MAX31329 Shield

Evaluates: MAX31329

General Description

The MAX31329 shield is a fully assembled and tested PCB to evaluate the MAX31329, low-cost, I²C real-time clock (RTC) with an integrated crystal oscillator and a crystal. The shield operates from a single supply, either from a USB or an external power supply. The device incorporates a battery input and maintains accurate timekeeping when the main power to the device is interrupted. The integration of the crystal resonator enhances the long-term accuracy of the device and eliminates the external crystal requirement in the system. This device is accessed through an I²C serial interface provided by a MAX32625 PICO board.

The shield provides the hardware and software user interface (GUI) necessary to evaluate the MAX31329. It connects to the PC through a MAX32625 PICO board and a Micro-USB cable.

Features and Benefits

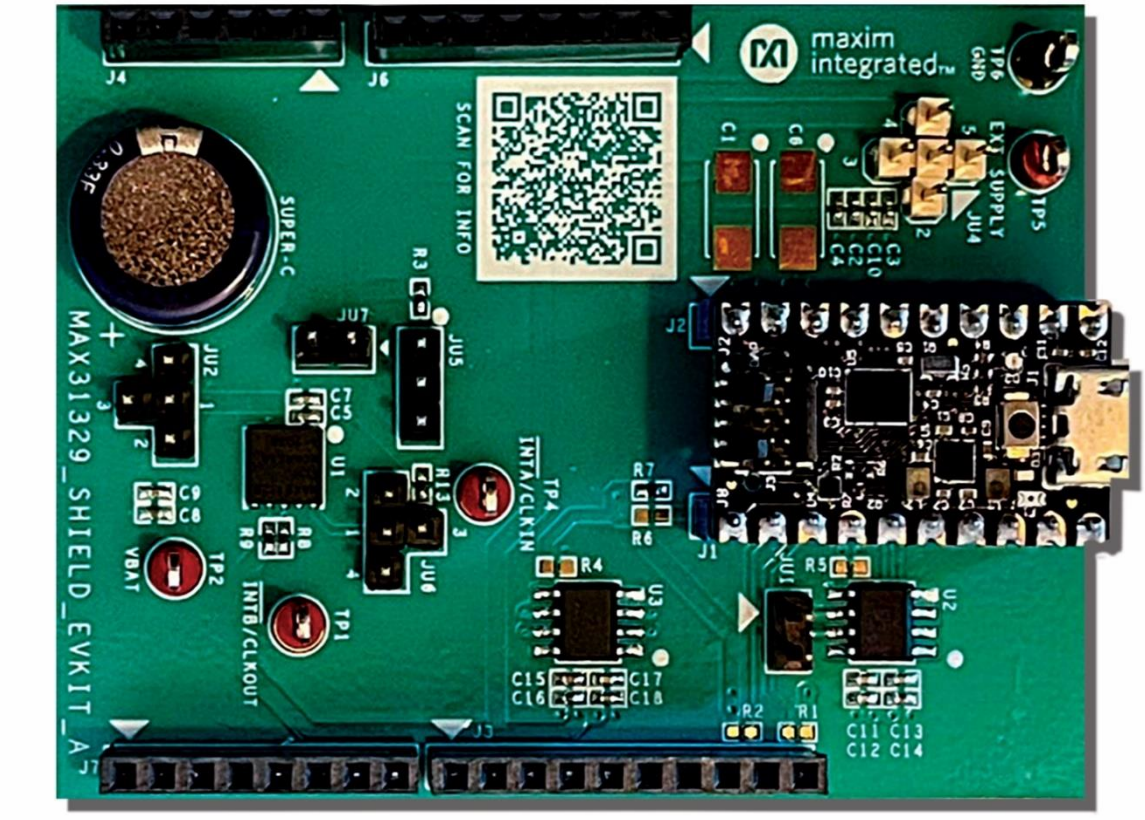
- Easy Evaluation of the MAX31329
- +1.6V to +5.5V Single-Supply Operation
- Proven PCB Layout
- Fully Assembled and Tested

Shield Contents

- Assembled MAX32625 PICO controller board
- Micro-USB cable
- Assembled circuit board including MAX31329ELB+

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

MAX31329 Shield Photo



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Quick Start

Required Equipment

- One pico ammeter for measuring the current
- One oscilloscope and one oscilloscope probe
- One PC or laptop with Microsoft Windows® 7 or later
- One USB Type A male to Micro-USB Type B male cable
- One assembled and programmed MAX32625 PICO board
- One MAX31329 shield

Procedure

The MAX31329 shield is fully assembled and tested. Use the following steps to verify board operation.

