



MAX7312 Evaluation Kit

Evaluates: MAX7312

General Description

The MAX7312 evaluation kit (EV kit) provides a proven design to evaluate the MAX7312 I²C-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 MAX7312. The MAX7312 EV kit printed-circuit board (PCB) comes with a MAX7312ATG+ installed.

Ordering Information

PART	TYPE
MAX7312EVKIT+	EV Kit

+Denotes lead-free and RoHS-compliant.

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
- ◆ Lead-Free and RoHS-Compliant
- ◆ On-Board Pushbutton Switches
- ◆ On-Board LEDs for Demonstrating the Push-Pull Capabilities of the GPIOs

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, C19	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

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)
R4, R20–R35	17	470Ω ±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)
S1, S2	2	Pushbutton switches
U1	1	I ² C port expander (24 thin QFN-EP*) Maxim MAX7312ATG+
U2	1	Adjustable output LDO regulator (5 SC70) Maxim MAX8512EXK+T
U3	1	LDO regulator (5 SC70) Maxim MAX8511EXK25+T

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Component List (continued)

DESIGNATION	QTY	DESCRIPTION
U4	1	UART-to-USB converter (32 TQFP) FTDI FT232BL
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 (HCM49)
Y2	1	6MHz crystal (HCM49)
Y3	0	Not installed, 32.768kHz crystal
—	6	Shunts
—	1	USB high-speed A-to-B cables, 6ft
—	1	PCB: MAX7312 Evaluation Kit+

*EP = Exposed pad.

Quick Start

Recommended Equipment

Before beginning, the following equipment is needed:

- MAX7312 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 MAX7312 EV kit is fully assembled and tested. Follow the steps below to verify board operation:

- 1) Visit www.maxim-ic.com/evkitsoftware to download the latest version of the EV kit software, 7312Rxx.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 **Building Driver Database** window pops up

Component Suppliers

SUPPLIER	PHONE	WEBSITE
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 MAX7312 when contacting these component suppliers.

MAX7312 EV Kit Files

FILE	DESCRIPTION
INSTALL.EXE	Installs the EV kit files on your computer
MAX7312.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

in addition to a **New Hardware Found** message 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 30s, remove the USB cable from the board and reconnect it. Administrator privileges are required to install the USB device driver on Windows 2000/XP/Vista.

- 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\MAX7312** (default installation directory) using the **Browse** button. During device driver installation, Windows might 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 MAX7312 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 5s for the program to automatically detect the slave address (0x40) of the MAX7312 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.

