### Evaluates: MAX31342

### **General Description**

The MAX31342 shield is a fully assembled and tested PCB to evaluate the MAX31342, low-current, real-time clock (RTC) with I<sup>2</sup>C interface. The shield operates from a single supply, either from USB or external power supply, and the onboard crystal provides a 32.768kHz clock signal. This device is accessed through an I<sup>2</sup>C serial interface.

The MAX31342 shield provides the hardware and software graphical user interface (GUI) necessary to evaluate the MAX31342. The shield includes a MAX31342EWA+T installed. The shield connects to the PC through a MAX32625PICO Board and a micro-USB cable.

### **Features**

- Easy Evaluation of the MAX31342
- +1.6V to 3.6V Single-Supply Operation
- Proven PCB Layout
- Mbed/Arduino Platform Compatible
- Fully Assembled and Tested

### **Shield Contents**

- Assembled MAX32625PICO controller board
- Micro-USB cable
- Assembled circuit board includes the MAX31342EWA+T

Ordering Information appears at end of data sheet.

### **Quick Start**

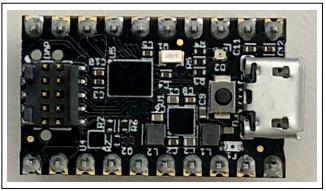
#### **Required Equipment**

- One Pico Ammeter for measuring the current
- One oscilloscope with probe
- One PC with Microsoft Windows 7, or later
- One USB A male to micro B USB cable
- One assembled and programmed MAX32625PICO board
- One MAX31342 Shield

### **Shield Board**



### MAX32625PICO Board





### Evaluates: MAX31342

### Procedure

The shield is fully assembled and tested. Follow the steps below to verify board operation.

- 1) Place the MAX31342 shield on a nonconductive surface to ensure that nothing on the PCB gets shorted to the workspace.
- 2) Set the jumpers of JU4, JU6, and JU7 to their default positions. Leave the jumper JU1 open.
- 3) Connect the MAX32625PICO Board to the shield as shown in Figure 1.
- 4) Connect the USB A male to micro B male cable between the MAX32625PICO board and PC/laptop.
- 5) Go to the MAX31342 Shield product page to download and install the latest version of the MAX31342 RTC Shield software.
- Open the MAX31342 RTC Shield software. Configuration and Time tab will be shown <u>Figure 2</u>.

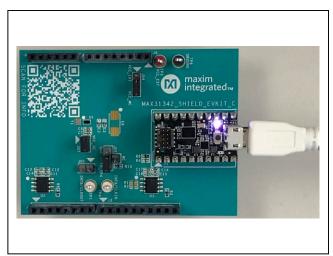


Figure 1. Connection and Setup

Configuration & Time Alarms & Timer	Registers		Real Time Monitoring	
Date/Time Configuration			0:00:00	Auto Update
Hour (0-23) Min (0-59)	Sec (0-59)		Sunday, January 0	
Month (1-12) Date (1-31)	Year (0-199) Day (Sun-Sat)	)	Interrupts & Flags	
01 v 01 v	00 v Sunday (1)	• Read Set	Int	errupts Disabled
		Reau Sei		Flags
RTC Configuration				
Oscillator Enable	INTA CLKIN	INTB CLKOUT	Alarm1 Interrupt	Alarm 1 Alarm 2
Rd_RTC	• 1 Hz	1 Hz	Timer Interrupt	Timer
Data Retention	50 Hz	4.098 kHz 8.192 kHz	Disable OSF	OSF
Soft Reset	32.768 kHz	• 32.768 kHz		Loss Of Signal
		Read	Read	Read
itatus Log				
Addresses found: 0xD2 MAX31342 I2C slave detected.				Log To File

Figure 2. MAX31342 RTC Shield Software-Configuration and Time Tab

### **Detailed Description**

The MAX31342 shield is a fully assembled and tested PCB to evaluate the MAX31342, low-current, real-time clock (RTC) with I<sup>2</sup>C interface. The shield operates from a single supply, either from USB or external power supply, and the onboard crystal provides a 32.768kHz clock signal. This device is accessed through an I<sup>2</sup>C serial interface.

The MAX31342 shield provides the hardware and software graphical user interface (GUI) necessary to evaluate the MAX31342. The shield includes a MAX31342EWA+T installed. The shield connects to the PC through a MAX32625PICO board and a micro-USB cable.

