



# MAX7321 Evaluation Kit

## General Description

The MAX7321 evaluation kit (EV kit) provides a proven design to evaluate the MAX7321 I<sup>2</sup>C port expander with eight open-drain I/Os. 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 MAX7321. The MAX7321 EV kit PCB comes with a MAX7321ATE+ installed.

## Ordering Information

PART	TYPE
MAX7321EVKIT+	EV Kit

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

## Features

- ◆ Wide 1.71V to 5.5V Supply Range
- ◆ Windows 2000/XP- and Windows Vista (32-Bit)-Compatible Software
- ◆ USB-PC Connection (Cable Included)
- ◆ USB Powered
- ◆ Lead(Pb)-Free and RoHS Compliant
- ◆ Proven PCB Layout
- ◆ Fully Assembled and Tested

## Component List

DESIGNATION	QTY	DESCRIPTION
C1, C3–C10, C17, C23–C26	14	0.1µF ±10%, 16V X7R ceramic capacitors (0603) TDK C1608X7R1C104K
C2, C13, C15	3	10µF ±20%, 6.3V X5R ceramic capacitors (0805) TDK C2012X5R0J106M
C11, C12	2	10pF ±5%, 50V C0G ceramic capacitors (0603) TDK C1608C0G1H100J
C14, C16	2	1µF ±20%, 6.3V X5R ceramic capacitors (0603) TDK C1608X5R0J105K
C18, C19	2	22pF ±5%, 50V C0G ceramic capacitors (0603) TDK C1608C0G1H220J
C20	1	3300pF ±10%, 50V X7R ceramic capacitor (0603) TDK C1608X7R1H332K
C21, C22	2	10µF ±20%, 6.3V X5R ceramic capacitors (0603) TDK C1608X5R0J106M
D1	1	Green LED (0603)
D2	1	Red LED, 700nm at 3mcd (T1-3/4)
D3–D6	4	Red LEDs (0603)
D7	1	Yellow LED (1206)
FB1	1	0Ω ±5% resistor (0603)

DESIGNATION	QTY	DESCRIPTION
H1	0	Not installed, 10-pin header (2 x 5)
H2, H3	2	8-pin headers
JU1, JU3	2	Dual-row (2 x 4) 8-pin headers
JU2, JU4–JU8	6	3-pin headers
JUA–JUE	0	Not installed, shorted with PCB trace
P1	1	USB type-B right-angle female receptacle
R1, R2, R10–R13	6	200Ω ±5% resistors (0603)
R3, R8, R9, R14–R17	7	10kΩ ±5% resistors (0603)
R4	1	2.2kΩ ±5% resistor (0603)
R5	1	1.5kΩ ±5% resistor (0603)
R6, R7	2	27Ω ±5% resistors (0603)
R18–R21	4	1kΩ ±5% resistors (0603)
R22–R25	0	Not installed, resistors (0603)
R26	1	20kΩ ±5% resistor (0603)
SW0–SW7	8	Momentary 6mm pushbutton switches
U1	1	I <sup>2</sup> C port expander (16 TQFN-EP*) Maxim MAX7321ATE+
U2	1	Low-cost microcontroller (68 QFN-EP*) Maxim MAXQ2000-RAX+

\*EP = Exposed pad.

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For pricing, delivery, and ordering information, please contact Maxim Direct at 1-888-629-4642, or visit Maxim's website at [www.maxim-ic.com](http://www.maxim-ic.com).

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## Component List (continued)

DESIGNATION	QTY	DESCRIPTION
U3	1	93C46 type (64kx16) 3-wire EEPROM (8 SO)
U4	1	UART-to-USB converter (32 TQFP)
U5	1	3.3V regulator (5 SC70) Maxim MAX8511EXK33+T (Top Mark: AEI)
U6	1	2.5V regulator (5 SC70) Maxim MAX8511EXK25+T (Top Mark: ADV)
U7	1	Level translator (10 $\mu$ MAX <sup>®</sup> ) Maxim MAX1840EUB+

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DESIGNATION	QTY	DESCRIPTION
Y1	1	16MHz crystal (HCM49) Hong Kong X'tals SSM1600000E18FAF
Y2	1	6MHz crystal (HCM49) Hong Kong X'tals SSL6000000E18FAF
—	8	Shunts (JU1–JU8)
—	1	PCB: MAX7321 Evaluation Kit+

## Component Suppliers

SUPPLIER	PHONE	WEBSITE
Hong Kong X'tals Ltd.	852-35112388	www.hongkongcrystal.com
TDK Corp.	847-803-6100	www.component.tdk.com

**Note:** Indicate that you are using the MAX7321 when contacting these component suppliers.

## MAX7321 EV Kit Files

FILE	DESCRIPTION
INSTALL.EXE	Installs the EV kit files on your computer
MAX7321.EXE	Application program
FTD2XX.INF	USB device driver file
UNINST.INI	Uninstalls the EV kit software
USB_Driver_Help.PDF	USB driver installation help file

## Quick Start

### Required Equipment

- MAX7321 EV kit (USB cable included)
- A user-supplied Windows 2000/XP- or Windows Vista-compatible PC with a spare USB port

**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 MAX7321 EV kit is fully assembled and tested. Follow the steps below to verify board operation:

- 1) Visit [www.maxim-ic.com/evkitsoftware](http://www.maxim-ic.com/evkitsoftware) to download the latest version of the EV kit software, 7321Rxx.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 INSTALL.EXE program inside the temporary folder. The program files are copied and icons are created in the Windows **Start | Programs** menu.
- 3) Verify that all jumpers (JU1–JU8) are in their default positions, as shown in Table 1.

