MAXIM

MAX7315 Evaluation Kit/Evaluation System

Evaluate: MAX7315

_____General Description

The MAX7315 evaluation kit (EV kit) is a fully assembled and tested circuit board that demonstrates the capabilities of the MAX7315 8-port I/O expander with LED intensity control, interrupt, and hot-insertion protection. The MAX7315 EV kit also includes Windows® 98SE/2000/XP-compatible software that which provides a simple graphical user interface (GUI) for exercising the features of the MAX7315.

The MAX7315 evaluation system (EV system) consists of the MAX7315 EV kit and a companion CMAXQUSB serial-interface board. The CMAXQUSB interface board allows a PC to control an I2C interface using its USB port. Order the MAX7315EVCMAXQU+ for a complete PC-based evaluation of the MAX7315. Order the MAX7315EVKIT+ if you already have a MAX7315-compatible serial interface.

Windows is a registered trademark of Microsoft Corp.

_____Component Supplier

SUPPLIER	PHONE	WEBSITE
TDK	847-803-6100	www.component.tdk.com

Note: *Indicate that you are using the MAX7315 when contacting this component supplier.*

_____Features

♦ **400kHz, 5.5V-Tolerant, 2-Wire Serial Interface**

♦ **2V to 3.6V Operation**

♦ **High Output Current—Each Port 50mA (max)**

♦ **5.5V-Rated Open-Drain Outputs**

♦ **Proven PCB Layout**

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

♦ **Fully Assembled and Tested**

♦ **EV System Includes USB Connectivity**

_____Ordering Information

PART	TYPE	INTERFACE
MAX7315EVKIT+	EV kit	User-supplied I2C interface
MAX7315EVCMAXQU+	EV system	CMAXQUSB interface board

+Denotes a lead-free and RoHS-compliant evaluation kit.

Note: *The MAX7315 EV kit software is included with the MAX7315 EV kit, but is designed for use with the complete EV system. The EV system includes both the Maxim CMAXQUSB interface board and the EV kit. If the Windows software will not be used, the EV kit board can be purchased without the Maxim CMAXQUSB board.*

_____Component List

MAX7315 EV Kit

DESIGNATION	QTY	DESCRIPTION
C1	1	0.1µF ±10%, 25V X7R ceramic capacitor (0603) TDK C1608X7R1E104K
C2, C3	2	10µF ±20%, 10V X5R ceramic capacitors (0805) TDK C2012X5R1A106M
D1, D2	2	RGB LEDs (2.7mm x 2.4mm x 0.95mm)
D3, D4, D5	3	White LEDs (PLCC-2)
J1	1	2 x 10 right-angle female receptacle
JU1, JU2, JU5	3	5-pin headers
JU3, JU4, JU7	3	3-pin headers

DESIGNATION	QTY	DESCRIPTION
JU6, JU8–JU13	7	2-pin headers
R1, R4	2	270Ω ±5% resistors (0603)
R2, R5	2	240Ω ±5% resistors (0603)
R3, R6	2	160Ω ±5% resistors (0603)
R7, R8	2	100kΩ ±5% resistors (0603)
R9, R10, R13	3	180Ω ±5% resistors (0603)
R11, R12	0	Not installed, resistors (0603)
S1, S2	2	Pushbutton switches
U1	1	MAX7315ATE+ (16-pin TQFN, 3mm x 3mm x 0.8mm)
—	13	Shunts
—	1	MAX7315EVKIT+ PCB

MAXIM _____ **Maxim Integrated Products** 1

For pricing, delivery, and ordering information, please contact Maxim/Dallas Direct! at 1-888-629-4642, or visit Maxim's website at www.maxim-ic.com.

MAX7315 Evaluation Kit/Evaluation System

_____Component List (continued)

MAX7315 EV System

PART	QTY	DESCRIPTION
MAX7315EVKIT+	1	MAX7315 EV kit
CMAXQUSB+	1	Serial-interface board

_____Quick Start

Recommended Equipment

- 5VDC, 1A power supply
- MAX7315 EV system

  MAX7315 EV kit

  Maxim CMAXQUSB interface board
  (USB cable included)

- A user-supplied Windows 98SE/2000/XP 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 98SE/2000/XP operating system.

Procedure

The MAX7315 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 website (www.maxim-ic.com/evkit-software) to download the most recent version of the EV kit software, 7315Rxx.ZIP.

2) Install the MAX7315 evaluation software on your computer by running the INSTALL.EXE program. The program files are copied and icons are created in the Windows **Start** menu.

3) On the CMAXQUSB board, ensure the shunt of JU1 is in the 3.3V or 2.5V position.

4) Enable the I^{2}C pullup resistors on the CMAXQUSB board by setting the DIP switch SW1 to the ON position.

5) For the MAX7315 EV kit, make sure the shunts of all jumpers are in the following default positions (Table 1).

