

## MAX7311 Evaluation Kit

Evaluates: MAX7311

### General Description

The MAX7311 evaluation kit (EV kit) provides a proven design to evaluate the MAX7311 I<sup>2</sup>C-compatible 16-bit I/O port expander, with each port configurable as input or push-pull output. The EV kit also includes Windows® 2000/XP/Vista®-compatible software that provides a simple graphical user interface (GUI) for exercising the features of the MAX7311. The MAX7311 EV kit PCB comes with a MAX7311ATG+ installed.

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### Ordering Information

PART	TYPE
MAX7311EVKIT#	EV Kit

#Denotes RoHS compliant

### Component List

DESIGNATION	QTY	DESCRIPTION
C1, C12, C14	3	10µF ±20%, 16V X5R ceramic capacitors (1206) Murata GRM31CR61C106M
C2, C3	2	22pF ±5%, 50V C0G ceramic capacitors (0603) Murata GRM1885C1H220J
C4	1	0.033µF ±10%, 16V X5R ceramic capacitor (0603) Taiyo Yuden EMK107BJ333KA
C5–C10, C17, C18, C20	9	0.1µF ±10%, 16V X7R ceramic capacitors (0603) TDK C1608X7R1C104K
C11, C13, C1	3	1µF ±10%, 16V X5R ceramic capacitors (0603) TDK C1608X5R1C105K
C15, C16	2	10pF ±5%, 50V C0G ceramic capacitors (0603) Murata GRM1885C1H100J
D1, D3, D5, D7, D9, D11, D13, D15	8	Green LEDs (0603)
D2, D4, D6, D8, D10, D12, D14, D16	8	Red LEDs (0603)
J1	1	USB series type-B right-angle PC-mount receptacle

### Features

- Windows 2000/XP/Vista (32-Bit)-Compatible Evaluation Software
- USB-PC Connection (Cable Included)
- USB Powered
- Configurable Input or Push-Pull Output
- Proven PCB Layout
- Fully Assembled and Tested
- RoHS Compliant
- On-Board Pushbutton Switches
- On-Board LEDs for Demonstrating the Push-Pull Capabilities of the GPIOs

DESIGNATION	QTY	DESCRIPTION
JU0, JU1, JU2	3	5-pin headers
JU3, JU4, JU5	3	3-pin headers
L1	1	Ferrite bead
R1, R2	2	27Ω ±5% resistors (0603)
R3, R17, R18, R19	4	1.5kΩ ±5% resistors (0603)
R5	1	2.2kΩ ±5% resistor (0603)
R6, R36, R37	3	10kΩ ±5% resistors (0603)
R10	1	169kΩ ±1% resistor (0603)
R11	1	100kΩ ±1% resistor (0603)
R12–R16	0	Not installed; resistors—short (PC trace) (0603)
R4, R20–R35	17	470Ω ±5% resistors (0603)
S1, S2	2	Pushbutton switches
U1	1	I/O port expander (24 TQFN-EP*) Maxim MAX7311ATG+
U2	1	Adjustable output LDO regulator (5 SC70) Maxim MAX8512EXK+T
U3	1	LDO regulator (5 SC70) Maxim MAX8511EXK25+T
U4	1	UART-to-USB converter (32 TQFP) FTDI FT232BL

\*EP = Exposed pad.

### Component List (continued)

DESIGNATION	QTY	DESCRIPTION
U5	1	93C46 type 3-wire EEPROM (8 SO) Atmel AT93C46A-10SU-2.7
U6	1	Microcontroller (68 QFN-EP*) Maxim MAXQ2000-RAX+
Y1	1	16MHz crystal Citizen Finedevice Crystals HCM4916000000ABJT
Y2	1	6MHz crystal Citizen Finedevice Crystals HCM4960000000ABJT
Y3	0	Not installed, crystal
—	6	Shunts
—	1	USB high-speed A-to-B cables, 6ft
—	1	PCB: MAX7311 Evaluation Kit+

\*EP = Exposed pad.