1. Place the shield on a nonconductive surface to ensure that nothing on the PCB gets shorted to the workspace.
2. Verify that all the jumpers are in their default position as shown in *Table 1*.
3. Connect the MAX32625 PICO board and a +1.6V to +5.5V supply to the shield at the location shown as in Connection and Setup as shown in *Figure 1*.
4. Connect the USB Type A male to Micro-USB Type B male cable between the MAX32625 PICO board and PC/Laptop.
5. Go to the MAX31329 shield product page to download and install the latest version of MAX31329 RTC SHIELD Software.
6. Open the MAX31329 RTC SHIELD Software, as shown in *Figure 2*.
7. On the **Device** tab, Click **Reconnect** to link the GUI to MAX31329 Shield after powering up the supply.

Table 1. Jumper Settings

JUMPER	SHUNT POSITION	DESCRIPTION
JU1	1-2	INTB/CLKOUT to the Header for Arduino®/Mbed®
	Open*	INTB/CLKOUT Not to Arduino/mbed
JU2	1-2*	Connect Backup Supply to external DC Supply
	1-3	Connect Backup Supply to Ground
	1-4	Connect Backup Supply to Super Capacitor
	Open	Backup Supply Open
JU4	1-2	Connect VCC Supply to +1.8V on board supply
	1-3	Connect VCC Supply to +3.3V on board supply
	1-4	Connect VCC Supply to +5.0V on board supply
	1-5*	Connect VCC Supply to external DC supply
	Open	VCC open
JU5	1-2	DIN Pin to VCC
	2-3*	DIN Pin to Ground
JU6	1-2*	INTA/CLKIN to TP4
	1-3	INTA/CLKIN to the Header for Arduino/Mbed
	1-4	INTA/CLKIN to Ground
JU7	1-2*	Connect VCC to U1
	Open	Disconnect VCC to U1 for IC current measurement
TP1		INTB/CLKOUT
TP2		VBAT from External Supply
TP4		INTA/CLKIN
TP5		External Power Supply for VCC from +1.6V to +5.5V
TP6		Ground