MAX7315 EV Kit Files

FILE	DESCRIPTION
INSTALL.EXE	Installs the EV kit files on your computer
MAX7315.EXE	Application program
FTD2XX.INF	USB device driver file
UNINST.INI	Uninstalls the EV kit software
TROUBLESHOOTING_ USB.PDF	USB driver installation help file

6) Carefully connect the boards by aligning the MAX7315 EV kit's 20-pin connector with the 20-pin connector of the CMAXQUSB board.

7) Connect the 5VDC power supply between the MAX7315 EV kit's VLED and GND pads.

8) Turn on the 5VDC power supply.

9) Connect the USB cable from the PC to the CMAXQUSB board. A **Building Driver Database** window pops up in addition to a **New Hardware Found** message. If you do not see a window that is similar to the one described above after 30 seconds, remove the USB cable from the CMAXQUSB and reconnect it. Administrator privileges are required to install the USB device driver on Windows 2000/XP. Refer to the TROUBLESHOOTING_USB.PDF document included with the software if you have any problems during this step.

10) Follow the directions of the **Add New Hardware Wizard** to install the USB device driver. Choose the

Table 1. MAX7315 EV Kit Default Jumper Positions

JUMPER	SHUNT POSITION	DESCRIPTION
JU1, JU2, JU5	1-4	I^{2}C slave address is 0xC6
JU3, JU4	2-3	P6, P7 set as input ports
JU6	1-2	$\overline{INT}$/O8 uses on-board LED indicator
JU7	2-3	CMAXQUSB provides the V+ power supply
JU8–JU13	1-2	P0–P5 uses on-board input/output circuitry

MAXIM

Search for the Best Driver for your Device option. Specify the location of the device driver to be **C:\Program Files\MAX7315** (or the directory chosen during installation) using the **Browse** button.

11) Start the MAX7315 EV kit software by opening its icon in the **Start** menu. The GUI main window appears, as shown in Figure 1.

12) Switch to the **Ports Configuration** tab (Figure 2). In the **Input Enable (0x03)** group box, uncheck **Port 0** and **Port 3**. Click the **Read All** button in the **Input State (0x00)** group box.

13) Switch to the **Blink Phase 0/1** tab (Figure 3). In the **RGB LED D1 Configuration** group box, uncheck **Red** in the **Blink Phase 0** line. In the **RGB LED D2 Configuration** group box, uncheck **Red** in the **Blink Phase 0** line. Observe the change of D1, D2 on the EV kit board.

14) On the MAX7315 EV kit board, press the S1 or S2 switch, observe the change of D5 on the EV kit board.

_____Detailed Software Description

To start the MAX7315 EV kit software, double-click the MAX7315 EV kit icon created during installation. The GUI main window appears, as shown in Figure 1. Wait approximately two seconds while the MAX7315 EV kit software connects to the CMAXQUSB board.