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- 4) Connect the USB cable from the PC to the EV kit board. A **New Hardware Found** window pops up when installing the USB driver for the first time. If you do not see a window that is similar to the one described above after 30 seconds, remove the USB cable from the board and reconnect it. Administrator privileges are required to install the USB device driver on Windows.
- 5) 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\MAX7321** (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.
- 6) Start the MAX7321 EV kit software by opening its icon in the **Start | Programs** menu. The EV kit software main window appears, as shown in Figure 1.
- 7) Verify that the P0–P7 port states are set to 1 (set as inputs). Write 0 to P0–P7 to drive low by checking the corresponding checkboxes on the GUI interface. P0–P3 have LEDs that light up when the port states are set to 0.

## Detailed Description of Software

The main window of the MAX7321 EV kit is shown in Figure 1.

To write to P0–P7, check the corresponding checkbox and press the **Write** button. The port state appears next to the port checkbox. The port state can only be **0** or **1**.

To read from P0–P7, press the **Read Byte** button. To read P0–P7 and their respective transition flags, press the **Read 2 Bytes** button. Reading 2 bytes always returns **0** when the port state is set to **0**. When P0–P7 port states are set to **1**, P0–P7 are configured as inputs and pressing the **Read 2 Bytes** button returns both the current state and the transition flag.

**Table 1. MAX7321 EV Kit Jumper Descriptions (JU1–JU8)**

JUMPER	SHUNT POSITION	DESCRIPTION
JU1	1-2	AD0 connects to GND
	3-4	AD0 connects to SCL
	5-6	AD0 connects to V+
	7-8*	AD0 connects to SDA
JU2	1-2*	V+ is powered from the on-board +3.3V supply
	2-3	V+ is powered from an external supply
JU3	1-2	AD2 connects to GND
	3-4	AD2 connects to SCL
	5-6	AD2 connects to V+
	7-8*	AD2 connects to SDA
JU4	1-2	VP is powered from an external supply
	2-3*	VP is powered from the on-board V+ supply
JU5	1-2*	MAXQ2000 microcontroller-generated SCL
	2-3	External SCL
JU6	1-2*	MAXQ2000 microcontroller-generated SDA
	2-3	External SDA
JU7	1-2	Connects D7 to P2 (used to demonstrate that multiple ports can be used to sink higher currents)
	2-3*	Connects D5 to P2
JU8	1-2	Connects D7 to P3 (used to demonstrate that multiple ports can be used to sink higher currents)
	2-3*	Connects D6 to P3

\*Default position.

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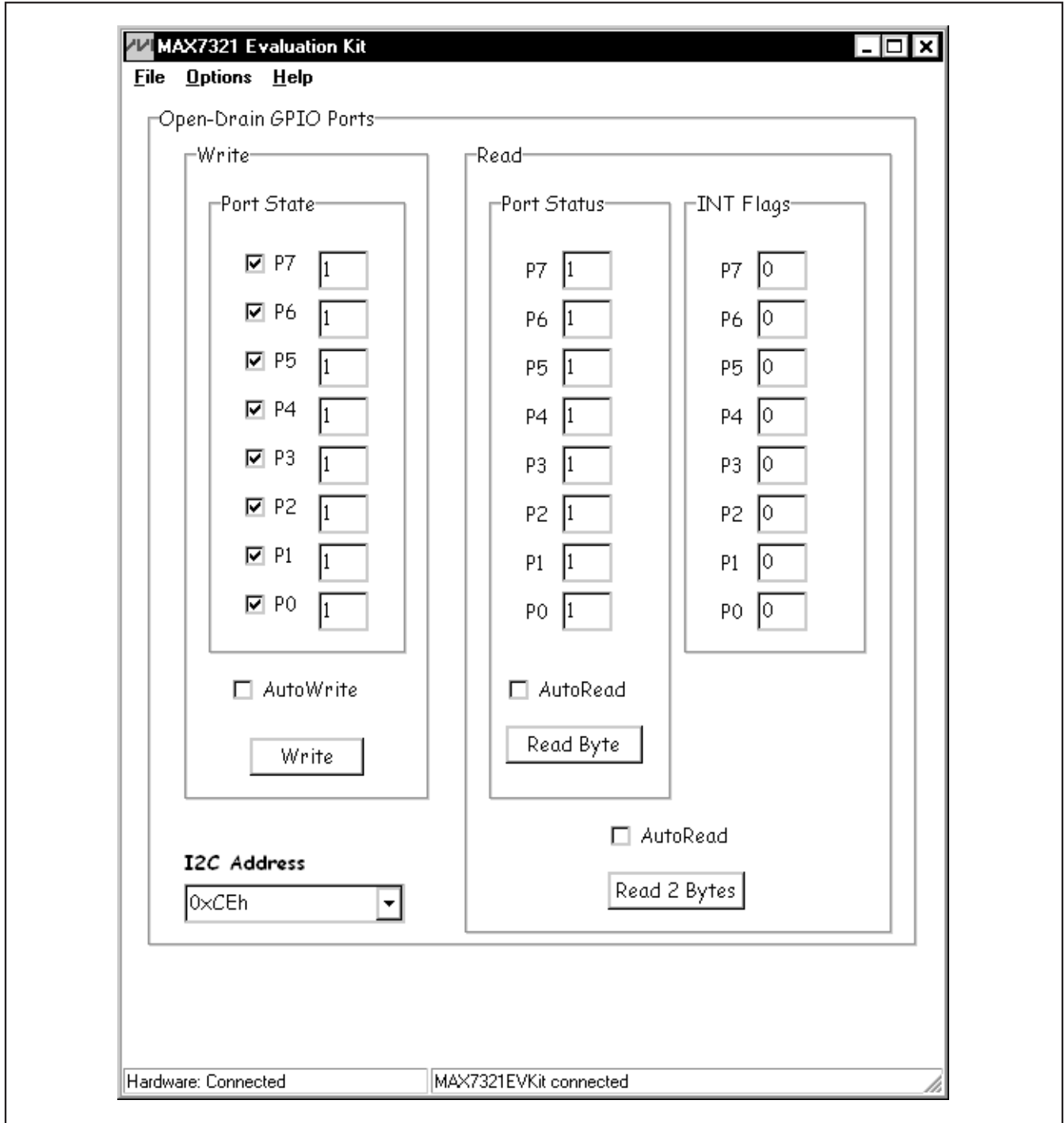


