# Evaluates: MAX31343

#### **General Description**

The MAX31343 shield is a fully assembled and tested PCB to evaluate the MAX31343, low-cost, extremely accurate, real-time clock (RTC) with an I<sup>2</sup>C interface and power management. The shield operates from a single supply, either from a USB or external power supply, and the integrated microelectromechanical systems (MEMS) resonator enhances the long-term accuracy and eliminates the external crystal requirement in the system. This device is accessed through an I<sup>2</sup>C serial interface provided by a MAX32625 PICO board.

The MAX31343 shield provides the hardware and software user interface (GUI) necessary to evaluate the MAX31343. The shield includes a MAX31343EKA+T. It connects to the PC through a MAX32625 PICO board and a Micro USB cable.

#### **Features**

- Easy Evaluation of the MAX31343
- +1.6V to +5.5V Single-Supply Operation
- Proven PCB Layout
- Fully Assembled and Tested
- Arduino<sup>®</sup>/Mbed<sup>®</sup> Platform Compatible

### **Shield Contents**

- Assembled MAX32625 PICO controller board
- Micro USB cable
- Assembled circuit board including MAX31343EKA+T

#### **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 A male to Micro-B male cable
- One assembled and programmed MAX32625 PICO board
- One MAX31343 shield

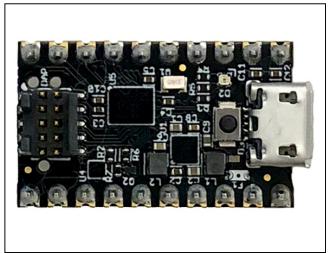
Ordering Information appears at end of data sheet.

### Shield Photo



Arduino is a registered trademark of Arduino, LLC. Mbed is a registered trademark of Arm Limited. Windows is a registered trademark of Microsoft Corporation.

### **PICO Board Photo**





# Evaluates: MAX31343

#### Procedure

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

- 1) Place the MAX31343 shield on a nonconductive surface to ensure that nothing on the PCB gets shorted to the workspace.
- 2) Verify that all jumpers are in their default position as shown in Table 1.
- 3) Connect the MAX32625 PICO board to the shield at the location shown as MAX32625 PICO (Figure 1).
- 4) Connect the USB Type A male to Micro-B male cable between the MAX32625 PICO board and PC/laptop.
- 5) Go to the MAX31343 shield product page to download and install the latest version of the MAX31343 RTC SHIELD Software.
- 6) Open the MAX31343 RTC SHIELD Software, shown in Figure 2.