On the lower part of the main window, the user can set the I^{2}C address manually or automatically in the **I2C Address Setting** pulldown menu, display the Maxim serial interface window by clicking the **Diagnose** button, reset the device to the default power-up condition by clicking the **Software Reset** button, and exit the application by clicking the **Exit** button.
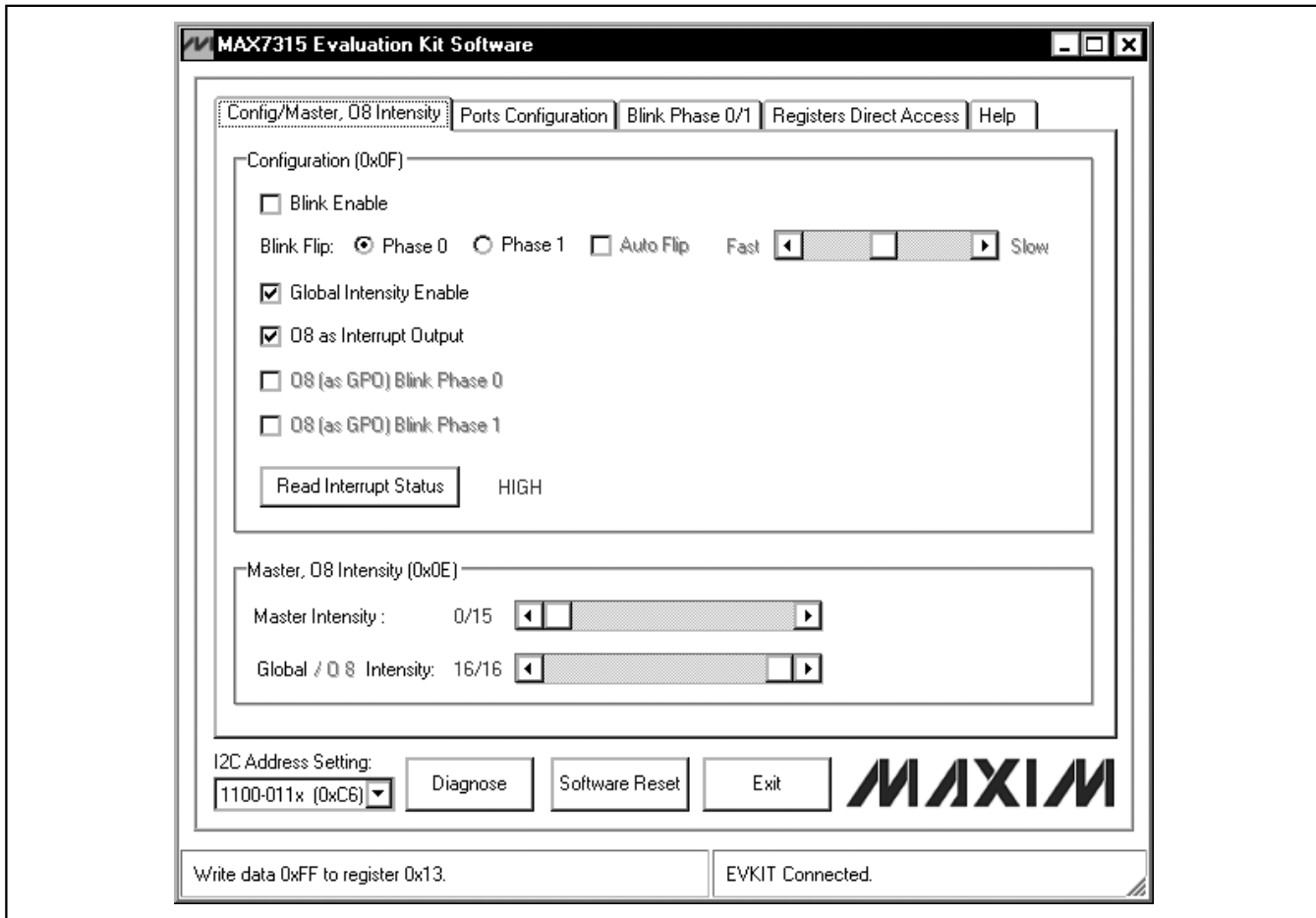

Figure 1. MAX7315 Evaluation Software Main Window (Config/Master, O8 Intensity Tab)

Refer to the MAX7315 IC data sheet for a detailed I2C slave address map.

On the bottom of the main window, the user can see the activity of the I2C interface and the status of the EV kit.

In the main window of the software, there are five tabs that let the user configure all the registers of the MAX7315. They are **Config/Master, O8 Intensity**, **Ports Configuration**, **Blink Phase 0/1**, **Registers Direct Access**, and **Help**.

Config/Master, O8 Intensity Tab

The **Config/Master, O8 Intensity** tab shown in Figure 1 contains the **Configuration (0x0F)** group box and the **Master, O8 Intensity (0x0E)** group box.

When **Blink Enable** is checked, **Auto Flip** is selectable. When **Auto Flip** is checked, the user can choose the blinking frequency as desired.