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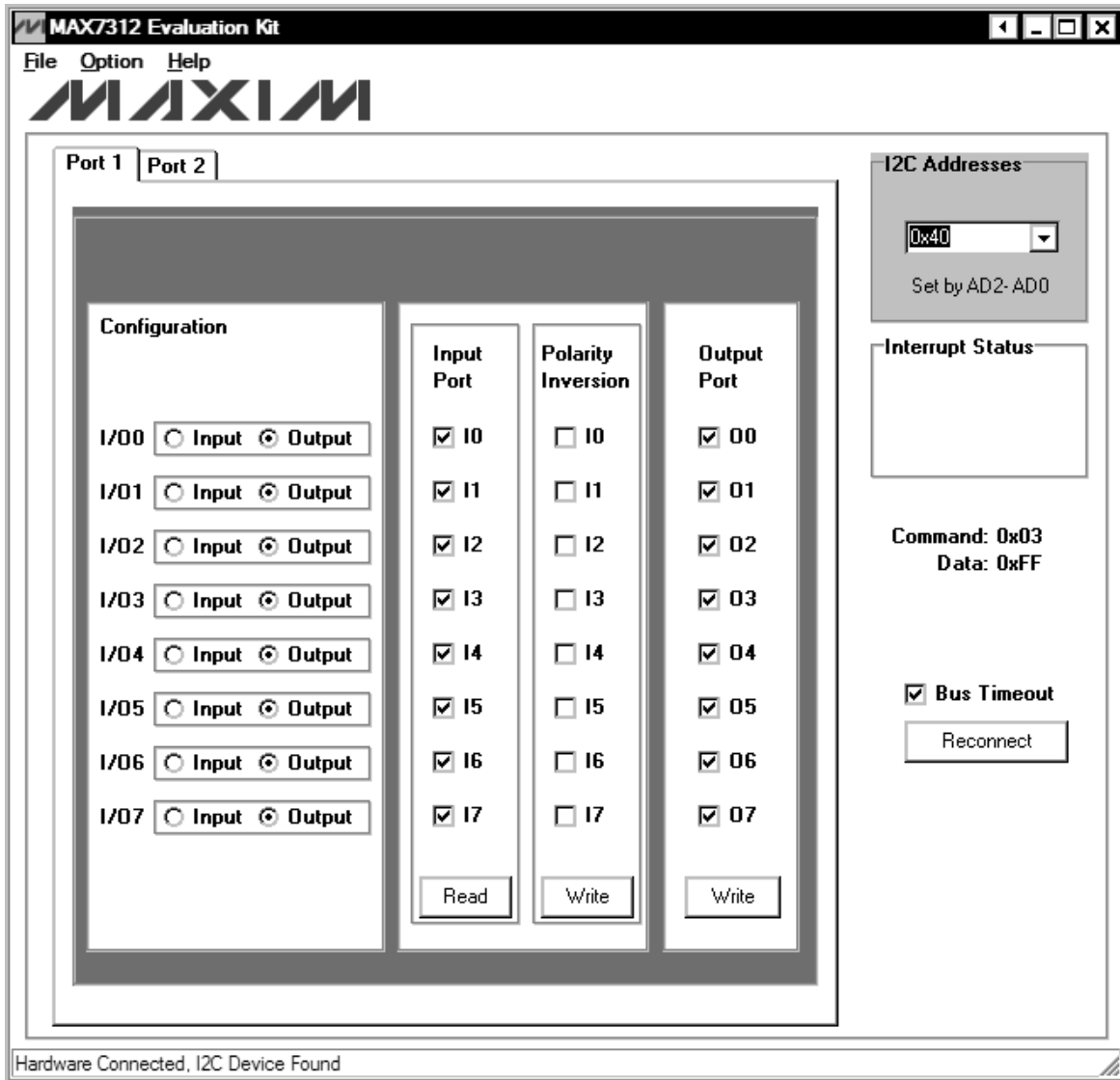


Figure 1. MAX7312 EV Kit Software Main Window (Port 1 Tab)

Detailed Description of Software

To start the MAX7312 EV kit software, double-click on the MAX7312 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 MAX7312. 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.

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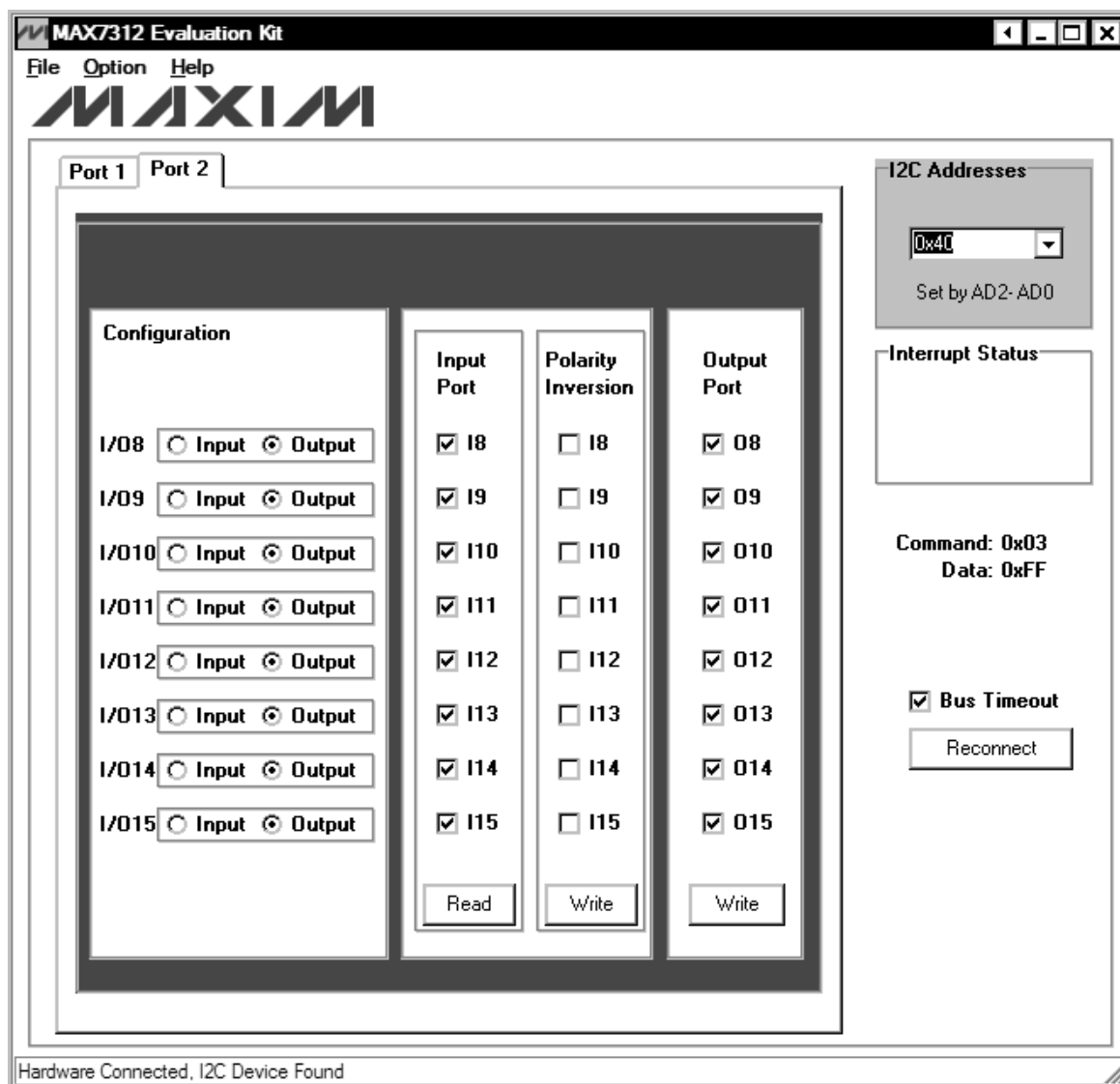