### Quick Start

#### Recommended Equipment

Before beginning, the following equipment is needed:

- MAX7311 EV kit (USB cable included)
- A user-supplied Windows 2000/XP/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 MAX7311 EV kit is fully assembled and tested. Follow the steps below to verify board operation:

- 1) Visit [www.maximintegrated.com/evkit-software](http://www.maximintegrated.com/evkit-software) to download the latest version of the EV kit software, 7311Rxx.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 (JU0–JU5) are in their default positions, as shown in Table 1.
- 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

### Component Suppliers

SUPPLIER	PHONE	WEBSITE
Citizen Finedevice Co. Ltd. (Crystal)	+81-267-31-1111	cfid.citizen.co.jp/english
Murata Electronics 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 MAX7311 when contacting these component suppliers.

### MAX7311 EV Kit Files

SUPPLIER	WEBSITE
INSTALL.EXE	Installs the EV kit files on your computer
MAX7311.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

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\MAX7311** (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 MAX7311 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) Wait approximately five seconds for the program to automatically detect the slave address (0x40) of the MAX7311 in the **I2C Addresses** group box.
- 8) Set **I/O0–I/O7** to outputs by selecting all **Output** radio buttons in the **Configuration** group box.
- 9) Verify that all red LEDs are brightly lit.

