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MAX31912/MAX31913 Evaluation Kits

Evaluate: MAX31912/MAX31913

General Description

The MAX31912 and MAX31913 evaluation kit (EV kit) provides the hardware and software graphical user interface (GUI) necessary to evaluate the MAX31912 or MAX31913 industrial octal digital input translators/serializers. The EV kit includes a MAX31912AUI+ or MAX31913AUI+ installed as well as a digital isolator and USB-to-SPI interface.

The USB-to-SPI dongle is a separate PCB that can be used to interact with the EV kit software. This dongle is optional and is not necessary for the proper operation of the devices if the user supplies the SPI interface.

Note: These EV kits are intended for functional and parametric evaluation of the ICs only and are not intended for EMC testing.

MAX31912/MAX31913 EV Kit Files

FILE	DESCRIPTION
MAX31912_13EVKitSoftwareInstall.EXE	Application program

Note: *The .EXE file is downloaded as a .ZIP file.*

Features

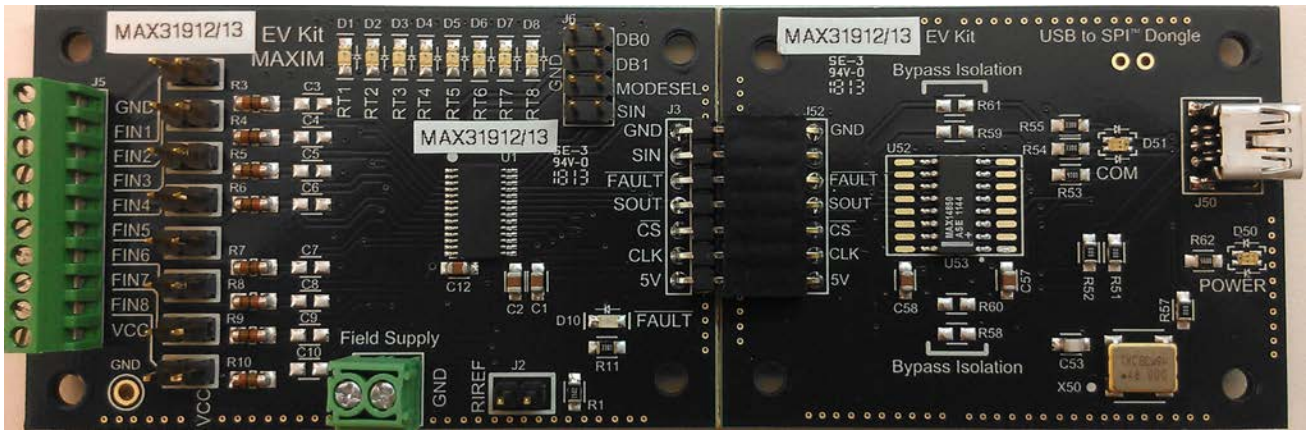
- Easy Evaluation of the MAX31912 or MAX31913
- USB HID Interface
- Digital Isolator
- Windows XP®- and Windows® 7-Compatible Software
- RoHS Compliant
- Proven PCB Layout
- Fully Assembled and Tested

EV Kit Contents

- Assembled Circuit Board including MAX31912AUI+ or MAX31913AUI+
- USB-to-SPI Dongle
- Mini-USB Cable

Ordering Information ***appears at end of data sheet.***

MAX31912/MAX31913 EV Kit Photo



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19-6753; Rev 0; 7/13

maxim integrated™

Quick Start

Required Equipment

- MAX31912/MAX31913 EV kit
- PC with Windows XP or Windows 7 OS
- USB port
- Mini-USB cable (included)
- EV kit hardware (included)
- USB to SPI Dongle (included)
- Screw driver
- Wire
- Power supply

Note: In the following sections, software-related items are identified by bolding. Text in **bold** refers to items directly from the install or 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:

