
JU3, JU4, JU11, JU12, JU14	0	Not installed, 2-pin headers—shorted with PCB trace
JU19	1	6-pin (2 x 3) header
JU20	0	Not installed, 6-pin (2 x 3) header
LED1, LED2	2	Red LEDs (T1-3/4)
L1, L2, L3	3	Ferrite beads (0603) TDK MMZ1608R301A

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Component List (continued)

DESIGNATION	QTY	DESCRIPTION
P1, P2	2	Banana jacks
R1, R2	2	27Ω ±5% resistors (0603)
R3	1	1.5kΩ ±5% resistor (0603)
R4	1	470Ω ±5% resistor (0603)
R5	1	2.2kΩ ±5% resistor (0603)
R6	1	10kΩ ±5% resistor (0603)
R7–R12, R26, R31, R32, R33, R64, R65, R66	13	37.4Ω ±1% resistors (0603)
R13	1	49.9Ω ±1% resistor (0603)
R14, R15	2	10kΩ ±1% resistors (0603)
R16, R17	2	330Ω ±5% resistors (0603)
R18	1	33kΩ ±5% resistor (0603)
R19–R23	0	Not installed, resistors—short (PC trace) (0402)
R24, R25	2	4.7kΩ ±5% resistors (0603)
R27	1	4.02kΩ ±1% resistor (0603)
R28, R29	2	100Ω ±5% resistors (0603)
R30, R37–R40, R48, R49	7	75Ω ±5% resistors (0603)
R34, R35	2	100kΩ ±5% resistors (0603)
R36	1	150Ω ±5% resistor (0603)
R41–R44, R50	5	1kΩ ±5% resistors (0603)
R45, R46	0	Not installed, resistors (0603)
R47	1	1.69kΩ ±1% resistor (0603)
R51, R52	2	1MΩ ±5% resistors (0603)
R53–R63	11	22Ω ±5% resistors (0603)
TP1–TP4	0	Not installed, test points
U1	1	Low-power multistandard video decoder (28 QSOP) Maxim MAX9526AEI+
U2	1	Low-voltage TTL buffer (48 TSSOP) (Top Mark: AVC16244)
U3	1	1.8V at 120mA LDO linear regulator (5 SC70) Maxim MAX8511EXK18+ (Top Mark: AEF)

DESIGNATION	QTY	DESCRIPTION
U4	1	3.3V at 350mA LDO linear regulator (8 SO) Maxim MAX1658ESA+
U5	1	Passive video switch (10 µMAX®) Maxim MAX4586EUB+
U6	1	10-bit CCIR-601 to PAL/NTSC video encoder (44 MQFP) Analog Devices ADV7176AKSZ
U7	1	Triple standard-definition video filter amplifier (8 µMAX) Maxim MAX9584AUA+
U8	0	Not installed, SMPTE 259M digital video serializer (44 MQFP) National CLC021AVGZ-3.3/NOPB
U9	1	Microcontroller (68 QFN-EP*) Maxim MAXQ2000-RAX+
U10	1	USB-to-UART converter (32 TQFP)
U11	1	93C46 type 3-wire EEPROM (8 SO)
U12	1	2.5V at 120mA LDO linear regulator (5 SC70) Maxim MAX8511EXK25+ (Top Mark: ADV)
Y1	1	27MHz crystal, fundamental mode (HCM49) Hong Kong X'tals SSM2700000E18FAFZ800
Y2	1	16MHz crystal (HCM49) Hong Kong X'tals SSM1600000E18FAF
Y3	0	Not installed, crystal
Y4	1	6MHz crystal (HCM49) Hong Kong X'tals SSL6000000E18FAF
—	9	Shunts
—	1	USB high-speed A-to-B cables, 6ft
—	1	PCB: MAX9526 Evaluation Kit+

EP = Exposed pad.

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Component Suppliers

SUPPLIER	PHONE	WEBSITE
Hong Kong X'tals Ltd.	852-35112388	www.hongkongcrystal.com
Murata Electronics North America, Inc.	770-436-1300	www.murata-northamerica.com
Taiyo Yuden	800-348-2496	www.t-yuden.com
TDK Corp.	847-803-6100	www.component.tdk.com

Note: *Indicate that you are using the MAX9526 when contacting these component suppliers.*

MAX9526 EV Kit Files

FILE	DESCRIPTION
MAX9526.EXE	Application program
FTD2XX.INF	USB device driver file
USB_Driver_Help.PDF	USB driver installation help file

Quick Start

Recommended Equipment

- MAX9526 EV kit (USB cable included)
- User-supplied Windows 2000/XP- or Windows Vista-compatible PC with a spare USB port
- 5V, 500mA DC power supply
- Video signal generator (e.g., Tektronix TG-2000 or similar)
- Component analog or parallel/serial digital video measurement equipment
- Component analog video monitor

Note: In the following sections, software-related items are identified by bolding. Text in **bold** refers to items directly from the EV kit software. Text in **bold and underlined** refers to items from the Windows operating system.

Procedure

The MAX9526 EV kit is fully assembled and tested. Follow the steps below to verify board operation. **Caution: Do not turn on the power supply until all connections are completed.**

1) Visit **www.maxim-ic.com/evkitsoftware** to download the latest version of the EV kit software, 9526Rxx.ZIP. Save the EV kit software to a temporary folder and uncompress the ZIP file.

2) Install the EV kit software on your computer by running the 9526Rxx.msi program inside the temporary folder. The program files are copied and icons are created in the Windows **Start | Programs** menu.

3) Verify jumper settings (see Table 1).

4) Connect external 5V, 500mA power supply to banana jacks P1 (+) and P2 (-) and verify that jumper JU1 is in the 1-2 position.

5) Connect the output of the video signal generator to the IN1A RCA connector on the MAX9526 EV kit.

6) Connect the H1 header from the EV kit to an ITU-compatible bit-parallel interface measurement equipment.

7) Optionally, connect component video monitor to the U/BLUE, Y/GREEN, and V/RED BNC connectors from the EV kit.

8) Set the video signal generator for the desired AC-coupled PAL or NTSC video input signal.

9) Turn on the power supply and enable the video signal generator.

10) Connect the USB cable from the PC to the EV kit board. A **Building Driver Database** window pops up in addition to a **New Hardware Found** message when installing the USB driver for the first time. If a window is not seen that is similar to the one described above after 30s, remove the USB cable from the board and reconnect it. Administrator privileges are required to install the USB device driver on Windows.

11) 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\MAX9526 (default installation directory) using the **Browse** button. During device driver installation, Windows may show a warning message indicating that the device driver Maxim uses does not contain a digital signature. This is not an error condition and it is safe to proceed with installation. Refer to the USB_Driver_Help.PDF document included with the software for additional information.

12) Start the MAX9526 EV kit software by opening its icon in the **Start | Programs** menu, then press the **Reset to Default Values** button. The EV kit software main window appears, as shown in Figure 1.

13) Analyze the video output signal.

Detailed Description of Software

The MAX9526 EV kit software provides a graphical user interface (GUI) to configure the EV kit hardware. Three devices are controlled by the I^{2}C interface bus: MAX9526 (U1), MAX4586 (U5), and ADV7176A (U6).

The status bar indicates MAX9526 $\overline{IRQ}$ output pin status.

