

## General Description

The MAX14914 peripheral module provides the hardware to evaluate the MAX14914 high-side/push-pull driver that operates as both an industrial digital output (DO) and an industrial digital input (DI). Refer to the MAX14914 IC data sheet for detailed information regarding operation of the IC.

The module can be used in various ways; Maxim sells a low-cost USB2PMB1 adapter board that uses the Munich GUI software for communication through a USB cable. This is not included with this board. Alternatively, any microcontroller or FPGA with a 12-pin Pmod™-compatible connector can be used, but the user needs to adapt the signalling because this is not a standard SPI port. Another option for the user is to wire-wrap a temporary connection from their system to the pins on connector X1.

## Contents

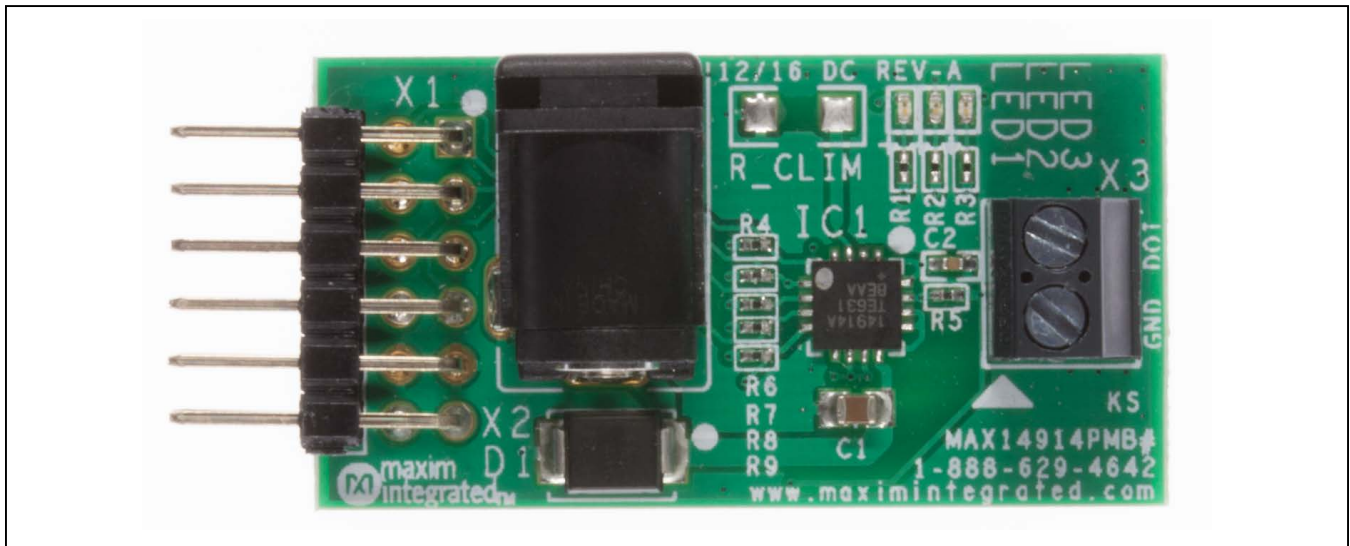
- MAX14914PMB with the MAX14914

## Features

- Easy Evaluation of the MAX14914
- Configurable as a Digital Input or a High-Side or Push-Pull Digital Output
- Accurate Internal Current Limiter for Types 1, 2, and 3 Digital Inputs
- Support High-Side Current Up to 1.3A with External 24V Supply
- Adjustable Short-Circuit Current Limit
- Safe-Demagnetization for Safe Turn Off of Unlimited Inductance
- Works with USB2PMB1 Adapter and Munich GUI Software
- Fully Assembled and Tested
- Proven PCB Layout
- RoHS Compliant

*Ordering Information appears at end of data sheet.*

## MAX14914PMB



*Pmod is a trademark of Digilent Inc.*

## Quick Start

### Required Equipment

- MAX14914PMB peripheral module
  - 24V DC supply (> 1.5A recommended) – not included
- The following items are Optional:**
- USB2PMB1 adapter board
  - Mini-USB cable
  - Windows XP®, Windows® 7, Windows 8.1, or Windows 10 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 system software. Text in **bold and underline** refers to items from the Windows operating system.