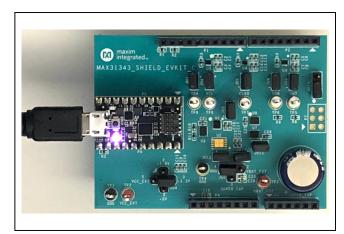


Figure 1. Connection and Setup

| JUMPER | SHUNT POSITION | DESCRIPTION   |  |  |  |  |  |
|--------|----------------|---|--|--|--|--|--|
| JU1    | 1-2*           | Connects clock output to pin 6 of P2 Arduino/Mbed connector       |  |  |  |  |  |
| JU1    | Open           | Disconnects clock output from Arduino/Mbed connector              |  |  |  |  |  |
|        | 1-2            | Connects backup supply to external DC supply                      |  |  |  |  |  |
| JU2    | 1-3            | Connects backup supply to supercapacitor                          |  |  |  |  |  |
| JUZ    | 1-4*           | Connects backup supply to ground                                  |  |  |  |  |  |
|        | Open           | Disconnects backup supply   |  |  |  |  |  |
| JU3    | 1-2*           | Connects interrupt signal to pin 3 of P2 Arduino/Mbed connector   |  |  |  |  |  |
| 103    | Open           | Disconnects interrupt signal from Arduino/Mbed connector          |  |  |  |  |  |
|        | 1-2            | Connects VCC supply to +1.8V on-board supply                      |  |  |  |  |  |
|        | 1-3*           | Connects VCC supply to +3.3V on-board supply                      |  |  |  |  |  |
| JU4    | 1-4            | Connects VCC supply to +5.0V on-board supply                      |  |  |  |  |  |
|        | 1-5            | Connects VCC supply to external DC supply                         |  |  |  |  |  |
|        | Open           | Disconnects VCC   |  |  |  |  |  |
| JU5    | 1-2*           | Connects VCC to MAX31343 IC WLP package (U1)                      |  |  |  |  |  |
| 105    | Open           | Disconnects VCC from MAX31343 IC WLP package (U1)                 |  |  |  |  |  |
| 11.10  | 1-2*           | Connects square-wave output to pin 4 of P2 Arduino/Mbed connector |  |  |  |  |  |
| JU8    | Open           | Disconnects square-wave output from Arduino/Mbed connector        |  |  |  |  |  |
| JU10   | 1-2*           | Sets MAX31343 WLP package (U1) IC under test                      |  |  |  |  |  |
| JU10   | 2-3            | Sets MAX31343 TDFN package (U2) IC under test                     |  |  |  |  |  |
| JU11   | 1-2*           | Connects VCC to MAX31343 IC TDFN package (U2)                     |  |  |  |  |  |
| JUTI   | Open           | Disconnects VCC from MX31343 IC TDFN package (U2)                 |  |  |  |  |  |
| 11112  | 1-2*           | Connects VBAT to MAX31343 IC WLP package (U1)                     |  |  |  |  |  |
| JU12   | Open           | Disconnects VBAT from MAX31343 IC WLP package (U1)                |  |  |  |  |  |
| JU13   | 1-2*           | Connects VBAT to MAX31343 IC TDFN package (U2)                    |  |  |  |  |  |
| 3013   | Open           | Disconnects VBAT from MAX31343 IC TDFN package (U2)               |  |  |  |  |  |

# Table 1. Jumper Settings

\*Default position

| onfiguration & Time Alarms & Timer Registers            | RAM                       |                           | Real Time Monitoring |                               |
|---|---------------------------|---------------------------|----------------------|-------------------------------|
| ate/Time Configuration                                  | RTC Configuration         |                           | Continuous Read      | Temp                          |
| Day (Sun-Sat)<br>Sunday (1)                             | Oscillator Enable         | SQW                       | January              | 00:00:10<br>01, 2000, Sunday  |
| Hour (0-23) Min (0-59) Sec (0-59)<br>00 • : 00 • : 10 • | Data Retention            | SQW Frequeny              | Interrupts & Flags   |                               |
| Month (1-12) Date (1-31) Year (0-199)                   | Soft Reset                | CLKO Frequeny<br>32 KHz 💌 | Interrupts           | Flags                         |
|   | CLKOUT                    |                           | Alarm1 Interrupt     | Alarm 1                       |
| Set Read  |                           | Read                      | Alarm2 Interrupt     | Alarm 2                       |
| ower Mode Configuration                                 | Temperature Configuration |                           | Timer Interrupt      | Timer                         |
| Auto     Supply select                                  | Te                        | emp measurement Interval  | Power Fail           | Power fail<br>Temp sense flag |
| Manual Use VCC •  | Auto Mode     One Shot    | 26.25°C                   | Disable OSF          | OSF                           |
| Trickle Charger Read                                    |                           | Read                      | Read                 | Read                          |
| us Log  |                           |                           |                      |                               |
| ldresses found: 0xD0<br>AX31343 I2C slave detected.     |                           |                           |                      | Log To File<br>Clear Log      |

Figure 2. MAX31343 RTC SHIELD Software—Configuration & Time Tab

### **Detailed Description**

The MAX31343 shield is a low-cost, extremely accurate RTC. It is driven by an internal temperature-compensated microelectromechanical systems (MEMS) resonator. The oscillator provides a stable and accurate reference clock and maintains the RTC to within  $\pm 0.432$  seconds-perday accuracy from -40°C to +85°C. The RTC device is accessed through an I<sup>2</sup>C serial interface.

The RTC maintains seconds, minutes, hours, day, date, month, year, and century information. The date at the end of the month is automatically adjusted for months with fewer than 31 days, including corrections for leap year up to the year 2199. The clock operates in the 24-hour format. Other features including two programmable timeof-day alarms, interrupt output, uncompensated programmable clock output, and temperature-compensated programmable square-wave output. A voltage reference and comparator circuit monitor the status of VCC to detect power failures and automatically switch to the backup supply when necessary.