Drop-down lists select the I^{2}C device address for MAX9526, MAX4586, and ADV7176A. The **ITU Demux Address** drop-down list includes both ADV7175A and ADV7176A device addresses. Each of these address selection drop-down lists include an option to search known addresses for each corresponding device (see Figure 1).
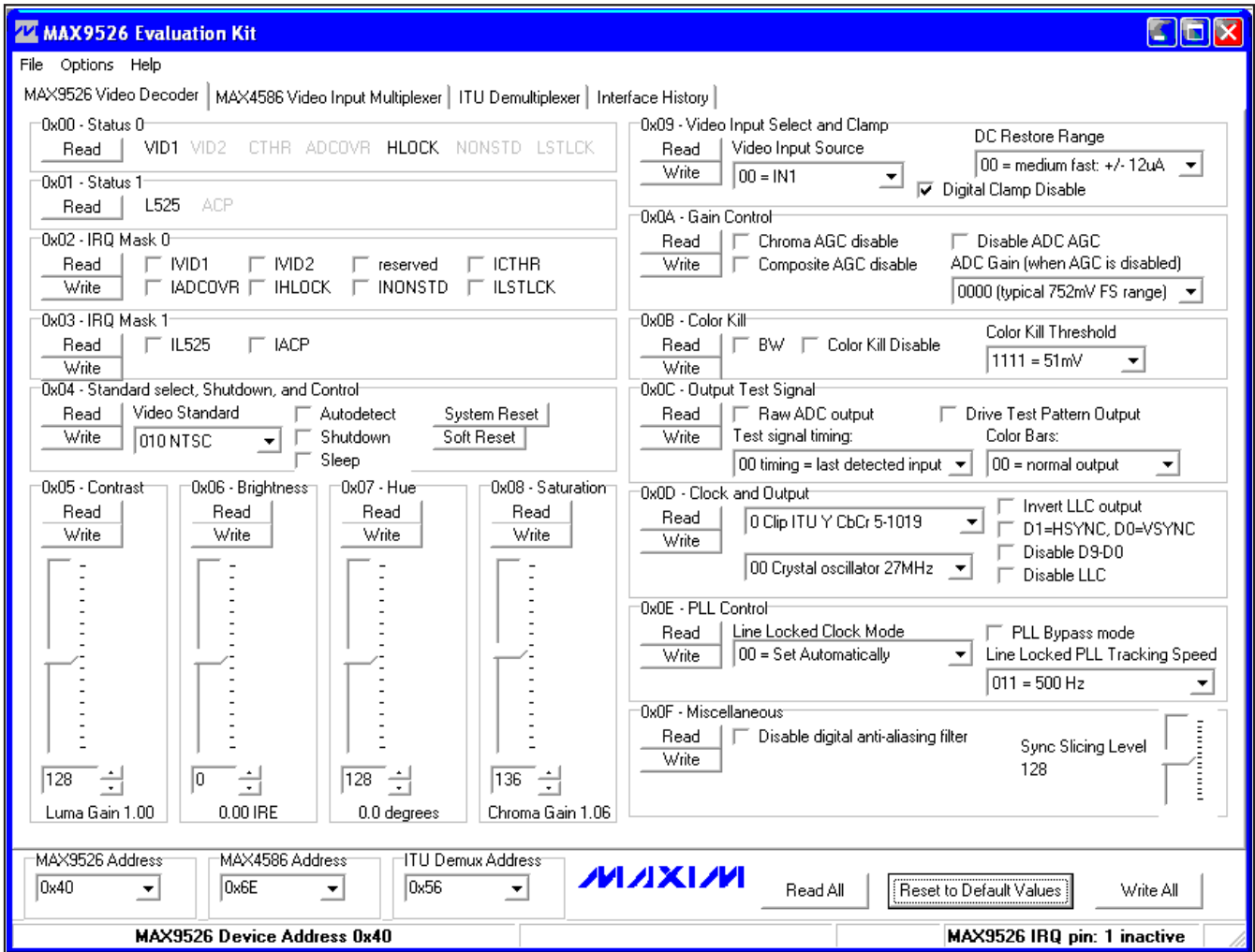

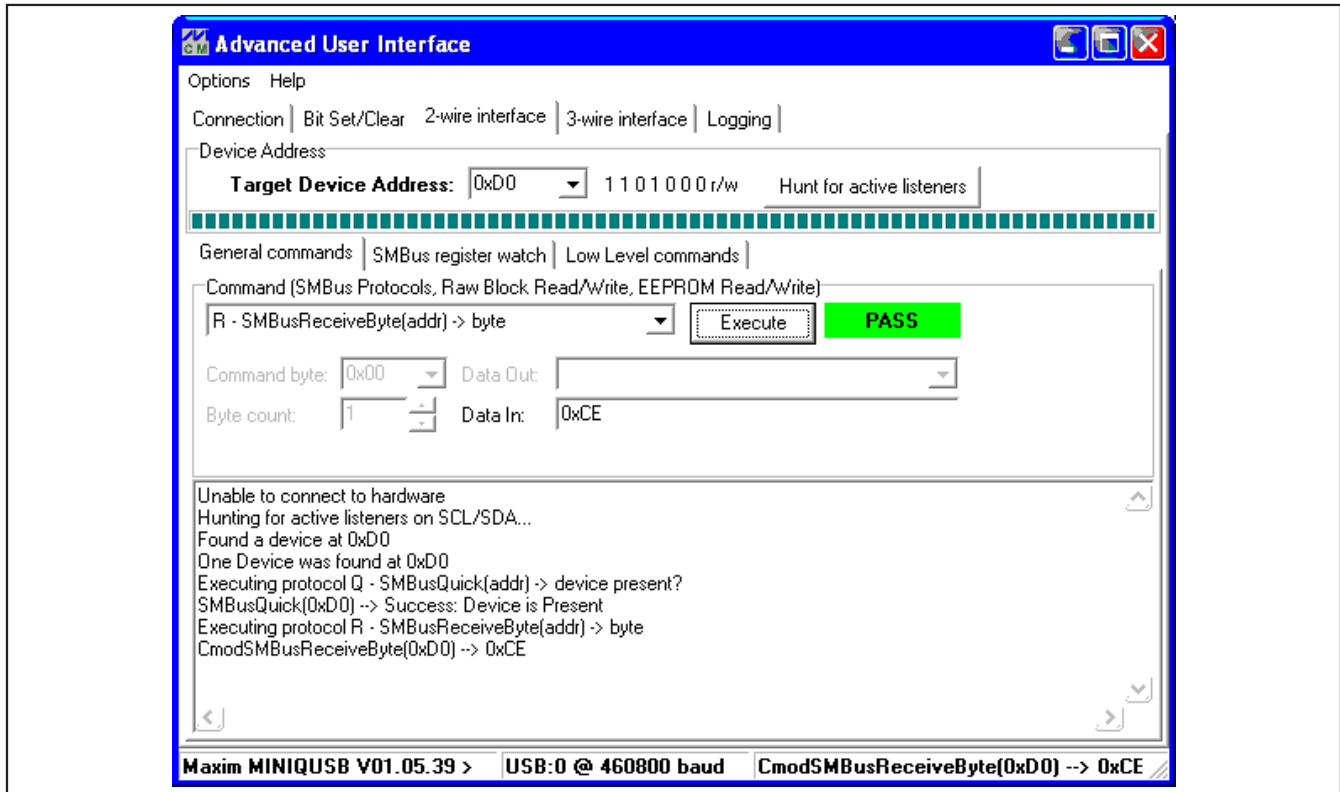*Figure 1. MAX9526 EV Kit Software Main Window*

Figure 2. Advanced User Interface Window

MAX9526 Video Decoder Tab

Registers 0x00 and 0x01 are read-only status displays. All the other registers have **Read** and **Write** buttons. The **Read All** and **Write All** buttons read or write all the MAX9526 device registers. The **Reset to Default Values** button allows writing all the MAX9526 device registers to their default state.