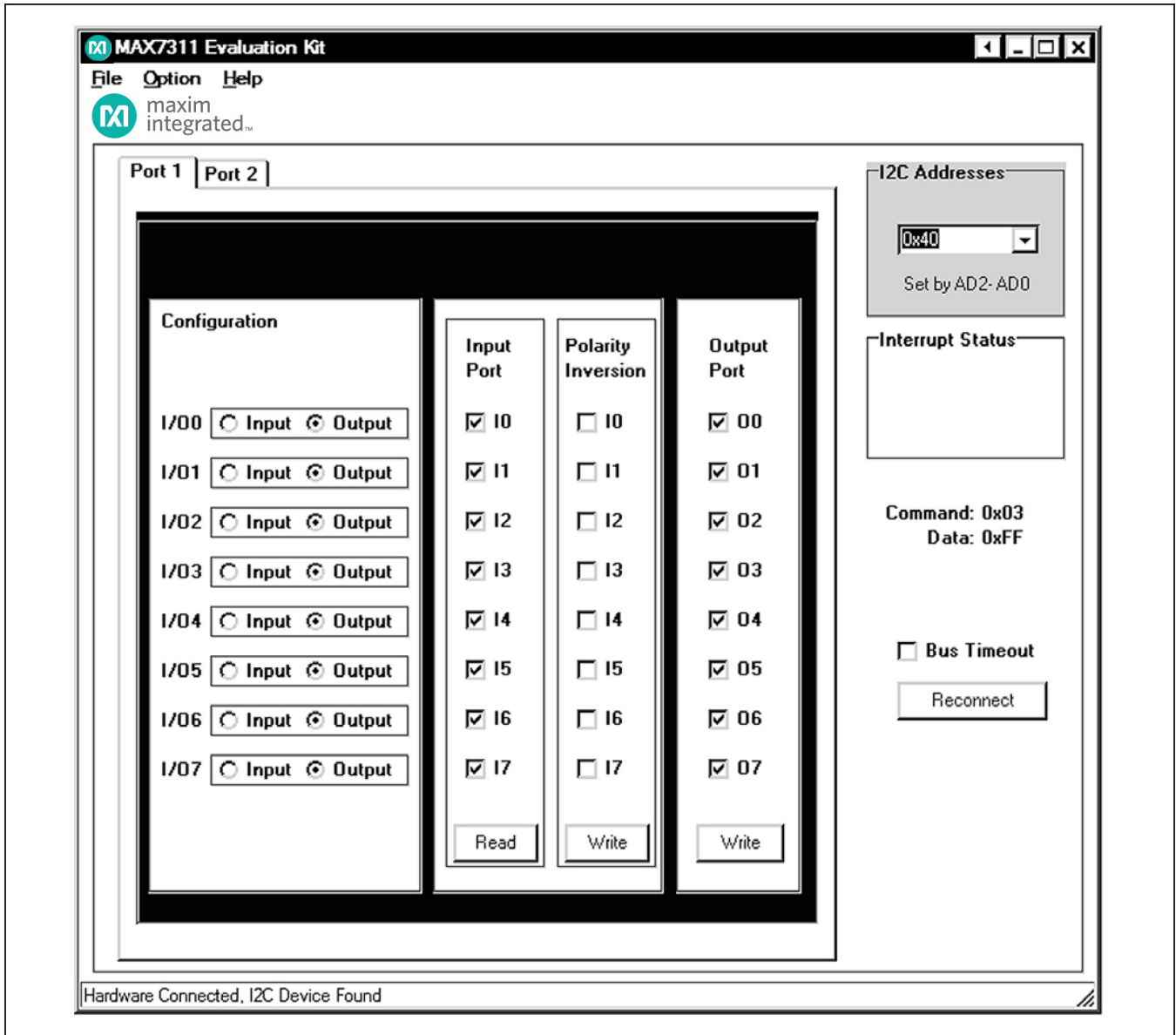


Figure 1. MAX7311 EV Kit Software Main Window (Port 1 Tab)

### Detailed Description of Software

To start the MAX7311 EV kit software, double-click on the MAX7311 EV kit icon that is created during installation. The GUI main window appears, as shown in Figure 1.

#### Port 1 and Port 2 Tabs

The **Port 1** tab sheet shown in Figure 1 controls all of the registers for I/O0–I/O7 of the MAX7311. In the **Configuration** group box, the user can set the I/O port

as an input or output by selecting the adjacent **Input** or **Output** radio buttons.

In the **Input Port** group box, press the **Read** button to read the input port status.

Check the desired checkboxes and press the **Write** button in the **Polarity Inversion** group box to invert the polarity of the corresponding port pins. Uncheck the checkboxes and press the **Write** button to obtain the default polarity of the corresponding port pins.