### **Functional Test Procedure**

#### **Real-Time Monitoring**

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

The time and date values can be updated by selecting the required values in the **Date/Time Configuration** group box and clicking the **Set** button.

The time stops counting when enabling **Data Retention** in **RTC Configuration** group box and restarts when disabling **Data Retention** and toggling **Oscillator Enable**. The time resets to **00:00:00** by enabling **Soft Reset** in **RTC Configuration** group box and it restarts by disabling **Soft Reset**.

#### **Current Draw at Time-Keeping Mode**

To measure the current draw under normal Real-Time Clock condition, without any interrupt or clock input/output:

- 1) Remove the jumper from JU7 on the shield.
- With the output set to the desired DC voltage (1.6V to 3.6V) and disabled, connect the positive terminal of the DC supply, through the pico ammeter, to pin 1 of **JU7** and negative terminal to the ground of the shield.
- 3) In Configuration and Time tab of the software, under RTC Configuration group box, press Read button, disable the CLKIN and CLKOUT, and select 1Hz for CLKIN Frequency and CLKOUT Frequency. Under Real Time Monitoring, uncheck Auto Update.
- 4) The reading on the pico ammeter is the current drawn by MAX31342 only.

**Note:** All instruments need to be disconnected from the I/O ports of the IC, since any loading would increase current consumption.

### **CLKOUT Frequency**

In **Configuration and Time** tab of the software, under **RTC Configuration** group box, select **CLKOUT** and the desired **CLKOUT Frequency**. The clock output can be monitored using an oscilloscope connected to the INTB/ CLKOUT test point. A frequency counter can also be used to measure the clock frequency accurately.

#### **Alarm Configuration**

On the MAX31342 shield board, set jumper JU1 to 1-2 and jumper JU6 to 1-4.

In Alarms and Timer tab of the software, under Alarm 1 Configuration group box, select the Repetition Rate to set the alarm, and make selections for all other relevant fields (such as Min, Sec, etc.). In Interrupts and Flags group box, enable alarm 1 by checking the Alarm 1 Interrupt check box. When the Real-Time clock reaches the alarm1 match condition, INTA/CLKIN will go from high to low. Under Flags group box, press Read button to read the status and clear the alarm flag bit if it has been previously set.

Repeat the same steps for Alarm 2 but measure the alarm interrupt output at INTB/CLKOUT test point.

**Note:** When testing alarm interrupts, CLKIN and CLKOUT need to be disabled under **RTC Configuration** group box in **Configuration and Time** tab of the software.

For more detail on using the software, refer to the MAX31342 shield software user's guide.

nfiguration & Time Alarms	& Timer Register	rs	Real Time Monitoring	
larm 1 Configuration		Alarm 2 Configuration		
Repetition Rate		Repetition Rate	0:01:52	🗸 Auto Upda
Date, Time Match	W	Date, Hr, Min Match 🔹	Sunday, January 0	1, 2000 Read
Hour (0-23) Min (0-59)	Sec (0-59)		Interrupts & Flags	
0 * 00 *	• 00	Hour (0-23) Min (0-59) Date (1-31	1-4	errupts Disabled
Month (1-12) Date (1-31)	Year (0-199)	0 v 00 v		enupis Disableu
v v	• 00			Flags
	Read	Read	Alarm1 Interrupt	Alarm 1
imer Configuration			Alarm2 Interrupt	Alarm 2
	Timer Frequency		Timer Interrupt	Timer
Timer Enable	01024Hz	Timer Init (0-255) 0 v	Disable OSF	OSF
Pause	64Hz	Timer Count 0		Loss Of Signal
	256Hz			LUSS OF Orginal
🗹 Repeat	• 16Hz	Read	Read	Read
s Log				
dresses found: 0xD2 X31342 I2C slave detected.				^
E read from register 0x00 (Con 7 written to register 0x00 (Conf	fig_reg1). ia_reg1)			
cillator enabled.	<u></u>			Log To File

