19-6333; Rev 0; 5/12

MAX31855PMB1 Peripheral Module

General Description

The MAX31855PMB1 peripheral module provides the necessary hardware to interface the MAX31855 cold-junction compensated thermocouple-to-digital converter to any system that utilizes Pmod™-compatible expansion ports. The IC performs cold-junction compensation and digitizes the signal from a thermocouple. Versions of the IC are available that operate with a K-, J-, N-, T-, R-, or E-type thermocouple. This module is set up to operate with a K-type thermocouple. The data is output in a signed 14-bit, SPI-compatible, read-only format. This converter resolves temperatures to 0.25°C, allows readings as high as +1800°C and as low as -270°C, and exhibits thermocouple accuracy of ±2°C for temperatures ranging from -200°C to +700°C for K-type thermocouples.

For full range accuracies, other thermocouple types, and detailed information regarding operation of the IC, refer to the MAX31855 IC data sheet.

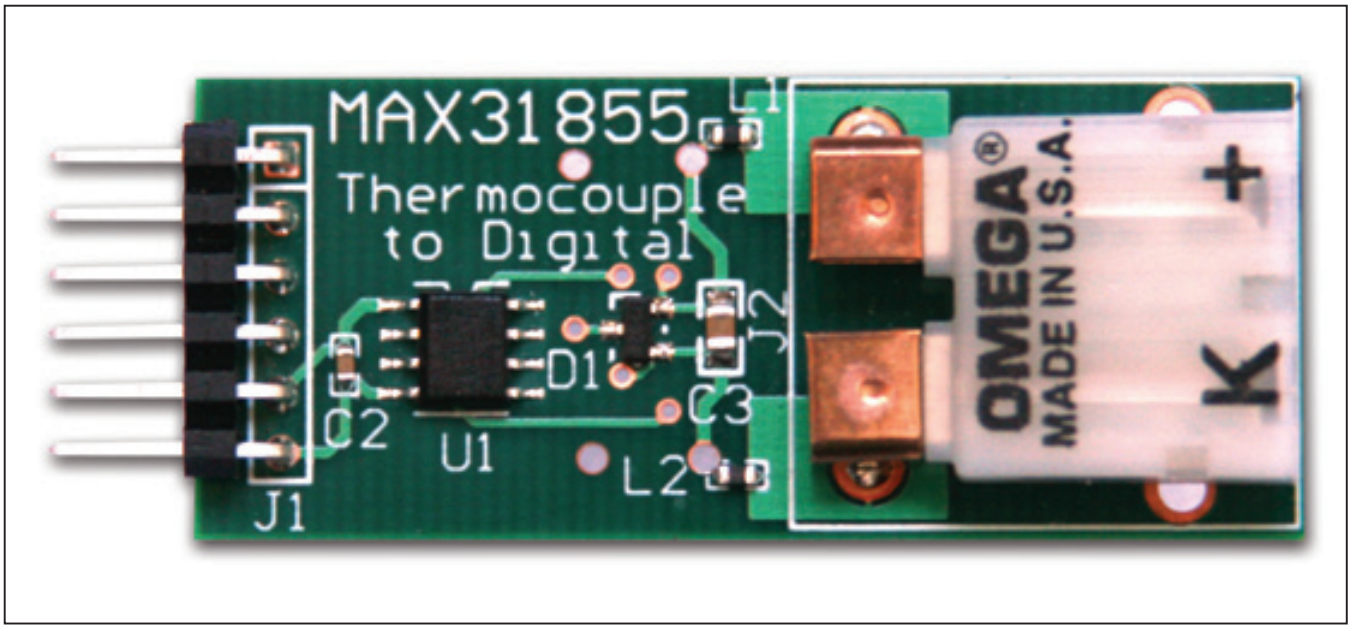
Note: K-type thermocouple is not included with Maxim Peripheral Module collections.