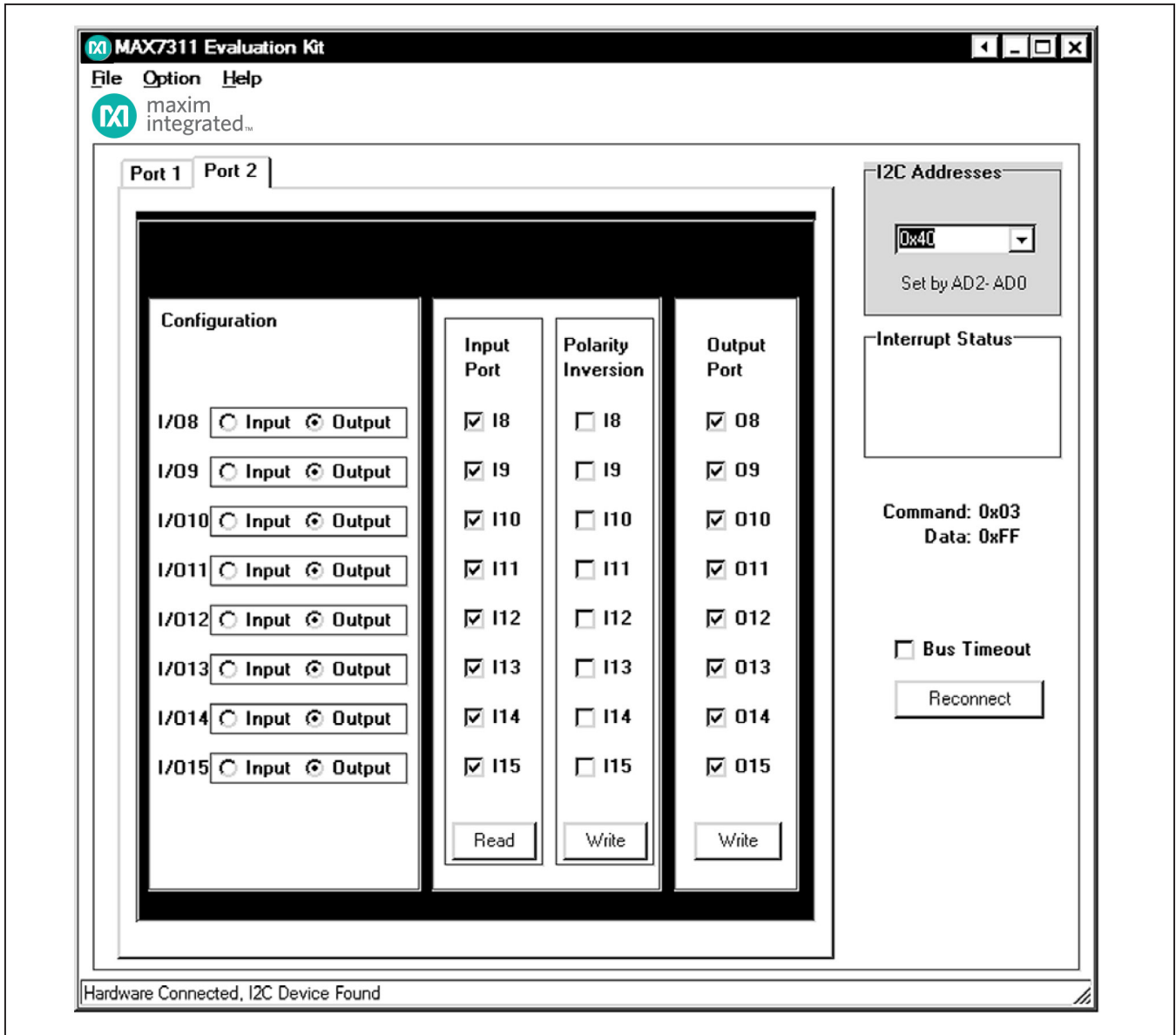


Figure 2. MAX7311 EV Kit Software Main Window (Port 2 Tab)

Check or uncheck the desired checkboxes and press the **Write** button in the **Output Port** group box to write the port settings to the MAX7311.

The **Port 2** tab sheet shown in Figure 2 contains the same functions as the **Port 1** tab sheet to control the registers for I/O8–I/O15.

### Bus Timeout Checkbox

Check the **Bus Timeout** checkbox to enable the bus-timeout function.

### Interrupt Status Group Box

The **Interrupt Status** group box shows the current status of the MAX7311  $\overline{\text{INT}}$  pin (active-low latching-transition-detection interrupt output).

### I<sup>2</sup>C Addresses Group Box

The I<sup>2</sup>C slave address of the MAX7311 depends on the jumper settings of JU0, JU1, and JU2. The **I<sup>2</sup>C Addresses** drop-down list automatically detects the MAX7311's I<sup>2</sup>C slave address when the GUI software starts. The default I<sup>2</sup>C slave address, when the EV kit is shipped, is 0x40.

### Reconnect Button

If the jumper settings of JU0, JU1, and JU2 change, press the **Reconnect** button to automatically detect the new I<sup>2</sup>C slave address of the MAX7311.

### Detailed Description of Hardware

The MAX7311 has 16 I/Os, configurable as push-pull outputs or inputs. The MAX7311 EV kit board provides a proven layout for evaluating the MAX7311. The EV kit comes with a MAX7311ATG+ installed.

### I<sup>2</sup>C Address Configuration

The combinations of shunt position of jumpers JU0, JU1, and JU2 determine the I<sup>2</sup>C slave address of the MAX7311 device. Refer to the MAX7311 IC data sheet for appropriate settings.

### Output Evaluations of I/Os

There are eight red LEDs and eight green LEDs on the EV kit to demonstrate the push-pull capability of the I/Os. When an I/O is configured as an output and the logic level is high, the corresponding red LED will be on and the green LED will be off. If the logic level is low, the corresponding green LED will be on and the red LED will be off.

### Input Evaluations of I/Os

Two pullup resistors and two pushbuttons are connected to I/O8 and I/O9 of the MAX7311. Press pushbutton S2 to drive I/O8 low and press pushbutton S1 to drive I/O9 low.

### User-Supplied Power Supply

By default, the MAX7311 EV kit is powered by USB. To use the user-supplied power supply, place a shunt on pins 2-3 of JU5, cut the trace between pins 1-2 of JU5, and connect a 2.5V to 3.3V power supply to the VIN pad.

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

To use the MAX7311 EV kit with a user-supplied I<sup>2</sup>C interface, install shunts on pins 2-3 of JU3 and JU4. Connect SDA, SCL, and GND lines from the user-supplied I<sup>2</sup>C interface to the SDA, SCL, and GND pads on the MAX7311 EV kit. Place a shunt on pins 2-3 of JU5, cut the trace between pins 1-2 of JU5, and connect a 2V to 5.5V power supply to the VIN pad.

