

General Description

The MAX14820 evaluation kit (EV kit) consists of a MAX14820 evaluation board and software. The EV kit is a fully assembled and tested circuit board that evaluates the MAX14820 and MAX14821 IO-Link® device transceivers.

The EV kit includes Windows XP®, Windows Vista®, and Windows® 7-compatible software that provides a graphical user interface (GUI) for exercising the features of the two devices. The EV kit is connected to a PC through a USB A-to-B cable.

Features

- IO-Link-Compliant Device Transceiver
- IO and SPI™ Interface Terminals
- Windows XP, Windows Vista, and Windows 7-Compatible Software
- USB-PC Connection (Cable Included)
- Proven PCB Layout
- Fully Assembled and Tested

Ordering Information appears at end of data sheet.

IO-Link is a registered trademark of ifm electronic GmbH.

Windows, Windows XP, and Windows Vista are registered trademarks of Microsoft Corp.

SPI is a trademark of Motorola, Inc.

Quick Start

Recommended Equipment

- MAX14820 EV kit (USB A-to-B cable included)
- User-supplied Windows XP, Windows Vista, or Windows 7 PC with a spare USB port
- 24V, 100mA DC power supply

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 EV kit is fully assembled and tested. Follow the steps below to verify board operation before exercising the full features of the device:

- 1) Visit www.maximintegrated.com/evkitsoftware to download the latest version of the EV kit software, 14820Rx.ZIP. Save the EV kit software to a temporary folder and uncompress the ZIP file.
- 2) Install the EV kit software and USB driver on your computer by running the INSTALL.EXE program inside the temporary folder. The program files are copied to your PC and icons are created in the Windows **Start | Programs** menu. During software installation, some versions of Windows may show a warning message indicating that this software is from an unknown publisher. This is not an error condition and it is safe to proceed with installation. Administrator privileges are required to install the USB device driver on Windows.
- 3) Verify that all the jumpers are in their default positions, as shown in [Table 1](#).
- 4) Connect the 24V DC power supply on the VCC and GND connectors on the EV kit board.
- 5) Connect the USB cable from the PC to the EV kit board. A Windows message appears when connecting the EV kit board to the PC for the first time. Each version of Windows has a slightly different message. If you see a Windows message stating **ready to use**, then proceed to the next step. Otherwise, open the USB_Driver_Help_200.PDF document in the Windows **Start | Programs** menu to verify that the USB driver was installed successfully.
- 6) Start the EV kit software by opening its icon in the Windows **Start | Programs** menu. The EV kit software main window appears, as shown in [Figure 1](#).
- 7) Verify that **Hardware: Connected** is displayed on the status bar at the bottom of the main window.
- 8) Press the **Read** or **Write** buttons on the GUI to access the device SPI registers.

Detailed Description of Software

The main window of the evaluation software ([Figure 1](#)) displays the SPI registers and the device pins that are connected to the on-board MAXQ2000 microcontroller. The user can send read or write SPI commands to the device, configure the logic levels of the device input pins, and read back the logic levels of the device output pins.

To read an SPI register or an output pin logic level, press the **Read** button.

To configure an SPI register or an input pin logic level, first click on the desired radio button(s), and then press the **Write** button.

The software also automatically monitors the presence of the wake-up pulse on the WU pin and displays the result on the GUI.

The user can also change the SPI clock speed by clicking on the desired **SPI Clock Speed** radio button.

Advanced User Interface

There are two methods for communicating with the device. The first is through the window shown in [Figure 1](#). The second is through the **Advanced User Interface** window shown in [Figure 2](#). The **Advanced User Interface** window becomes available by selecting the **Options | Interface (Advanced User)** menu item and allows execution of serial commands manually.

The **Advanced User Interface** window can also be used as a debug tool because it is capable of manually reading and writing to every register and logic pin of the device.