Figure 1. MAX7321 EV Kit Software Main Window

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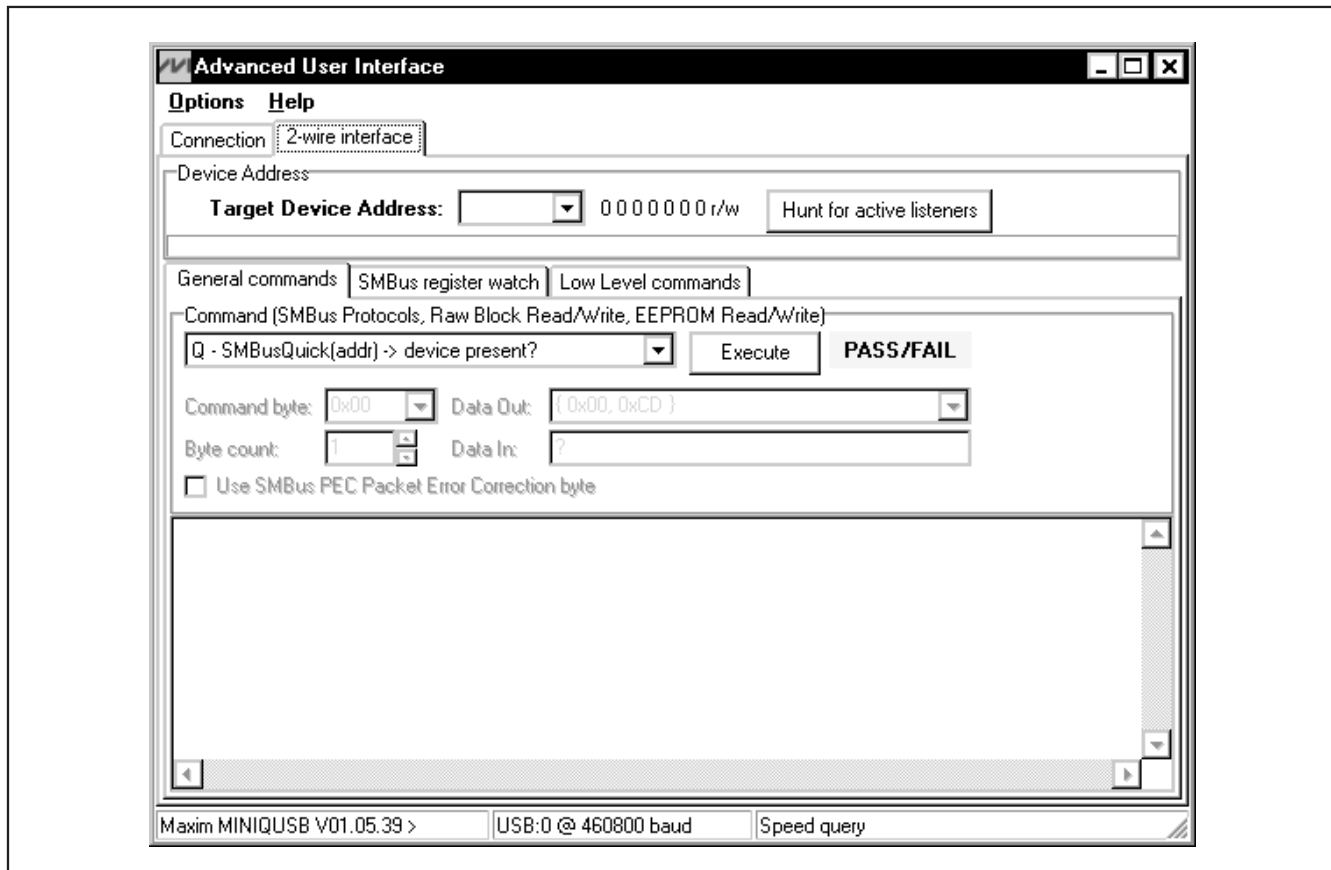


Figure 2. Advanced User Interface Window

The **AutoWrite** and **AutoRead** checkboxes can be checked to have the software automatically perform write and read operations. **AutoWrite** allows the user to change port states without pressing the **Write** button. **AutoRead** allows pushbutton inputs to be read without pressing the **Read** buttons. There are two **AutoRead** checkboxes, but only one can be pressed at a time.

