MAX31825 Evaluation System

Evaluates: MAX31825

General Description

The MAX31825 evaluation system (EV system) demonstrates the MAX31825 1-Wire® temperature sensor with hardware-selectable address and alarm. The MAX31825 EV system includes the MAX31825 evaluation kit (EV kit) and the USB2PMB2 module. Windows® 7/8/8.1/10-compatible software provides a user-friendly interface that demonstrates the features of the MAX31825.

The MAX31825 EV kit contains an on-board DS2482 I^2C to 1-Wire converter and comes with the 6-pin WLP MAX31825ANT+ installed.

Features

- On-Board I^2C to 1-Wire Converter (DS2482)
- Proven PCB Layout
- Fully Assembled and Tested
- Windows XP, Windows 7/8/8.1/10-Compatible Software

Quick Start

Required Equipment

- MAX31825 EV system (USB cable included)
- Windows PC
- MAX31825GUISetup.msi file

Note: In the following sections, software-related items are identified by bolding. Text in **bold** refers to items directly from the EV kit software. Text in **bold and underlined** refers to items from the Windows operating system.

Procedure

The EV system is fully assembled and tested. Follow the steps below to verify board operation:

1) Install the MAX31825GUISetup.msi software on a computer.
2) Align the X2 connector (top row) of the USB2PMB2 with the J1 connector of the MAX31825 EV kit. Figure 1 shows the side view of how the two boards are connected. The USB2PMB2 is on the left and the MAX31825 EV kit is on the right.

MAX31825 EV System Photo
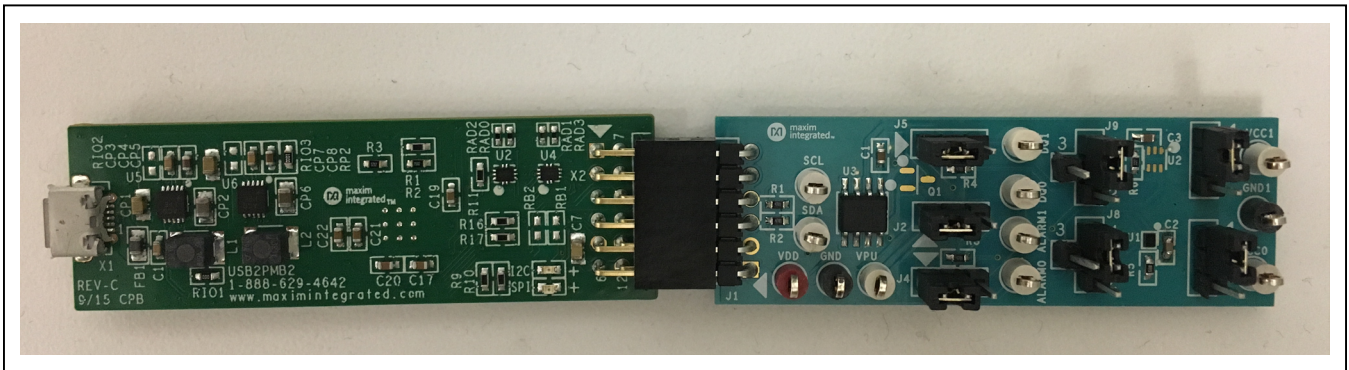
Ordering Information **appears at end of data sheet.**

1-Wire is a registered trademark of Maxim Integrated Products, Inc.
Windows is a registered trademark of Microsoft Corporation.

3) Verify that the shunts are in the default position as shown in Table 1.

4) Connect the USB cable from the PC to the USB2PMB2 board.

5) Open the EV kit GUI, MAX31825EVKit.exe (Figure 2).

6) Click the **Scan Adapters** button. Then select the option **PMODxxxxxx** (where xxxxxx is numeric) and click the **Connect** button.

7) Click the **Detect Address** button, and the **0b111110** bits appear in the **A5-A0** edit box.