MAX4586 Video Input Multiplexer Tab

The **MAX4586 Video Input Multiplexer** tab sheet has a set of five radio buttons, selecting IN1 = IN1A, IN1B, the unconnected input pins, or nothing. **Note:** The EV kit hardware does not connect all MAX4586 inputs.

ITU Demultiplexer Tab

The **ITU Demultiplexer** tab sheet controls the ADV7176A MODE0, MODE1, and MODE2 registers.

Interface History Tab

The **Interface History** tab sheet provides a list of the I^2C and other commands generated by the on-board microcontroller.

Advanced User Interface

The **Options | Interface (Advanced Users)** menu item brings up the **Advanced User Interface** window shown in Figure 2. This window allows sending arbitrary commands on the I^2C bus.

Configuration File Format

Register configuration can be saved to a file and later reloaded by the software. From the **File** menu, select either the **Load Configuration File** or the **Save Configuration File As...** menu item. The MAX9526 read-only status registers (0x00 and 0x01) are saved but not restored when configuration is loaded. The MAX4586 device (U5) saves the channel selection from the software GUI. The ITUDEMUX device (U6) saves only four of its registers (0x00, 0x01, 0x07, and 0x0D). Any registers added by manually editing the configuration file are not checked for data integrity.

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Table 1. Jumper Selection

JUMPER	SHUNT POSITION	DESCRIPTION
JU1	1-2*	Power 3.3V LDO U4 from external user-supplied power supply
	2-3	Power 3.3V LDO U4 from USB+5V
JU3	Not installed*	SDA pullup resistor R24 connected
	PCB trace cut open	SDA pullup must be user supplied
JU4	Not installed*	SCL pullup resistor R25 connected
	PCB trace cut open	SCL pullup must be user supplied
JU5	1-2	U6 ADV7176A $\overline{\text{HSYNC}}$ = GND
	Open*	U6 ADV7176A $\overline{\text{HSYNC}}$ = open
JU6	1-2	U6 ADV7176A FIELD$\overline{\text{SYNC}}$ = GND
	Open*	U6 ADV7176A FIELD$\overline{\text{SYNC}}$ = open
JU7	1-2	U6 ADV7176A $\overline{\text{BLANK}}$ = GND
	Open*	U6 ADV7176A $\overline{\text{BLANK}}$ = open
JU8	1-2*	U6 ADV7176A ALSB = VDDU6
	2-3	U6 ADV7176A ALSB = GND
JU9	1-2*	U8 CLC021 TPGENAB = +3.3V
	2-3	U8 CLC021 TPGENAB = GND
JU10	1-2*	U5 MAX4586 A = USB+5V
	2-3	U5 MAX4586 A = GND
JU11	Not installed*	SDA connected to on-board microcontroller
	PCB trace cut open	SDA disconnected from on-board microcontroller
JU12	Not installed*	SCL connected to on-board microcontroller
	PCB trace cut open	SCL disconnected from on-board microcontroller
JU13	1-2*	U8 CLC021 $\overline{\text{SMPTEMODE}}$ = 1
	2-3	U8 CLC021 $\overline{\text{SMPTEMODE}}$ = 0
JU14	Not installed*	On-board microcontroller GPIO K5 = MAX9526 $\overline{\text{IRQ}}$
	PCB trace cut open	On-board microcontroller GPIO K5 is unconnected
JU19	1-2*	U1 MAX9526 DEVADR = +3.3V
	3-4	U1 MAX9526 DEVADR = GND
	5-6	U1 MAX9526 DEVADR = SDA

*Default position.

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_Detailed Description of Hardware

The MAX9526 EV kit is a fully assembled and tested surface-mount PCB that contains a MAX9526 IC. The MAX9526 is a low-power, high-performance multistandard video decoder.

External passive video switch U5 (MAX4586) allows evaluation of recovery from asynchronous external multiplexer switching. LDO linear regulator U3 (MAX8511) powers the MAX9526 1.8V digital and analog supplies. LDO linear regulator U4 (MAX1658) supplies 3.3V to the rest of the board. Low-voltage TTL buffer U2 (74AVC16244) drives the 3.3V ITU-R BT.656 bit-parallel interface-compatible signals on header H1. Header H2 provides access to the I^{2}C bus. On-board resistors R24 and R25 pull up SCL and SDA. The microcontroller circuitry (U9, U10, U11, and U12) is equivalent to Maxim's MAXQ2000-based MINIQUSB board.

Analog Reconstruction DAC

U6 (ADV7176A) reconstructs the digital ITU-R BT.656 bit-parallel interface signals into component analog video output. U7 (MAX9584) buffers and filters the DC-coupled outputs U/BLUE, Y/GREEN, and V/RED.

Serial Digital Output Option

Optional U8 (CLC021AVGZ) converts the parallel digital ITU-R BT.656 bit-parallel interface signals into differential serial digital output (SDO).

User-Supplied I^{2}C Interface

To use the MAX9526 EV kit with a user-supplied I^{2}C interface, first cut the JU11 and JU12 default traces, disconnecting SCL and SDA from the on-board microcontroller. If the user-supplied I^{2}C bus provides its own SCL/SDA pullup resistors, then disable on-board pullup resistors R24 and R25 by cutting the JU3 and JU4 default traces. Lastly, connect the SCL, SDA, and GND signals to the corresponding test points on header H2 on the MAX9526 EV kit board.

Table 2. Jumper Selection Related to U6

JUMPER	SHUNT POSITION	DESCRIPTION
JU5	1-2	U6 ADV7176A $\overline{\text{HSYNC}}$ = GND
	Open*	U6 ADV7176A $\overline{\text{HSYNC}}$ = open
JU6	1-2	U6 ADV7176A FIELD$\overline{\text{SYNC}}$ = GND
	Open*	U6 ADV7176A FIELD$\overline{\text{SYNC}}$ = open
JU7	1-2	U6 ADV7176A $\overline{\text{BLANK}}$ = GND
	Open*	U6 ADV7176A $\overline{\text{BLANK}}$ = open
JU8	1-2*	U6 ADV7176A ALSB = VDDU6
	2-3	U6 ADV7176A ALSB = GND

*Default position.

Table 3. Jumper Selection for Serial Digital Output

JUMPER	SHUNT POSITION	DESCRIPTION
JU9	1-2*	U8 CLC021 TPGENAB = +3.3V
	2-3	U8 CLC021 TPGENAB = GND
JU13	1-2*	U8 CLC021 $\overline{\text{SMPTEMODE}}$ = 1
	2-3	U8 CLC021 $\overline{\text{SMPTEMODE}}$ = 0

*Default position.

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Table 4. Jumper Selection for I2C Interface

JUMPER	SHUNT POSITION	DESCRIPTION
JU3	Not installed*	SDA pullup resistor R24 connected
	PCB trace cut open	SDA pullup must be user supplied
JU4	Not installed*	SCL pullup resistor R25 connected
	PCB trace cut open	SCL pullup must be user supplied
JU8	1-2*	U6 ADV7176A ALSB = +3.3V
	2-3	U6 ADV7176A ALSB = GND
JU10	1-2*	U5 MAX4586 A = USB+5V
	2-3	U5 MAX4586 A = GND
JU11	Not installed*	SDA connected to on-board microcontroller
	PCB trace cut open	SDA disconnected from on-board microcontroller
JU12	Not installed*	SCL connected to on-board microcontroller
	PCB trace cut open	SCL disconnected from on-board microcontroller
JU19	1-2*	U1 MAX9526 DEVADR = +3.3V
	3-4	U1 MAX9526 DEVADR = GND
	5-6	U1 MAX9526 DEVADR = SDA

*Default position.