When **Global Intensity Enable** is checked, bits 0 through 3 of the master/O8 intensity register (0x0E) control the global LED intensity. When **Global Intensity Enable** and **O8 as Interrupt Output** are unchecked, the bits 0 through 3 of the master/O8 intensity register (0x0E) control the O8 LED intensity.
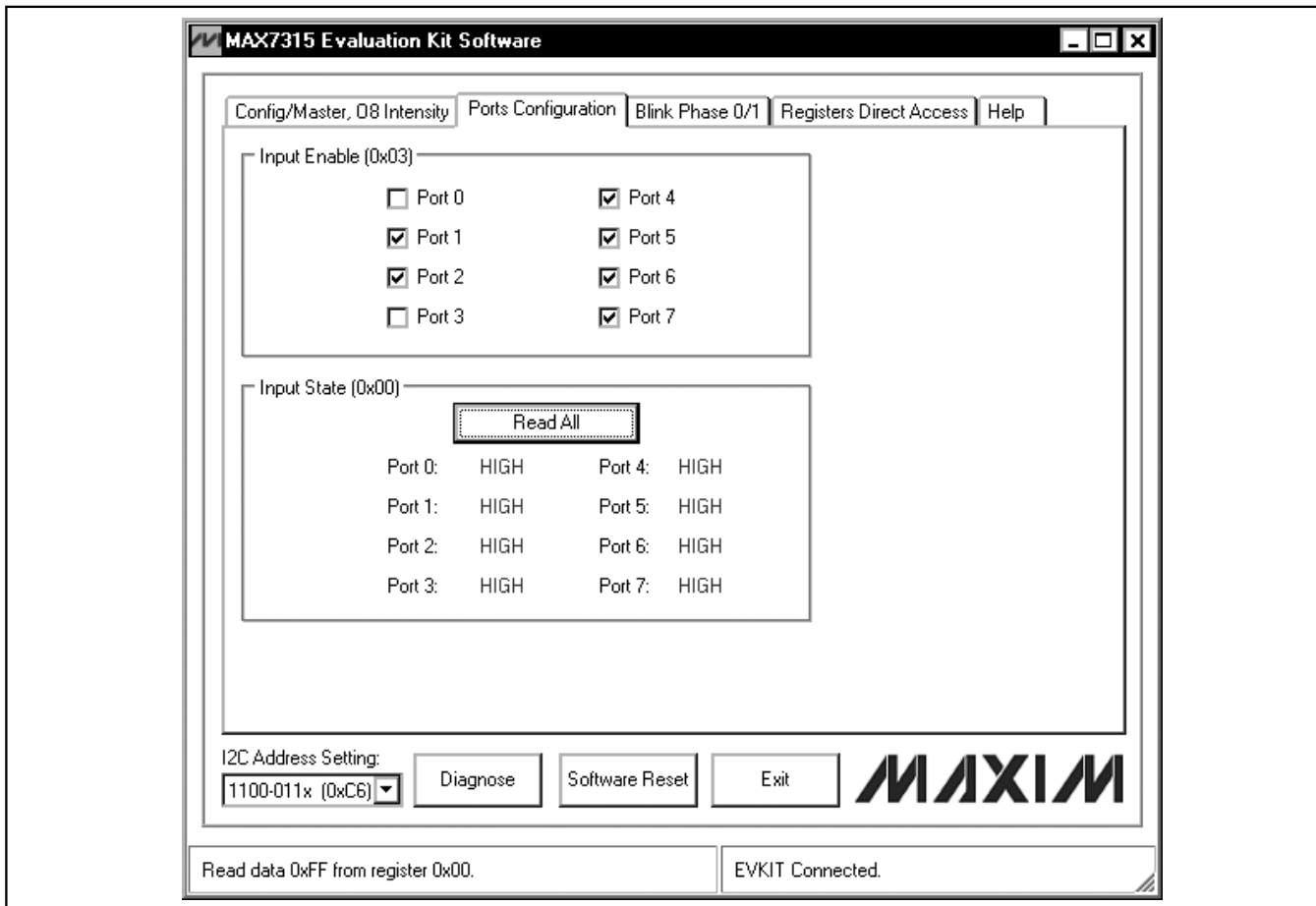
Figure 2. Ports Configuration Tab

MAXIM

MAX7315 Evaluation Kit/Evaluation System

Ports Configuration Tab

In the **Input Enable (0x03)** group box, when a port is checked, the port is set as an input port. When a port is unchecked, the port is set as an output port.

In the **Input State (0x00)** group box, the user can read the incoming logic levels of all the ports, regardless of whether the port is defined as an input or an output by the ports configuration register (0x03).