MAX14820 Evaluation Kit

File Options Reconnect Help

Status Register

WuInt

DoFaultInt

DiLvl

QLvl

C/QFaultInt

UV33Int

UV24Int

OTempInt

Read

1

0

1

0

1

0

1

0

1

0

1

0

1

0

1

0

Read

CQConfig Register

RxFilter

HiSlew

C/Q_N/P

C/Q_PP

C/QDEn

Q

RxDis

C/QLoad

Read

Write

1

0

1

0

1

0

1

0

1

0

1

0

1

0

1

0

Read

Write

DIOConfig Register

DoInv

DoAv

DoN/P

DoPP

DoEn

DoBit

LiDis

DiLoad

Read

Write

1

0

1

0

1

0

1

0

1

0

1

0

1

0

1

0

Read

Write

Mode Register

RST

WuIntEn

DoFault

C/QFault

UV24

OTemp

UV33En

LD033Dis

Read

Write

1

0

1

0

1

0

1

0

1

0

1

0

1

0

1

0

Read

Write

Read Pins (The corresponding jumpers on JU10 must be closed)

UV

IRQ

LI

RX

Auto read every 1 second

Read

Read

Read

Read

1

0

1

0

1

0

0

1

Wake-up Pulse Detection

Not Detected

Clear

Write Pins (The corresponding jumpers on JU10 must be closed)

TXEN

TXQ

TXC

LO

Note:
Place the shunts across pins 1-3
on JU6 - JU9.