Figure 2. MAX7312 EV Kit Software Main Window (Port 2 Tab)

Check or uncheck the desired checkboxes and press the **Write** button in the **Output Port** group box to write the port settings to the MAX7312.

The **Port 2** tab 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 MAX7312 INT pin (active-low latching-transition-detection interrupt output).

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I²C Addresses Group Box

The I²C slave address of the MAX7312 depends on the jumper settings of JU0, JU1, and JU2. The **I²C Addresses** drop-down list automatically detects the MAX7312's I²C slave address when the GUI software starts. The default I²C 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 I²C slave address of the MAX7312.

Detailed Description of Hardware

The MAX7312 has 16 I/Os, configurable as push-pull outputs or inputs. The MAX7312 EV kit board provides a proven layout for evaluating the MAX7312. The EV kit comes with a MAX7312ATG+ installed.

I²C Address Configuration

The combinations of shunt position of jumpers JU0, JU1, and JU2 determine the I²C slave address of the MAX7312 EV kit. Refer to MAX7312 IC data sheet for the appropriate setting.

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 is on and the green LED is off. If the logic level is low, the corresponding green LED is on and the red LED is off.

Input Evaluations of I/Os

Two pullup resistors and two pushbuttons are connected to I/O8 and I/O9 of the MAX7312. Press pushbutton S2 to drive I/O8 low and press pushbutton S1 to drive I/O9 low.

User-Supplied Power Supply

By default, the MAX7312 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 VDD pad.

User-Supplied I²C Interface

To use the MAX7312 EV kit with a user-supplied I²C interface, install shunts on pins 2-3 of JU3 and JU4. Connect SDA, SCL, and GND lines from the user-supplied I²C interface to the SDA, SCL, and GND pads on the MAX7312 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 VDD pad.

Table 1. MAX7312 EV Kit Jumper Descriptions (JU0–JU5)

JUMPER	SHUNT POSITION	DESCRIPTION
JU0	1-2	Connects AD0 to VCC
	1-3*	Connects AD0 to GND
	1-4	Connects AD0 to SDA signal
	1-5	Connects AD0 to SCL signal
JU1	1-2	Connects AD1 to VCC
	1-3*	Connects AD1 to GND
	1-4	Connects AD1 to SDA signal
	1-5	Connects AD1 to SCL signal
JU2	1-2	Connects AD2 to VCC
	1-3*	Connects AD2 to GND
	1-4	Connects AD2 to SDA signal
	1-5	Connects AD2 to SCL signal
JU3	1-2*	MAX7312 SCL signal connected to on-board microcontroller
	2-3	Connects user-supplied SCL signal to the on-board SCL pad
JU4	1-2*	MAX7312 SDA signal connected to on-board microcontroller
	2-3	Connects user-supplied SDA signal to the on-board SDA pad
JU5	1-2*	MAX7312 V+ is set to the on-board 3.3V supply powered from the USB port
	2-3	Connects user-supplied external supply to the VCC pad

*Default position.