The **I<sup>2</sup>C Address** drop-down list has a feature to **AutoDetect**. Users have the option to choose their own I<sup>2</sup>C address from the list, even if that address is not detected. When an address is selected that is not detected, the software GUI displays **MAX7321EVKit not connected** in the status bar.

### Advanced User Interface

A serial interface can be used by advanced users by selecting **Options | Interface (Advanced Users)** from the menu bar.

For I<sup>2</sup>C, select the **2-wire interface** tab, as shown in Figure 2. Press the **Hunt for active listeners** button to obtain the current MAX7321 slave address in the **Target Device Address** combo box. In the **General commands** tab, select **1 – SMBusSend-Byte(addr,cmd)** in the **Command** drop-down list. Enter the desired values into the **Command byte** combo box and press the **Execute** button.

### Detailed Description of Hardware

The MAX7321 EV kit provides a proven layout for the MAX7321. Jumper blocks JU1 and JU3 select the I<sup>2</sup>C device address (refer to the MAX7321 IC data sheet for detailed information). Headers H2 and H3 provide labeled test points for all of the MAX7321 pins. Ports P0–P3 have LEDs. Ports P2 and P3 can be tied together to double the LED current on D7 by changing the shunt position on JU7 and JU8. Ports P4–P7 do not include LEDs for customized port testing. All ports have momentary pushbutton switches.

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### ***User-Supplied Power Supply***

The MAX7321 EV kit is powered completely from the USB port by default. By default, V+ is 3.3V and the port voltage is 3.3V. To set the port (LED) voltage independent of V+, move the shunt on JU4 to the 1-2 position and provide a positive voltage on the VPEXT pad. To set a different voltage on V+, move the shunt on JU2 to the 2-3 position and provide a positive voltage on the EXT\_V+ pad.

### ***User-Supplied I<sup>2</sup>C Interface***

The MAX7321 EV kit uses the on-board SDA and SCL by default. For user-supplied I<sup>2</sup>C, change the shunt position on JU5 and JU6 to the 2-3 position. JU5 connects to the EXT\_SCL pad and JU6 connects to the EXT\_SDA pad. If supplying I<sup>2</sup>C, make sure to pull up the SDA and SCL lines to V+ or to an external voltage.

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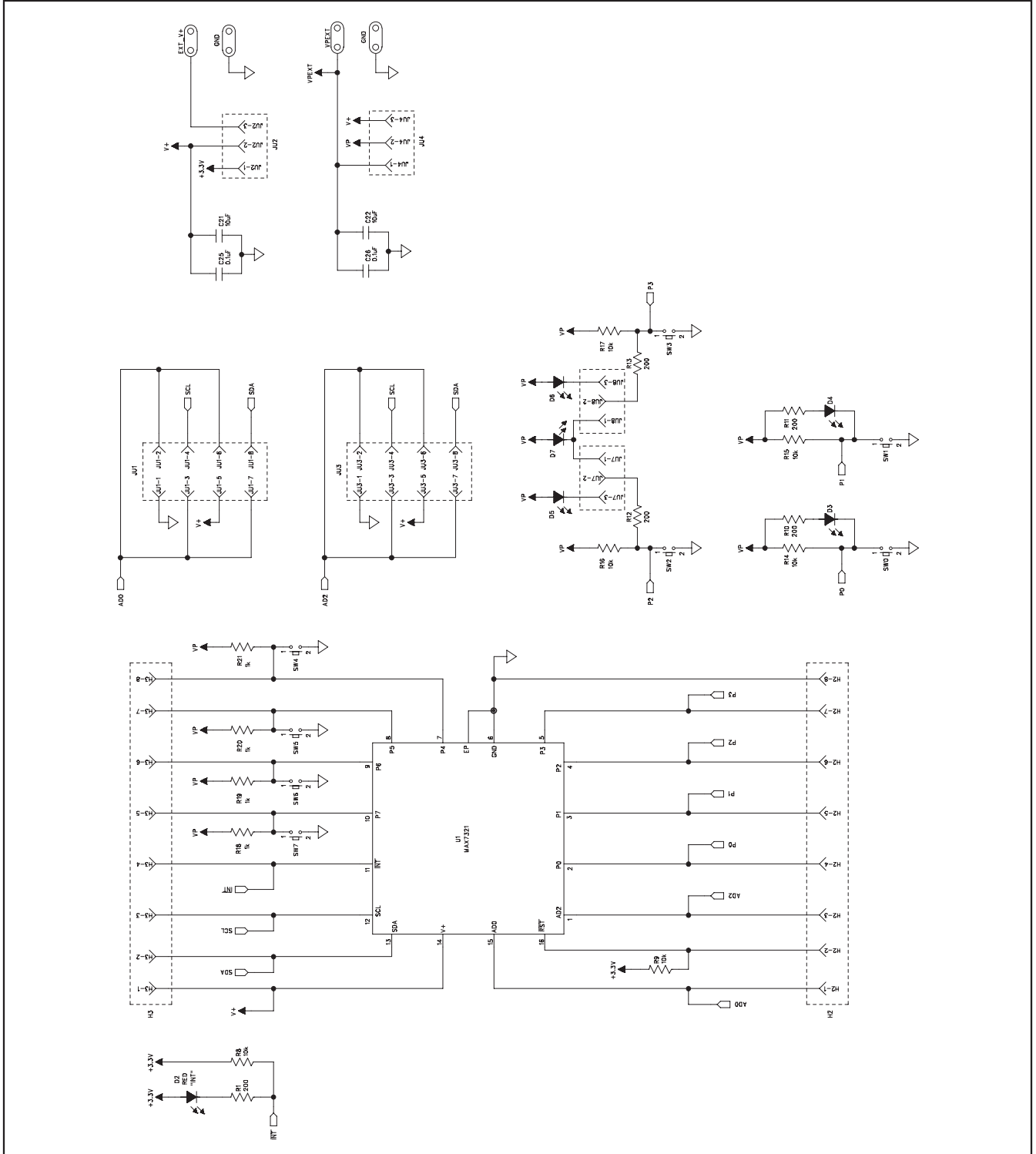