Figure 3. MAX31342 RTC Shield Software—Alarms and Timer Tab

0x01     Config_reg2     RW     0x02     Interrupts     Interrupts <t< th=""><th>-</th><th>Time A</th><th>larms &amp; Timer</th><th>Registers</th><th></th><th></th><th></th><th></th><th>Real Time Monitoring</th><th></th></t<>	-	Time A	larms & Timer	Registers					Real Time Monitoring	
Addr   Reg Name   R/W   Value   Desei Ali   Sunday, January 01, 2000   Read     0x00   Config_reg2   R/W   0x00   Image: Config_reg2   R/W   0x00   Read     0x03   Timer_config   R/W   0x00   Image: Config_reg2   Image:	Reg	jister Map							0.07.10	🗸 Auto Linda
0x01     Config_reg2     R/W     0x02     Interrupts       0x03     Timer_config     R/W     0x07     Interrupts     Interrupts       0x05     Int_status_reg     RC     0x40     Interrupts     Interrupts       0x06     Seconds     R/W     0x00     Interrupts     Interrupts     Interrupts       0x06     Seconds     R/W     0x00     Interrupts     Regs       0x07     Minutes     R/W     0x00     Interrupts     Alarm       0x08     Hours     R/W     0x01     Interrupt     Alarm       0x08     Month     R/W     0x00     Interrupt     Alarm       0x00     Alarm1_sec     R/W     0x00     Interrupt     Alarm       0x02     Year     R/W     0x00     Interrupt     Interrupt     Interrupt       0x02     Alarm1_min     R/W     0x00     Interrupt     Interrupt     Interrupt       0x02     Alarm1_min     R/W     0x00     Interrupt     Interrupt     Interrupt		Addr	Reg Name	R/W	Value	Desel All	^		0.07.10	
0x03   Timer_config   R/W   0x07   Interrupts   Inte		0x00	Config_reg1	R/W	0x07				Sunday, January	01, 2000 Read
0x04   int_en_reg   RW   0x00   Int_en_reg   RW   0x00   Int_en_reg   Interrupts Disabled     0x06   Seconds   RW   0x00   Interrupts   Flags   Interrupts   Alarm 1     0x07   Minutes   R/W   0x00   Interrupts   Alarm 1     0x08   Hours   R/W   0x01   Interrupts   Alarm 1     0x08   Month   R/W   0x01   Interrupt   Alarm 2     0x08   Month   R/W   0x01   Interrupt   Alarm 1     0x08   Month   R/W   0x00   Interrupt   Alarm 2     0x00   Year   R/W   0x00   Interrupt   Interrupt     0x00   Alarm 1   Read   Iterrupt   Iterrupt   Iterrupt     0x00   Alarm 1   Read   Write   Iterrupt   Iterrupt   Iterrupt     0x10   Alm1_write   RW   0x00   Vite   Write   Read   Read      0x11   Alarm1_write   Read   Read   Read   Read   Read <td< td=""><td></td><td>0x01</td><td>Config_reg2</td><td>R/W</td><td>0x0C</td><td><math>\checkmark</math></td><td></td><th></th><td></td><td></td></td<>		0x01	Config_reg2	R/W	0x0C	$\checkmark$				
0x05   Int_status_reg   RC   0x40   Interrupt   Interrupt Disabled     0x06   Seconds   R/W   0x00   Interrupt   Flags     0x08   Hours   R/W   0x00   Interrupt   Alarm 1     0x09   Day   R/W   0x01   Interrupt   Alarm 1     0x00   Alarm 1   Alarm 2   Alarm 2     0x00   Year   R/W   0x00   Interrupt   Alarm 2     0x00   Year   R/W   0x00   Interrupt   Alarm 2     0x00   Alarm 1_min   R/W   0x00   Interrupt   Interrupt     0x00   Alarm 1_min   R/W   0x00   Interrupt   Interrupt     0x00   Alarm 1_min   R/W   0x00   Interrupt   Interrupt   Interrupt     0x10   Alm1_brs   R/W   0x00   Vinte   Write   Read   Read     dresses found: 0x02   Vinte   Vinte   Vinte   Read   Interrupt   Interrupt     dresses found: 0x02   Vinte   Vinte   Vinte   Read   Interrupt   Interr		0x03	Timer_config	R/W	0x07				Interrupts & Flags	