1) Connect the USB-to-SPI dongle (J52) to the EV kit connector J3.
2) Install jumpers on RIREF (J2) and SIN-GND (J6).
3) Set the EV kit hardware on a nonconductive surface that ensures that nothing on the PCB gets shorted to the workspace.
4) Use the wires to connect J1 (VCC and GND) to a power supply and tighten the screws on the wire.
5) Prior to starting the GUI, connect the EV kit hardware to a PC using the supplied mini-USB cable, or equivalent. The POWER LED (D50) should be green and the COM LED (D51) should be red and slowly flash orange.
6) Windows should automatically begin installing the necessary device driver. The USB interface of the EV kit hardware is configured as an HID device and therefore does not require a unique/custom device driver. Once the driver installation is complete, a Windows message appears near the **System Icon** menu indicating that the hardware is ready to use. Do not attempt to run the GUI prior to this message. If you do, then you must close the application and restart it once the driver installation is complete. On some versions of Windows, Administrator privileges may be required to install the USB device.
7) Once the device driver installation is complete, visit **www.maximintegrated.com/evkitsoftware** to download the latest version of the EV kit software, MAX31912_13EVKitSoftwareInstall.ZIP. Save the EV kit software to a temporary folder.
8) Open the .ZIP file and double-click the .EXE file to run the installer. A message box stating **The publisher could not be verified. Are you sure you want to run this software?** may appear. If so, click **Yes**.
9) The installer GUI appears. Click **Next** and then **Install**. Once complete, click **Close**.
10) Go to **Start | All Programs**. Look for the **MAX31912_13EVKitSoftware** folder and click on MAX31912_13EVKitSoftware.EXE inside the folder.
11) When the GUI appears, the text above the status box should display **EV kit Hardware Connected**. The COM LED (D51) on the EV kit board should turn green.
12) Connect field inputs to J5, or install jumpers on FIN1–FIN8, and click **Single Read**.

Detailed Description of Software

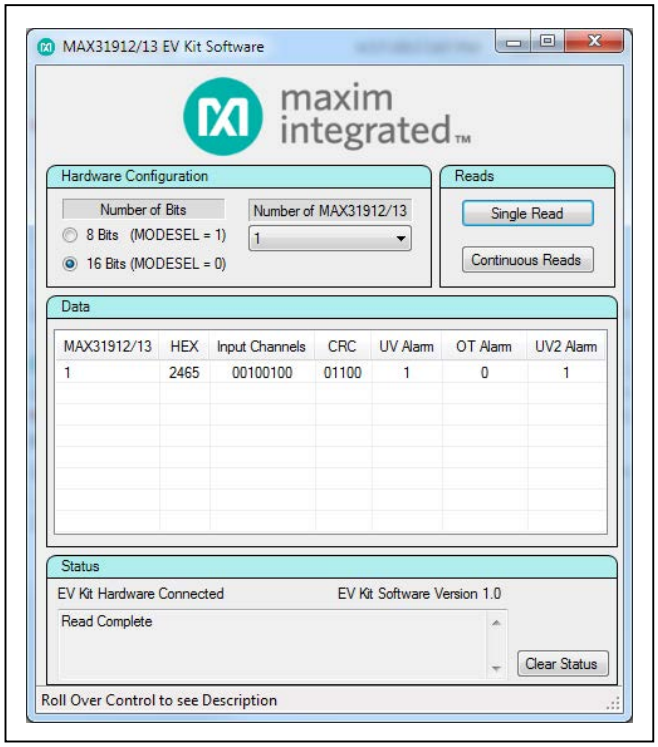

Figure 1. MAX31912/MAX31913 EV Kit GUI

Hardware Configuration

In this section the user must provide hardware configuration information about the EV kit. Select the **8 Bits** radio button in the **Number of Bits** section if MODESEL does not have a jumper on J6. Select the **16 Bits** radio button if MODESEL is connected to GND on J6. If there are more devices daisy-chained to the EV kit, select the number of devices from the **Number of MAX31912/13** combo box.

Reads

To read the input channels of the devices, select **Single Read**. This calculates the number of bits to read based on the **Hardware Configuration** settings and then displays the read data in the table. **Continuous Reads** reads the input channels every 300ms and displays the data in the table. Once the **Continuous Reads** start, the button text changes to **Stop** for the user to stop the reads.

Data

The Data table displays the 8 or 16 bits read from each device connected to the EV Kit. The first row of data is the first 8 or 16 bits read from the device connected to the microcontroller. The second row is the data read from the device connected to the SIN of the first device (see Figure 2). The **MAX31912/13** column displays the device name. The device name can be changed by clicking on the name twice. The **HEX** column displays the data in hexadecimal format for each device. The **Input Channels**, **CRC**, **UV Alarm**, **OT Alarm**, and **UV2 Alarm** columns display the data in binary format.