Features

- **Converts Output of a K-Type Thermocouple Directly to a Signed 14-Bit Digital Word**
- **Cold-Junction Compensation**
- **14-Bit, 0.25°C Resolution**
- **Detects Thermocouple Shorts to GND or VCC**
- **Detects Open Thermocouple**
- **6-Pin Pmod-Compatible Connector (SPI)**
- **Example Software Written in C for Portability**
- **RoHS Compliant**
- **Proven PCB Layout**
- **Fully Assembled and Tested**

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

MAX31855PMB1 Photo



Pmod is a trademark of Digilent Inc.

Component List

DESIGNATION	QTY	DESCRIPTION
C1, C4	0	Not installed, ceramic capacitors (0805)
C2	1	0.1µF ±10%, 16V X7R ceramic capacitor (0603) Murata GRM188R71C104KA01D
C3	1	0.01µF ±10%, 16V X7R ceramic capacitor (0603) Murata GRM188R71C103KA01D
D1	1	TVS diode (3 SOT3) ON Semi NUP2105TL1G
J1	1	6-pin right-angle male header
J2	1	K-type thermocouple socket Omega PCC-SMP-K-5-ROHS
L1, L2	2	470Ω ferrite beads (0603) Murata BLM18PG471SN1D
R1, R2, R3	3	150Ω ±5% resistors (0603)
U1	1	Thermocouple to digital IC (8 SO) Maxim MAX31855KASA+
—	1	K-type thermocouple, mini plug*
—	1	PCB: EPCB31855PM1

**Thermocouple not included with Maxim peripheral module collections.*

Component Suppliers

SUPPLIER	PHONE	WEBSITE
Murata Electronics North America, Inc.	770-436-1300	www.murata-northamerica.com
Omega Engineering	888-826-6342	www.omega.com
ON Semiconductor	602-244-6600	www.onsemi.com

Note: *Indicate that you are using the MAX31855PMB1 when contacting these component suppliers.*

Detailed Description

SPI Interface

The MAX31855PMB1 peripheral module can plug directly into a Pmod-compatible port (configured for SPI) through connector J1. For information on the SPI protocol, refer to the MAX31855 IC data sheet.

Connector J1 provides connection of the module to the Pmod host. The pin functions and pin assignments adhere to the Pmod standard recommended by Digilent. See Table 1.

Software and FPGA Code

Example software and drivers are available that execute directly without modification on several FPGA development boards that support an integrated or synthesized microprocessor. These boards include the Digilent Nexys 3, Avnet LX9, and Avnet ZEDBoard, although other platforms can be added over time. Maxim provides complete Xilinx ISE projects containing HDL, Platform Studio, and SDK projects. In addition, a synthesized bitstream, ready for FPGA download, is provided for the demonstration application.

Table 1. Connector J1 (SPI Communication)

PIN	SIGNAL	DESCRIPTION
1	SS	Chip enable. Must be asserted low to enable the SPI interface.
2	N.C.	Not connected
3	MISO	Serial-data output
4	SCK	Serial-clock input
5	GND	Ground
6	VCC	Power supply

The software project (for the SDK) contains several source files intended to accelerate customer evaluation and design. These include a base application (maximModules.c) that demonstrates module functionality and uses an API interface (maximDeviceSpecific Utilities.c) to set and access Maxim device functions within a specific module.

The source code is written in standard ANSI C format, and all API documentation including theory/operation, register description, and function prototypes are documented in the API interface file (maximDeviceSpecificUtilities.h & .c).

The complete software kit is available for download at **www.maxim-ic.com**. Quick start instructions are also available as a separate document.