0x00   Minutes   R/W   0x00   Image: seconds   R/W   0x00   Image: seconds   Flags     0x06   Hours   R/W   0x00   Image: seconds   Alarm1   Alarm1     0x09   Day   R/W   0x01   Image: seconds   Alarm1   Alarm1     0x00   Year   R/W   0x01   Image: seconds   Alarm2   Alarm1     0x00   Year   R/W   0x01   Image: seconds   Alarm2   Alarm2     0x00   Alarm1_min   R/W   0x00   Image: seconds   Image: seconds   Alarm2     0x00   Alarm1_min   R/W   0x00   Image: seconds   Image: seconds   Image: seconds   Image: seconds     0x00   Alarn1_min   R/W   0x00   Image: seconds   Image: seco		0x04	Int_en_reg	R/W	0x00					
0x07   Minutes   RW   0x00   Image: Second Se		0x05	Int_status_reg	RC	0x40				In	terrupts Disabled
0x07   minutes   fvvv   0x00   Image: state intervent		0x06	Seconds	R/W	0x00	$\checkmark$				
0x09   Day   R/W   0x01   Image: Constraint of the second s		0x07	Minutes	R/W	0x00					Flags
Image: Structure   Image: Structure   Image: Structure   Alarm 2     Image: Structure   Image: Structure   Alarm 2     Image: Structure   Image: Structure   Alarm 2     Image: Structure   Image: Structure   Image: Structure     Image: Structure   Image: Structure   Image: Structure   Image: Structure     Image: Structure   Image: Structure   Image: Structure   Image: Structure   Image: Structure     Image: Structure   Image: Structure   Image: Structure   Image: Structure   Image: Structure   Image: Structure     Image: Structure   Image: Structure   Image: Structure   Image: Structure   Image: Structure   Image: Structure   Image: Structure   Image: Structure   Image: Structure   Image: Structure   Image: Structure   Image: Structure   Image: Structure   Image: Structure		0x08	Hours	R/W	0x00	$\checkmark$				
0x0B   Month   R/W   0x01   Alarm2   Alarm2   Alarm2     0x0C   Year   R/W   0x00   Image: Constraint of the state of the stat		0x09	Day	R/W	0x01				Alarm1 Interrupt	Alarm 1
0x0B     Month     R/W     0x01     Image: Construction of the construc		0x0A	Date	R/W	0x01	$\checkmark$			Alarm2 Interrunt	Alarm 2
0x0D   Alm1_sec   R/W   0x00   Image: Constraint of the second sec		0x0B	Month	R/W	0x01				Alamiz Interrupt	/ dill 2
0x0E     Alm1_min     R/W     0x00     Image: Constraint of the state of		0x0C	Year	R/W	0x00	$\checkmark$			Timer Interrupt	Timer
0x0E   Alm1_min   R/W   0x00   Image: Constraint of the second sec		0x0D	Alm1_sec	R/W	0x00				Dischie 005	0.05
0x10 Alm1day_date R/W 0x00 Read   0x11 Alm1_mon R/W 0xC0 Read   0x12 Alm1_year R/W 0x00 Read		0x0E	Alm1_min	R/W	0x00	$\checkmark$			Disable OSF	OSF
Image: Control of the control of t		0x0F	Alm1_hrs	R/W	0x00					Loss Of Signal
0x12 Alm1_year R/W 0x00 Write   Read		0x10	Alm1day_date	R/W	0x00	$\checkmark$		Read		
dresses found: 0xD2 V31342 I2C slave detected. DE read from register 0x00 (Config_reg1).		0x11	Alm1_mon	R/W	0xC0					
V31342 I2C slave detected. DE read from register 0x00 (Config_reg1).		0x12	Alm1_year	R/W	0x00		~	Write	Read	Read
V31342 I2C slave detected. DE read from register 0x00 (Config_reg1).										
W31342 I2C slave detected. 0E read from register 0x00 (Config_reg1).	us Log									
0E read from register 0x00 (Config_reg1).										~
or white register oxoo (conlig_regi).										
scillator enabled.	or windon to	la d								