8) Adjust the **Conversion** to **111-125ms** within the **Configuration Register** group box.

9) Click the **Write Scratchpad** button.

10) Verify the configuration register is set by clicking the **Read Scratchpad** button.

11) Start evaluating the MAX31825 by clicking the **Sample Continuously** button. Figure 3 shows the MAX31825 measuring temperature.

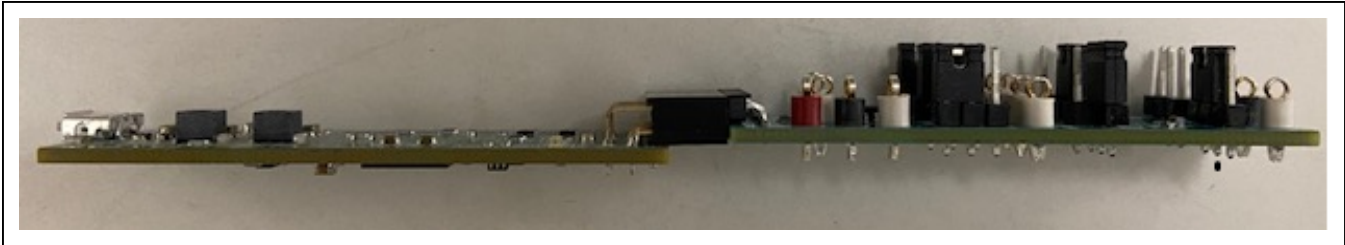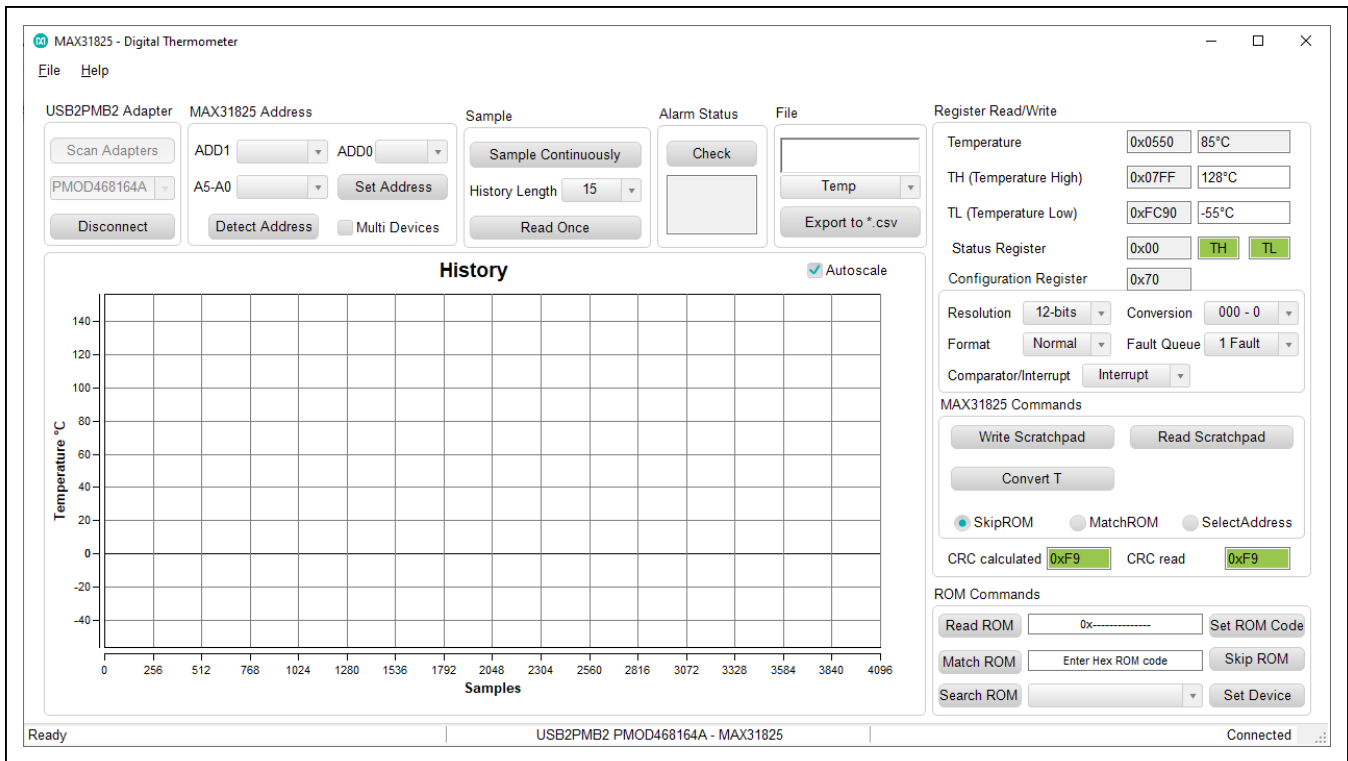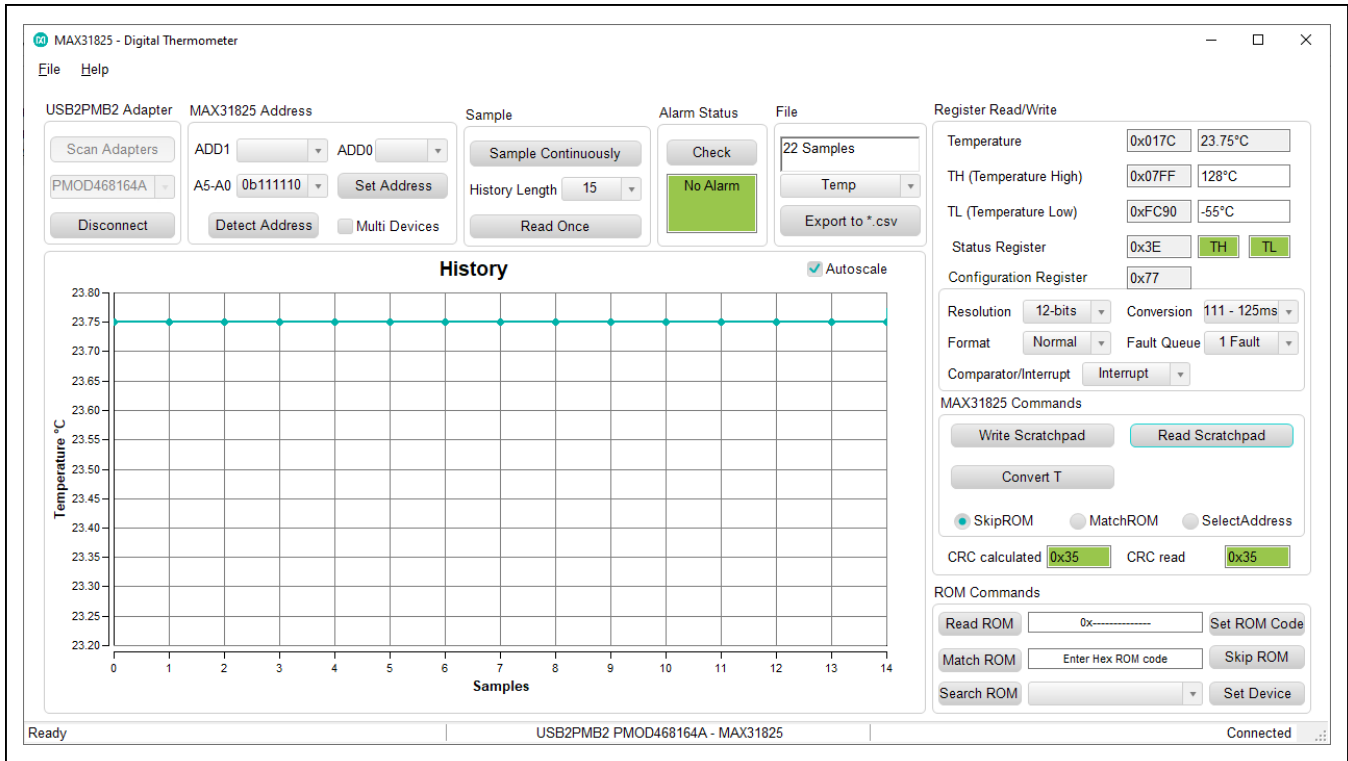*Figure 1. MAX31825 Side View*