**Table 1. MAX7311 EV Kit Jumper Descriptions (JU0–JU5)**

JUMPERS	SHUNT POSITION	DESCRIPTION
JU0	1-2	Connects AD0 to SCL
	1-3	Connects AD0 to SDA
	1-4*	Connects AD0 to GND
	1-5	Connects AD0 to VCC
JU1	1-2	Connects AD1 to SCL
	1-3	Connects AD1 to SDA
	1-4*	Connects AD1 to GND
	1-5	Connects AD1 to VCC
JU2	1-2	Connects AD2 to SCL
	1-3	Connects AD2 to SDA
	1-4*	Connects AD2 to GND
	1-5	Connects AD2 to VCC
JU3	1-2	MAX7311 SCL signal connected to on-board microcontroller
	2-3	Connects user-supplied SCL signal to the on-board SCL pad
JU4	1-2*	MAX7311 SDA signal connected to on-board microcontroller
	2-3	Connects user-supplied SDA signal to the on-board SDA pad
JU5	1-2*	MAX7311 V+ is set to the on-board 3.3V supply powered from the USB port
	2-3	Connects user-supplied external supply to the VIN pad

\*Default position



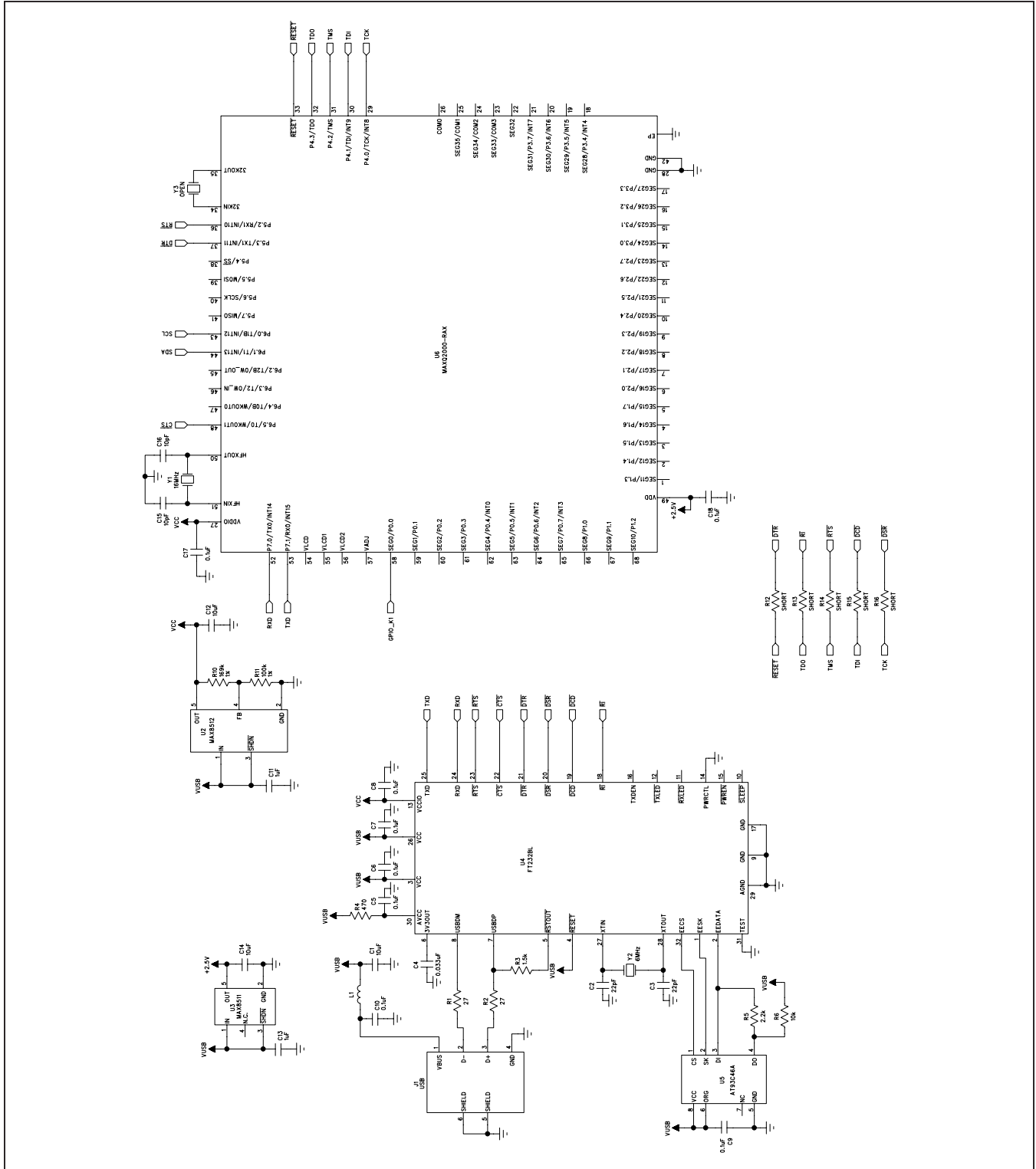


Figure 3b. MAX7311 EV Kit Schematic (Sheet 2 of 2)