Figure 3a. MAX7321 EV Kit Schematic (1 of 3)

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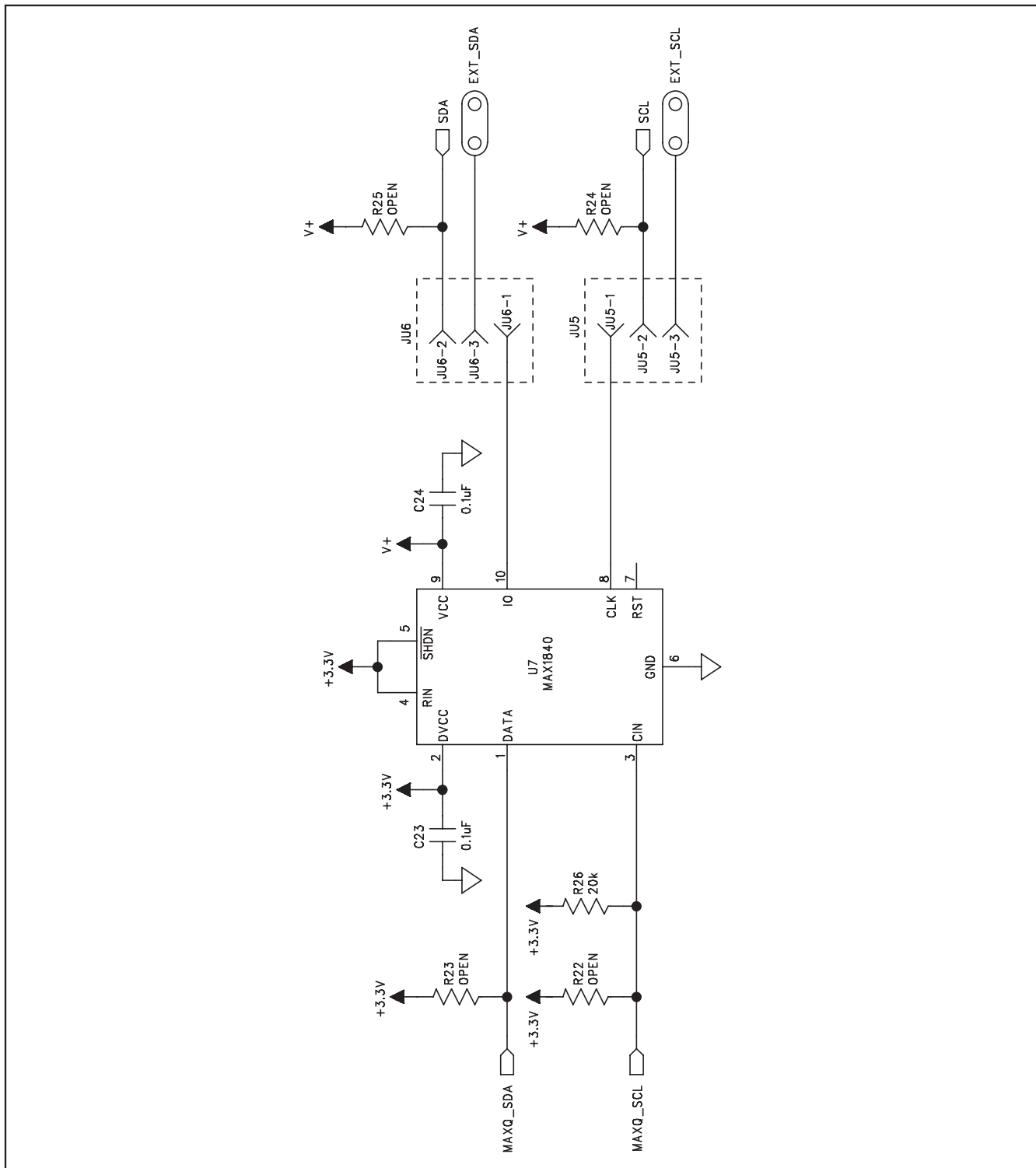


Figure 3b. MAX7321 EV Kit Schematic (2 of 3)