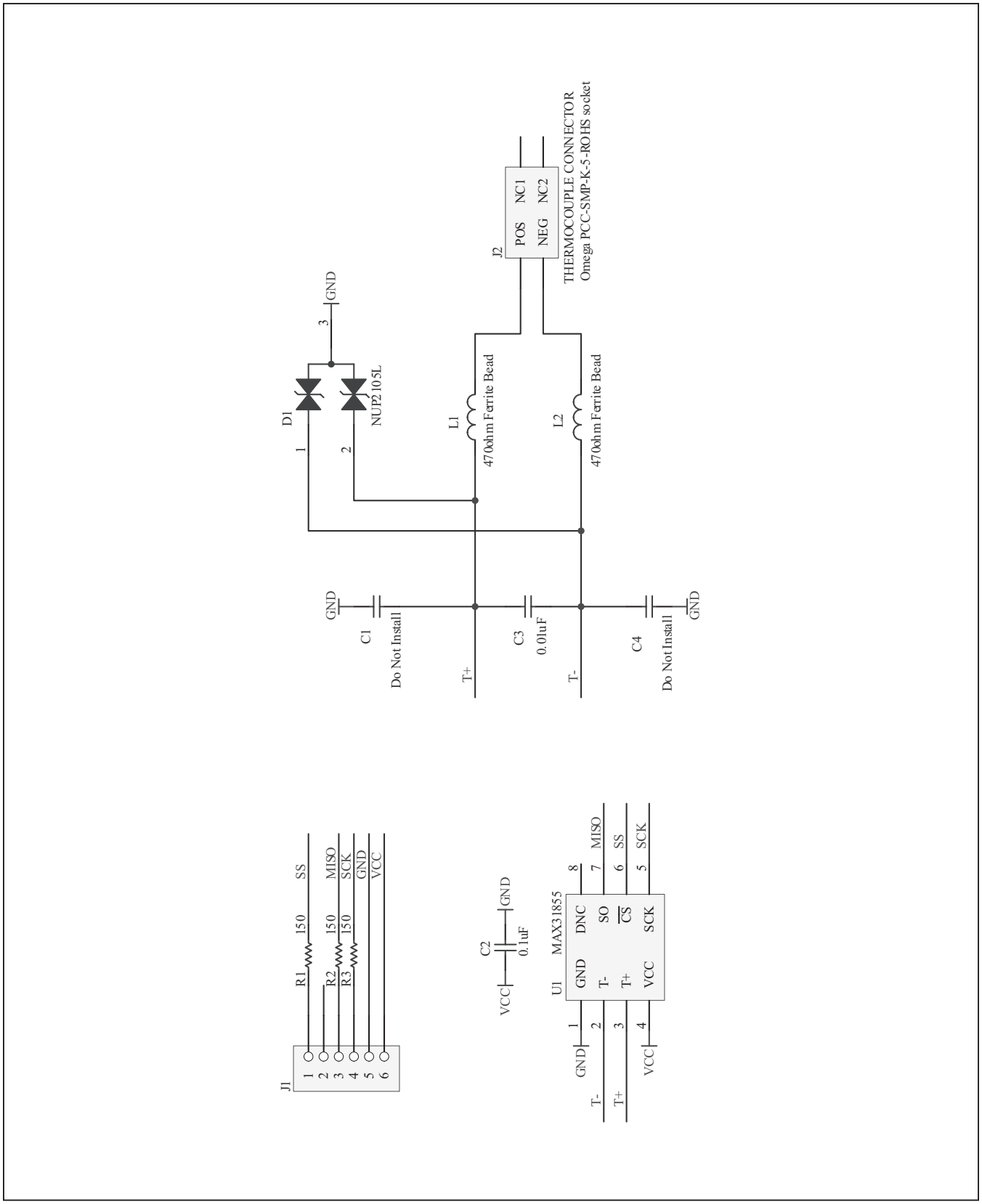


Figure 1. MAX31855PMB1 Peripheral Module Schematic

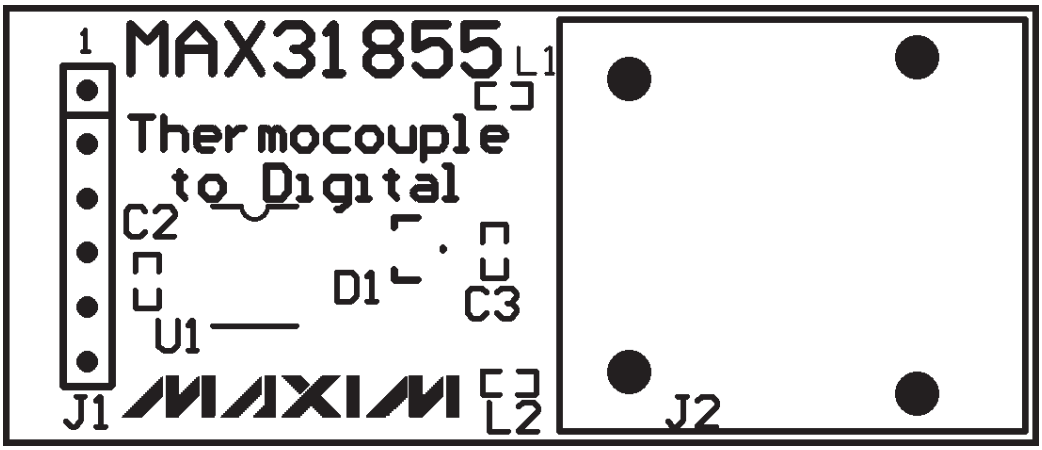


Figure 2. MAX31855PMB1 Peripheral Module Component Placement Guide—Component Side