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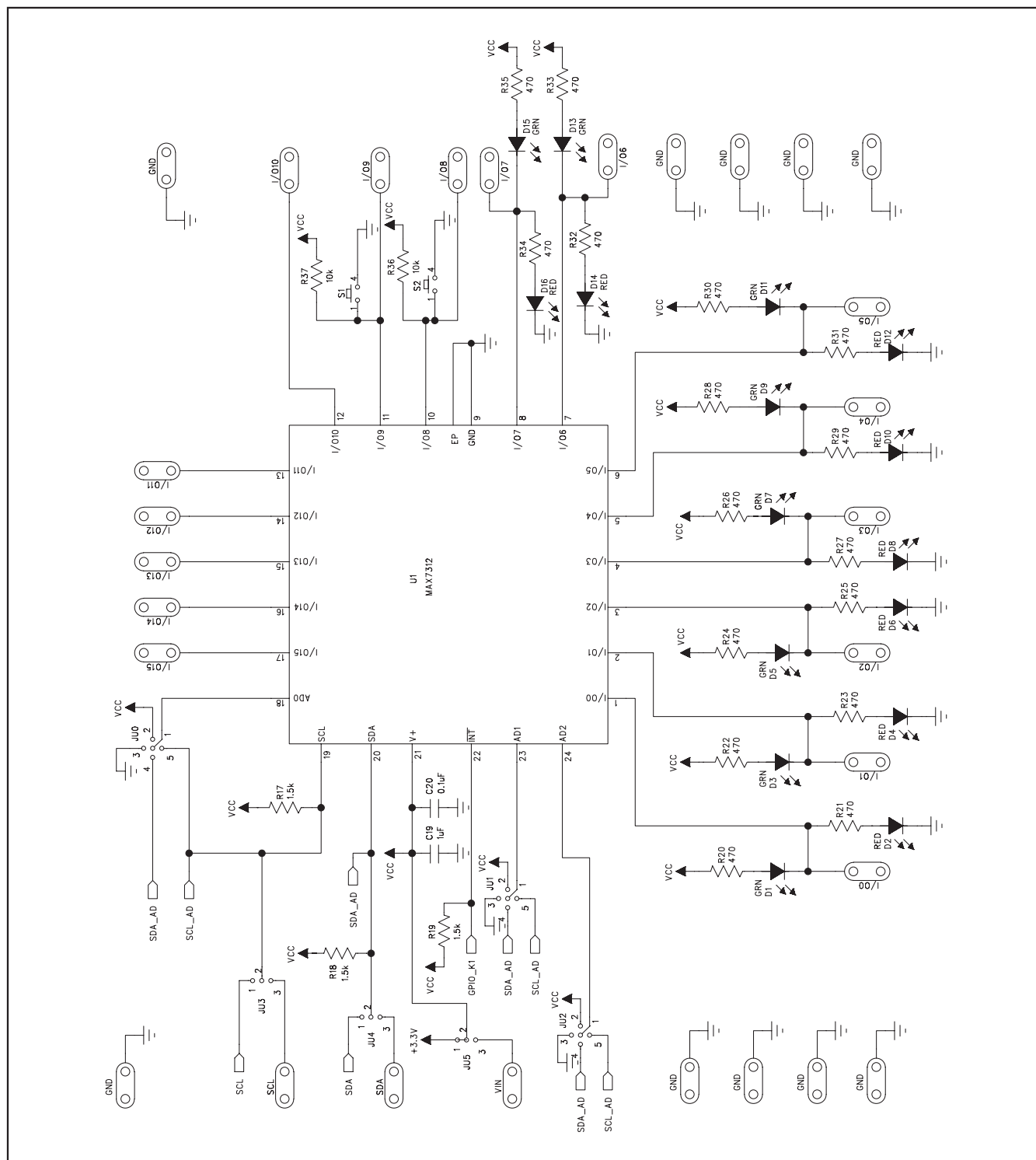