**Default position*

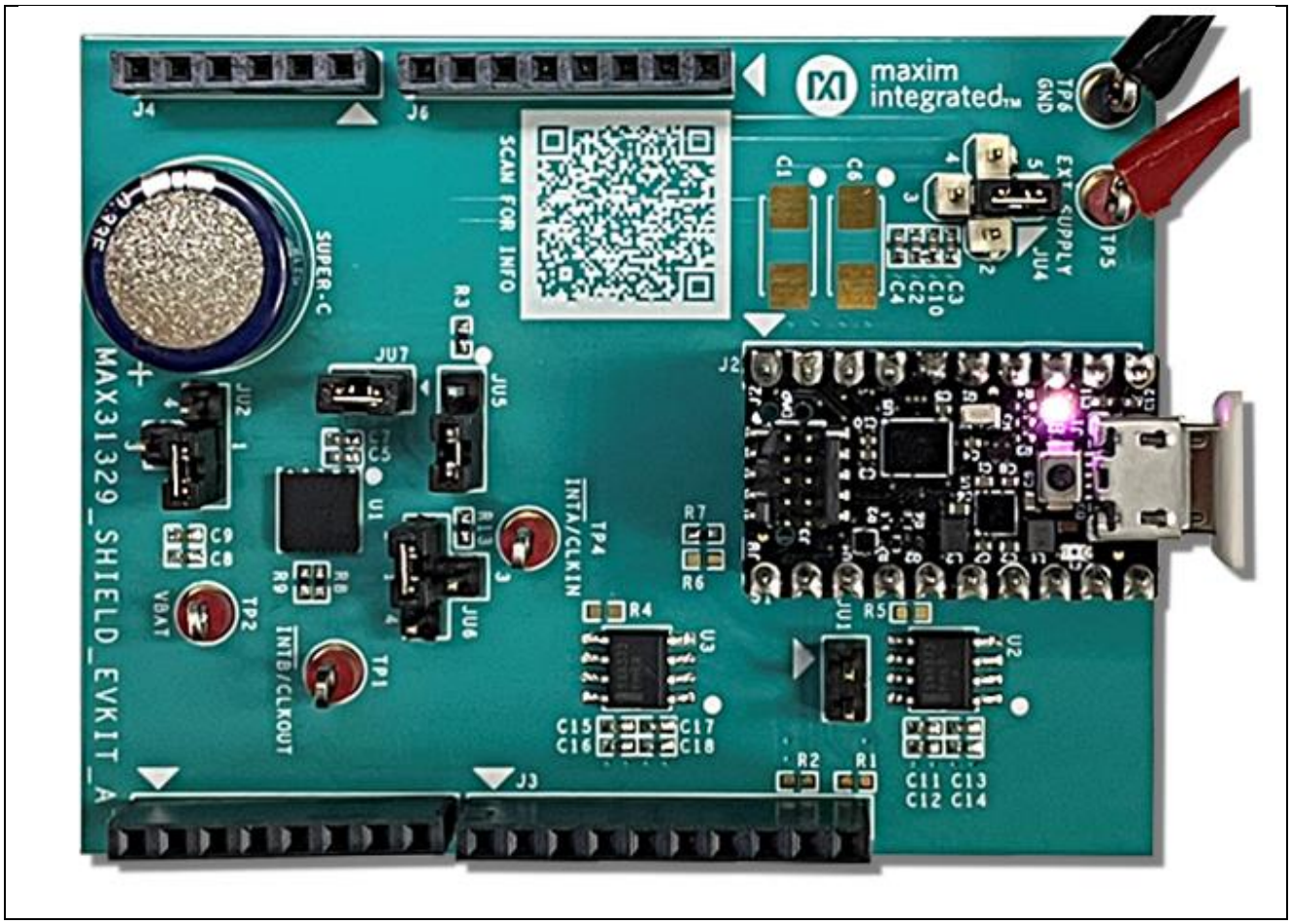


Figure 1. Connection and Setup

Detailed Description of Hardware

The MAX31329 low-current, real-time clock (RTC) is a time-keeping device that provides nano amperes timekeeping current, extending battery life. The MAX31329 incorporates an integrated 32.768kHz crystal, eliminating the need for an external crystal. This device is accessed through an I^2C serial interface. The device features one digital Schmitt trigger input (DIN) and generates an interrupt output on a falling or rising edge of this digital input. An integrated power-on reset function ensures deterministic default register status upon power-up. Other features include two time-of-day alarms, interrupt outputs, a programmable square-wave output, a serial bus timeout mechanism. The clock/calendar provides seconds, minutes, hours, day, date, month, and year information. The date at the end of the month is automatically adjusted for months with fewer than 31 days, including corrections for leap year. The clock operates in either 24-hour or 12-hour format. The MAX31329 also includes a clock input for synchronization. When a reference clock (e.g., 32kHz, 50Hz/60Hz Power Line, GPS 1PPS) is present at the CLKIN pin and the enable external clock input bit (ENCLKIN) is set to 1, the MAX31329 RTC is frequency-locked to the external clock and the clock accuracy is determined by the external source. The device is available in a lead (Pb)-free/RoHS-compliant, 10-pin, 5mm x 5mm LGA package.

Detailed Description of Software

Real Time Monitoring

To monitor the time and date, on the **Configuration and Time** tab, in the **RTC Configuration** group box, enable the **Oscillator Enable toggle** button**,** and in the **Real Time Monitoring** group box, check **Auto Update** checkbox for continuous reading.

Battery current draw in Timekeeping Mode

To measure the backup battery current draw under normal real-time clock conditions, without any interrupt or CLKOUT output and without probe being connected to any IOs.

1) Remove the jumper from JU2.

2) Connect the negative terminal of the pico ammeter to the pin 4 of the JU9 and the positive terminal to pin 1 of JU9.