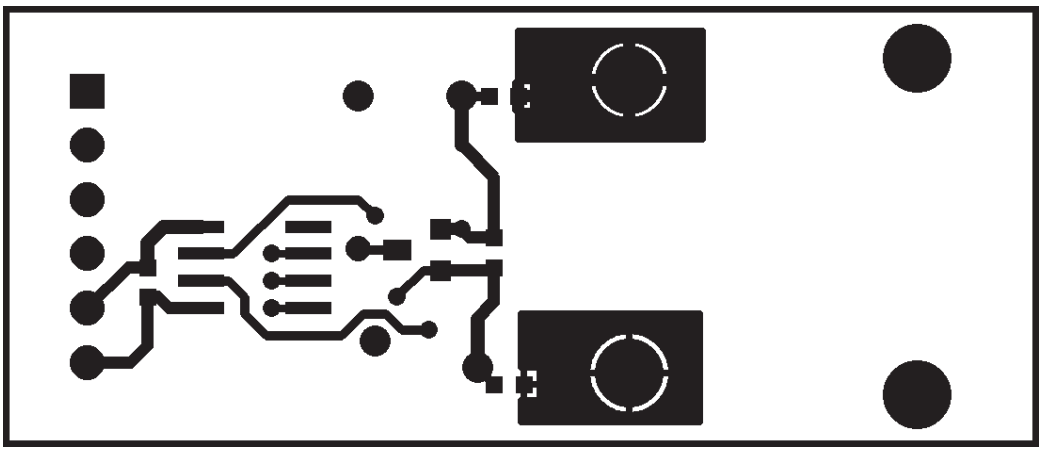


Figure 3. MAX31855PMB1 Peripheral Module PCB Layout—Component Side

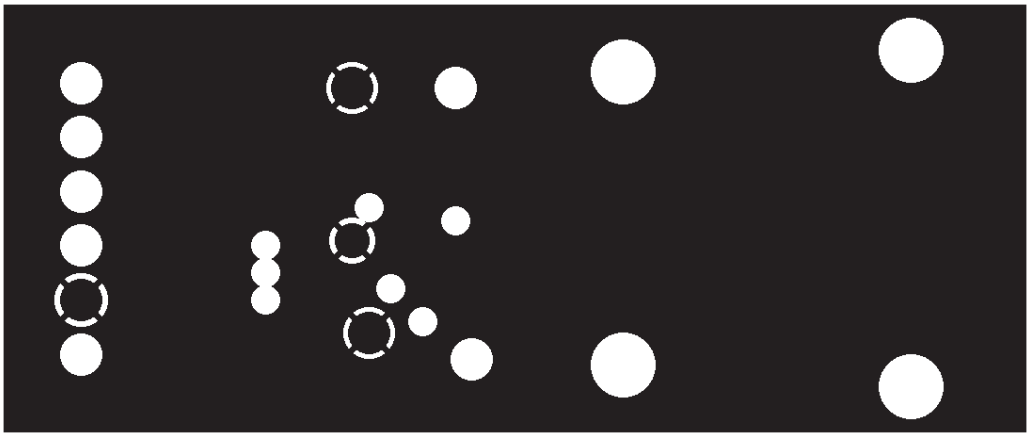


Figure 4. MAX31855PMB1 Peripheral Module PCB Layout—Inner Layer 1 (Ground)