Figure 3a. MAX7312 EV Kit Schematic (Sheet 1 of 2)

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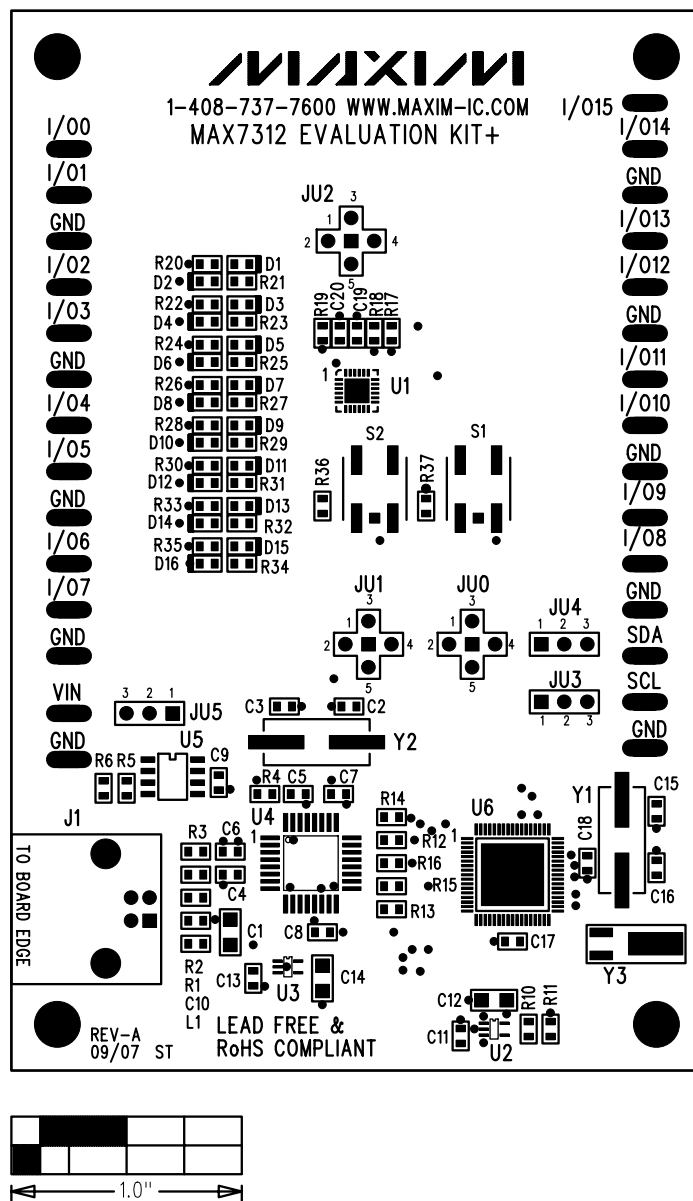