Write

Write

Write

Write

1

0

1

0

1

0

1

0

SPI Clock Speed

8MHz

2MHz

400KHz

4MHz

1MHz

100KHz

Hardware: Connected

MAX14820EVKIT

Figure 1. MAX14820 EV Kit Software Main Window

www.maximintegrated.com

Maxim Integrated | 3

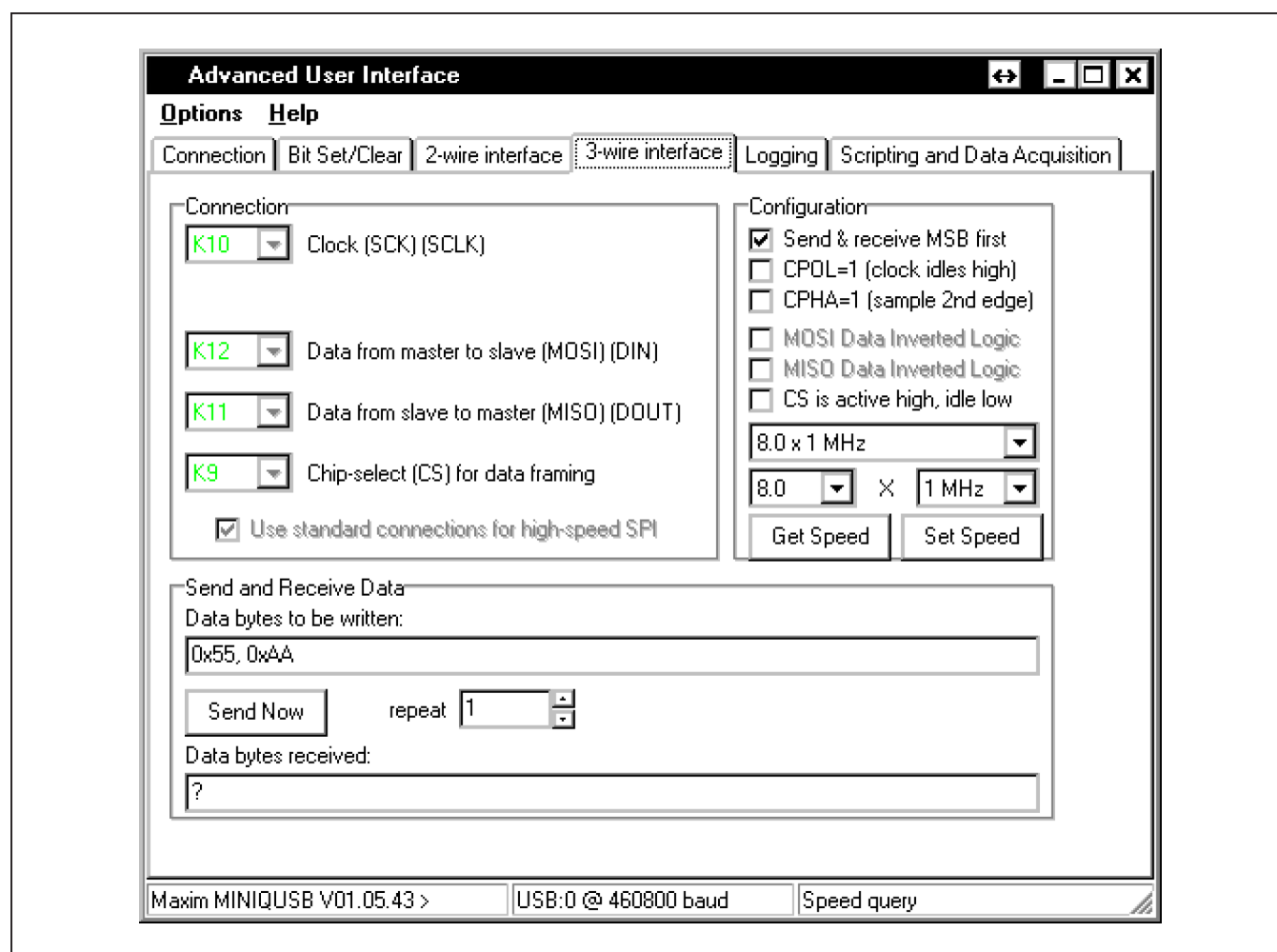


Figure 2. MAX14820 EV Kit Software Advanced User Interface Window

Detailed Description of Hardware

The MAX14820 EV kit provides a proven layout for the MAX14820/MAX14821 IO-Link device transceivers.

All the power-supply and regulator input and output pins are connected to convenient connectors for easy probing. The device logic input and output pins are also provided with convenient connectors for logic testing.

As an option, the user can also connect their own SPI controller to access the device registers.

The transceiver's C/Q, DO, and DI pins are protected by Semtech SDC36C TVS diodes.

See [Table 1](#) for a description of all the EV kit jumper configurations.

Table 1. Jumper Descriptions

JUMPER	SHUNT POSITON	DESCRIPTION
JU1	Closed*	Enables the C/Q LED indicator
	Open	Disables the C/Q LED indicator
JU2	Closed*	Enables the DO LED indicator
	Open	Disables the DO LED indicator
JU4	1-2*	Device is powered by the internal LDO
	1-3	Device is powered by external 5V connected on TP8
JU5	1-2*	Device VL is connected to LDO33
	2-3	Device VL is connected to V5
JU6	1-3*	TXEN pin is controlled by the microcontroller through the GUI
	1-2	TXEN pin is connected to VL
	1-4	TXEN pin is connected to GND
JU7	1-3*	TXQ pin is controlled by the microcontroller through the GUI
	1-2	TXQ pin is connected to VL
	1-4	TXQ pin is connected to GND
JU8	1-3*	TXC pin is controlled by the microcontroller through the GUI
	1-2	TXC pin is connected to VL
	1-4	TXC pin is connected to GND
JU9	1-3*	LO pin is controlled by the microcontroller through the GUI
	1-2	LO pin is connected to VL
	1-4	LO pin is connected to GND
JU10	Closed*	Device logic IO pins are connected to the on-board microcontroller
	Open	Device logic IO pins are disconnected from the on-board microcontroller
JU11	Closed*	Enables the WU LED indicator
	Open	Disables the WU LED indicator
JU13	Closed*	Enables the $\overline{\text{IRQ}}$ LED indicator
	Open	Disables the $\overline{\text{IRQ}}$ LED indicator
JU14	Closed*	Enables the LI LED indicator
	Open	Disables the LI LED indicator
JU15	Closed*	Enables the RX LED indicator
	Open	Disables the RX LED indicator
JU16–JU19	Closed*	Device uses the on-board SPI interface
	Open	Device uses an external SPI interface
JU23	Closed*	Device LDOIN is bypassed by the 0.1 μ F capacitor
	Open	Device LDOIN has no bypass capacitor

*Default position.