Table 5. Jumper Selection for Power Supply

JUMPER	SHUNT POSITION	DESCRIPTION
JU1	1-2*	Power 3.3V LDO U4 from external user-supplied power supply
	2-3	Power 3.3V LDO U4 from USB+5V

*Default position.

User-Supplied 3.3V Power Supply
The MAX9526 EV kit requires a USB connection to power the on-board microcontroller. When directly connected to a high-power (500mA) USB host, move the shunt of JU1 to the 2-3 position to power the EV kit 3.3V and 1.8V LDO linear regulators (U4 and U3) from USB.

When used with a low-power (100mA) USB host, such as a hub, power the 3.3V MAX1658 LDO linear regulator from an external 500mA power supply. Move the shunt of JU1 to the 1-2 position to apply your own 4.8V to 16.5V DC power supply at the P1 (EXT PWR) banana jack.

Input Coupling
The MAX9526 EV kit inputs IN1A, IN1B, and IN2 are AC-coupled.

Output Coupling
The MAX9526 EV kit drives DC-coupled analog video reconstruction outputs from the ADV7176A (U6).

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I^2C Device Address Maps

Table 6. U1 MAX9526 I^2C Device Address

JU19 DEVADR	MAX9526 I^2C ADDRESS	WRITE READ
1-2* (DVDD)	0100 000 r/w	0x40 0x41
3-4 (DGND)	0100 001 r/w	0x42 0x43
5-6 (SDA)	0100 010 r/w	0x44 0x45

*Default position.

Table 7. U6 ITU Demultiplexer I^2C Device Address

JU8 ALSB	U6 PART NUMBER	U6 I^2C ADDRESS	WRITE READ
1-2* (DVDD)	ADV7176A	0101 011 r/w	0x56 0x57
2-3 (DGND)	ADV7176A	0101 010 r/w	0x54 0x55

*Default position.

Table 8. U5 MAX4586 I^2C Device Address

JU10 A	MAX4586 I^2C ADDRESS	WRITE READ
1-2* (USB+5V)	0110 111 r/w	0x6E 0x6F
2-3 (GND)	0110 101 r/w	0x6A 0x6B

*Default position.
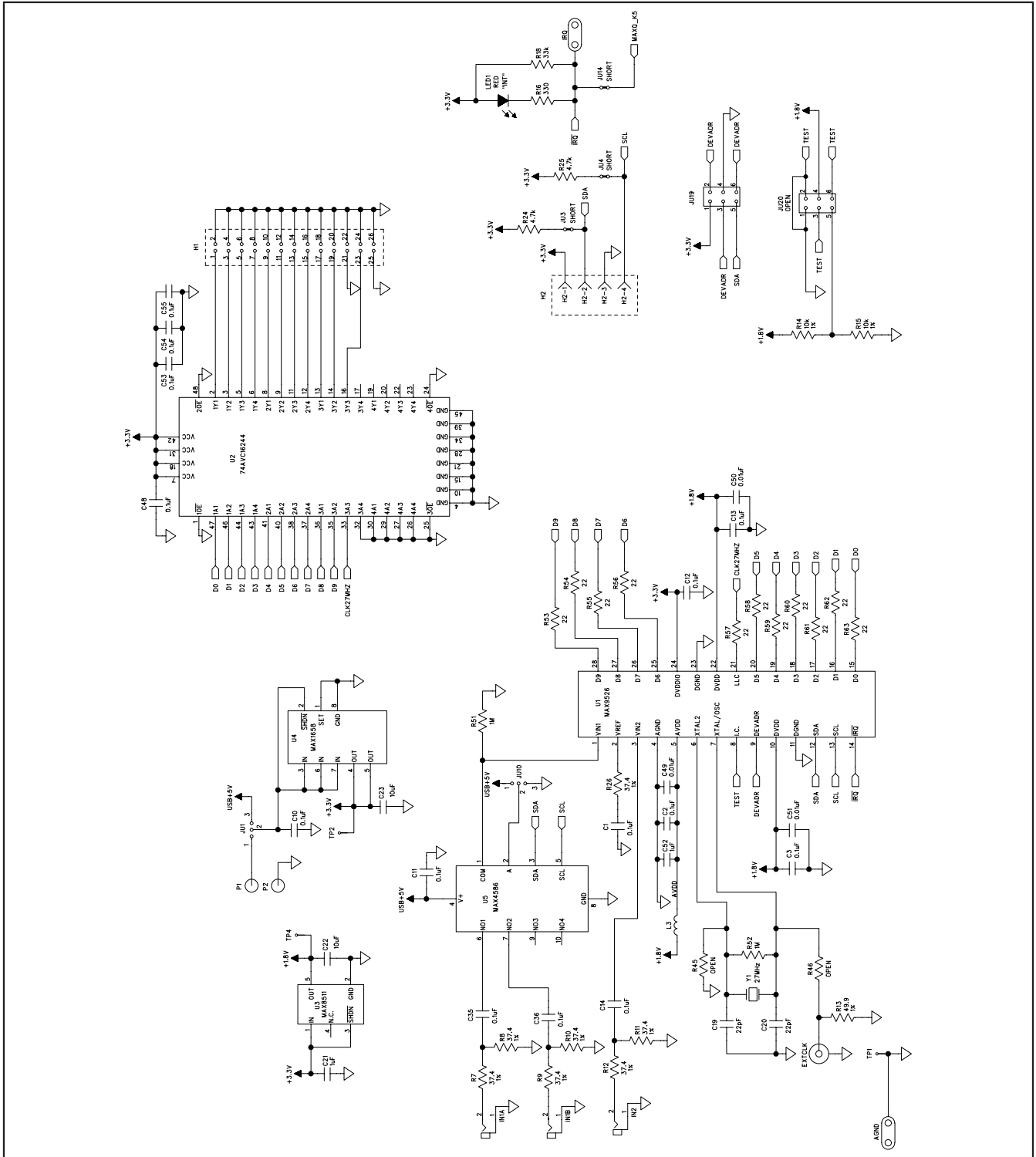
Figure 3a. MAX9526 EV Kit Schematic (Sheet 1 of 4)