Blink Phase 0/1 Tab

The **Blink Phase 0/1** tab shown in Figure 3 contains the **RGB LED D1 Configuration**, the **RGB LED D2 Configuration**, and the **White LED D3, D4 Configuration** group boxes. These three group boxes control the **Blink Phase 0** (0x01), **Blink Phase 1** (0x09), and output intensity (0x10, 0x11, 0x012, 0x13) registers. They directly control LED D1, D2, D3, and D4.
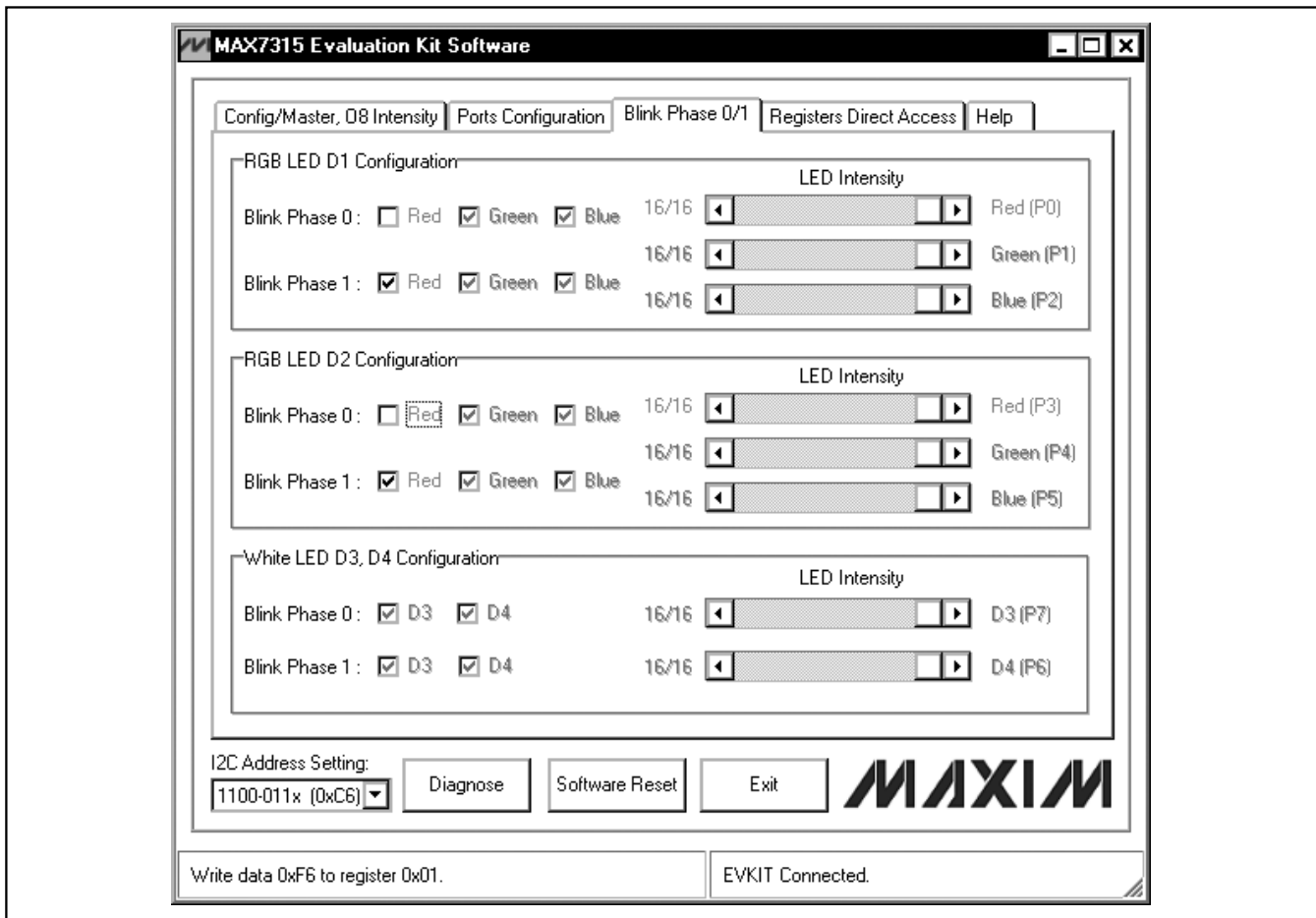
Figure 3. Blink Phase 0/1 Tab

Registers Direct Access Tab

The **Registers Direct Access** tab shown in Figure 4 contains all ten registers of the MAX7315. The user can directly write to the ten registers by inputting desired values and then clicking the **Write All** button. The user can read all ten registers by clicking the **Read All** button.

Help Tab

The **Help** tab contains the MAX7315 EV kit software revision and Maxim Integrated Product's website information.

____Detailed Hardware Description

The MAX7315 is an 8-port I/O expander with LED intensity control, interrupt, and hot-insertion protection. The MAX7315 EV kit board provides a proven layout for evaluating the MAX7315. The EV kit comes with a MAX7315ATE+ installed.

Power Supplies

The power supply for all LEDs must be powered by a user-provided 3.2V to 5.5V power supply that connects to the VLED pad. The MAX7315 can be either powered from the CMAXQUSB interface board or from a user-supplied 2.0V to 3.6V power supply that connects to the VCC pad, as shown in Table 2.

Table 2. V+ Selection Configuration

JUMPER	SHUNT POSITION	DESCRIPTION
JU7	1-2	User-provided 2.0V to 3.6V power supply (VCC)
	2-3*	Powered by CMAXQUSB interface board