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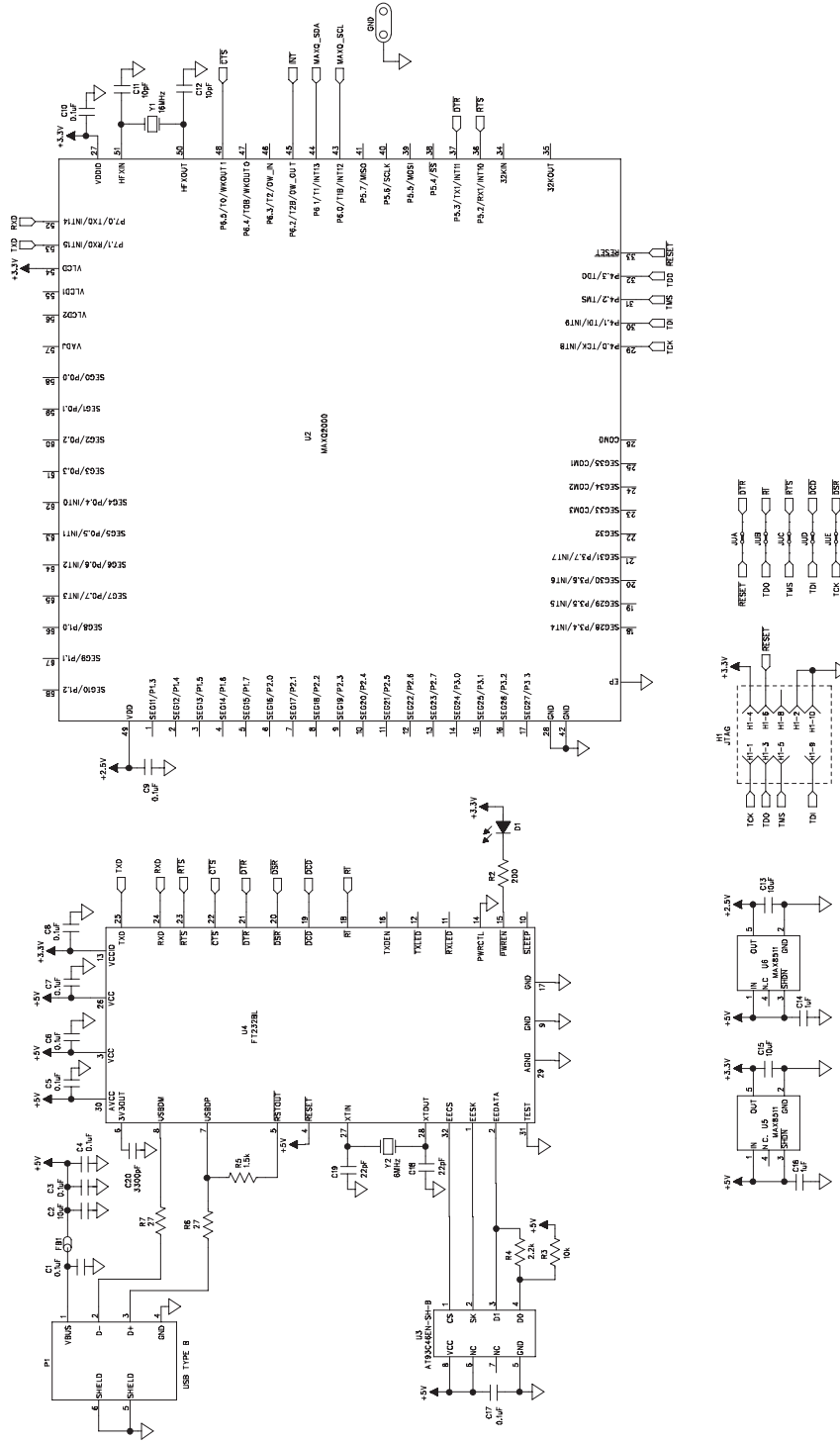


Figure 3c. MAX7321 EV Kit Schematic (3 of 3)