MAX14820 EV Kit Files

FILE	DESCRIPTION
INSTALL.EXE	Installs the EV kit files on your computer
14820.EXE	Application program
CDM20600.EXE	Installs the USB device driver
UNINST.EXE	Uninstalls the EV kit software
USB_Driver_Help_200.PDF	USB driver installation help file

Component Suppliers

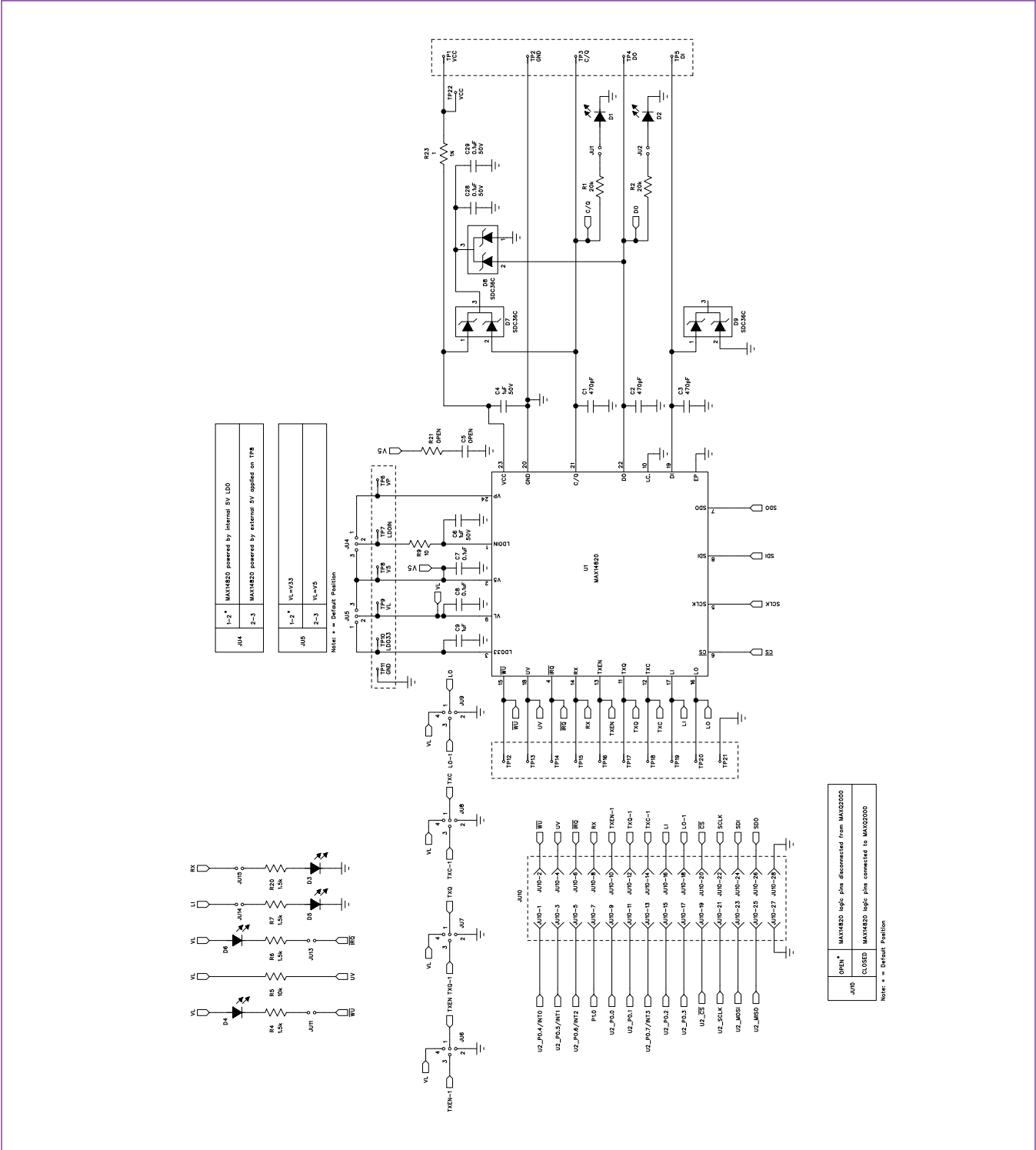
SUPPLIER	WEBSITE
Hong Kong X'tals Ltd.	www.hongkongcrystal.com
Murata Americas	www.murata.com
Semtech Corporation	www.semtech.com