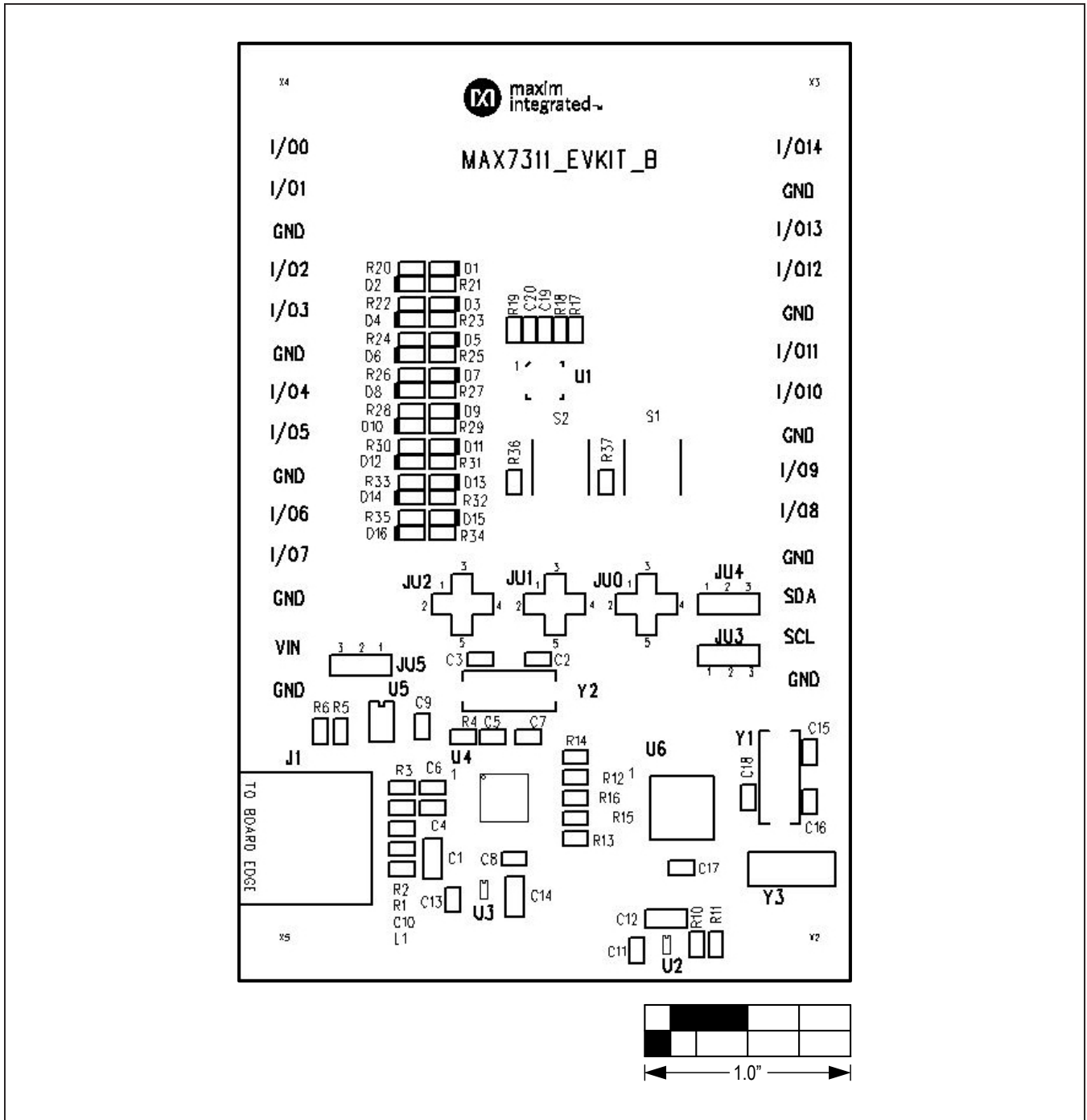


Figure 4. MAX7311 EV Kit Component Placement Guide—Component Side