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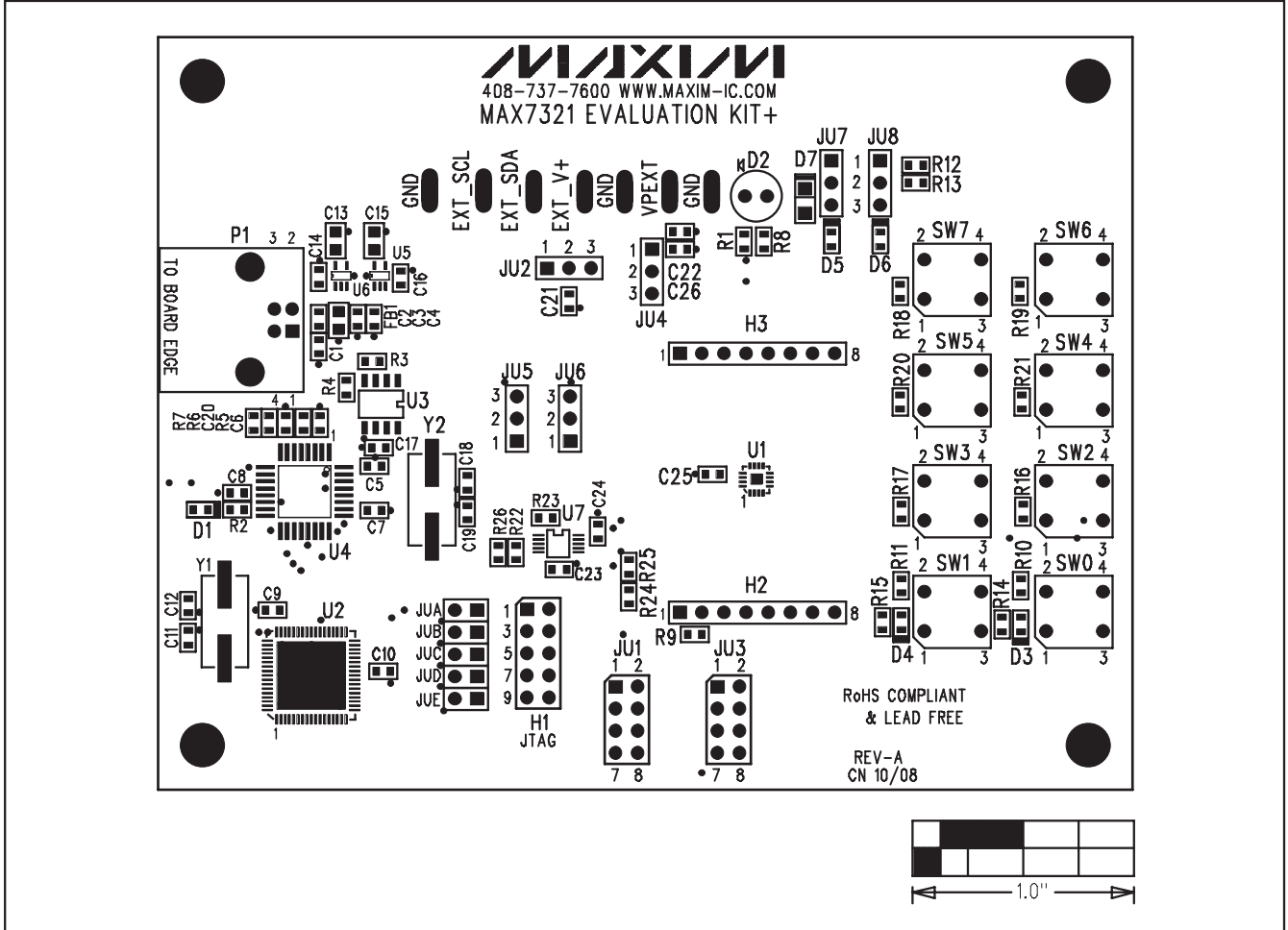


Figure 4. MAX7321 EV Kit Component Placement Guide—Component Side

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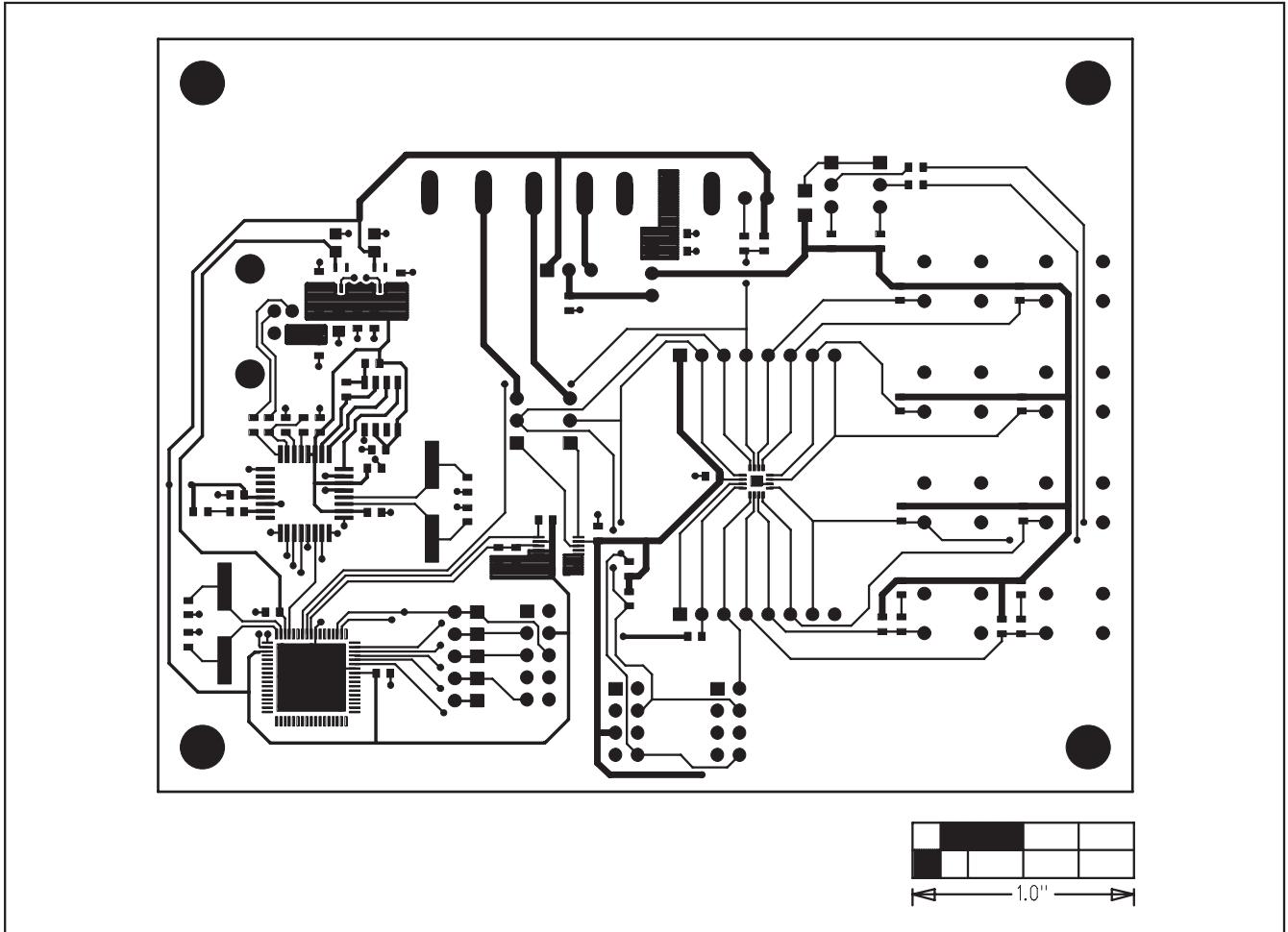