### Procedure

If the USB2PMB1 adapter is used, the user can download software by following the steps below to get started:

- 1) Visit [www.maximintegrated.com/evkitsoftware](http://www.maximintegrated.com/evkitsoftware) to download the latest version of the Munich\_GUI software, version 2.12 or later, Munich\_GUISetupV2.12.ZIP.
- 2) Save the software to a temporary folder. Unzip the .ZIP file and double-click the .EXE file to run the installer. A message box asking **Do you want to allow the following program to make changes to this computer?** might appear. If so, click **Yes**.
- 3) The installer includes the drivers for the hardware and software. Follow the instructions on the installer and once complete, click **Finish**. The default location of the software is in the program files directory.
- 4) Connect the MAX14914PMB Pmod connector X1 to the connector on USB2PMB1.
- 5) Connect the USB2PMB1 to the PC with the Mini-USB cable. Windows should automatically recognize the device and display a message near the **System Icon** menu indicating that the hardware is ready to use.
- 6) Once the hardware is ready to use, launch the software. The status bar in the GUI should display **Disconnected** in the bottom right-hand corner. Go to the **Device** tab to select the MAX14914PMB.
- 7) Click **Update Once** to read the default status of the MAX14914.

## Detailed Description of Software

### Connect to Hardware

The **Device** menu has options to search and connect to the hardware. Use the **Scan Adapters** option to search for the USB2PMB1 modules connected to the PC. If modules are found, the serial numbers of the modules are listed in the **USB2PMB1s** menu item. Select the serial number in the **USB2PMB1s** list to connect the software to communicate with that module. The software can only communicate to one module at a time only.

### Setting MAX14914 Configuration

The **Setting** buttons ([Figure 1](#)) control the configuration and operating modes for the MAX14914:

**DI\_ENA** defines the DOI as a digital output (set to 0) or as a digital input (set to 1).

**DO\_PP** defines the mode of DOI, depending upon how **DI\_ENA** is set. If the MAX14914 is configured as a digital output, **DO\_PP** selects high-side mode (set to 0) or push-pull mode (set to 1). If the MAX14914 is configured as a digital input, **DO\_PP** selects type 1/3 mode (set to 0) or type 2 mode (set to 1).

**DO\_SET** is used when the MAX14914 is configured as a DO; when **DO\_SET** is 0 the output pin DOI is either high impedance (in high-side mode) or 0V (in push-pull mode). When **DO\_SET** is 1, the output pin DOI is turned on (24V) in high-side mode or in push-pull mode.

Changing one of these buttons causes changes to be made directly to the MAX14914.

*Windows and Windows XP are registered trademarks and registered service marks of Microsoft Corporation.*

### Monitoring MAX14914 Status

Two boxes show the status of the MAX14914 as well as the visual indication from the three LEDs on the PCB.

**DIDO\_LVL:** Reports the level of DOI pin.

**FAULT:** Reports a FAULT condition such as thermal shutdown or loss of ground occurs.

Refer to the MAX41914 IC data sheet for more details of the configuration settings.

### Sample

To start continuous monitoring, check the **Update Continuously** check box. For a single status check, uncheck **Update Continuously** and click the **Update Once** button.

### Detailed Description of Hardware

The MAX14914PMB hardware provides everything needed to evaluate the MAX14914, and includes the MAX14914, a screw terminal for the external load or input, and a 24V DC power connector. An on-chip 5V regulator supply's local power to the board for MAX14914 control interface. An optional USB2PMB1 module can be used with the Munich GUI to provide the USB-to-MAX14914 interface to configure and control the MAX14914. Note an external 24V DC supply is required even if used with the USB2PMB1 and a USB cable.

### Pmod-Style Connector

The MAX14914PMB can plug directly into a Pmod-compatible port through X1. Note the pin definitions are not compatible with SPI, and the user must configure the microcontroller or FPGA to match MAX14914 signals. For more information on the interface and control, refer to the MAX41914 IC data sheet. Three pins are used to configure the MAX14914 (DO\_SET, DO\_PP, and DI\_ENA), and three pins are used to monitor the status of MAX14914 (DIDO\_LVL, OV\_VDD, and FAULT). See [Figure 2](#) for the X1 pinout.

### External Supply

An external 24V DC supply is required. The rating of this supply must be aligned to the load connected to X3.