Note: Indicate that you are using the MAX14820 or MAX14821 when contacting these component suppliers.

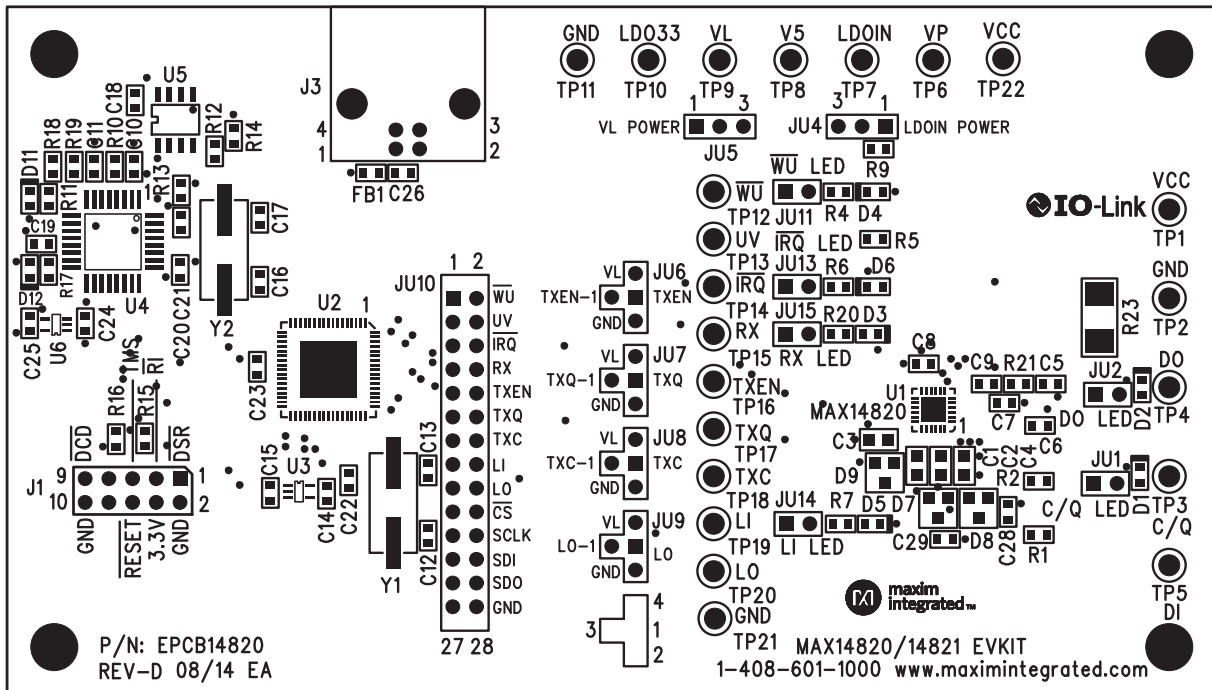
MAX14820 EV Kit Bill of Materials

ITEM	DESCRIPTION	QTY	DESIGNATOR	MANUFACTURER / PART NUMBER
1	470pF ±5%, 50V C0G ceramic capacitors (0805)	3	C1-C3	Murata GRM2165C1H471J
2	1uF ±10%, 50V X7R ceramic capacitor (0805)	2	C4, C6	Murata GRM21BR71H105K
3	0.1uF ±10%, 50V X7R ceramic capacitors (0603)	2	C28, C29	Murata GRM188R71H104K
4	0.1uF ±10%, 16V X5R ceramic capacitors (0603)	12	C7, C8, C10, C15, C18-C24, C26	Murata GRM188R61C104K
5	1uF ±10%, 16V X5R ceramic capacitor (0603)	1	C9	Murata GRM188R61C105K
6	0.033uF ±10%, 16V X7R ceramic capacitor (0603)	1	C11	Murata GRM188R71C333K
7	10pF ±5%, 50V C0G ceramic capacitors (0603)	2	C12, C13	MURATA GRM1885C1H100J
8	10uF ±20%, 6.3V X5R ceramic capacitors (0603)	2	C14, C25	Murata GRM188R60J106M
9	22pF ±5%, 50V C0G ceramic capacitors (0603)	2	C16, C17	MURATA GRM1885C1H220J
10	Hyper-bright low current green LED (0603)	8	D1- D6, D11, D12	OSRAM OPTO LG L29K-G2J1-24-Z
11	TVS diode, 33V,4A	3	D7-D9	Semtech SDC36C.TCT
12	Ferrite beads, 0.1OHM DCR, 30OHM@100MHz	1	FB1	MURATA BLM18PG300SN1
13	USB type-B right angle receptacle	1	J3	ASSMANN AU-Y1007-R
14	2-pin headers (36 pin strip, cut to fit)	6	JU1, JU2, JU11, JU13-JU15	Sullins PEC36SAAN
15	3-pin headers (36 pin strip, cut to fit)	2	JU4, JU5	Sullins PEC36SAAN
16	4-pin headers (36 pin strip, cut to fit)	4	JU6-JU9	Sullins PEC36SAAN