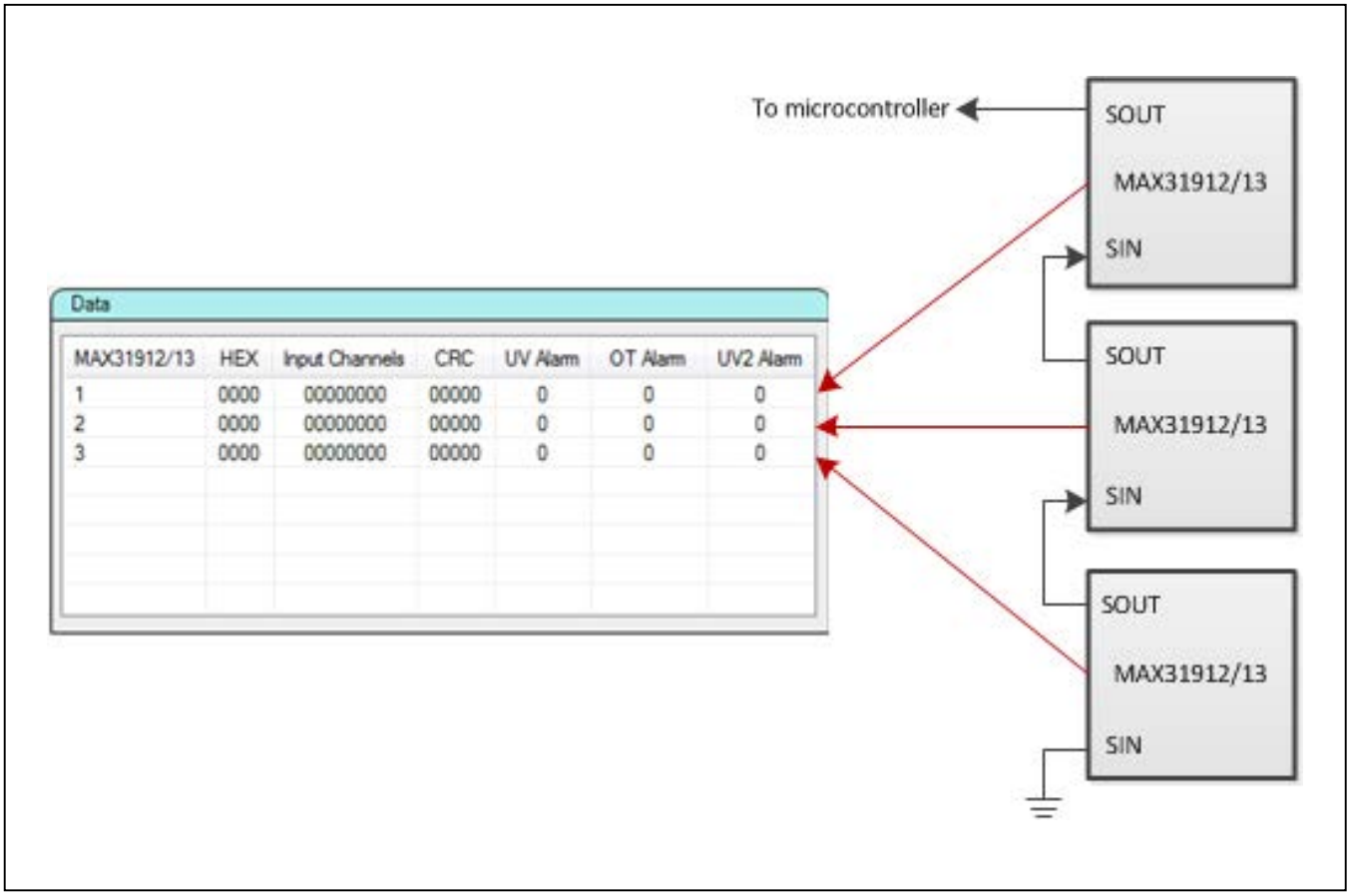

Figure 2. MAX31912/MAX31913 EV Data Table

Table 1. Hardware Configurations

HARDWARE ACTION	COMPONENTS	DESCRIPTION
Connect field inputs	J5	Remove pullup jumpers FIN1–FIN8 and connect field inputs to J5.
Adjust current limit	J2	Remove jumper on J2 and connect external resistor to the RIREF pin on J2. Connect other end of the resistor to GND.
Daisy-chain MAX31912/ MAX31913	SIN (J6)	Remove SIN jumper on J6 and connect external MAX31912/MAX31913 SOUT to SIN on J6.
Remove isolation	R58 – R61	On the USB-to-SPI dongle, populate 0Ω resistors on R58–R61.
Connect user-supplied SPI interface	J3	Remove USB-to-SPI dongle from J3 and connect user SPI interface to J3 pins. **Note:** This also removes the digital isolator. See the *User-Supplied SPI Interface* section for more details.

Detailed Description of Hardware

User-Supplied SPI Interface

The USB-to-SPI dongle is an optional PCB that is only needed to interact with the MAX31912/MAX31913 software. The user has the option to supply an external SPI interface to communicate with the devices. To connect a user-supplied SPI interface, remove the dongle from J3 and connect an external SPI interface to the pins on J3. Removing the dongle also removes the isolator so the user may also want to provide an external digital isolator.