### LEDs

Two LEDs are used to indicate the status of the MAX41914. LED1 (RED) is illuminated if a FAULT condition, such as thermal shutdown or loss of ground, occurs. The FAULT LED reflects the status of the MAX41914's FAULT pin. When the LED is on, the FAULT pin is active to indicate that there a fault is occurring. LED3 (GREEN) is illuminated based on the logic level of DOI pin: on for 24V or off for 0V.

The MAX14914PMB comes with LED2 (YELLOW) not populated, but can be added to monitor an OV\_VDD overvoltage condition when, a) the device is configured for DI operation, or b) the DOI level is higher than VDD (nominally 24V).

### Default Condition

Resistors R7, R8, and R9 are used to initially configure the MAX14914 as a Type 2 DI. The user can change this functionality by driving pins DI\_ENA, DO\_SET, and DO\_PP.

### Current Limiting

The MAX14914 has a settable current limiting when in high-side switch mode. The load current is limited between 135mA (min) and 1.3A (max), depending on the value of the resistor used at the CLIM pin. The MAX14914PMB comes with R\_CLIM not populated, meaning the current is limited at 1.1A. If the 82.5kΩ resistor is inserted, the current limit is 500mA. Refer to the MAX14914 data sheet for full details on current limit adjustment.

### Surge Protection

No external surge suppression is needed on DOI as it is protected against surge pulses as per IEC61000-4-5. A suppressor/diode D1 is connected between VDD and GND to clamp high-surge transients on the VDD supply input.