Default position.
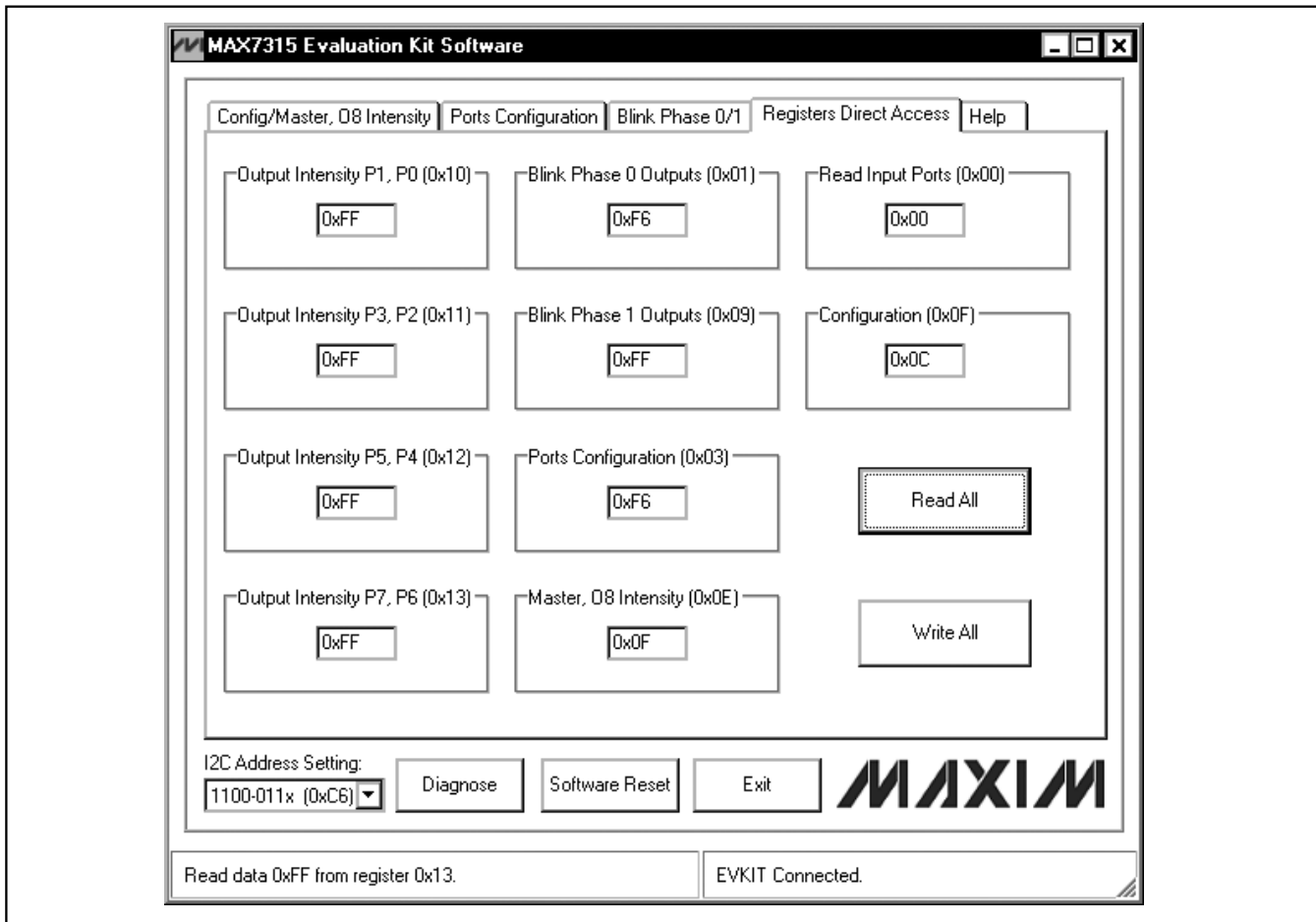
Figure 4. Registers Direct Access Tab

Evaluate: MAX7315

I²C Address Configuration

The shunt position of jumpers JU1, JU2, and JU5 determine the I²C slave address of the MAX7315 EV kit. Refer to the MAX7315 IC data sheet for a detailed I²C slave address map.

Reserved Jumper Settings

Jumpers JU3, JU4, JU6, JU8–JU13 set the port configurations as described in Table 3.

User-Supplied I²C Interface

To use the MAX7315 EV kit with a user-supplied I²C interface, install the shunt on jumper JU7 on pins 1 and 2. Connect SDA, SCL, and GND lines from the user-supplied I²C interface to the SDA, SCL, and GND pads on the MAX7315 EV kit. Apply a 2.0V to 3.6V power supply to the VCC pad of the MAX7315 EV kit. Depending on the configuration of the user-supplied I²C interface, it may be necessary to install the I²C pullup resistors R11 and R12.

Table 3. Port Configurations

JUMPER	SHUNT POSITION	DESCRIPTION
JU3	2-3*	P7 set as input port, controlled by S1.
	1-2	P7 set as output port, driving LED D3.
	Open	Use P7 pad to evaluate this I/O pin.
JU4	2-3*	P6 set as input port, controlled by S2.
	1-2	P6 set as output port, driving LED D4.
	Open	Use P6 pad to evaluate this I/O pin.
JU6	1-2*	$\overline{\text{INT}}$/O8 set as GPO or interrupt, driving LED D5.
	Open	Use $\overline{\text{INT}}$/O8 pad to evaluate this I/O pin.
JU8–JU13	1-2*	When P0–P5 are set as output ports, P0–P5 drive LED D1 and D2. When P0–P5 are set as input ports, they are pulled up by VLED.
	Open*	Use P0–P5 pads to evaluate the corresponding I/O pin.