Table 2. Description of Jumpers

JUMPER	DESCRIPTION
J2	RIREF: Connects R1 to RIREF pin
J6*	DB0: Pulls DB0 down to GND
	DB1: Pulls DB1 down to GND
	MODESEL: Pulls MODESEL down to GND.
	SIN: Pulls SIN down to GND
FIN1–FIN8	Field Inputs: Connects field input FINX to VIN

**These inputs have internal pullups.*

Table 3. Description of LEDs

LED	COLOR	DESCRIPTION
D1–D8	Red	Field Input LED Driver: Field input is logic-high.
D10	Red	Fault: MAX31912/MAX31913 has detected a fault. The field supply is too low or the IC temperature is too high.
D50 (POWER)	Red	USB Power Fault: A fault occurred due to overvoltage limit, current limit, or thermal limit
	Green	USB Power: USB power supply is on.
D51 (COM)	Red	Communication: After the software has initialized the hardware the LED flashes red when a command from the PC is received.
	Green	Initialized: Hardware has been initialized by software.

Troubleshooting

All effort have been made to ensure that each kit works on the first try, right out-of-the-box. In the rare occasion that a problem is suspected, see Table 4 to help troubleshoot the issue.

Table 4. Troubleshooting

SYMPTOM	CHECK	SOLUTION
GUI says hardware not found.	Is the LED labeled D50 red?	If yes, then the electronic fuse (U50) is in a fault state. Inspect for electrical shorts on the PCB and make sure that the PCB is not sitting on a conductive surface.
	Does the LED labeled D51 turn green when the GUI is running?	If not, then exit the GUI and try running it again. If D51 still does not turn green, then exit the GUI and try connecting the USB cable to a different USB port on the PC and wait for a Windows message that states the hardware is ready to use. Run the GUI again.
	Are any of the LEDs illuminated?	If not, then the PCB may not be getting power from the USB. Try a different USB cable or a different USB port
CRC returns all 0s or all 1s	J6 (MODESEL)	Place a jumper on J6 (MODESEL) for the devices to be in 16-bit mode.

Component Lists

MAX31912/MAX31913 EV Kit

DESIGNATION	QTY	DESCRIPTION
C1, C12	2	0.1µF, X7R ceramic capacitors (0805) TDK CGJ4J2X7R1H104K
C2	1	4.7µF, X7R ceramic capacitor (0805) TDK CGA4J1X7R1E475K
C3–C10	0	Do not populate, 1nF, 60V ceramic capacitors (0805)
C11	1	10µF, 100V X7S ceramic capacitor (2220) TDK C5750X7S2A106M
D1–D8	8	LEDs (0805)
D9	1	36V, 600W zener diode ON Semiconductor 1SMB36AT3G
D10	1	Red LED (0805) Kingbright APT2012EC
J1	1	2-position screw terminal, 3.5mm pitch Phoenix Contact 1984617
J2, J15–J22	9	2-pin single-row header, 2.54mm pitch Molex 22-28-4020
J3	1	7-pin single-row right-angle header, 2.54mm pitch Molex 22-28-8070

DESIGNATION	QTY	DESCRIPTION
J5	1	10-position screw terminal, 2.5mm pitch TE Connectivity 1-282834-0
J6	1	8-pin (2 x 4) header, 2.54mm pitch TE Connectivity 5-146256-4
J7–J14	0	Do not populate, solder bridge
R1	1	15kΩ ±1%, 1/8W resistor (0805) Bourns CR0805-FX-1502ELF
R2	1	150Ω ±5%, 1/3W resistor MELF (0207) Vishay MMB02070C1500FB200
R3–R10	8	2.2kΩ ±1%, 1/4W resistor MELF (0204) Vishay MMA02040C2201FB300
R11	1	3.3kΩ ±5% resistor (0805) Bourns CR0805-FX-3301ELF
TP1	1	Black test point
U1	1	Industrial interface serializer (28 TSSOP-EP*) Maxim MAX31913AUI+ or MAX31912AUI+
—	1	PCB: MAX31912/13 EV Kit

**EP = Exposed pad.*

Component List (continued)