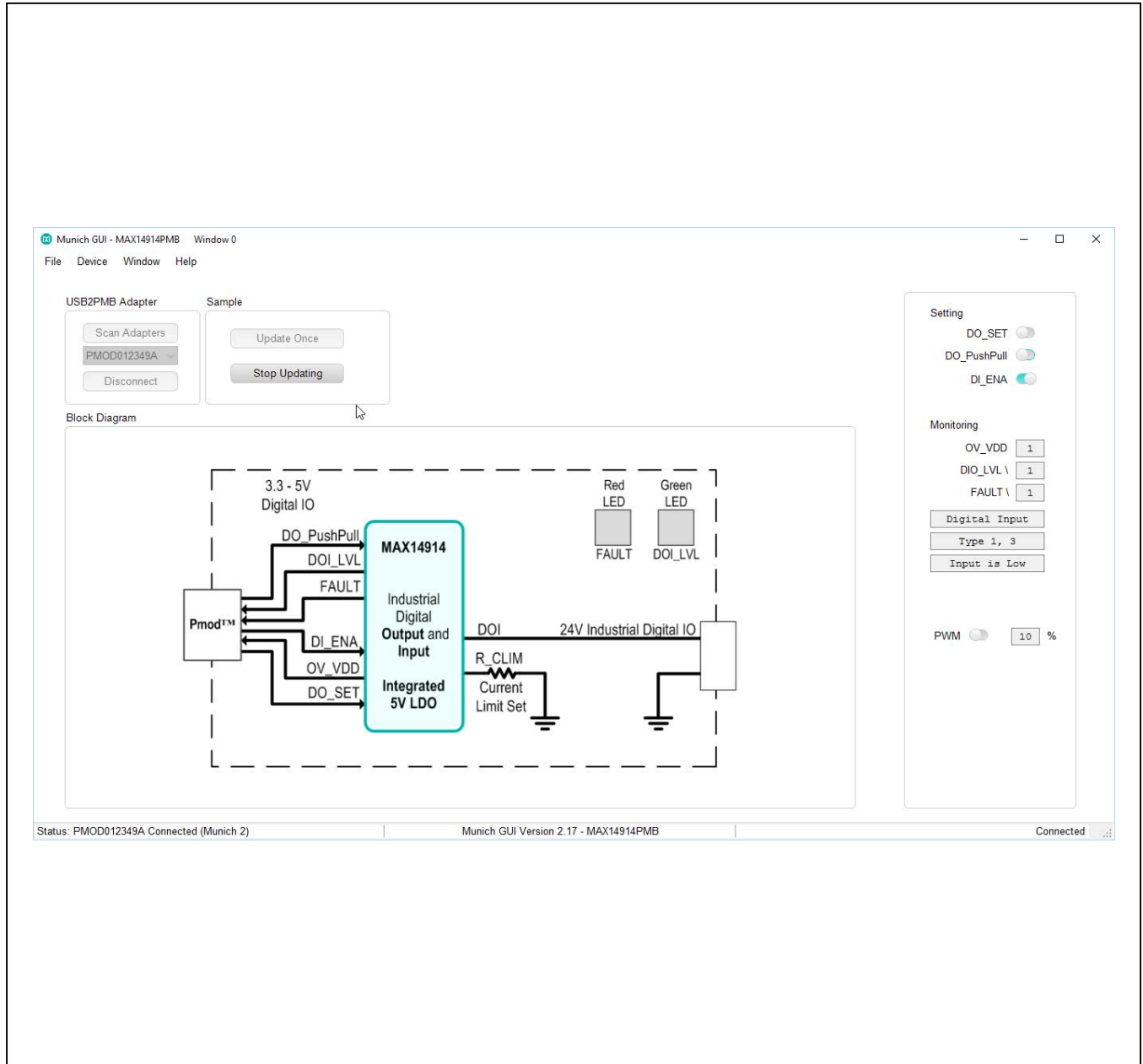


Figure 1. MAX14914PMB Software (Munich GUI Tab)