### Detailed Description of Software and Functional Test Procedure

#### **Real Time Monitoring**

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

#### **Current Draw in Timekeeping Mode**

To measure the current draw under normal RTC conditions without any interrupt or CLKO output:

- 1) Remove the jumper from JU5.
- With the output set to +3.3V and disabled, connect the negative terminal of the pico ammeter to the pin 1 of JU5 (marked as a white dot) and the positive terminal to pin 2 of JU5.
- 3) On the Configuration & Time tab, in the Date/Time Configuration group box, click the Read button. In the RTC Configuration group box, disable the CLKOUT toggle button, and select 1Hz in SQW Frequency drop-down list. In the Real Time Monitoring section, uncheck the Continuous Read checkbox.
- The reading on the pico ammeter is the current consumed by the MAX31343 IC only. It should be around 940nA.

#### **CLKOUT Frequency**

On the **Configuration & Time** tab of the software, in the **RTC Configuration** group box, enable the **CLKOUT** toggle button and select the desired frequency. The clock output can be monitored using an oscilloscope connected to the CLKO test point (TP7). A frequency counter can also be used to measure the clock frequency accurately.

#### Alarm and Timer Configuration

Use the **Alarm & Timer Configuration** tab to configure Alarm 1, Alarm 2, and timer. (Figure 3)

| onfiguration & Time Alarms 8                        | Timer Registers | RAM          |                  |      | Real Time Monitoring |                  |
|---|-----------------|--------------|------------------|------|----------------------|------------------|
| arm 1 Configuration                                 |                 | Alarm 2 Conf | iguration        |      | Continuous Read      | Temp             |
| Repetition Rate                                     |                 | Repeti       | tion Rate        |      |                      | 00:00:42         |
| Date, Month, Year, Time M                           | atch 🔹          | Dat          | e, Hr, Min Match | ¥    | January              | 01, 2000, Sunday |
| Hour (0-23) Min (0-59)                              | Sec (0-59)      | Hour (0-2    | 23) Min (0-59)   |      | Interrupts & Flags   |                  |
|   | 00 🔻            | 00           |                  |      | INT<br>Disabled      |                  |
| Month (1-12) Date (1-31)                            | Year (0-99)     | Date (1-3    |                  |      | Interrupts           | Flags            |
|   |                 |              |                  |      | Alarm1 Interrupt     | Alarm 1          |
|   | Read            |              |                  | Read | Alarm2 Interrupt     | Alarm 2          |
| mer Configuration                                   |                 |              |                  |      | Timer Interrupt      | Timer            |
| Timer Enable  | Timer Frequency |              | Timer Init       |      | Power Fail           | Power fail       |
| Pause   |                 | 256Hz        | (0-255)          | 0 *  | Temp sense flag      | Temp sense flag  |
|   |                 | 16Hz         | Timer Count      | 0    | Disable OSF          | OSF              |
| 🗹 Repeat  |                 |              |                  | Read | Read                 | Read             |
| us Log  |                 |              |                  |      |                      |                  |
| ldresses found: 0xD0<br>4X31343 I2C slave detected. |                 |              |                  |      |                      | ^                |
|   |                 |              |                  |      |                      | Log To File      |

Figure 3. MAX31343 RTC SHIELD Software—Alarms & Timer Page

### **Registers Tab**

Write and read the MAX31343 IC register map in the **Register** tab. (Figure 4)