/VI/IXI/VI
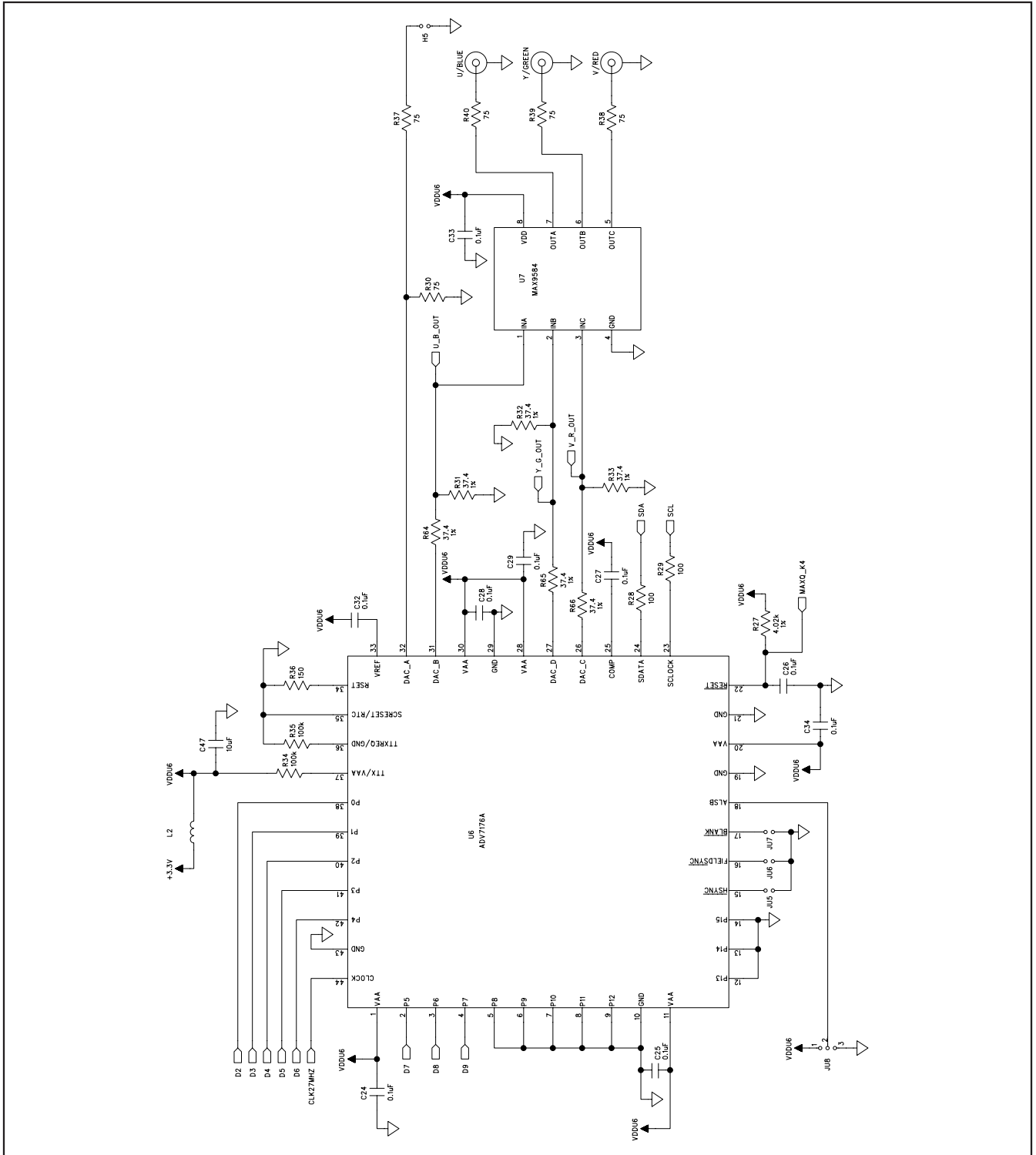
Figure 3b. MAX9526 EV Kit Schematic (Sheet 2 of 4)

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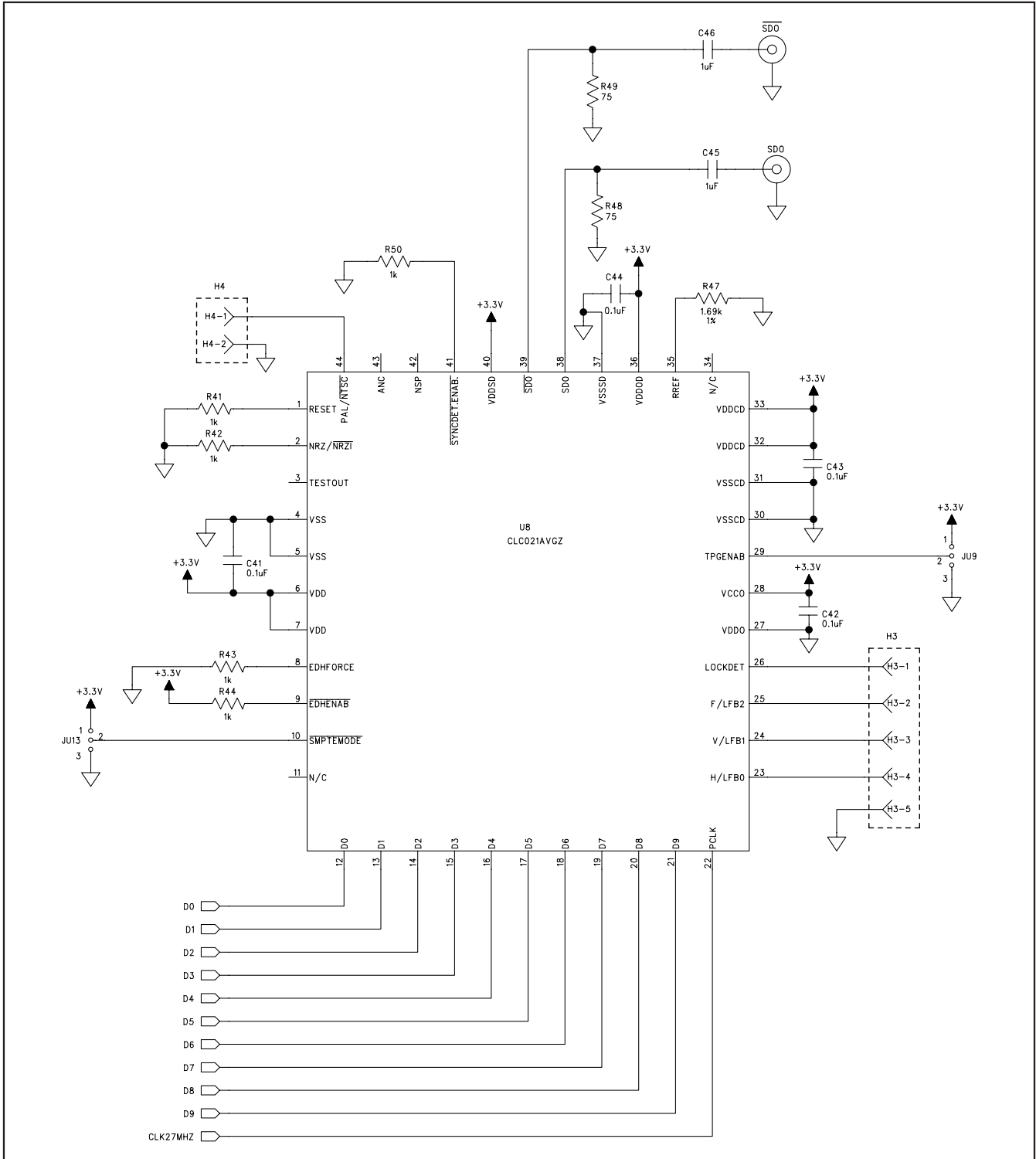
Figure 3c. MAX9526 EV Kit Schematic (Sheet 3 of 4)
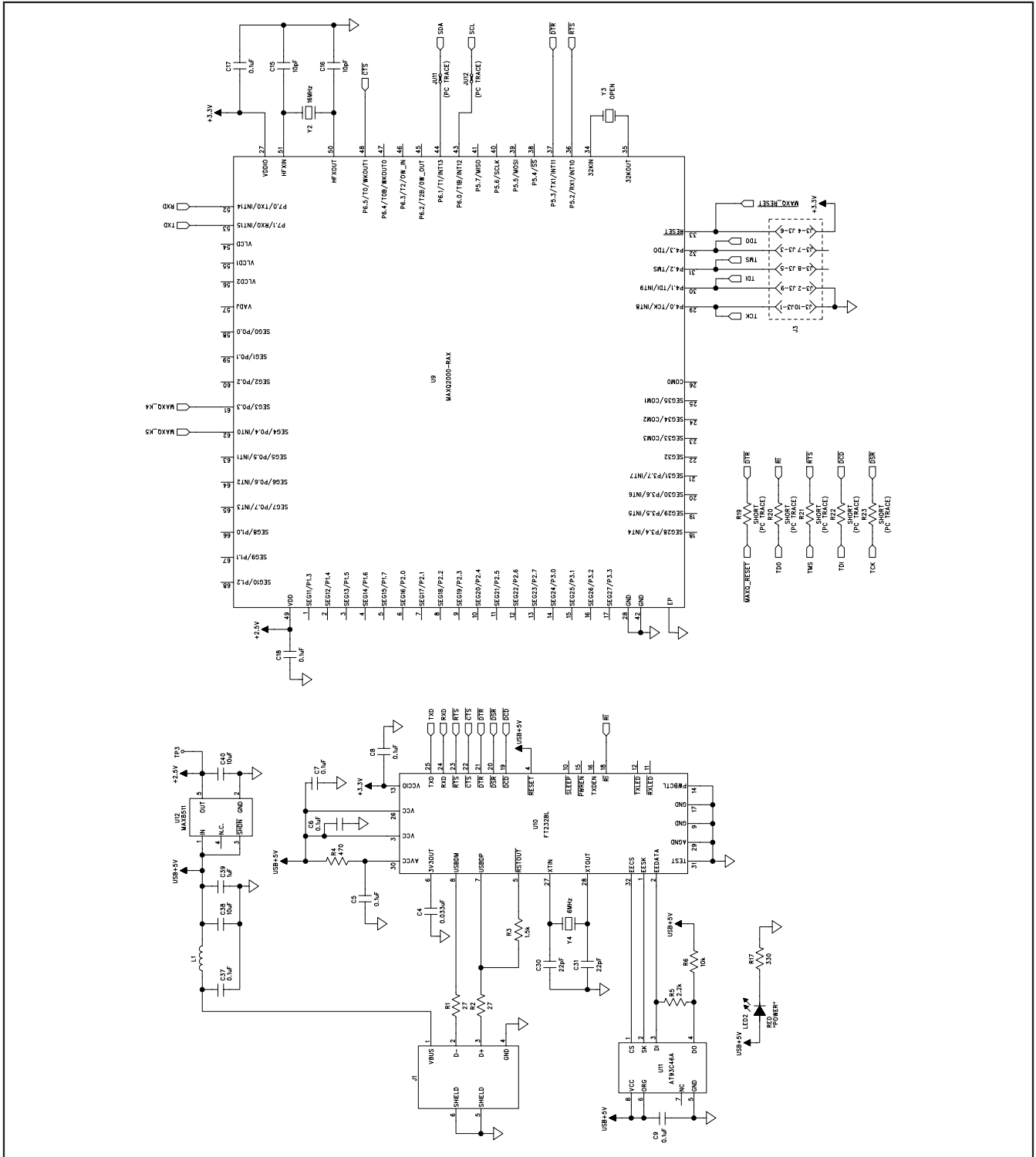
Figure 3d. MAX9526 EV Kit Schematic (Sheet 4 of 4)