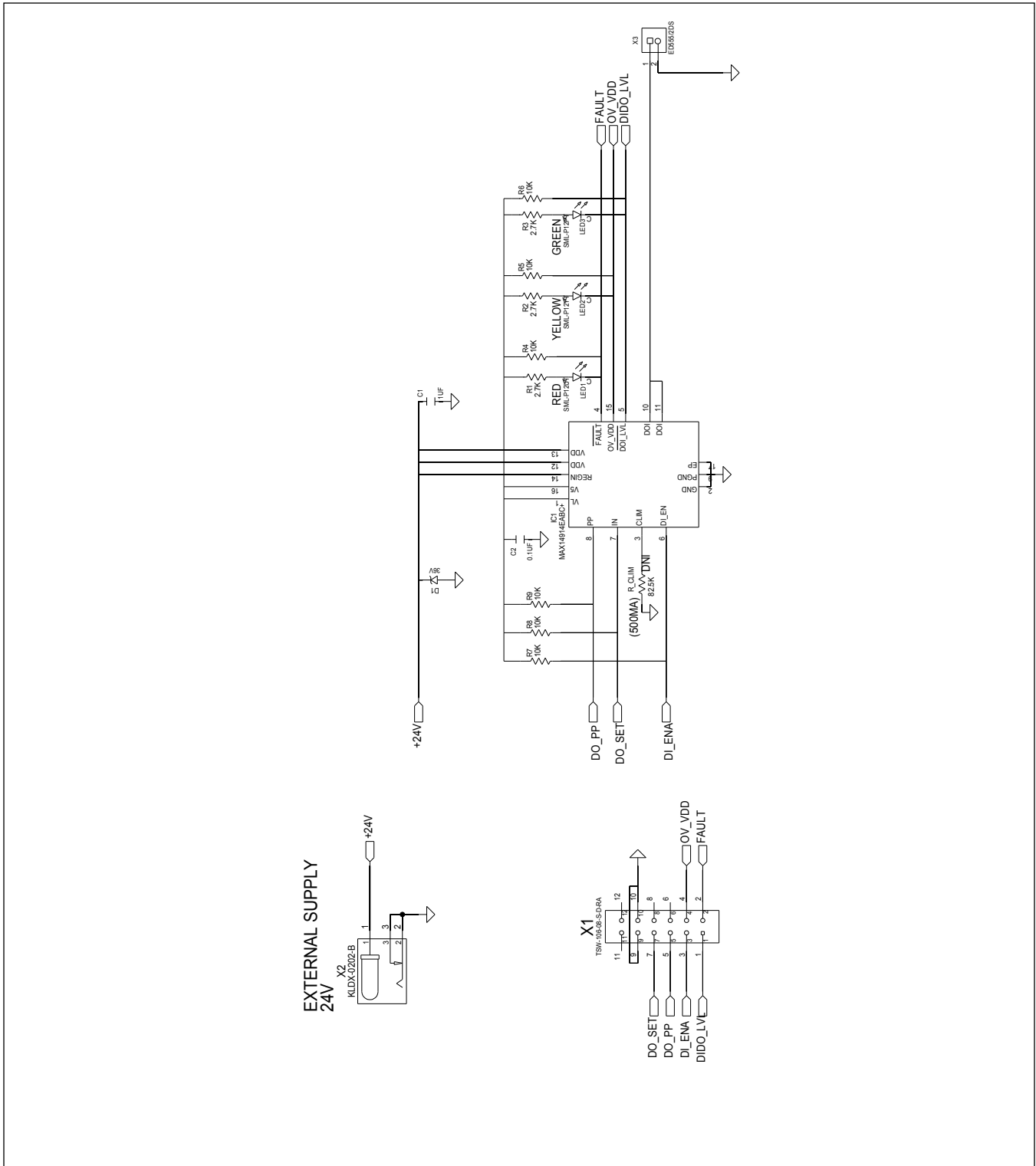


Figure 2. MAX14914PMB Schematic

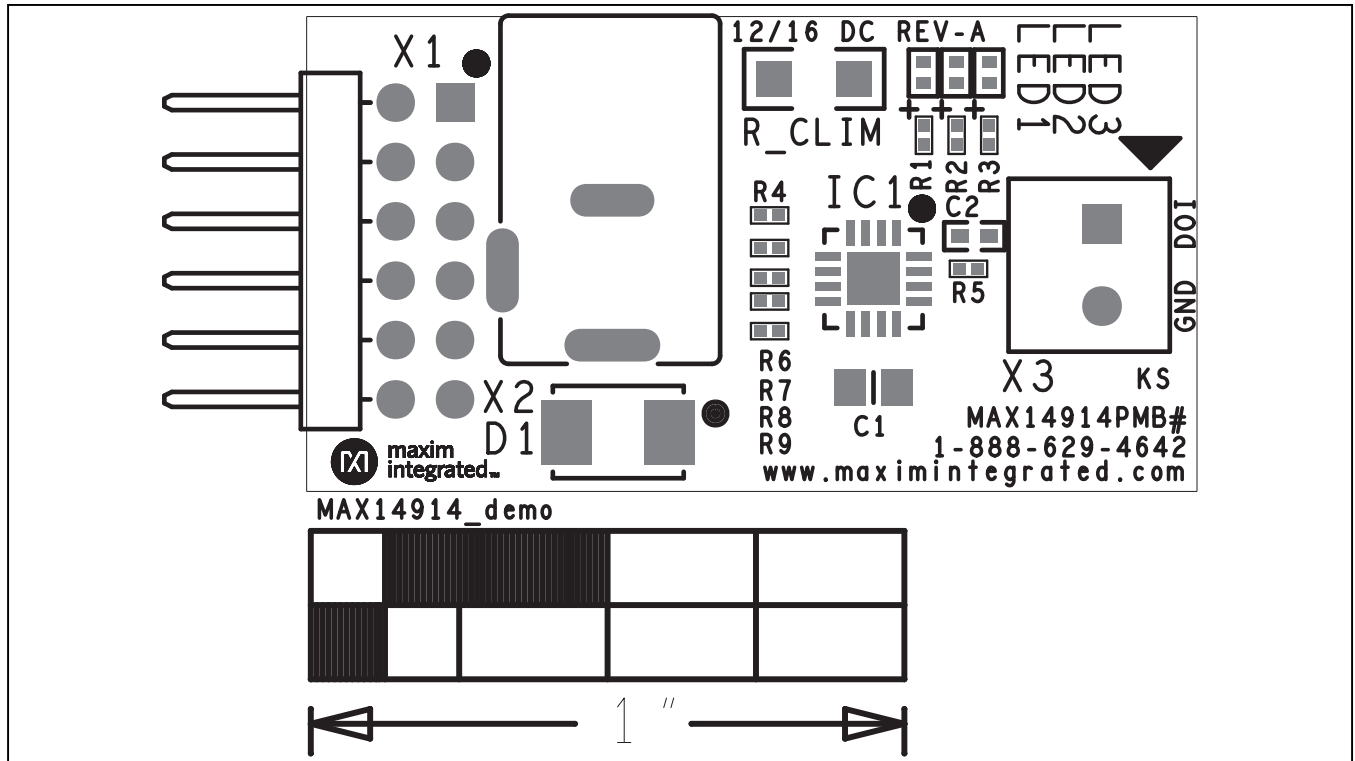


Figure 3. MAX14914PMB PCB Layout—Top Silkscreen

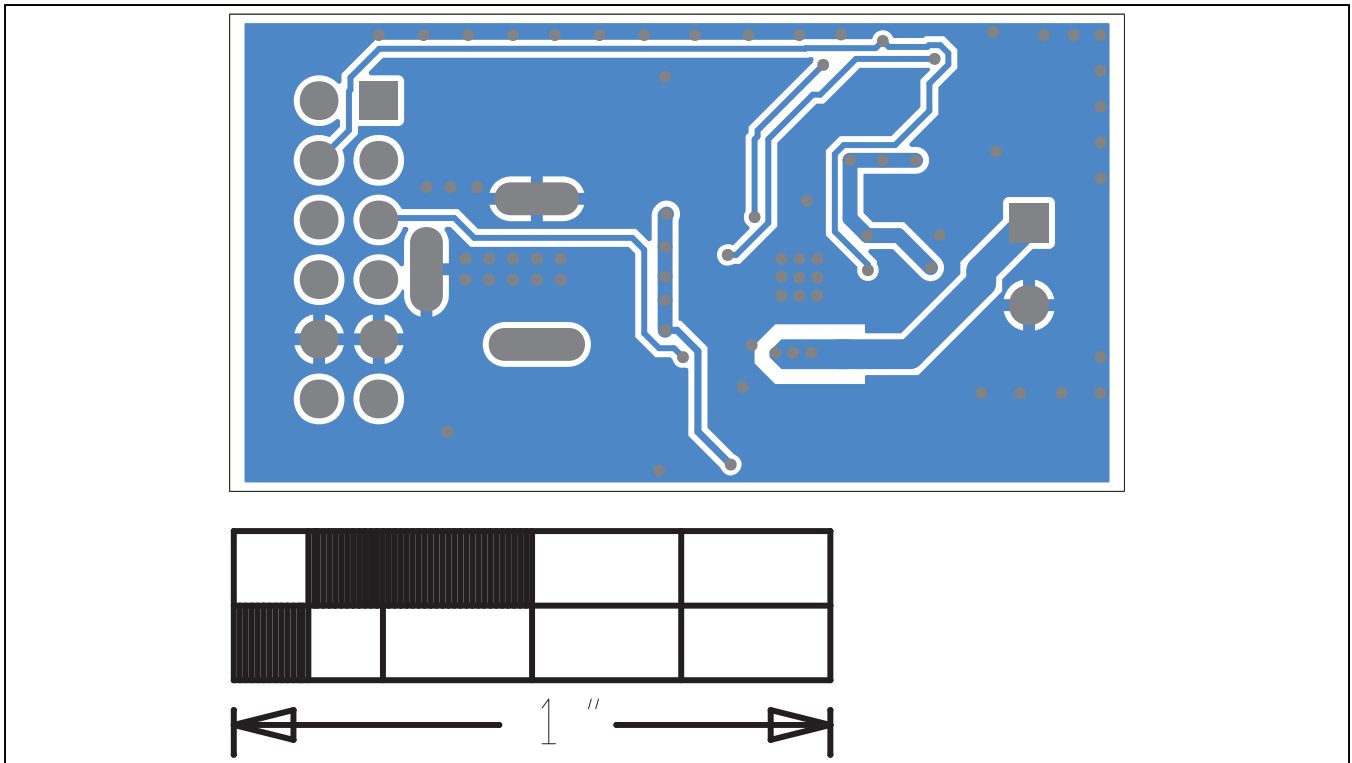


Figure 4. MAX14914PMB PCB Layout—Bottom

## Bill of Materials

DESIGNATION	QTY	DESCRIPTION
C1	1	1 $\mu$ F ceramic capacitor (0805)
C2	1	0.1 $\mu$ F ceramic capacitor (0402)
D1	1	36V diode/TVS
X1	1	12-pin (2x6) right-angle header, 2.54mm pitch
X2	1	Female DC power jack
X3	1	2-pin terminal block

DESIGNATION	QTY	DESCRIPTION
R1–R3	3	2.7k $\Omega$ $\pm$ 1% resistors (0201)
R4–R9	6	10k $\Omega$ $\pm$ 1% resistors (0201)
R_CLIM	1	82.5k $\Omega$ $\pm$ 1% resistor (1206)
LED1	1	Red LED (0402)
LED2	1	Yellow LED (0402)
LED3	1	Green LED (0402)
U1	1	DIO IC (16 TQFN) Maxim MAX14914ATE+
—	1	PCB: MAX41914PMB#

## Ordering Information

PART	TYPE
MAX14914PMB#	Peripheral Module

#Denotes RoHS compliant.