| onfigu  | ration & Time  | Alarms & Timer | Registers | RAM   |           |   |       | Real Time Monitoring |                  |
|---------|----------------|----------------|-----------|-------|-----------|---|-------|----------------------|------------------|
| Regis   | ster Map       |                |           |       |           |   |       | Continuous Read      | Temp             |
| Ē       | Addr           | Reg Name       | R/W       | Value | Desel All | ^ |       |                      | 00:00:42         |
|         | 0x00           | status         | RC        | 0x00  |           |   |       |                      |                  |
|         | 0x01           | Int_en         | R/W       | 0x00  |           |   |       | January              | 01, 2000, Sunday |
|         | 0x02           | RTC_reset      | R/W       | 0x00  |           |   |       | Interrupts & Flags   |                  |
|         | 0x03           | RTC_config1    | R/W       | 0x0A  |           |   |       | INT                  |                  |
|         | 0x04           | RTC_config2    | R/W       | 0x40  |           |   |       | Disabled             |                  |
|         | 0x05           | Timer_config   | R/W       | 0x04  |           |   |       |                      |                  |
|         | 0x06           | Seconds        | R/W       | 0x42  |           |   |       | Interrupts           | Flags            |
| ΕĒ      | 0x07           | Minutes        | R/W       | 0x00  |           |   |       |                      |                  |
|         | 0x08           | Hours          | R/W       | 0x00  |           |   |       | Alarm1 Interrupt     | Alarm 1          |
| LΓ      | 0x09           | Day            | R/W       | 0x01  |           |   |       | Alarm2 Interrupt     | Alarm 2          |
|         | 0x0A           | Date           | R/W       | 0x01  |           |   |       |                      |                  |
|         | 0x0B           | Month          | R/W       | 0x01  |           |   |       | Timer Interrupt      | Timer            |
|         | 0x0C           | Year           | R/W       | 0x00  |           |   |       | Power Fail           | Power fail       |
|         | 0x0D           | Alm1_sec       | R/W       | 0x00  |           |   |       | Town constant        |                  |
|         | 0x0E           | Alm1_min       | R/W       | 0x00  |           |   |       | Temp sense flag      | Temp sense flag  |
|         | 0x0F           | Alm1_hrs       | R/W       | 0x00  |           |   | Read  | Disable OSF          | OSF              |
|         | 0x10           | Alm1day_date   | R/W       | 0x00  |           |   |       |                      |                  |
|         | 0x11           | Alm1_mon       | R/W       | 0x00  |           | ~ | Write | Read                 | Read             |
| tus Log | 9              |                |           |       |           |   |       |                      |                  |
|         | ses found: 0xD |                |           |       |           |   |       |                      | ^                |
| AX313   | 43 I2C slave d | etected.       |           |       |           |   |       |                      |                  |
|         |                |                |           |       |           |   |       |                      |                  |
|         |                |                |           |       |           |   |       |                      | Log To File      |
|         |                |                |           |       |           |   |       |                      |                  |

Figure 4. MAX31343 RTC SHIELD Software—Registers Tab

# **Ordering Information**

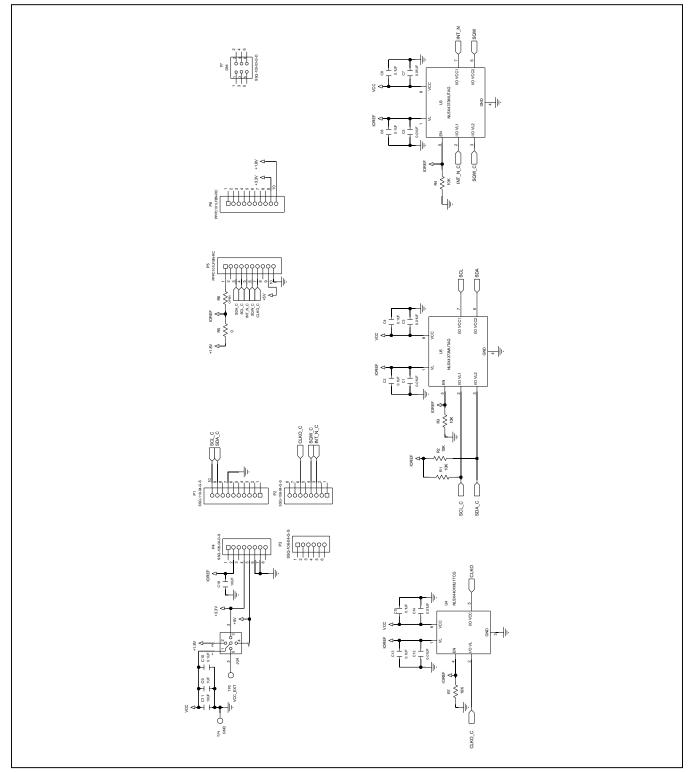
| PART          | ТҮРЕ   |
|---------------|--------|
| MAX31343SHLD# | Shield |

#Denotes RoHS compliance.