3) On the **Configuration and Time** tab, in the **RTC Configuration** group box, make sure CLKOUT Frequency is 1Hz selected. In the **Real Time Monitoring** group box**,** uncheck the **Auto Update** check box as shown in *Figure 2*.

4) Under **Power Management**, in the **Supply Select and Fail Enable** group box, select **Force VBAT and PWR Fail Disable** as shown in *Figure 2*.

5) The reading in the pico ammeter is the battery current consumed by the MAX31329 IC only. It should be around 240nA.

32kHz Output Frequency

On the **Configuration and Time** tab of the software, in the **RTC Configuration** group box, click the **CLKOUT** button. The clock output can be monitored using an oscilloscope connected to INTB/CLKOUT test point (TP1). The clock output frequency has a selection for 1Hz/4.096kHz/8.192kHz/32.768kHz. A frequency counter can also be used to measure the clock frequency accurately.

Alarm and Timer Configuration

On the **Alarms and Timer** tab, use the **Alarm 1 Configuration** and **Alarm 2 Configuration** to configure Alarm 1 and Alarm 2.

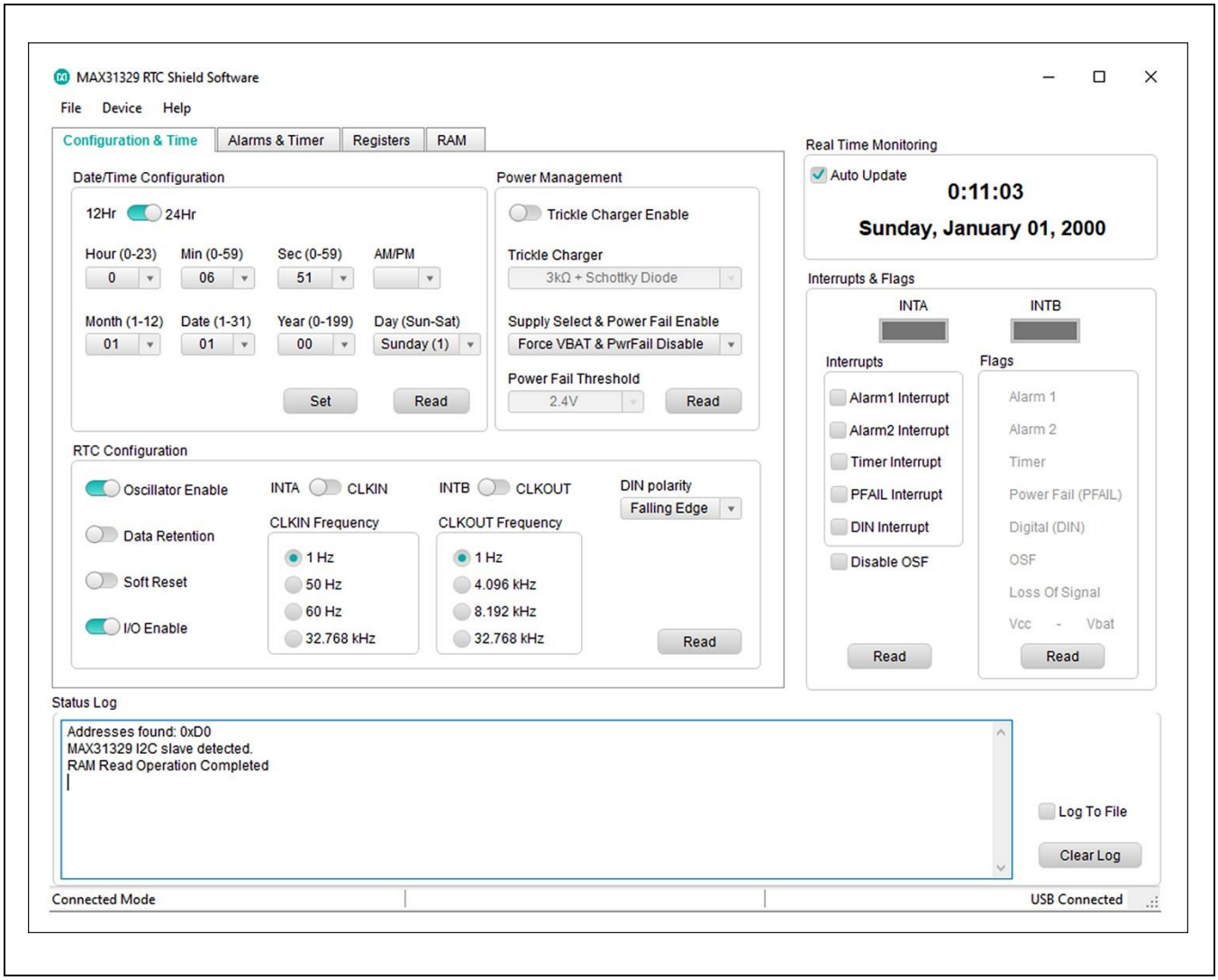


Figure 2. MAX31329 RTC Shield Software—Configuration and Time Page

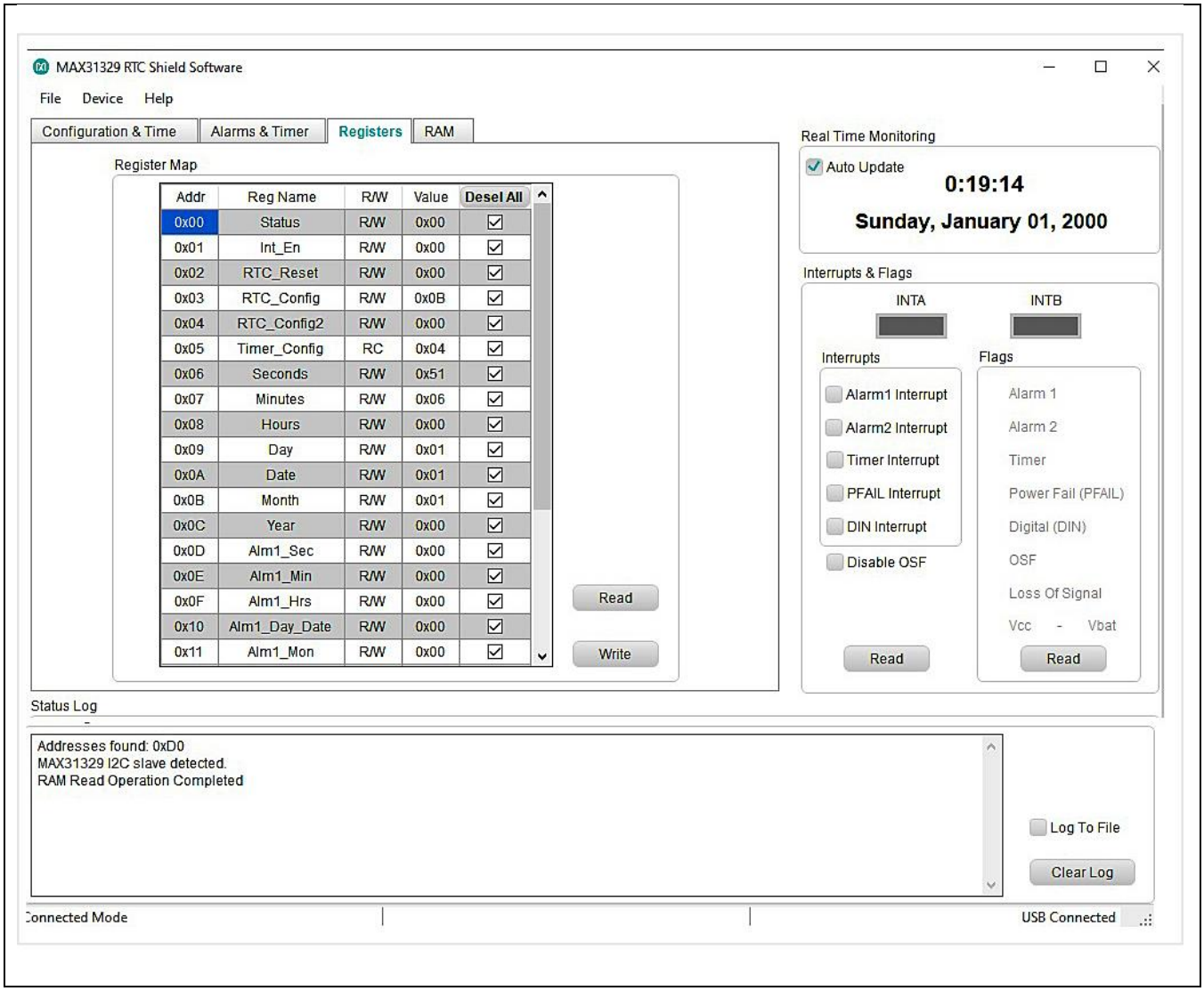


Figure 3. MAX31329 RTC Shield Software—Registers Page

Ordering Information

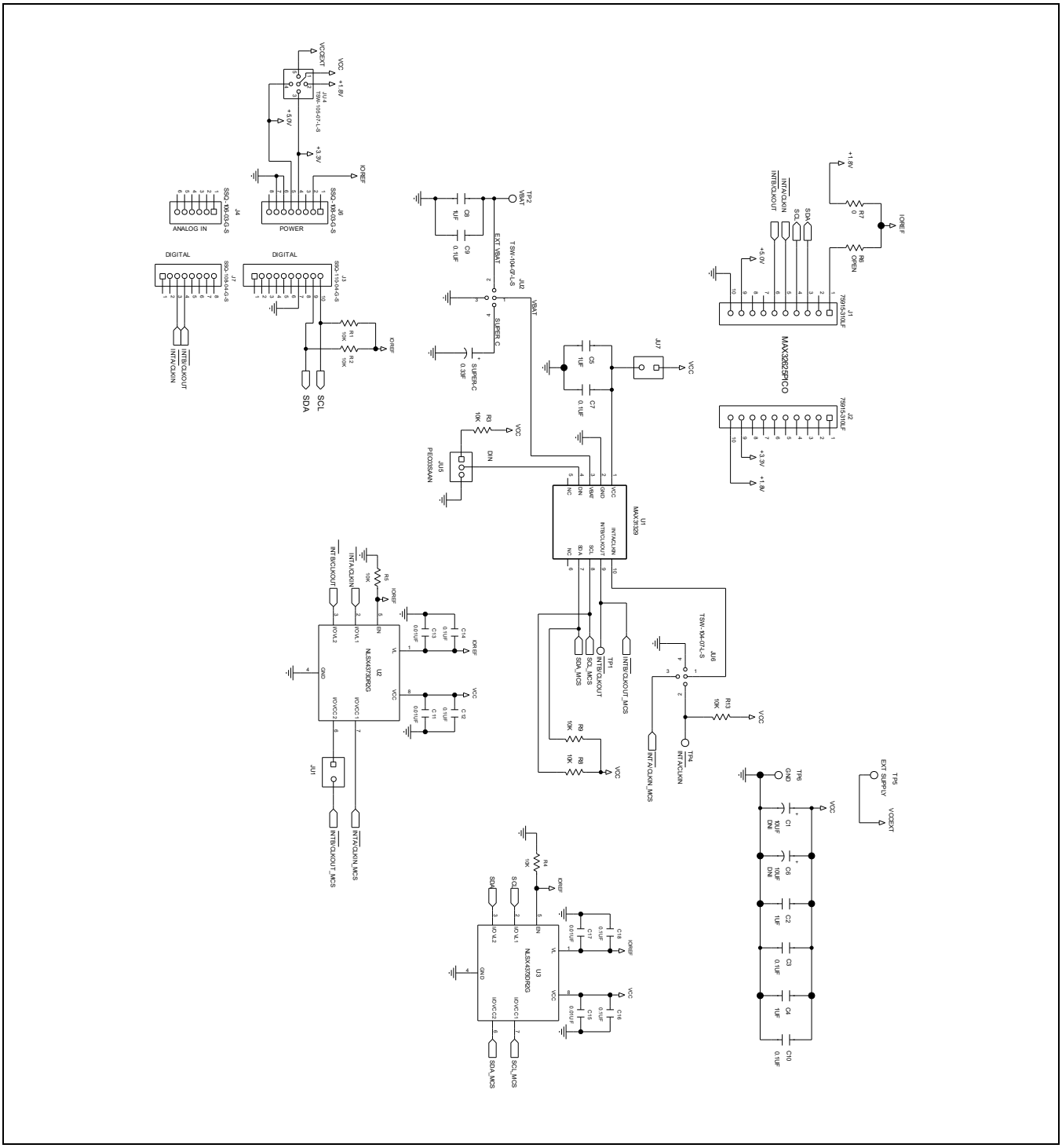
PART	TYPE
MAX31329SHLD#	Shield

#Denotes RoHS-compliant.