USB-to-SPI Dongle

DESIGNATION	QTY	DESCRIPTION
C50, C51	2	10µF X7R ceramic capacitors (0805) KEMET C0805C106K8RACTU
C53	1	22pF X7R ceramic capacitor (0805) KEMET C0805C220KBRACTU
C54	1	220nF X7R ceramic capacitor (0805) TDK CGJ4J2X7R1H224K
C55	1	1µF X7R ceramic capacitor (0805) TDK C2012X7R1H105K
C56–C58	3	0.1µF X7R ceramic capacitors (0805) TDK CGJ4J2X7R1H104K
D50, D51	2	Dual LEDs, red/green Kingbright APHB M2012SURKC-GKC
D52	1	Schottky diode ROHM Semi RB060M-30TR
J50	1	5-pin female Mini-USB Molex 54819-0519
J51	0	Do not populate
J52	1	7-pin single-row right-angle socket, 2.54mm pitch PPPC071LGBN-RC
R50, R62	2	560Ω ±1% resistors (0805) Bourns CR0805-FX-5600ELF
R51, R52, R57	3	0Ω ±5% resistors (0805) Bourns CR0805-J/-000ELF
R53	1	4.7kΩ ±1% resistor (0805) Bourns CR0805-FX-4701ELF
R54, R55	2	330Ω ±1% resistors (0805) Bourns CR0805-FX-3300ELF
R56	1	2.2kΩ ±1% resistor (0805) Bourns CR0805-FX-2201ELF
R58–R61	0	Do not populate, resistors (0805)
R63	1	100kΩ ±1% resistor (0805) Bourns CR0805-FX-1003ELF
U50	1	50mA to 600mA current-limit switch (6 SOT23) Maxim MAX4995AAUT+
U51	1	Microcontroller (28 SO) Microchip PIC18LF2550-I/SO
U52	0	Do not populate, 4-channel digital isolator (16 SO, 300 mils) TI ISO7242M/C
U53	1	6-channel digital isolator (16 SO, 150 mils) Maxim MAX14850ASE+
X50	1	48MHz, 5V oscillator (SMD) TXC 7W-48.000MAB-T

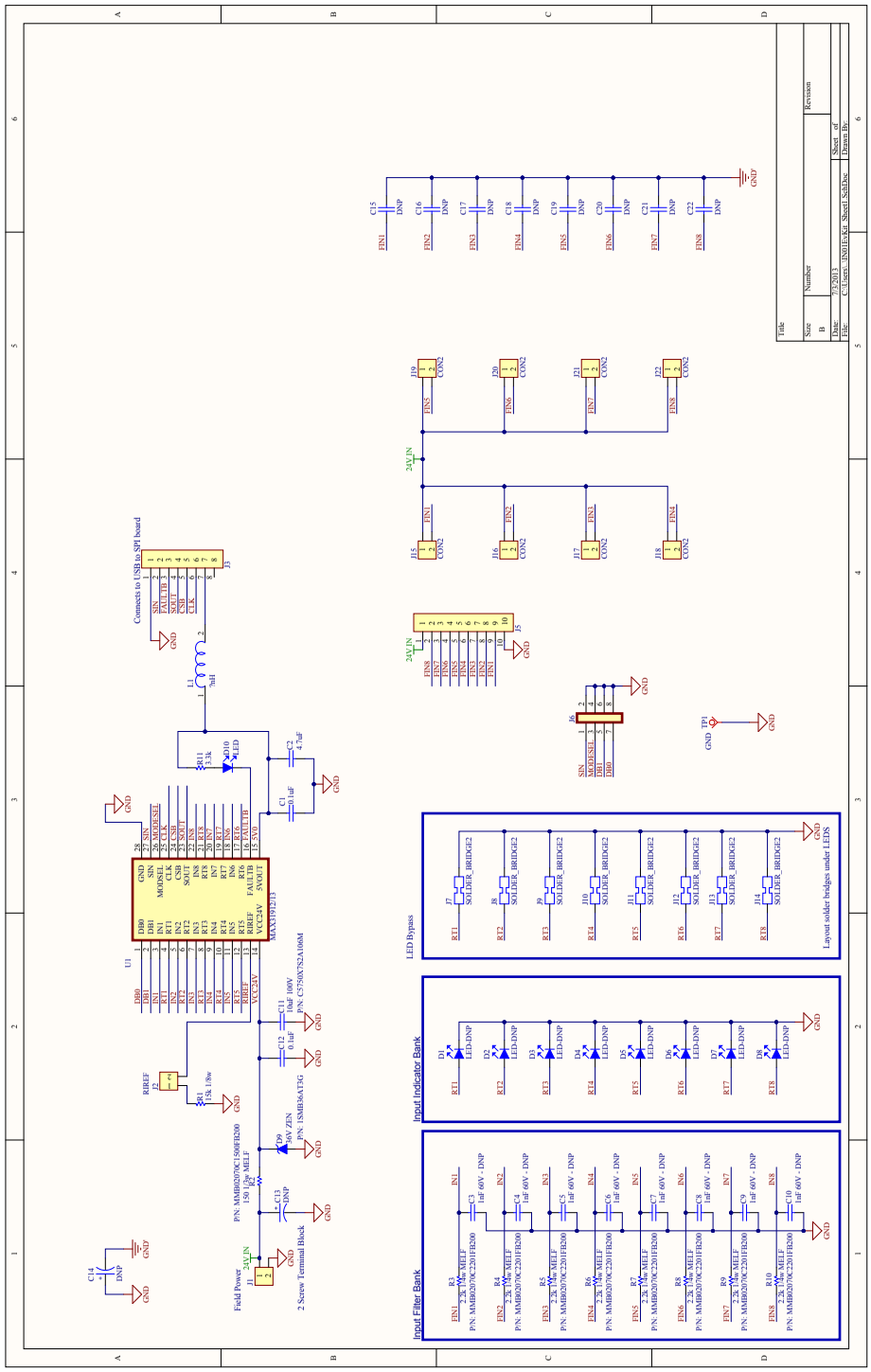

Figure 3a. MAX31912/MAX31913 EV Kit Schematic (Sheet 1 of 2)