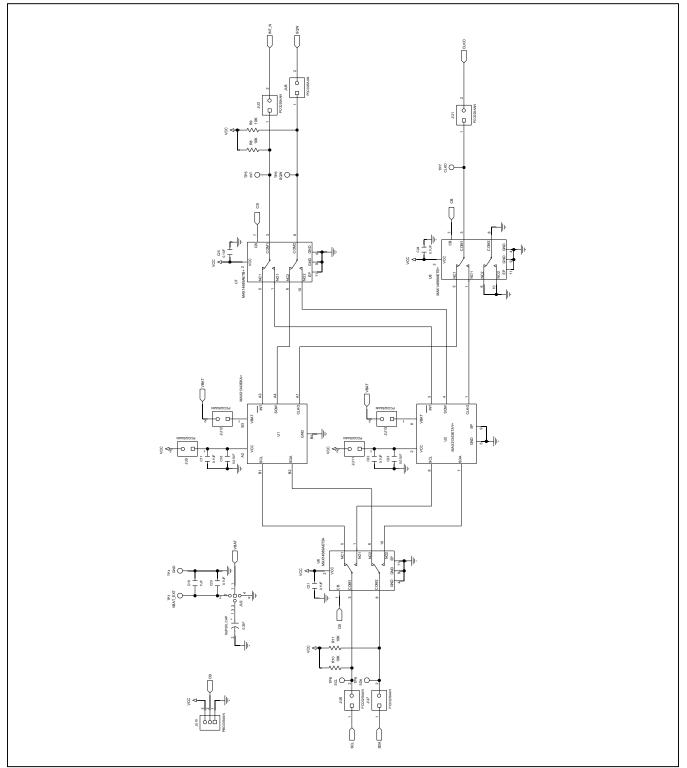
# MAX31343 Shield Bill of Materials

| 1 (C<br>2 C10<br>3 4  | I, C3, C5, C7, C12,<br>C14, C16, C23<br>C2, C4, C6, C8,<br>10, C13, C15, C17,<br>C20-C22,<br>C24, C25<br>C9, C19<br>C11, C18<br>U1, JU3, JU5-JU8,<br>JU11-JU13 | -   | 8<br>13<br>2 | C0402C103J3RAC<br>C1005X7R1C104K050BC;ATC530L104KT16;<br>0402YC104KAT2A;CGA2B1X7R1C104K050BC;<br>GCM155R71C104KA55;C0402X7R160-104KNE;<br>CL05B104K05NNNC;GRM155R71C104KA88;<br>CL005X7L1C104;CC0402KRX7R7BB104; | KEMET<br>TDK;AMERICAN TECHNICAL CERAMICS;<br>AVK;TDK;MURATA;VENKEL LTD.;<br>SAMSUNG ELECTRONICS;MURATA;<br>TDK;YAGEO PHICOMP;TAIYO YUDEN; | 0.01UF         | CAPACITOR; SMT (0402); CERAMIC CHIP; 0.01UF; 25V; TOL=5%;<br>TG=-55 DEGC TO +125 DEGC; TC=X7R<br>CAPACITOR; SMT (0402); CERAMIC CHIP; 0.1UF; 16V; TOL=10%;                                |
|-----------------------|--|-----|--------------|--|---|----------------|---|
| 2 C10<br>3 4<br>5 JU: | C2, C4, C6, C8,<br>10, C13, C15, C17,<br>C20-C22,<br>C24, C25<br>C9, C19<br>C11, C18<br>U1, JU3, JU5-JU8,<br>JU11-JU13   | -   |              | 0402YC104KAT2A;CGA2B1X7R1C104K050BC;<br>GCM155R71C104KA55;C0402X7R160-104KNE;<br>CL05B104KO5NNNC;GRM155R71C104KA88;  | AVK;TDK;MURATA;VENKEL LTD.;<br>SAMSUNG ELECTRONICS;MURATA;  |                |   |
| 4<br>5                | C11, C18<br>U1, JU3, JU5-JU8,<br>JU11-JU13   | -   | 2            | EMK105B7104KV;CL05B104KO5  | SAMSUNG ELECTRONICS   | 0.1UF          | TG=-55 DEGC TO +125 DEGC; TC=X7R  |
| 5 JU:                 | U1, JU3, JU5-JU8,<br>JU11-JU13   | -   | _            | CL05B105KQ5NQNC; GRM155R70J105KA12   | SAMSUNG ELECTRONICS;MURATA  | 1UF            | CAPACITOR; SMT (0402); CERAMIC CHIP; 1UF; 6.3V;<br>TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R  |
| 5                     | JU11-JU13  |     | 2            | GRM155R61A106ME44;GRM155R61A106ME11;<br>0402ZD106MAT2A;CL05A106MP5NUNC   | MURATA;MURATA;AVX;SAMSUNG   | 10UF           | CAPACITOR; SMT (0402); CERAMIC CHIP; 10UF; 10V; TOL=20%;<br>TG=-55 DEGC TO +85 DEGC; TC=X5R   |
| 6                     |  | -   | 9            | PCC02SAAN  | SULLINS   | PCC02SAAN      | CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT<br>THROUGH; 2PINS; -65 DEGC TO +125 DEGC   |
|                       | JU2  | -   | 1            | PEC04SAAN  | SULLINS ELECTRONICS CORP.   | PEC04SAAN      | CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT;<br>4PINS  |
| 7                     | JU4  | -   | 1            | TSW-105-07-L-S   | SAMTEC  | TSW-105-07-L-S | EVKIT PART-CONNECTOR; THROUGH HOLE; TSW SERIES; SINGLE<br>ROW; STRAIGHT; SPINS  |
| 8                     | JU10   | -   | 1            | PBC03SAAN  | SULLINS   | PBC03SAAN      | CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT;<br>3PINS; -65 DEGC TO +125 DEGC   |
| 9                     | P1   | -   | 1            | SSQ-110-04-G-S   | SAMTEC  | SSQ-110-04-G-S | CONNECTOR; FEMALE; THROUGH HOLE; .025IN SQ POST SOCKET;<br>STRAIGHT; 10PINS ;   |
| 10                    | P2, P4   | -   | 2            | SSQ-108-04-G-S   | SAMTEC  | SSQ-108-04-G-S | CONNECTOR; FEMALE; THROUGH HOLE; .025IN SQ POST SOCKET;<br>STRAIGHT; 8PINS ;  |