*Default position.
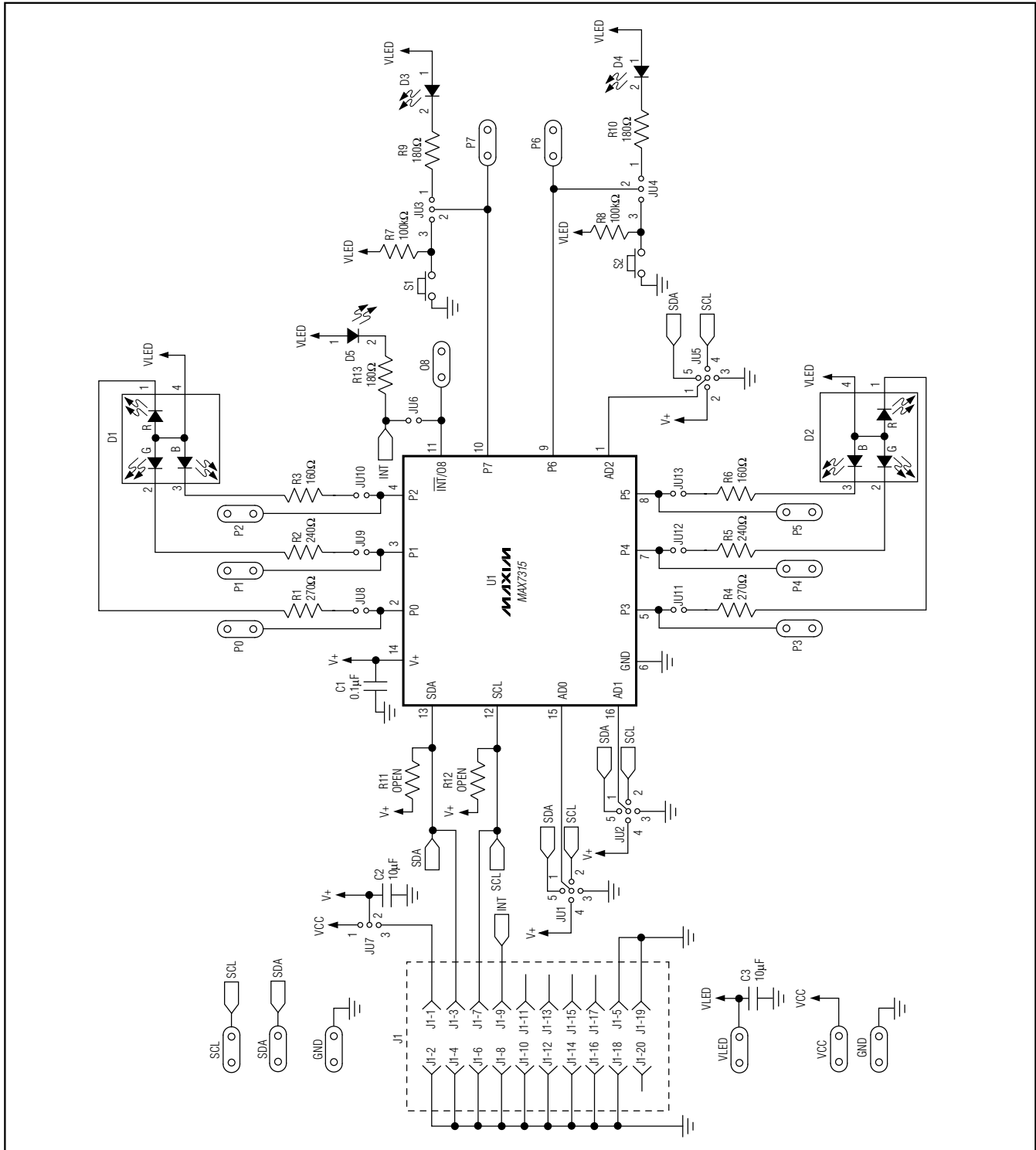
MAXIM _____   7

Evaluate: MAX7315

Figure 5. MAX7315 EV Kit Schematic
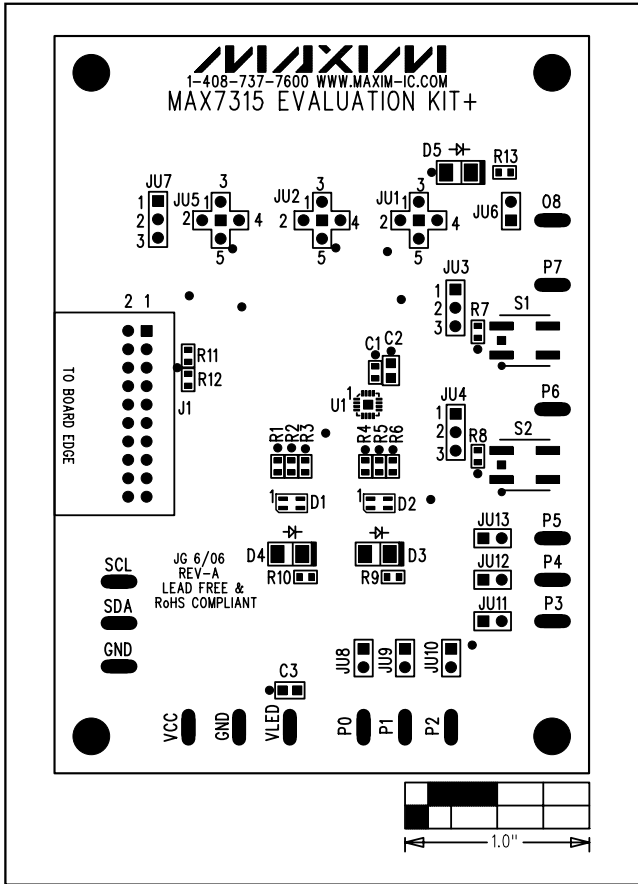
MAXIM