Figure 2. MAX31825 Main Window

Figure 3. Measuring Temperature on the MAX31825

Table 1. Jumper Descriptions

JUMPER	SHUNT POSITION	DESCRIPTION
J2	1-2*	Connects VDD to the pullup resistors for DQ and ALARM.
	2-3	User-supplied VPU. Connects VPU to the pullup resistors for DQ and ALARM.
J4	1-2*	Connects ALARM signal from the USB2PMB2 to the MAX31825 (U1).
	2-3	Connects ALARM signal from the USB2PMB2 to the IC (U2).
J5	1-2*	Connects DQ signal from the DS2482 to the MAX31825 (U1).
	2-3	Connects DQ signal from the DS2482 to the IC (U2).
J6	1-2*	Connects VDD to power the MAX31825 (U1).
	2-3	Connects VPU to power the MAX31825 (U1).
	Not installed	User-supplied VDD. Connect power to VCC0 test point.
J7	1-2*	Not in Use
	1-3	Not in Use.
J8	1-2*	Connects ADD1 to PU pullup voltage for address selection for the MAX31825 (U1).
	1-3	Parasite Power Mode Only. Connects ADD1 to DQ signal for address selection for the MAX31825 (U1).
	1-4	Connects ADD1 to ground for address selection for the MAX31825 (U1).
J9	1-2*	Connects ADD1 to PU pullup voltage for address selection for the IC (U2).
	1-3	Connects ADD1 to DQ signal for address selection for the IC (U2).
	1-4	Connects ADD1 to ground for address selection for the IC (U2).

*Default position.

General Description of Software

The main window of the MAX31825 EV kit software contains controls to evaluate the MAX31825 IC.

Configuration Register

The **Configuration Register** groupbox allows the user to select the resolution, conversion rate, format, and fault queue. Use the **Resolution** drop-down list to select between 9-, 10-, 11-, and 12-bits resolution. With each resolution, the user can set the desired sampling rate using the options in the **Conversion** drop-down list. The temperature can be adjusted between normal and extended format. In addition, users can set the fault queue from 1 or 4 consecutive faults. When the desired configuration is set, click the **Write Scratchpad** button to apply.

High and Low Fault

Adjust the **TH (Temperature High)** and **TL (Temperature Low)** edit boxes to the desired temperature threshold. When the desired setting is set, click the **Write Scratchpad** button to apply.

When the $\overline{\text{ALARM}}$ output asserts in comparator mode, the **TH** or **TL** fault status bits displays red until the temperature returns within the threshold range.

When the $\overline{\text{ALARM}}$ output asserts in interrupt mode, the **TH** or **TL** fault status bits displays red until the read is performed on any registers.

The $\overline{\text{ALARM}}$ also appears at the $\overline{\text{ALARM}}$ pin of the IC. To check if the signal is high or low, use the **Check** button for the alarm status.

Address

The address is determined by the resistor/connection on ADD0 and ADD1 pins of the MAX31825. **Detect Address** loads bits to status register. Refer to the IC data sheet for the list of addresses. When multiple devices are on the 1-Wire bus, check the **Multi Devices** checkbox before clicking the **Detect Address** button. Addresses are displayed on the **A5-A0** drop-down list. Once the desired address is selected, click the **Set Address** button before sending function commands (**Write Scratchpad**, **Read Scratchpad**, and **Convert T**).