| 11                    | P3   | -   | 1            | SSQ-106-04-G-S   | SAMTEC  | SSQ-106-04-G-S | CONNECTOR; FEMALE; THROUGH HOLE; .025IN SQ POST SOCKET;<br>STRAIGHT; 6PINS ;  |
| 12                    | P5, P6   | -   | 2            | PPPC101LFBN-RC   | SULLINS ELECTRONICS CORP.   | PPPC101LFBN-RC | CONNECTOR; FEMALE; THROUGH HOLE; HEADER CONNECTOR;<br>STRAIGHT; 10PINS  |
| 13 F                  | R1-R4, R7-R11  | -   | 9            | ERJ-2GEJ103  | PANASONIC   | 10K            | RESISTOR; 0402; 10K OHM; 5%; 200PPM; 0.10W;<br>THICK FILM   |
| 14                    | R5   | -   | 1            | ERJ-2GEOROO  | PANASONIC   | 0              | RESISTOR; 0402; 0 OHM; 0%; JUMPER; 0.10W;<br>THICK FILM   |
| 15                    | SUPER_CAP  | -   | 1            | KW-5R5C334-R   | EATON POWERING BUSINESS<br>WORLDWIDE  | 0.33F          | CAP; THROUGH HOLE-RADIAL LEAD; 0.33F; +80%/-20%;<br>5.5V; ALUMINUM-ELECTROLYTIC ;   |
| 16                    | TP1, TP4   | -   | 2            | 5011   | KEYSTONE  | N/A            | TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD<br>HOLE=0.063IN; BLACK; PHOSPHOR BRONZE WIRE SILVER PLATE<br>FINISH;   |
| 17                    | TP2, TP3   | -   | 2            | 5010   | KEYSTONE  | N/A            | TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD<br>HOLE=0.063IN; RED; PHOSPHOR BRONZE WIRE SIL;  |
| 18                    | TP5-TP9  | -   | 5            | 5012   | KEYSTONE  | N/A            | TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD<br>HOLE=0.063IN; WHITE; PHOSPHOR BRONZE WIRE SILVER PLATE<br>FINISH;   |
| 19                    | U1   | -   | 1            | MAX31343EKA+   | махім   | MAX31343EKA+   | EVKIT PART-IC; MAX31343EKA+; +/-4PPM; I2C REAL-TIME<br>CLOCK WITH INTEGRATED MEMS OSCILLATOR; PACKAGE<br>OUTLINE: 21-100336; PACKAGE CODE: K82A2+1  |
| 20                    | U2   | DNI | 1            | MAX31343ETAY+  | MAXIM   | MAX31343ETAY+  | EVKIT PART-IC; MAX31343ETAY+; +/-4PPM; I2C REAL-TIME<br>CLOCK WITH INTEGRATED MEMS OSCILLATOR; PACKAGE<br>OUTLINE: 21-100322; PACKAGE LAND PATTERN: 90-100121;<br>PACKAGE CODE: T834MKY+1 |
| 21                    | U3, U5   | -   | 2            | NLSX4373MUTAG  | ON SEMICONDUCTOR  | NLSX4373MUTAG  | IC; TRANS; 2-BIT 20 MB/S DUAL-SUPPLY LEVEL<br>TRANSLATOR; UDFN8   |
| 22                    | U4   | -   | 1            | NLSX4401MU1TCG   | ON SEMICONDUCTOR  | NLSX4401MU1TCG | IC; TRANS; 1-BIT 20 MB/S DUAL-SUPPLY LEVEL<br>TRANSLATOR; UDFN6   |
| 23                    | U6-U8  | -   | 3            | MAX14689AETB+  | MAXIM   | MAX14689AETB+  | IC; ASW; ULTRA-SMALL LOW-RON BEYOND-THE-RAILS<br>DPDT ANALOG SWITCHES; TDFN10-EP  |
| 24                    | PCB  | -   | 1            | MAX31343SHIELD   | MAXIM   | PCB            | PCB:MAX31343SHIELD  |
| 25                    | P7   | DNP |              | SSQ-103-03-G-D   | SAMTEC  | SSQ-103-03-G-D | CONNECTOR; FEMALE; THROUGH HOLE; SSQ SERIES ; STRAIGHT;<br>6PINS  |
| 26<br>TOTAL           | R6   | DNP | 0<br>72      | N/A  | N/A   | OPEN           | PACKAGE OUTLINE 0402 RESISTOR   |