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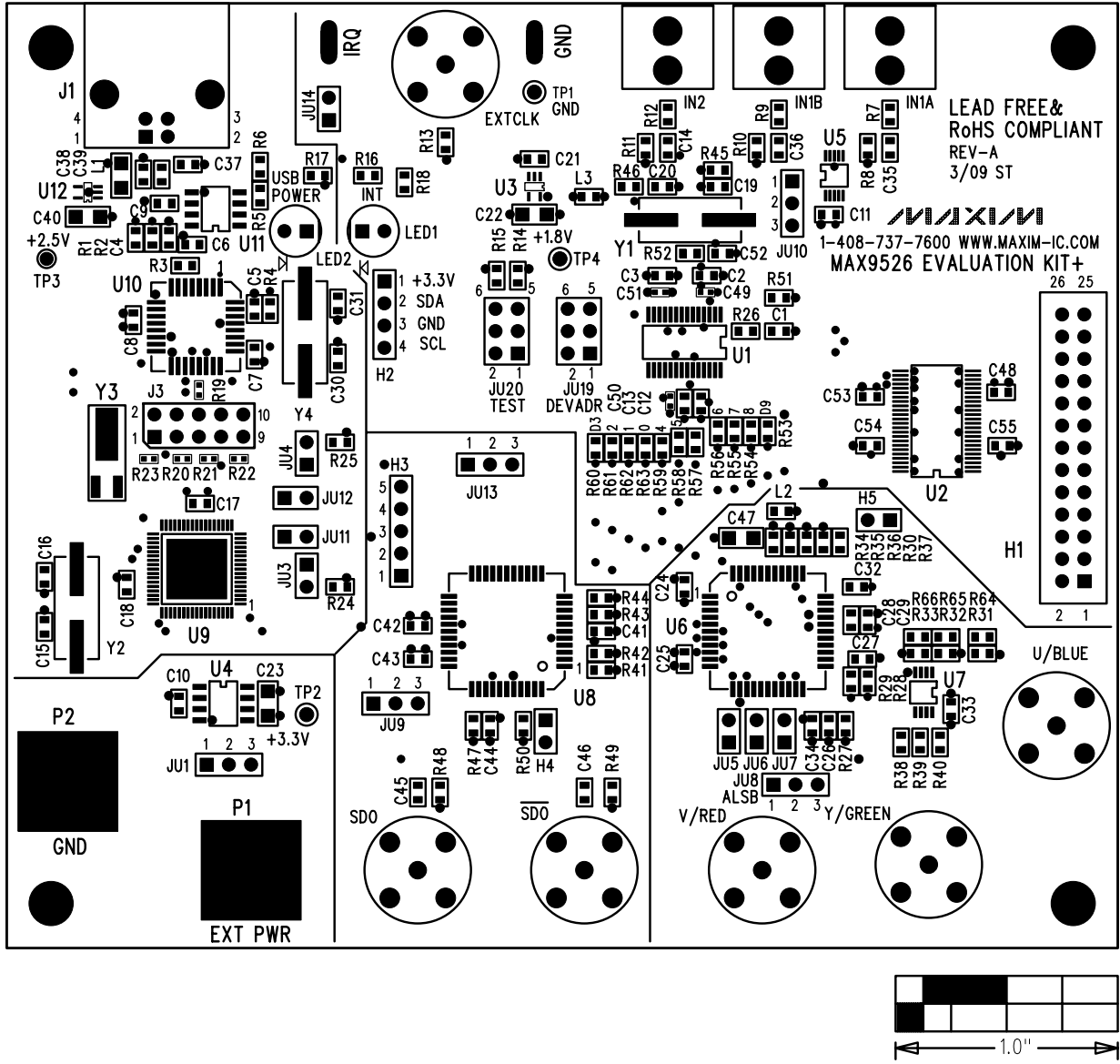
Figure 4. MAX9526 EV Kit Component Placement Guide—Component Side
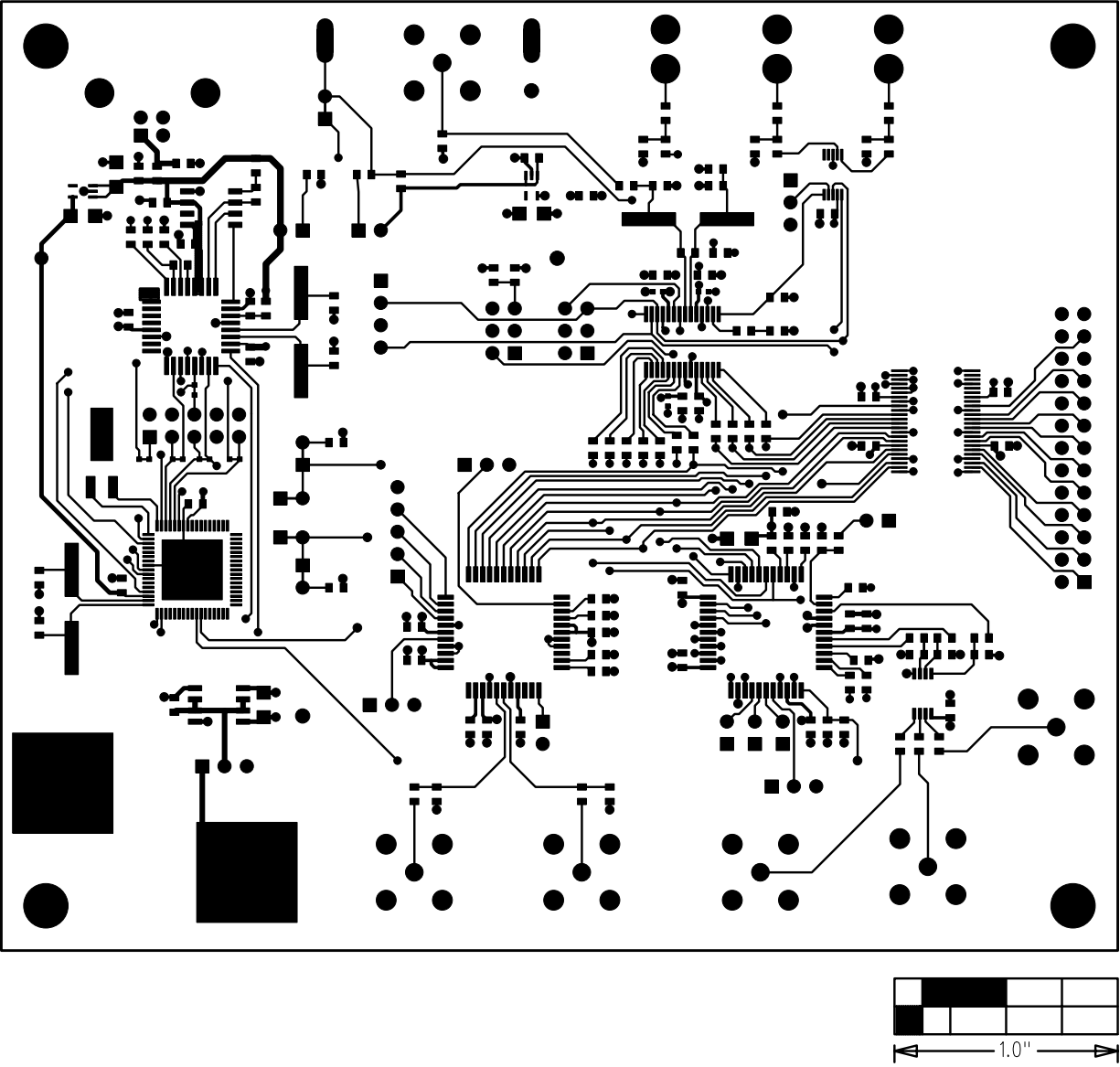
Figure 5. MAX9526 EV Kit PCB Layout—Component Side
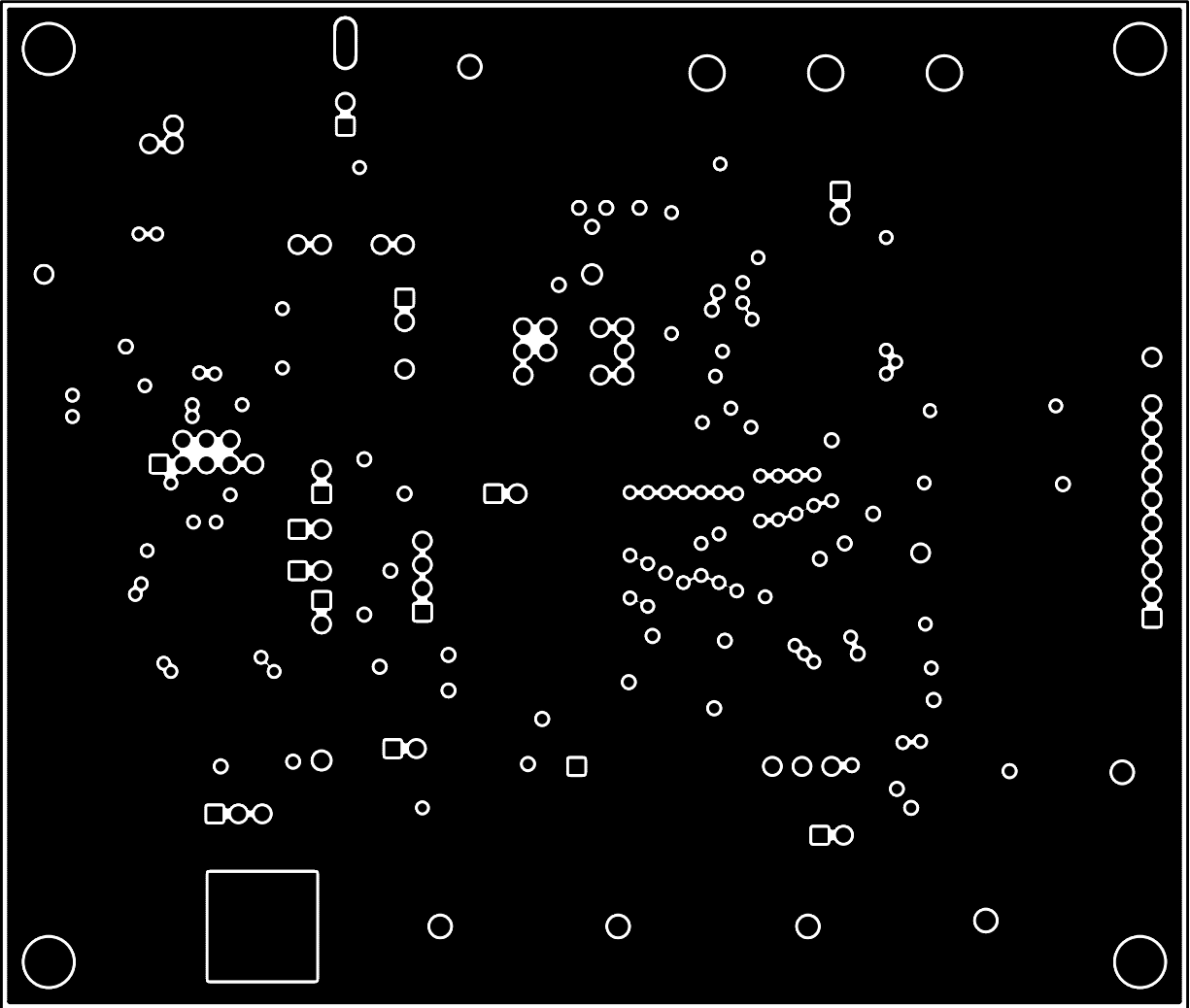
Figure 6. MAX9526 EV Kit PCB Layout—Layer 2