17	28-pin (2x14) dual-row header (2x36 pin strip, cut to fit)	1	JU10	Sullins PEC36DAAN
18	20k ±5% resistors (0603)	2	R1, R2	
19	10 ±1% resistors (0603)	1	R9	
20	1.5k ±5% resistors (0603)	7	R4, R6, R7, R10, R11, R17, R20	
21	10k ±5% resistors (0603)	2	R5, R14	
22	2.2k ±5% resistor (0603)	1	R12	
23	470 ±5% resistor (0603)	1	R13	
24	0 ±5% resistors (0603)	2	R15, R16	
25	27 ±5% resistors (0603)	2	R18, R19	
26	1 ±1% resistor (2010)	1	R23	
27	Red multipurpose test points	12	TP1, TP6-TP10, TP22	Keystone 5010
28	Black multipurpose test points	2	TP2, TP11	Keystone 5011
29	Yellow multipurpose test points	13	TP3-TP5, TP12-TP21	Keystone 5014
30	IO-LINK device transceiver (24 TQFN-EP)	1	U1	Maxim MAX14820ETG+
31	Microcontroller (68 QFN-EP)	1	U2	Maxim MAXQ2000-RAX+
32	LDO regulator (5 SOT70)	1	U3	Maxim MAX8511EXK25+
33	USB UART	1	U4	FTDI FT232BL (32 TQFP)
34	93C46 type (64kx16) 3-wire EEPROM (8 SOIC)	1	U5	Atmel AT93C46EN-SH-B
35	LDO regulator (5 SOT70)	1	U6	Maxim MAX8511EXK33+
36	16MHz crystal	1	Y1	Hongkong X'tals SSM16000N1HK188F0-0
37	6MHz crystal	1	Y2	Hongkong X'tals SSL6000N1HK188F0-0
38	Shunts, 2 position, 0.1 center	26	See Jumper Table	Kycon SX1100-B
39	Printed Circuit Board	1	MAX14820/14821 EVALUATION KIT	1 oz copper
	Not installed, 10-pin (2x5) dual-row header	0	J1	
	Not installed, 0603 resistor	0	R21	
	Not installed, 0603 capacitor	0	C5	
JUMPER TABLE				
			Jumper	Shunt Location
			JU1, JU2, JU4, JU5, JU11, JU13-JU15	pins 1-2
			JU10	all rows closed.
			JU6-JU9	pins 1-3