MAX7315 Evaluation Kit/Evaluation System

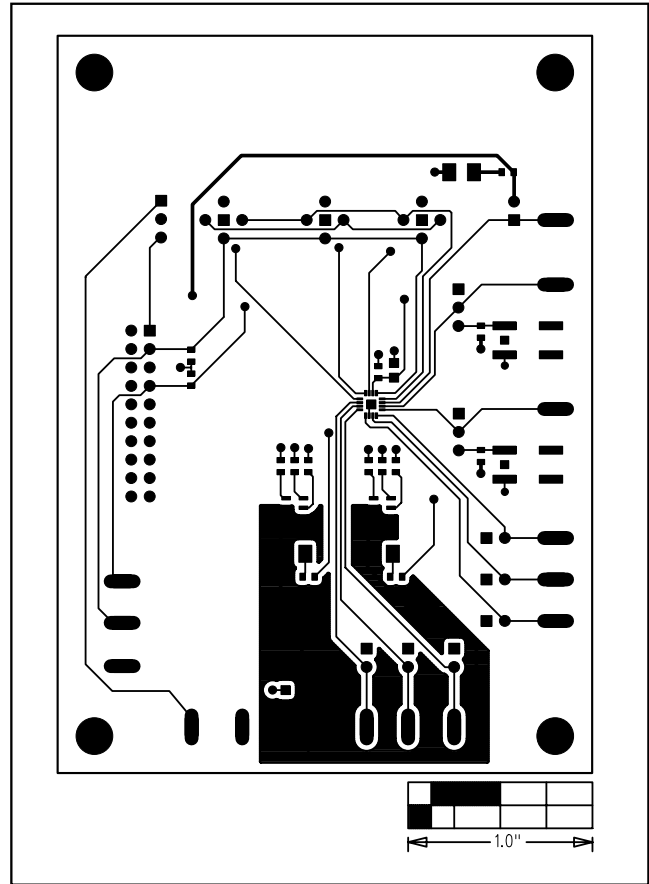Figure 6. MAX7315 EV Kit Component Placement Guide—
Component Side

Figure 7. MAX7315 EV Kit PCB Layout—Component Side

_____ 9

Evaluate: MAX7315
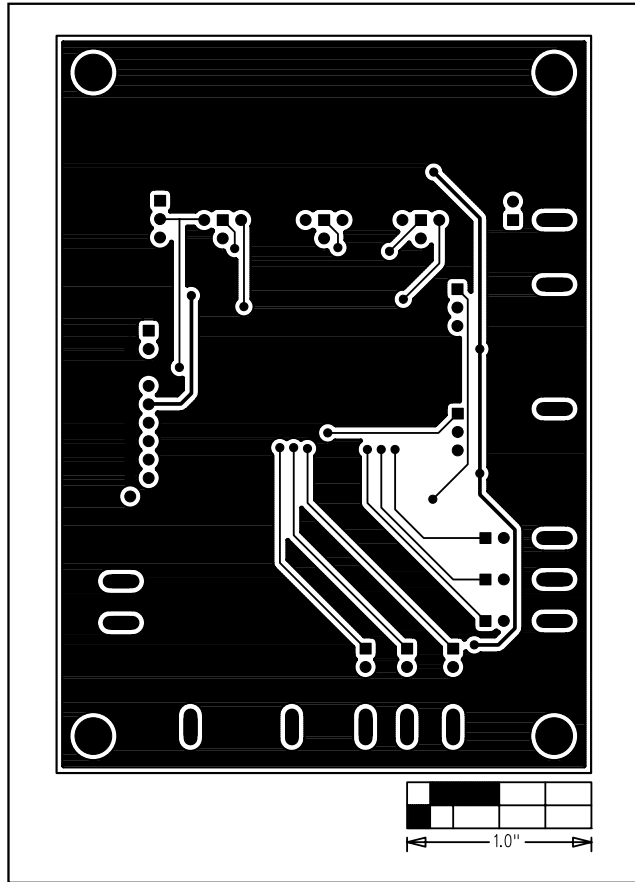
Figure 8. MAX7315 EV Kit PCB Layout—Solder Side