ROM

Within the **ROM Command** groupbox, the controls include **Read ROM**, **Match ROM**, **Skip ROM**, and **Search ROM**.

MAX31825 Commands

Within the **MAX31825 Command** groupbox, the controls include **Read Scratchpad**, **Write Scratchpad**, and **Convert T**.

Temperature

The temperature is displayed in the graph, hexadecimal code, and converted temperature by clicking on the **Sample Continuously** or **Read Once** button.

Logging Data

The temperature and raw code can be saved to a file. Click the **Export to *.CSV** button before collecting data.

General Description of Hardware

The MAX31825 EV system demonstrates the MAX31825, 1-Wire temperature sensor with address and alarm. The USB2PMB2 module and the EV kit complete the system. The DS2482 acts as the 1-Wire master for the MAX31825 and as an I^2C slave for the USBPMBP2.

User-Supplied I^2C and I/O

To evaluate the EV kit with a user-supplied **I^2C** bus, the connector J1 is a PMod™-compatible connector. If the master does not have a PMod-compatible connector, then make connection directly to the SCL, SDA test points. Make sure the return ground is the same as the DS2482. See Table 1 for jumper position.

User-Supplied 1-Wire

To evaluate the EV kit with a user-supplied 1-Wire bus, See Table 1 for jumper position.

User-Supplied VDD

The MAX31825 is powered through USB by default when a PMod-compatible master module is connected to the J1 connector of the EV kit. If the user-supplied VDD is used, a PMod master module is not allowed on the J1 connector. In this case, remove the shunt from J6 jumper and apply a voltage between +1.6V and +3.6V at the VCC0 test point and ground is connected at the GND1 test point.

User-Supplied VPU

The J2 jumper allows the user to apply their own pullup voltage. When a shunt is on the 2-3 position, apply a voltage between +2.3V and +3.6V at the VPU test point and verify the return path is connected at the GND test point.

Pmod is a trademark of Digilent Inc.

Ordering Information

PART	TYPE
MAX31825EVSYS1#	EV system (EV kit + Master Board)
MAX31825EVKIT#	EV kit
USB2PMB2#	Master Board

#Denotes RoHS compliance.