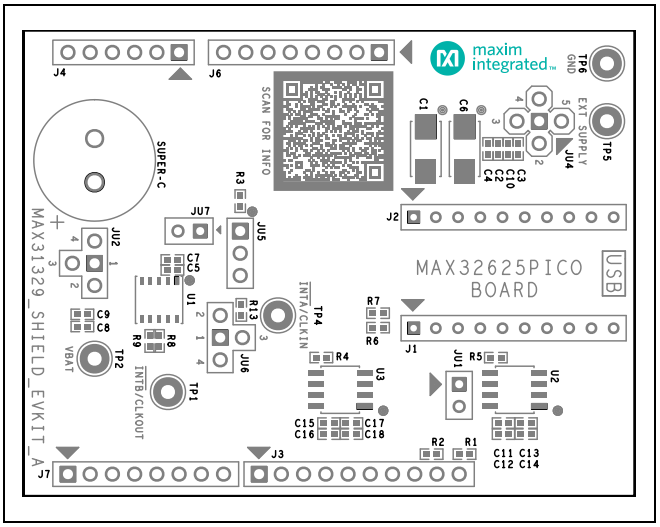
MAX31329 Shield Bill of Materials

ITEM	QTY	REF DES	QTY	DESCRIPTION
1	4	C2, C4, C5, C8	4	CAPACITOR; SMT (0402); CERAMIC CHIP; 1UF; 6.3V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R
2	4	C3, C7, C9, C10	4	CAP; SMT (0402); 0.1UF; 10%; 6.3V; X7R; CERAMIC CHIP
3	4	C11, C13, C15, C17	4	CAPACITOR; SMT (0402); CERAMIC CHIP; 0.01UF; 25V; TOL=5%; TG=-55 DEGC TO +125 DEGC; TC=X7R
4	4	C12, C14, C16, C18	4	CAPACITOR; SMT (0402); CERAMIC CHIP; 0.1UF; 16V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R
5	2	J1, J2	2	CONNECTOR; FEMALE; THROUGH HOLE; STRAIGHT; 10PINS
6	1	J3	1	CONNECTOR; FEMALE; THROUGH HOLE; .025IN SQ POST SOCKET; STRAIGHT; 10PINS
7	1	J4	1	CONNECTOR; MALE; THROUGH HOLE; THROUGH-HOLE .025 SQ POST SOCKET ; STRAIGHT; 6PINS
8	1	J6	1	CONNECTOR; FEMALE; THROUGH HOLE; .025IN SQ POST SOCKET; STRAIGHT; 8PINS
9	1	J7	1	CONNECTOR; FEMALE; THROUGH HOLE; .025IN SQ POST SOCKET; STRAIGHT; 8PINS
10	2	JU1, JU7	2	EVKIT PART-CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 2PINS
11	2	JU2, JU6	2	EVKIT PART-CONNECTOR; MALE; THROUGH HOLE; TSW SERIES; SINGLE ROW; STRAIGHT; 4PINS
12	1	JU4	1	EVKIT PART-CONNECTOR; THROUGH HOLE; TSW SERIES; SINGLE ROW; STRAIGHT; 5PINS
13	1	JU5	1	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 3PINS
14	4	R3, R8, R9, R13	4	RESISTOR; 0402; 10K; 1%; 100PPM; 0.0625W; THICK FILM
15	1	R7	1	RESISTOR; 0402; 0 OHM; 5%; JUMPER; 0.063W; THICK FILM
16	1	SUPER-C	1	CAP; THROUGH HOLE-RADIAL LEAD; 0.33F; +80%/-20%; 5.5V; ALUMINUM-ELECTROLYTIC
17	4	TP1, TP2, TP4, TP5	4	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; RED
18	1	TP6	1	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; BLACK
19	1	U1	1	EVKIT PART - IC; MAX31329; LOW-CURRENT; REAL-TIME CLOCK WITH I^2C
20	2	U2, U3	2	IC; TRANS; 2-BIT 20 MB/S DUAL-SUPPLY LEVEL TRANSLATOR; NSOIC8