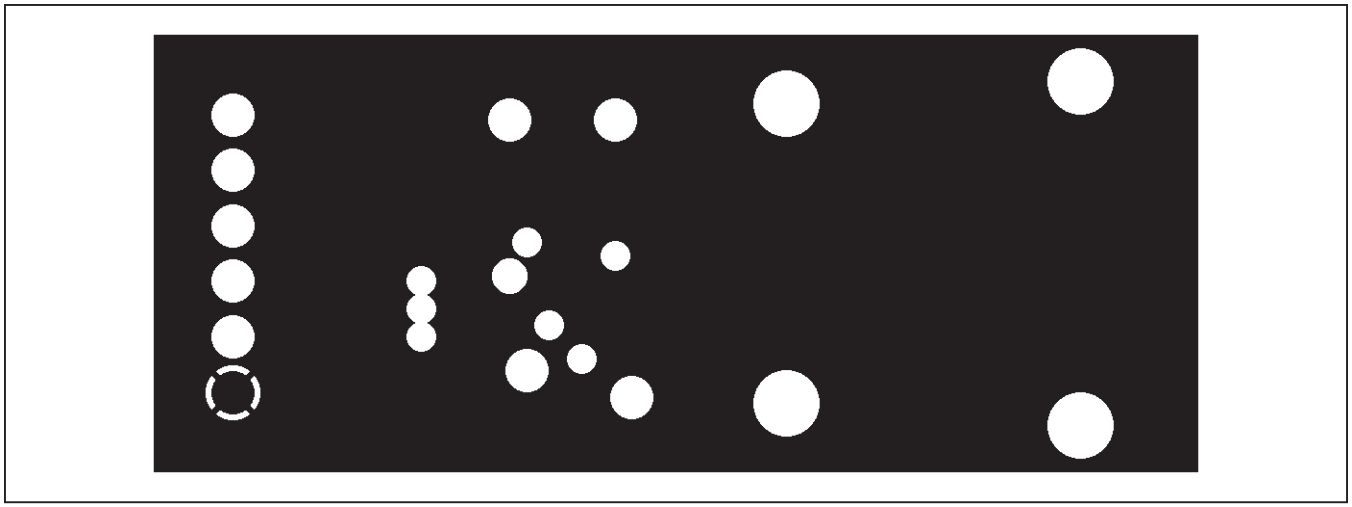


Figure 5. MAX31855PMB1 Peripheral Module PCB Layout—Inner Layer 2 (Power)