MAX31825 EV System Bill of Materials

| ITEM	QTY	REF DES	VAR STATUS	MAXINV	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION	COMMENTS
1	9	ALARM0, ALARM1, DQ0, DQ1, SCL, SDA, VCC0, VCC1, VPU	Pref	02-TPCOMP5007-00	5007	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.35IN; BOARD HOLE=0.063IN; WHITE; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH; RECOMMENDED FOR BOARD THICKNESS=0.062IN; NOT FOR COLD TEST;NOTE: SET TO OBSOLETE DUE TO CORRECTION IN STEP MODEL COLOR	
2	3	C1-C3	Pref	20-000U1-BA63	GCJ188R71H104KA12; GCM188R71H104K; CGA3E2X7R1H104K080AA	MURATA;MURATA;TDK	0.1UF	CAPACITOR; SMT (0603); CERAMIC CHIP; 0.1UF; 50V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R; AUTO	
3	2	GND, GND1	Pref	02-TPCOMP5006-00	5006	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.35IN; BOARD HOLE=0.063IN; BLACK; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH; RECOMMENDED FOR BOARD THICKNESS=0.062IN; NOT FOR COLD TEST;NOTE: SET TO OBSOLETE DUE TO CORRECTION IN STEP MODEL COLOR	
4	1	J1	Pref	01-TSW10608SSRA6P-19	TSW-106-08-S-S-RA	SAMTEC	TSW-106-08-S-S-RA	CONNECTOR; MALE; THROUGH HOLE; 0.025 INCH SQUARE POST HEADER; RIGHT ANGLE; 6PINS	
5	5	J2, J4-J7	Pref	01-TSW10307TS3P-17	TSW-103-07-T-S	SAMTEC	TSW-103-07-T-S	CONNECTOR; THROUGH HOLE; TSW SERIES; SINGLE ROW; STRAIGHT; 3PINS	
6	2	J8, J9	Pref	01-PEC04SAAN4P-21	PEC04SAAN	SULLINS ELECTRONICS CORP.	PEC04SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 4PINS	
7	4	R1-R4	Pref	80-004K7-19	CRCW06034K70FK	VISHAY DALE	4.7K	RESISTOR; 0603; 4.7K; 1%; 100PPM; 0.10W; THICK FILM	
8	2	R5, R6	Pref	80-04K99-CA18	RNCP0603FTD4K99	STACKPOLE ELECTRONICS INC	4.99K	RESISTOR; 0603; 4.99K OHM; 1%; 100PPM; 0.125W; THIN FILM	
9	8	SU1-SU8	Pref	02-JMPFS1100B-00	S1100-B;SX1100-B;STC02SYAN	KYCON;KYCON;SULLINS ELECTRONICS CORP.	SX1100-B	TEST POINT; JUMPER; STR; TOTAL LENGTH=0.24IN; BLACK; INSULATION=PBT;PHOSPHOR BRONZE CONTACT=GOLD PLATED	
10	1	U1	Pref	00-SAMPLE-03	MAX31825ANT+	MAXIM	MAX31825ANT+	EVKIT PART - IC; 1-WIRE TEMPERATURE SENSOR WITH ADDRESS AND ALARM; +/- 1 DEGREE CELCIUS ACCURACY; PACKAGE OUTLINE: 21-100395; PACKAGE CODE: N61A1+1; WLP6	
11	1	U3	Pref	10-DS2482S100-S	DS2482S-100+	MAXIM	DS2482S-100+	IC; INFC; SINGLE-CHANNEL 1-WIRE MASTER; NSOIC8; NOTE: SET TO OBSOLETE TO UPDATE TO MAXIM STANDARD FOOTPRINT. KINDLY USE PART WITH JEDEC TYPE MAXIM_90-0096	
12	1	VDD	Pref	02-TPCOMP5005-00	5005	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.35IN; BOARD HOLE=0.063IN; RED; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH; RECOMMENDED FOR BOARD THICKNESS=0.062IN ;NOTE: SET TO OBSOLETE DUE TO CORRECTION IN STEP MODEL COLOR	
13	1	PCB	-	EPCB31825	MAX31825	MAXIM	PCB	PCB:MAX31825	-
TOTAL	40								

| DO NOT PURCHASE(DNP)									
ITEM	QTY	REF DES	VAR STATUS	MAXINV	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION	COMMENTS
1	1	Q1	DNP	EQ111000002627	BSS84Q-7-F	DIODES INCORPORATED	BSS84Q-7-F	TRAN; PCH; MOSFET; SOT-23; PD-(0.3W); I-(-0.13A); V-(-50V)	DNI
2	1	U2	DNP	N/A	MAX31825ALT+	MAXIM	MAX31825ALT+	EVKIT PART - IC; 1-WIRE TEMPERATURE SENSOR WITH ADDRESS AND ALARM; +/- 1 DEGREE CELCIUS ACCURACY; PACKAGE OUTLINE: 21-0164; PACKAGE CODE: LC622+1C; UDFN6	
TOTAL	2								