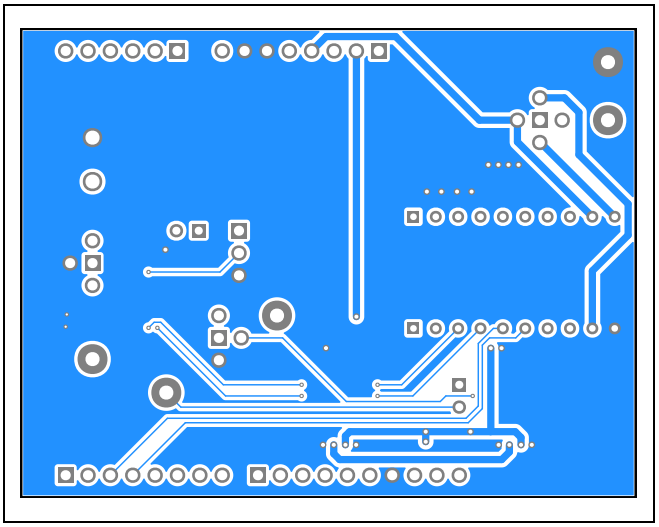
MAX31329 Shield Schematic Diagram



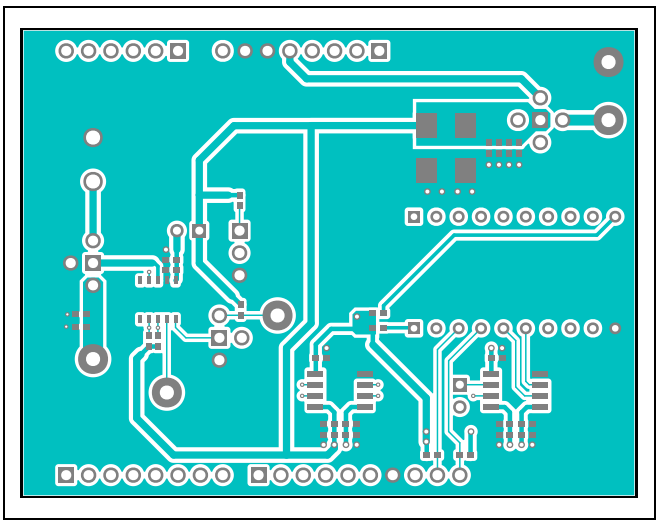
MAX31329 Shield PCB Layout Diagrams



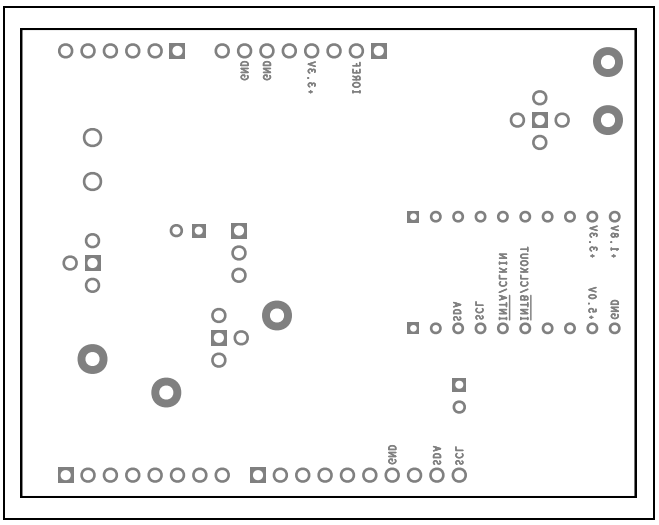
MAX31329 Shield PCB Layout Diagram—Top Silkscreen



MAX31329 Shield PCB Layout Diagram—Bottom View



MAX31329 Shield PCB Layout Diagram—Top View



MAX31329 Shield PCB Layout Diagram—Bottom Silkscreen

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	5/21	Release for Market Intro	—