# **MAX31343 Shield Schematics**

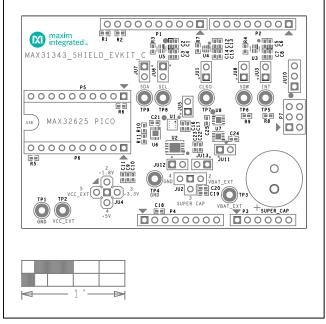


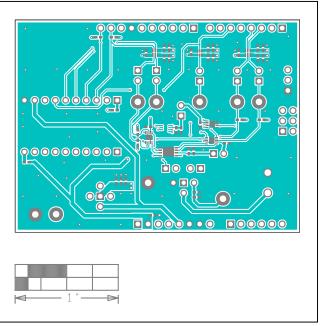
# MAX31343 Shield Schematics (continued)



# Evaluates: MAX31343

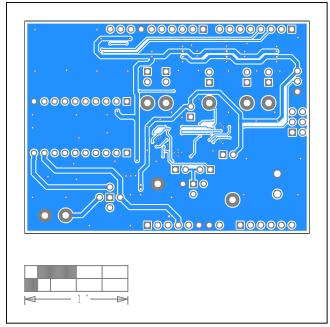
### MAX31343 Shield PCB Layouts



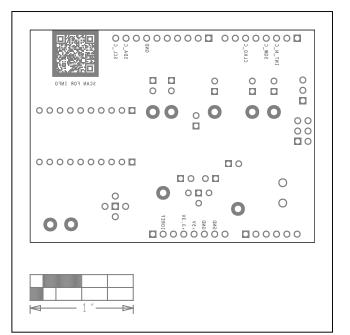


MAX31343 Shield PCB Layout—Top

MAX31343 Shield Component Placement Guide—Top Silkscreen



MAX31343 Shield PCB Layout—Bottom



MAX31343 Shield Component Placement Guide—Bottom Silkscreen

# Evaluates: MAX31343

### **Revision History**

| REVISION<br>NUMBER | REVISION<br>DATE | DESCRIPTION   | PAGES<br>CHANGED |
|--------------------|------------------|---|------------------|
| 0                  | 5/20             | Initial release   | —                |
| 1                  | 5/20             | Updated title, Features, and Detailed Description of Software and Functional Test Procedure | All              |

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