Figure 4. MAX31342 RTC Shield Software—Registers Tab

# **Jumper Settings**

JUMPER	SHUNT POSITION	DESCRIPTION
JU1	1-2	$\overline{\text{INTB}}/\text{CLKOUT}$ pin of U1 is connected to IO $V_{CC2}$ pin of the level translator (U2)
301	OPEN*	INTB/CLKOUT pin of U1 is unconnected
JU4	1-2	System V <sub>CC</sub> powered by VCC_EXT test point
JU4	2-3*	System $V_{CC}$ powered by 3.3V supply on mbed/Arduino platform
	1-2	INTA/CLKIN pin of U1 is connected to ground
JU6	1-3	$\overline{\text{INTA}}/\text{CLKIN}$ pin of U1 is connected to IO $\text{V}_{\text{CC1}}$ pin of the level translator (U2)
	1-4*	$\overline{\text{INTA}}/\text{CLKIN}$ is connected to TP4 test point and a 4.7K $\Omega$ pullup resistor to system V_{CC}
	1-2*	$V_{CC}$ pin of U1 is powered by system $V_{CC}$
JU7	OPEN	$V_{CC}$ pin of U1 is unconnected. Connect an ammeter between the pins of JU7 to measure the current consumption of U1.

# **Ordering Information**

PART	TYPE	
MAX31342SHLD#	SHIELD	

#Denotes RoHS compliant.