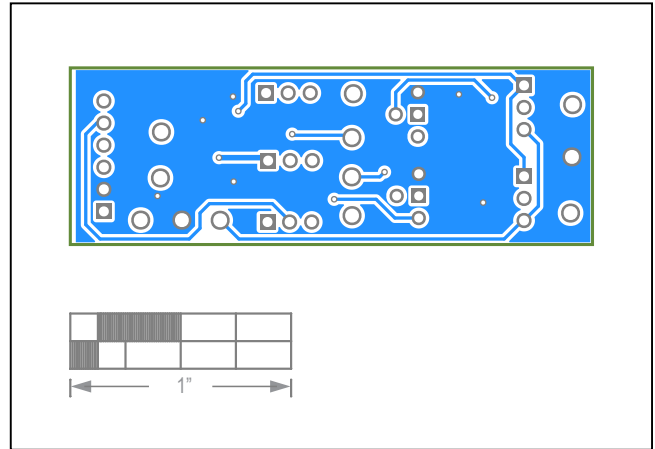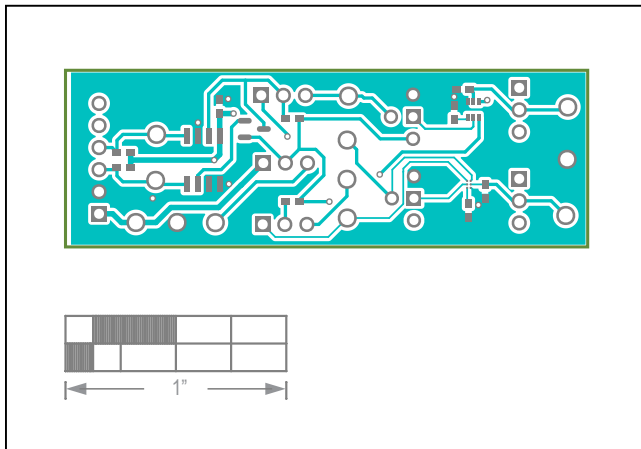| PACKOUT (These are purchased parts but not assembled on PCB and will be shipped with PCB)									
ITEM	QTY	REF DES	VAR STATUS	MAXINV	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION	COMMENTS
TOTAL	0								