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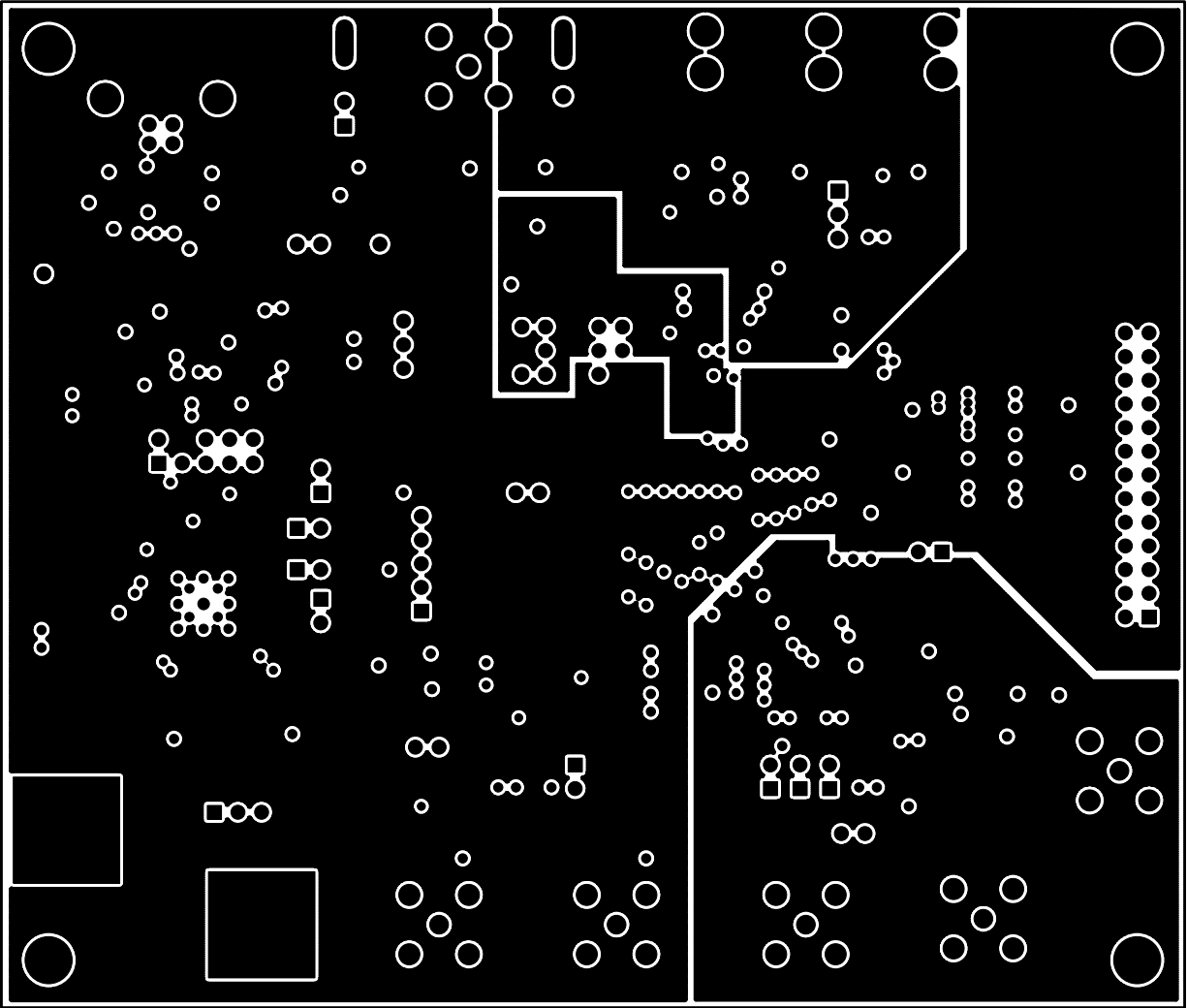
Figure 7. MAX9526 EV Kit PCB Layout—Layer 3