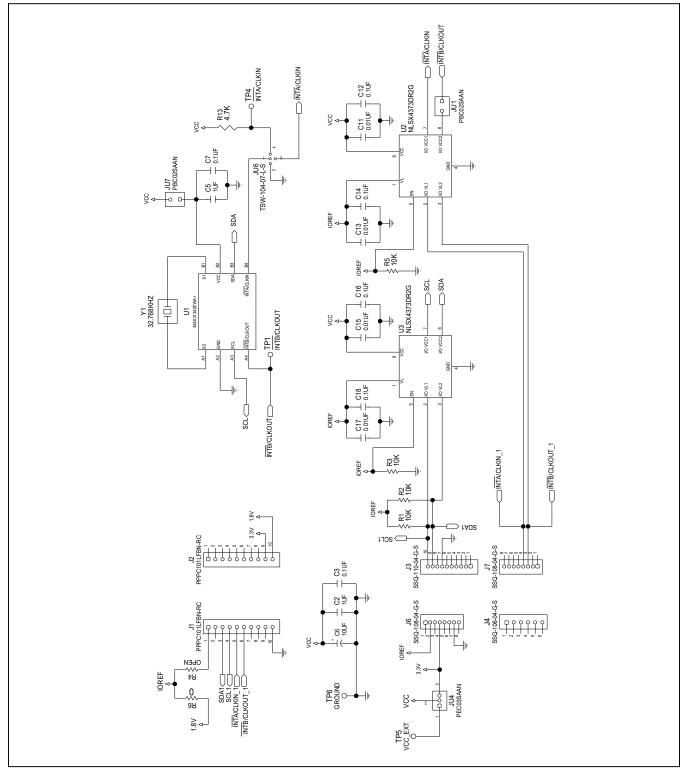
# Evaluates: MAX31342

### MAX31342 SHIELD Bill of Materials

NOTE: DNI	> DO NOT INSTALL(PAC	CKOUT	) ; DN	P> DO NOT PROCURE			
ITEM	REF_DES		QTY	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION
1	C2, C5		2	CL05B105KQ5NQNC; GRM155R70J105KA12	SAMSUNG ELECTRONICS; MURATA	1UE	CAPACITOR: SMT (0402); CERAMIC CHIP; 1UF; 6:3V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R
2	C3, C7, C12, C14, C16, C18			GRM155R70J104KA01	MURATA	0.1UF	CAPACITOR; SMT (0402); CERAMIC CHIP; 0.1UF; 6.3V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R
3	C6		1	TAJC106K016RNJ	AVX	10UF	CAPACITOR; SMT (6032); TANTALUM CHIP; 10UF; 16V; TOL=10%; MODEL=TAJ SERIES; TG=-55 DEGC TO +125 DEGC
4	C11, C13, C15, C17		4	ATC520L103KT16T	AMERICAN TECHNICAL CERAMICS	0.01UF	CAPACITOR; SMT (0402); CERAMIC CHIP; 0.01UF; 16V; TOL=10%; MODEL=ULTRA-BROADBAND; TG=-55 DEGC TO +125 DEGC; TC=X7R
5	J1, J2		2	PPPC101LFBN-RC	SULLINS ELECTRONICS CORP.	PPPC101LFBN-RC	CONNECTOR; FEMALE; THROUGH HOLE; HEADER CONNECTOR; STRAIGHT; 10PINS
6	J3		1	SSQ-110-04-G-S	SAMTEC	SSQ-110-04-G-S	CONNECTOR; FEMALE; THROUGH HOLE; .025IN SQ POST SOCKET; STRAIGHT; 10PINS ;
7	J4		1	SSQ-106-04-G-S	SAMTEC	SSQ-106-04-G-S	CONNECTOR; FEMALE; THROUGH HOLE; .025IN SQ POST SOCKET; STRAIGHT; 6PINS ;
8	J6, J7		2	SSQ-108-04-G-S	SAMTEC	SSQ-108-04-G-S	CONNECTOR; FEMALE; THROUGH HOLE; .025IN SQ POST SOCKET; STRAIGHT; 8PINS ;
9	JU1, JU7		2	PBC02SAAN	SULLINS ELECTRONICS CORP.	PBC02SAAN	EVKIT PART-CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 2PINS; -65 DEGC TO +125 DEGC;
10	JU4		1	PEC03SAAN	SULLINS ELECTRONICS CORP.	PEC03SAAN	EVKIT PART-CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 3PINS; -65 DEGC TO +125 DEGC;
11	JU6		1	TSW-104-07-L-S	SAMTEC	TSW-104-07-L-S	EVKIT PART-CONNECTOR; MALE; THROUGH HOLE; TSW SERIES; SINGLE ROW; STRAIGHT; 4PINS
12	R1-R3, R5		4	CRCW040210K0FK;RC04 02FR-0710KL	VISHAY DALE;YAGEO PHICOMP	10K	RESISTOR; 0402; 10K; 1%; 100PPM; 0.0625W; THICK FILM
13	R6		1	RC0402JR-070RL; CR0402-16W-000RJT	YAGEO PHYCOMP;VENKEL LTD.		0 RESISTOR; 0402; 0 OHM; 5%; JUMPER; 0.063W; THICK FILM
14	R13		1	CRCW04024K70JN	VISHAY DALE	4.7K	RESISTOR; 0402; 4.7K OHM; 5%; 200PPM; 0.063W; THICK FILM
15	TP1, TP4-TP6		4	5010	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; RED; PHOSPHOR BRONZE WIRE SIL;
16	U1		1	MAX31342EWA+	MAXIM	MAX31342EWA+	EVKIT PART-IC; MAX31342EWA+; LOW CURRENT REAL TIME CLOCK WITH I2C INTERFACE; PACKAGE OUTLINE: 21-100291; PACKAGE CODE: W80D1-1
17	U2, U3		2	NLSX4373DR2G	ON SEMICONDUCTOR	NLSX4373DR2G	IC; TRANS; 2-BIT 20 MB/S DUAL-SUPPLY LEVEL TRANSLATOR; NSOIC8
18	Y1		1	ECS327-6-12	ECS INC	32.768KHZ	CRYSTAL; SMT 2.0 MM X 1.2 MM; 6PF; 32.768KHZ; +/-20PPM; -0.03PPM/DEGC2
19	PCB		1	MAX31342SHIELD	MAXIM	PCB	PCB:MAX31342SHIELD
20	R4	DNP	0	N/A	N/A	OPEN	PACKAGE OUTLINE 0402 RESISTOR
TOTAL			38				

# Evaluates: MAX31342

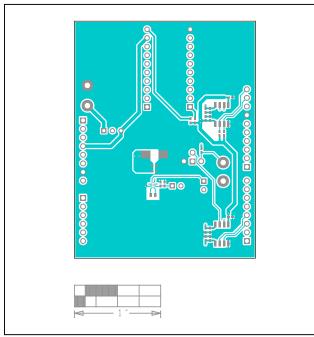
### MAX31342 SHIELD Schematic



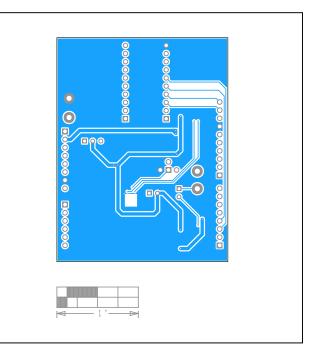
### Evaluates: MAX31342

### MAX31342 SHIELD PCB Layout Diagrams 000000000 000000 (32625PI BOARD 8 0 0 00000 5

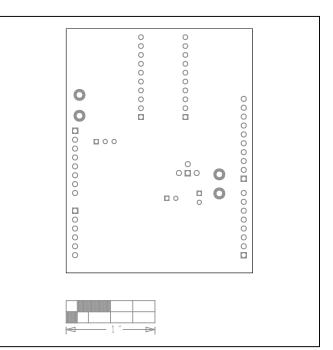
MAX31342 Shield—Assembly Top Silkscreen



MAX31342 Shield—PCB Top Layer



MAX31342 Shield—PCB Bottom Layer



MAX31342 Shield—PCB Bottom Silkscreen