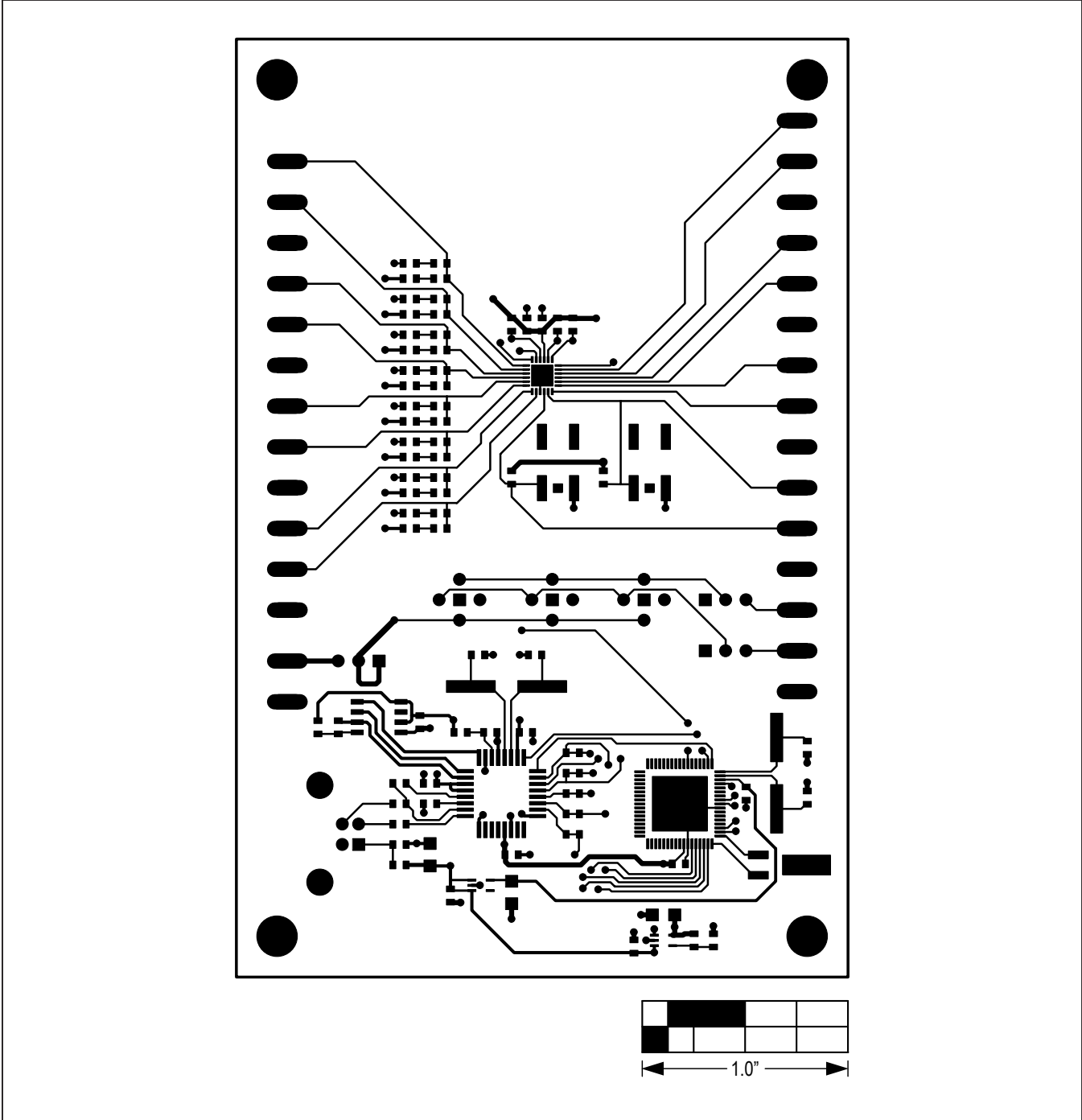


Figure 5. MAX7311 EV Kit PCB Layout—Component Side