![Maxim logo]

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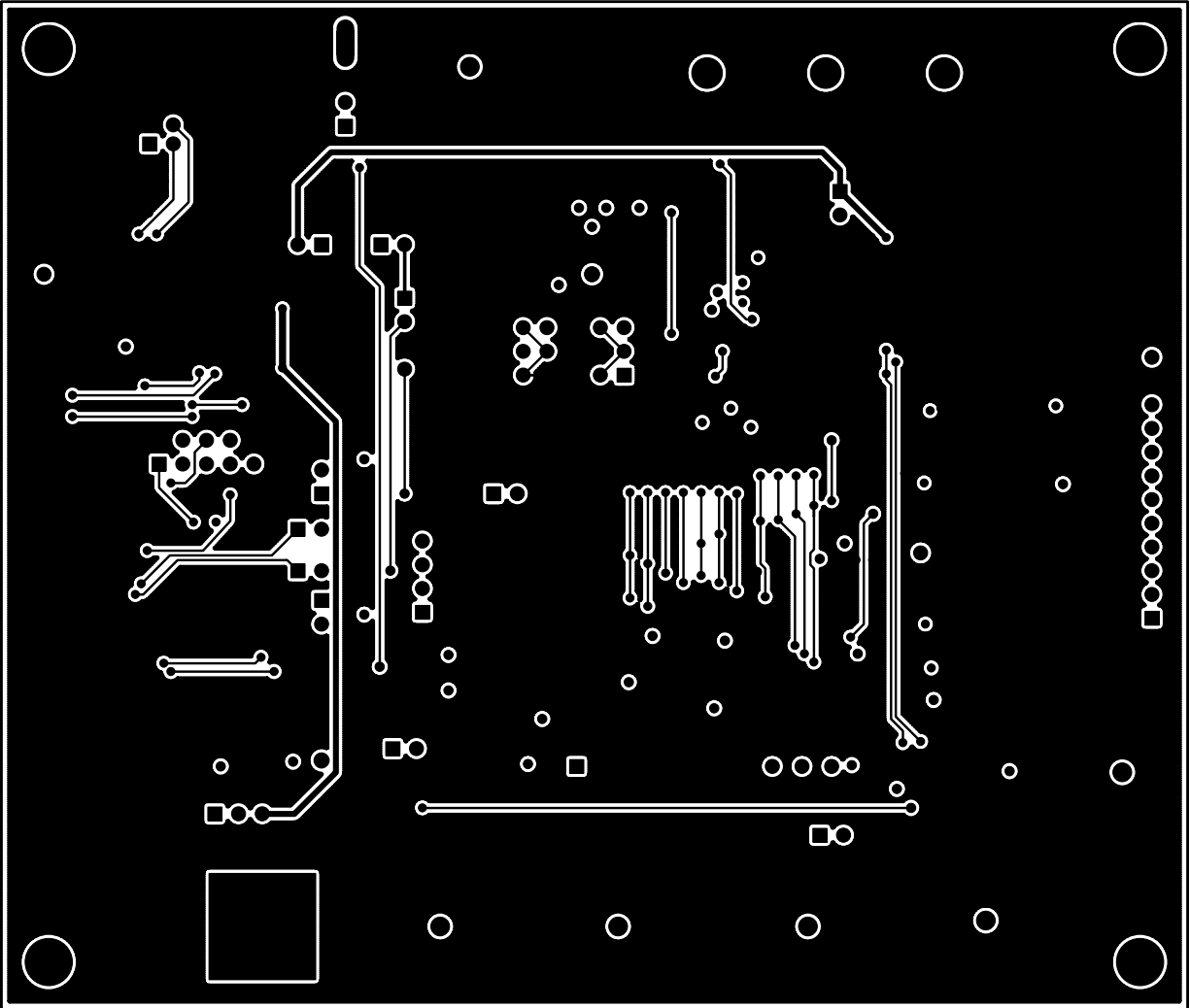
Figure 8. MAX9526 EV Kit PCB Layout—Solder Side

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