Figure 5. MAX7321 EV Kit PCB Layout—Component Side

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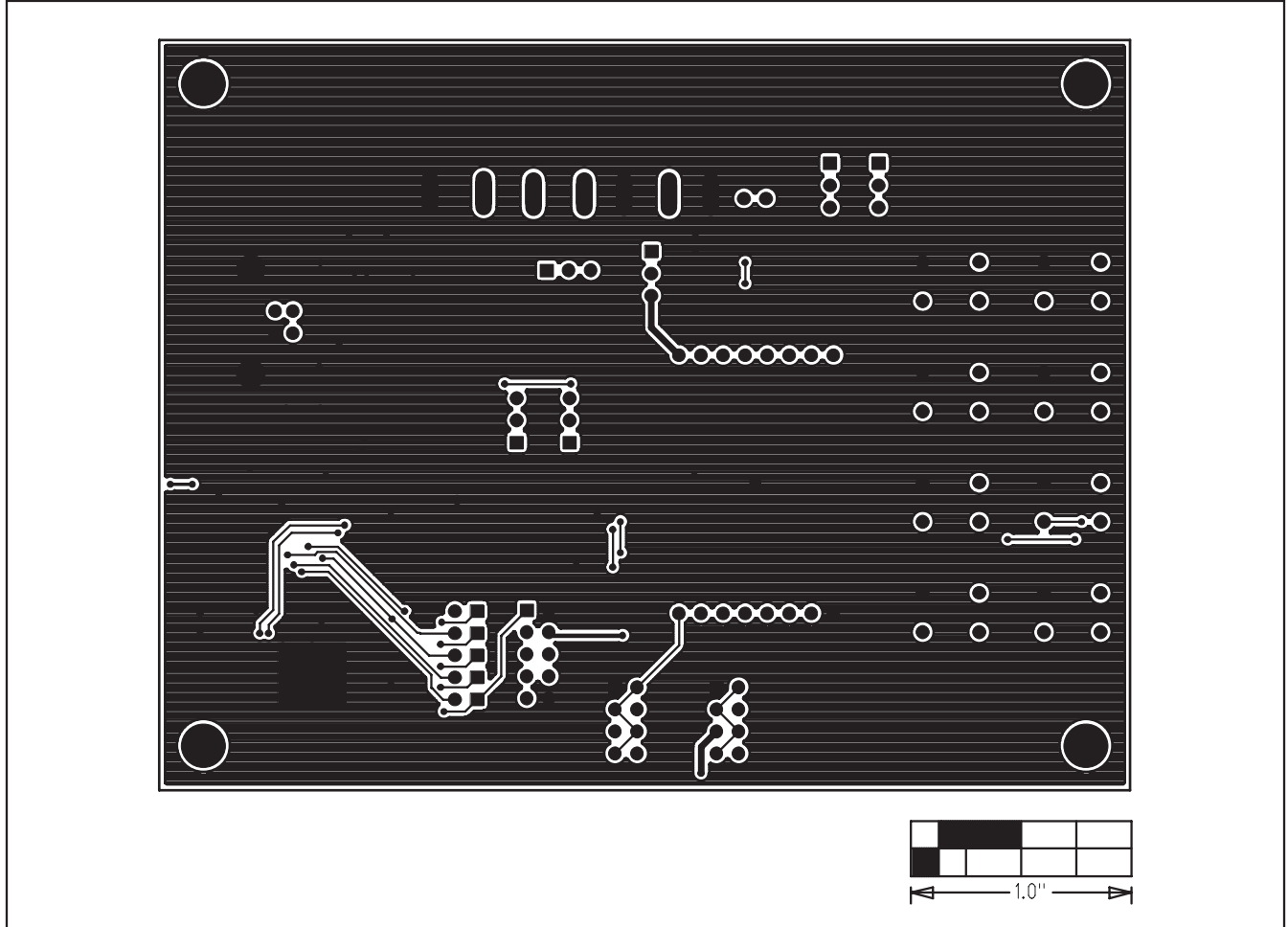


Figure 6. MAX7321 EV Kit PCB Layout—Solder Side

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