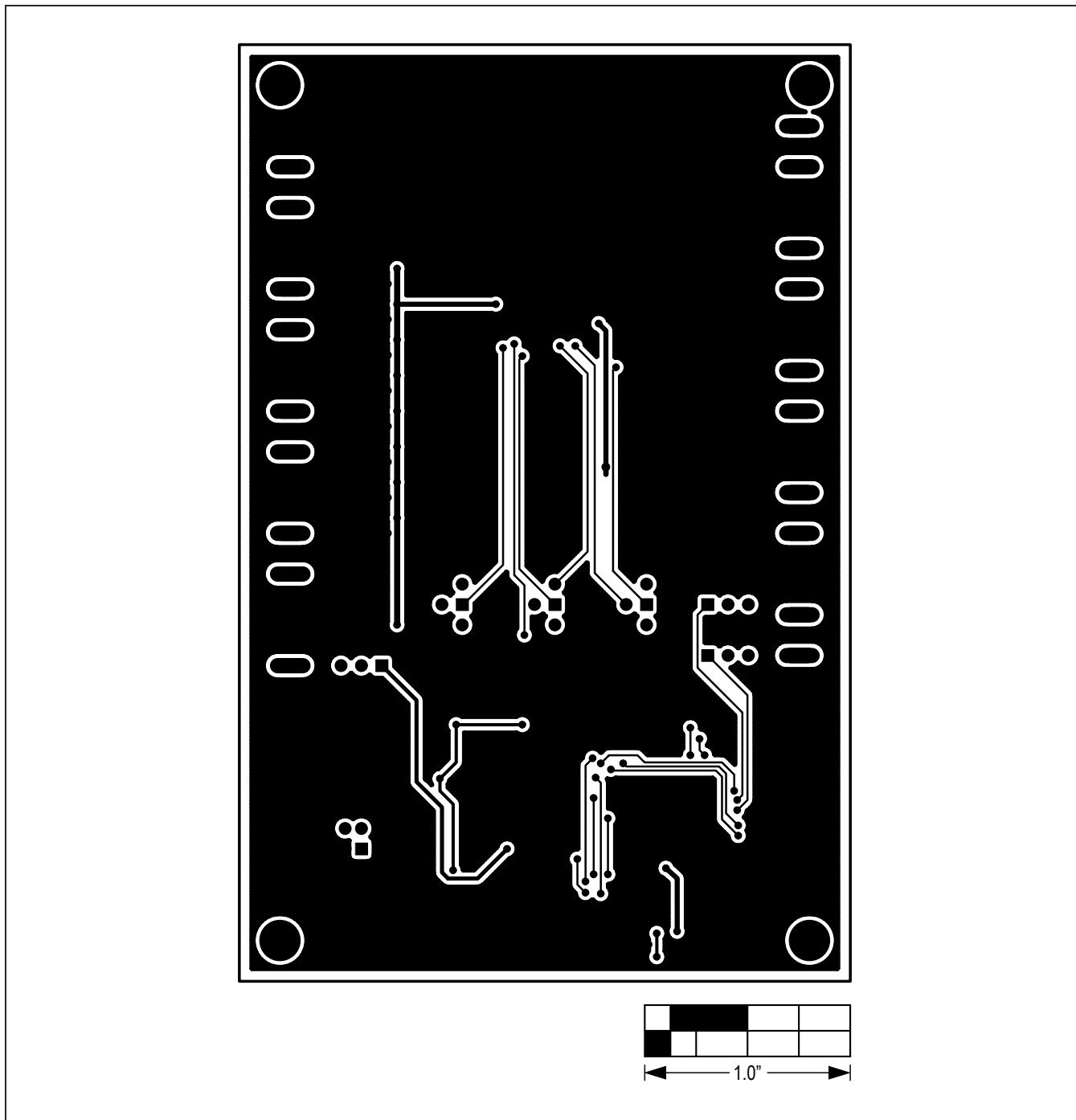


Figure 6. MAX7311 EV Kit PCB Layout—Solder Side