Figure 4. MAX7312 EV Kit Component Placement Guide—Component Side

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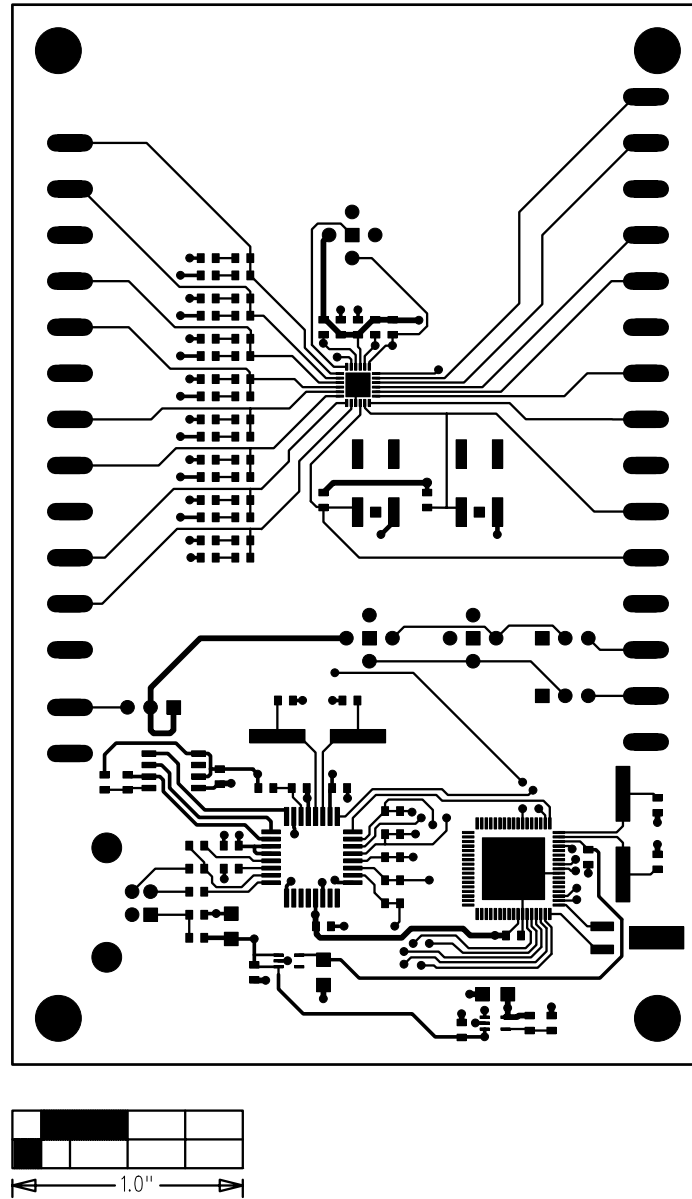


Figure 5. MAX7312 EV Kit PCB Layout—Component Side

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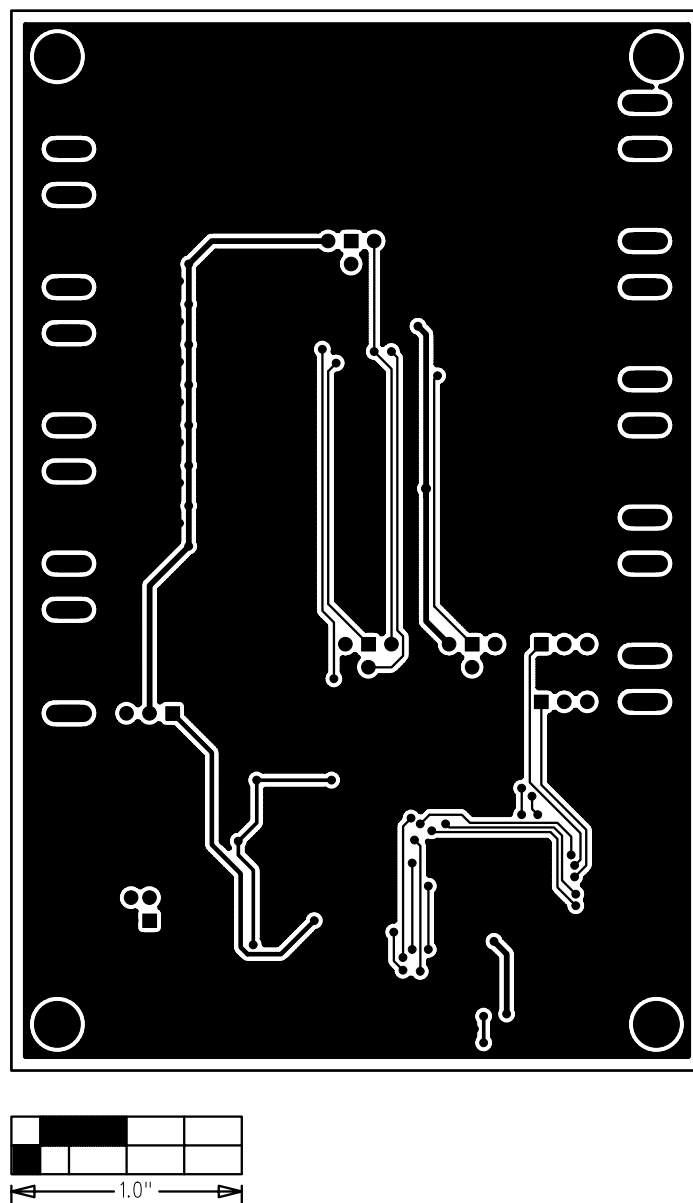


Figure 6. MAX7312 EV Kit PCB Layout—Solder Side

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