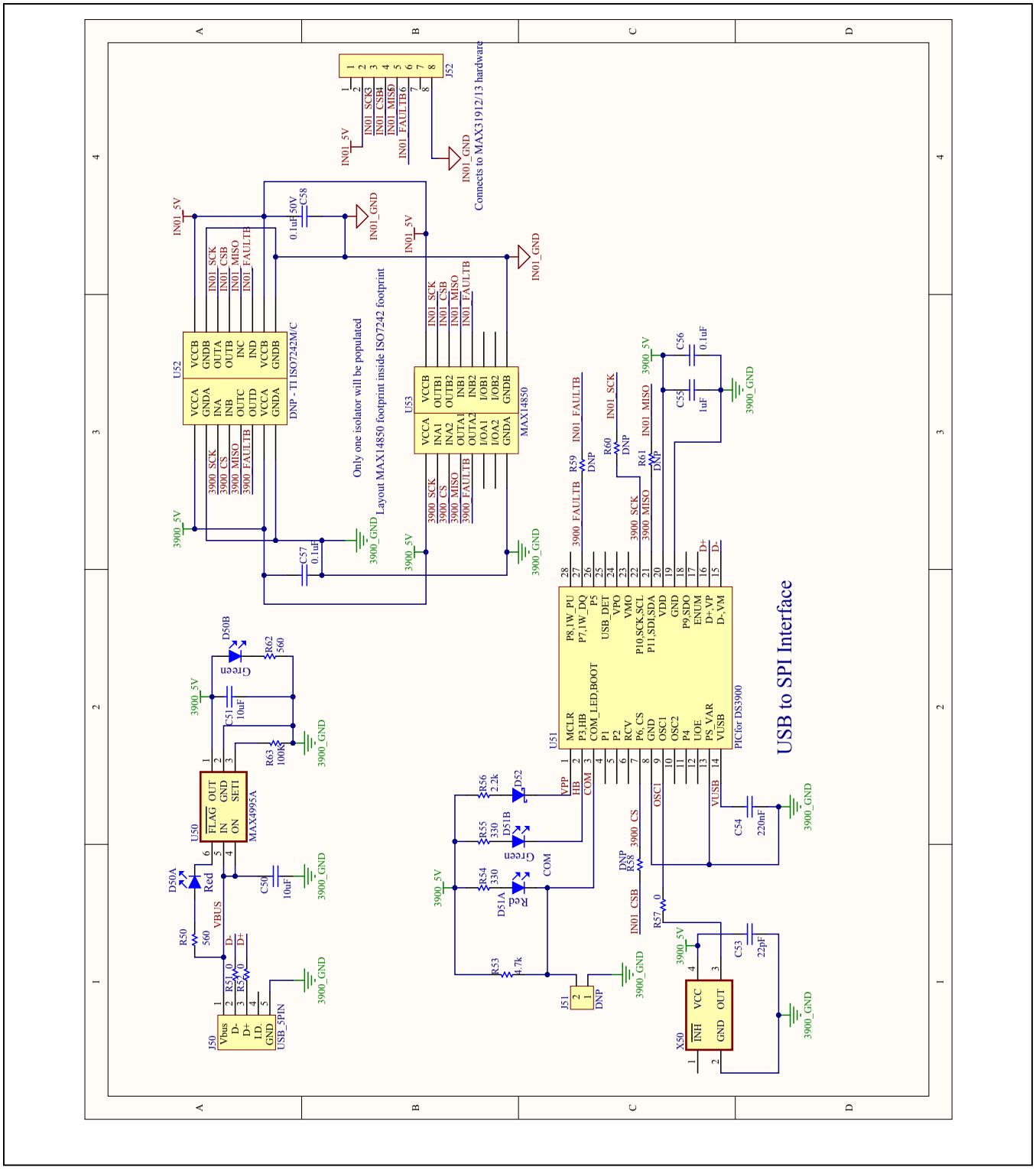

Figure 3b. MAX31912/MAX31913 EV Kit Schematic (Sheet 2 of 2)