MAX14820 EV Kit Schematics

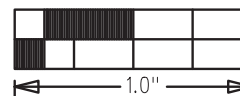
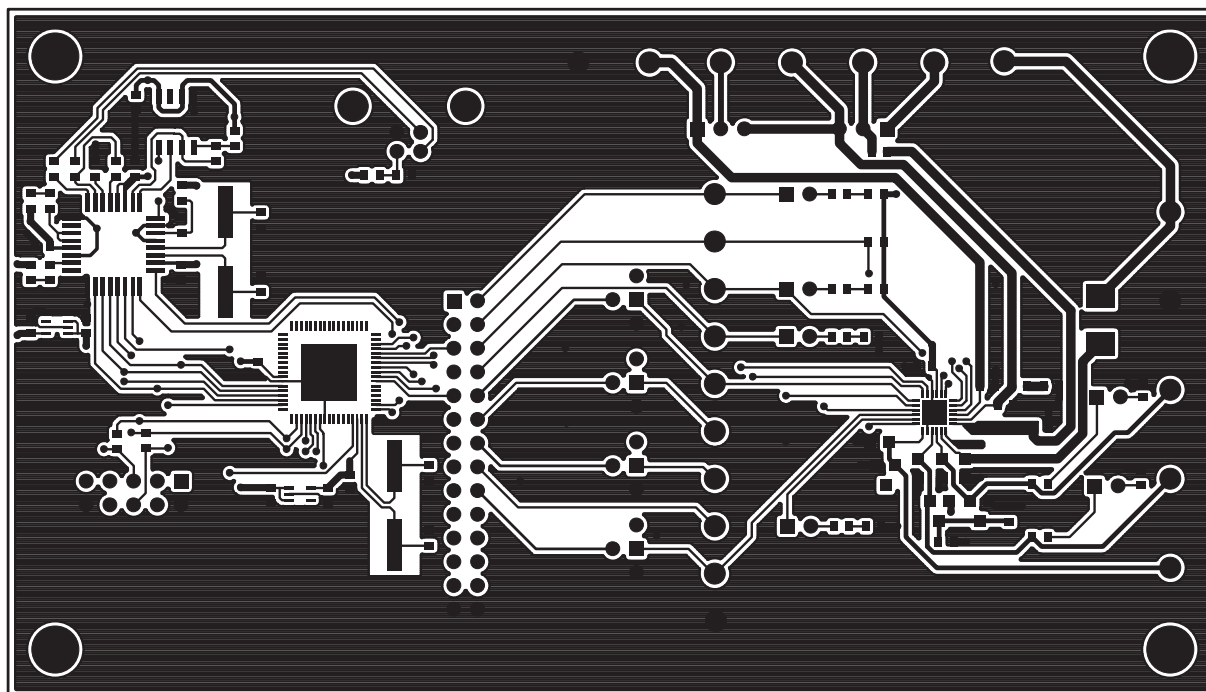