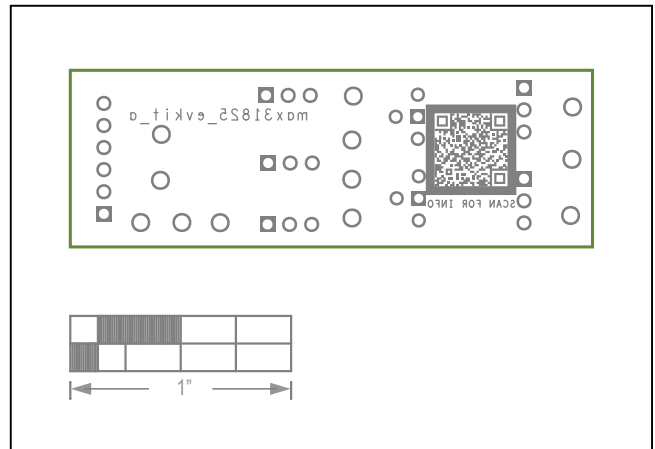## MAX31825 EV System Schematic
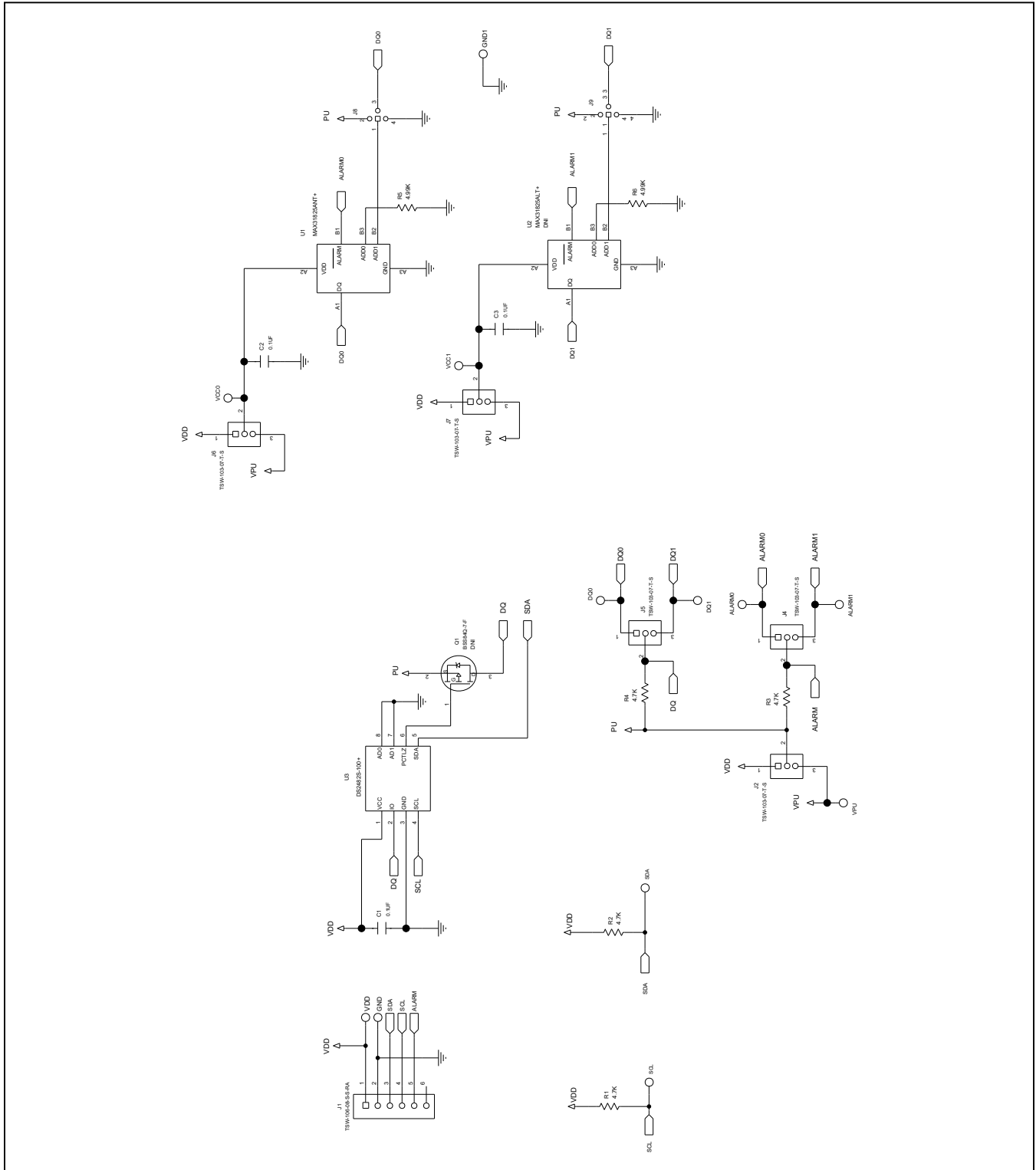
MAX31825 EV System PCB Layouts
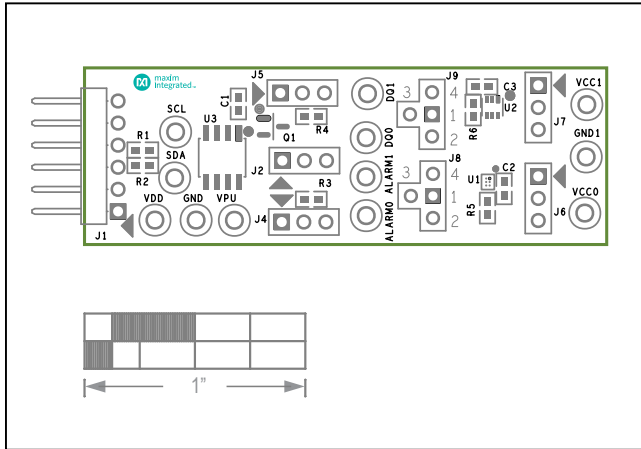
MAX31825 EV System Component Placement Guide—Top Silkscreen

MAX31825 EV System PCB Layout—Bottom

MAX31825 EV System PCB Layout—Top

MAX31825 EV System PCB Layout—Silk Bottom

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	3/20	Initial release	—