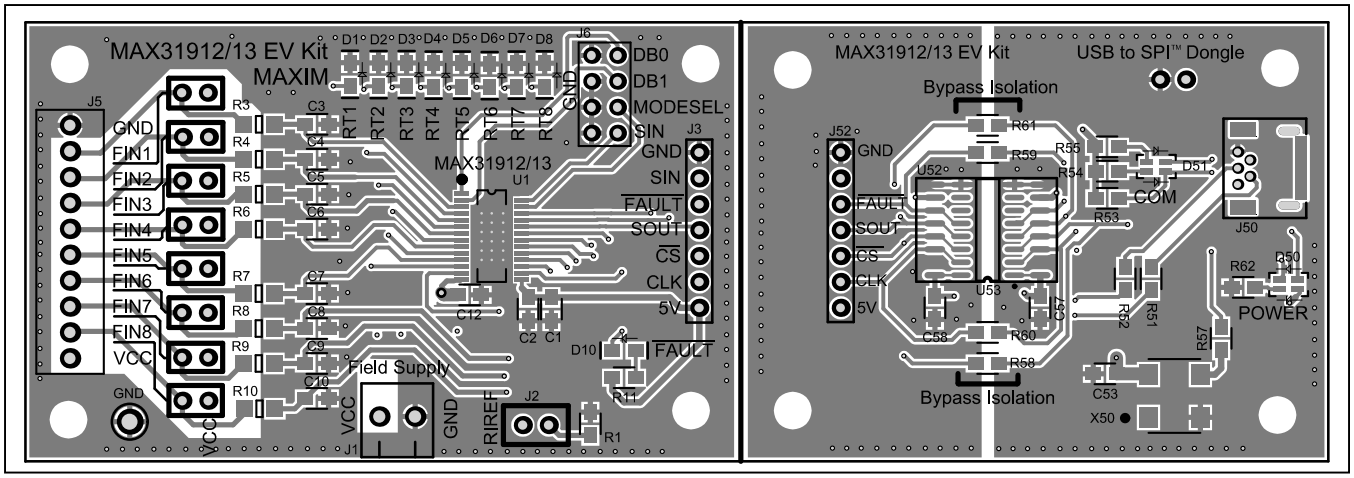

Figure 4. MAX31912/MAX31913 EV Kit PCB Layout—Top

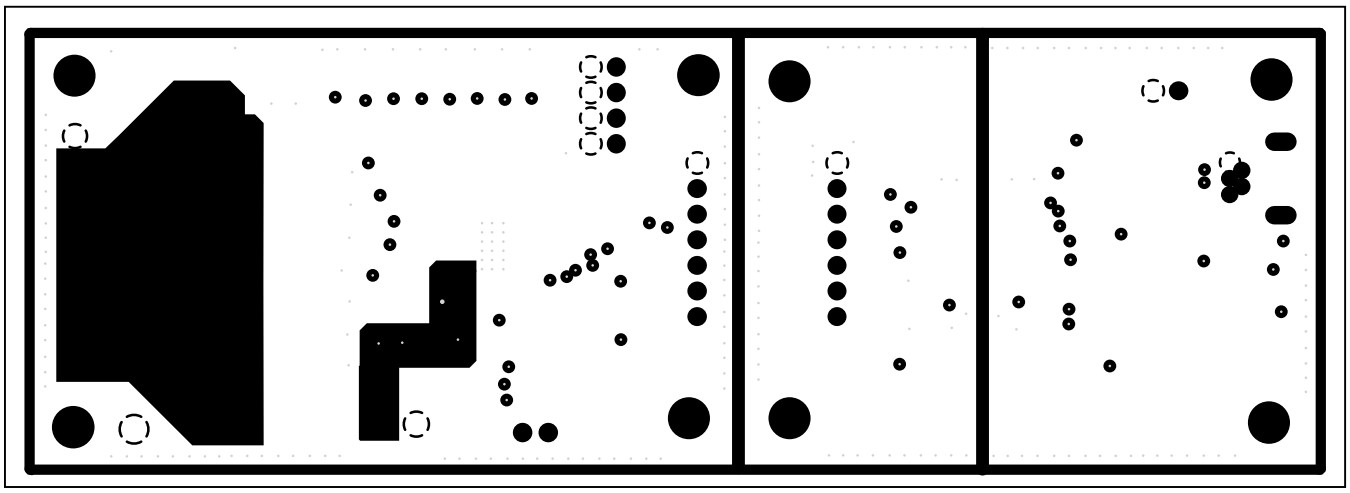

Figure 5. MAX31912/MAX31913 EV Kit PCB Layout—Internal Layer 1

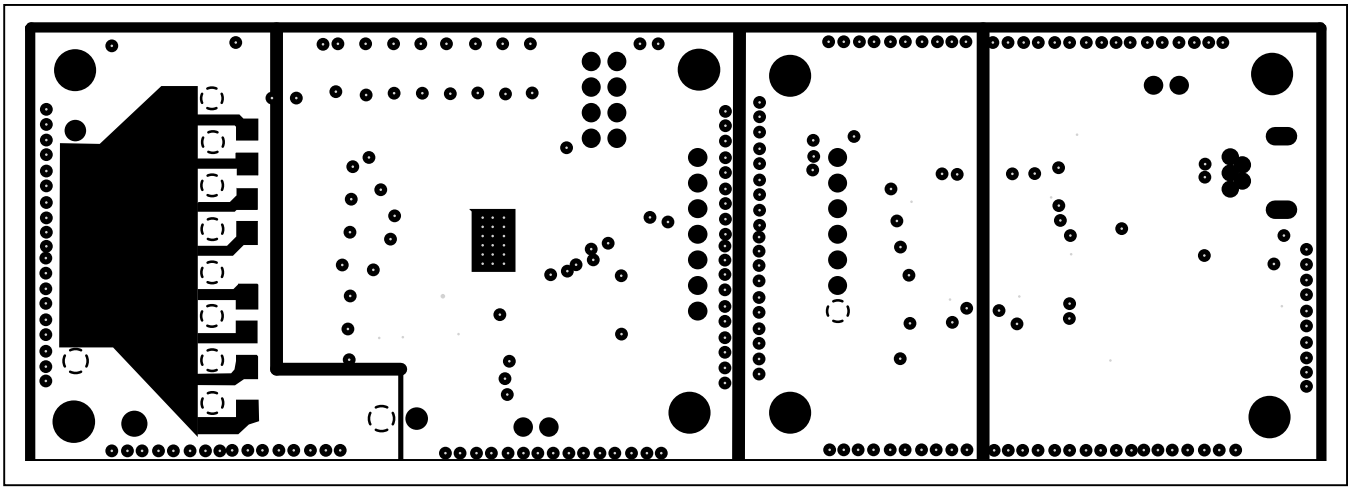

Figure 6. MAX31912/MAX31913 EV Kit PCB Layout—Internal Layer 2

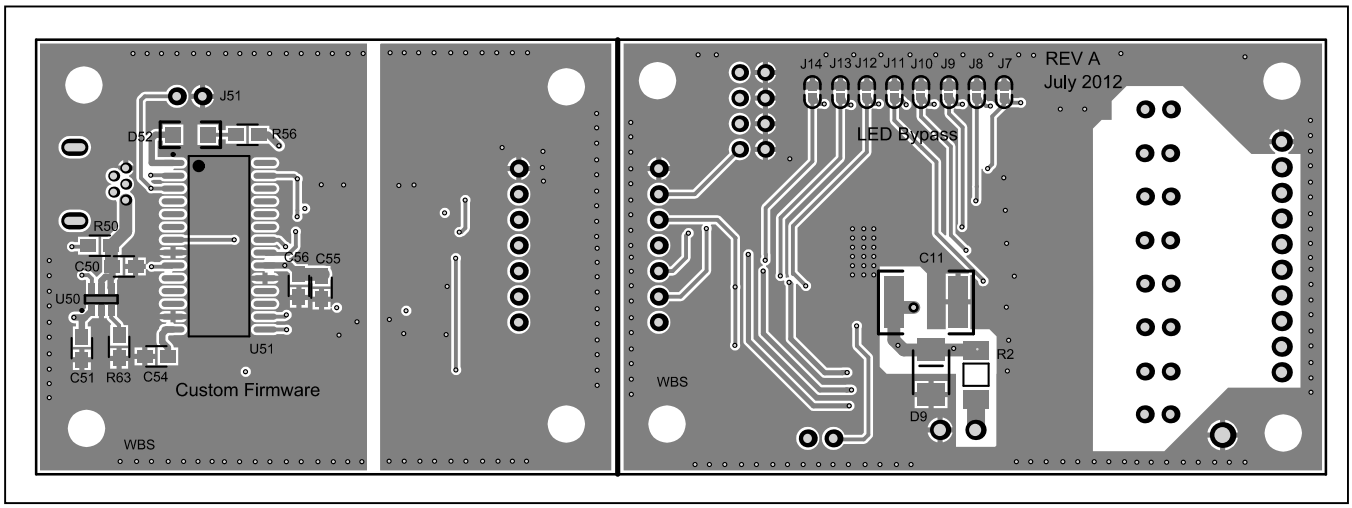

Figure 7. MAX31912/MAX31913 EV Kit PCB Layout—Bottom

Ordering Information

PART	TYPE
MAX31912EVKIT#*	EV Kit
MAX31913EVKIT#	EV Kit

#Denotes an RoHS-compliant device that may include lead(Pb), which is exempt under the RoHS requirements.

**Future product—contact factory for availability.*

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	7/13	Initial release	—