MAX14820 EV Kit PCB Layout Diagrams



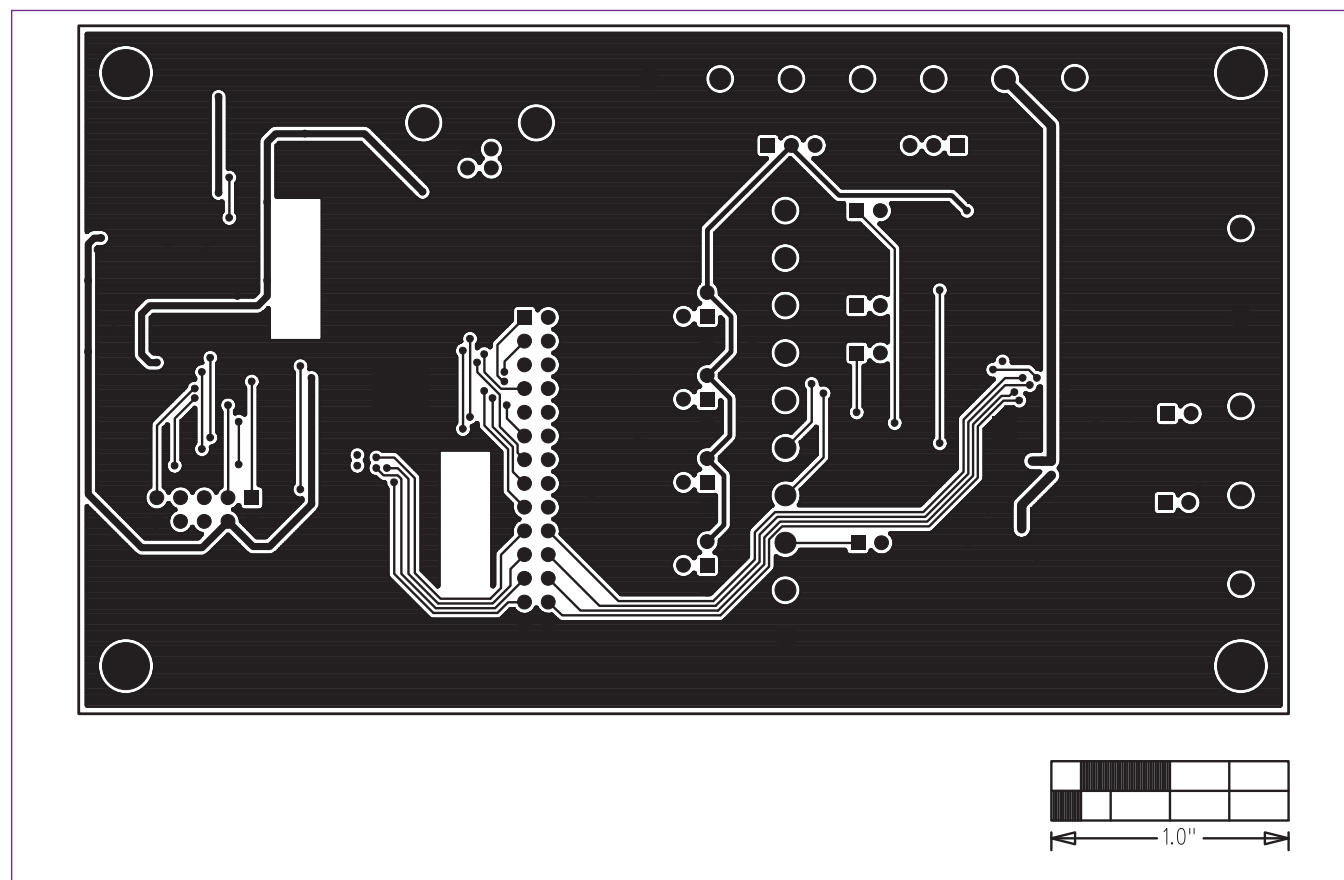
MAX14820 EV Kit—Top Silkscreen

MAX14820 EV Kit PCB Layout Diagrams (continued)



MAX14820 EV Kit—Component Side

MAX14820 EV Kit PCB Layout Diagrams (continued)



MAX14820 EV Kit—Solder Side

Ordering Information

PART	TYPE
MAX14820EVKIT#	EV Kit

#Denotes RoHS compliant.

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	6/11	Initial release	—
1	3/15	Updated schematic, layout and BOM files	1-2, 7-10

For pricing, delivery, and ordering information, please contact Maxim Direct at 1-888-629-4642, or visit Maxim Integrated's website at www.maximintegrated.com.

Maxim Integrated cannot assume responsibility for use of any circuitry other than circuitry entirely embodied in a Maxim Integrated product. No circuit patent licenses are implied. Maxim Integrated reserves the right to change the circuitry and specifications without notice at any time.