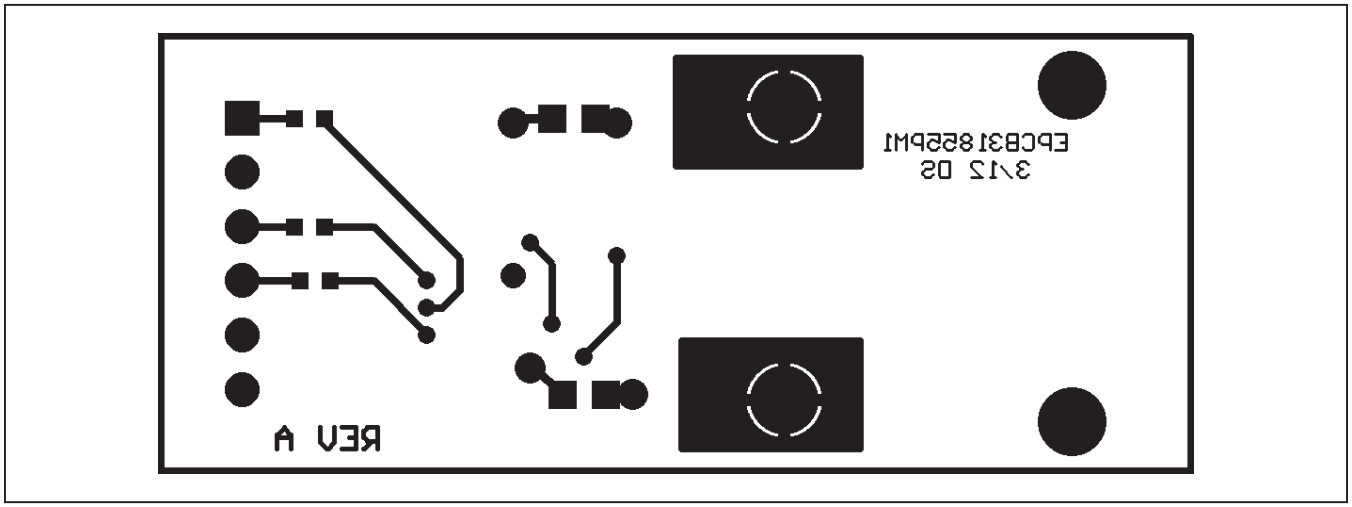


Figure 6. MAX31855PMB1 Peripheral Module PCB Layout—Solder Side

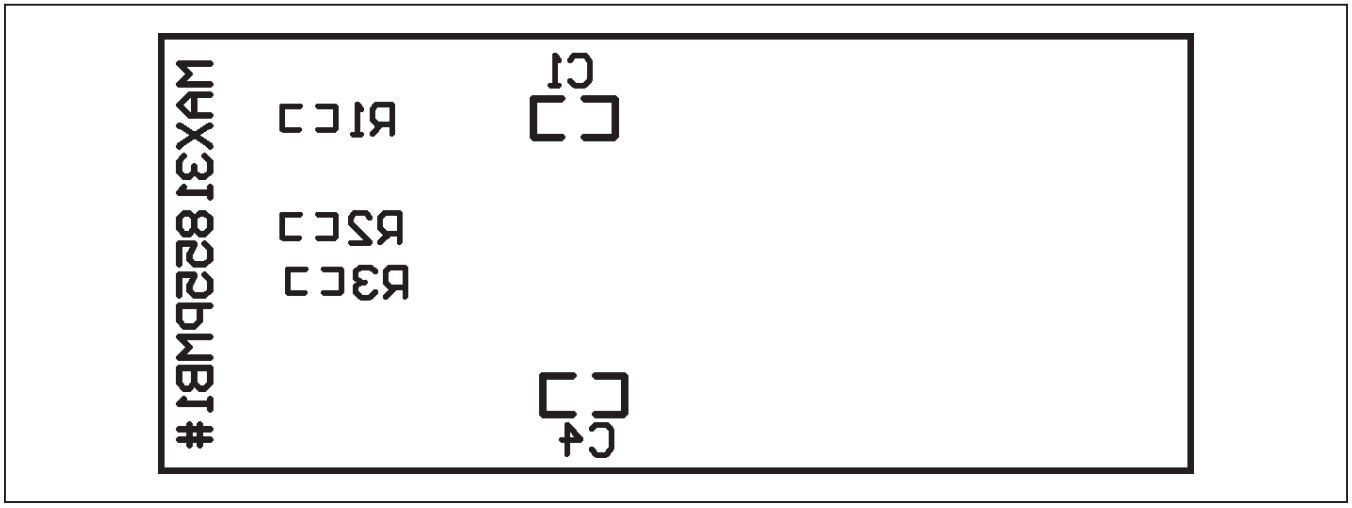


Figure 7. MAX31855PMB1 Peripheral Module Component Placement Guide—Solder Side

Ordering Information

PART	TYPE
MAX31855PMB1#	Peripheral Module

#Denotes RoHS compliant.

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	5/12	Initial release	—