



# MAX1358 Evaluation Kit

Evaluates: MAX1358

## General Description

The MAX1358 evaluation kit (EV kit) is a convenient platform to evaluate the capabilities of the MAX1358 data-acquisition system. The EV kit contains all the hardware necessary to interface to a PC and run application software.

## Ordering Information

PART	TYPE	PC INTERFACE	INTERFACE TYPE
MAX1358EVKIT#	EV Kit	RS-232	Windows XP®

#Denotes RoHS compliant.

## Features

- ◆ MAX1358 Data-Acquisition System
- ◆ Graphical User Interface (GUI) for EV Kit Control
- ◆ MAXQ2000 Microcomputer
  - 64kB (32k x 16) Flash Memory
  - 2kB (1k x 16) Data RAM
- ◆ UART-to-RS-232 Physical Interface
- ◆ Serial Memories
  - 2kB IIC EEPROM
  - 4kB SPI™ EEPROM
  - 512 Bytes 1-Wire
- ◆ Internal and External Temperature Sensors
- ◆ MAX1358 Internal Temperature Sensors
  - External Transistor Temperature Sensor
  - External Linear Temperature Sensor
  - External Thermistor
- ◆ Piezo Buzzer

## Component List

DESIGNATION	QTY	DESCRIPTION
1Y1–1Y4, 2Y1, V203A, V203B, V2P5, VTST	9	Test points Keystone 5011 Digi-Key 5011K-ND
C1	1	0.001µF ±20% nonpolarized ceramic capacitor KEMET C0805C102M5RACTU Digi-Key 399-1146-1-ND
C2–C5, C7, C14, C16, C22, C28, C30, C33, C34, C35, C36	14	10µF ±10% nonpolarized ceramic capacitors KEMET C0805C106K9PACTU Digi-Key 399-3138-1-ND
C6, C20, C23, C24, C25, C26, C27	7	1µF ±10% nonpolarized ceramic capacitors KEMET C0805C105K8RACTU Digi-Key 399-1172-1-ND
C8, C9, C12, C13, C15, C18, C19, C21, C31	9	0.1µF ±10% nonpolarized ceramic capacitors KEMET C0805C104K4RACTU Digi-Key 399-1167-1-ND
C10, C11, C29, C32	4	22pF ±5% nonpolarized ceramic capacitors KEMET C0805C220J5GACTU Digi-Key 399-1113-1-ND

DESIGNATION	QTY	DESCRIPTION
C17	1	4.7µF ±10% nonpolarized ceramic capacitor KEMET C0805C475K8PACTU Digi-Key 399-3133-1-ND
D1, D5	2	Green LEDs LiteOn LTST-C150GKT Digi-Key 160-1169-1-ND
D2	1	Amber LED LiteOn LTST-C150AKT Digi-Key 160-1166-1-ND
D3	1	Red LED LiteOn LTST-C150CKT Digi-Key 160-1167-1-ND
D4	1	Diode ON Semi MMBD6050LT1G Digi-Key MMBD6050LT1GOSCT-ND
D6	1	Transient voltage suppressor ON Semi 1N6376G Digi-Key 1N6376GOS-ND
F1	1	4A fast-acting fuse Littelfuse 0459004.UR Digi-Key F1171CT-ND

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## Component List (continued)

DESIGNATION	QTY	DESCRIPTION
J1	1	26 x 2-pin header, 0.100in Molex 10-89-7521 Digi-Key WM26952-ND
J2	1	20 x 2-pin header, 0.100in Molex 10-89-7401 Digi-Key WM26940-ND
J3	1	USB type-B connector Mill-Max 897-43-004-90-000000 Digi-Key ED90064-ND
J5	1	5-pin dual-row connector, 0.100in Molex 10-89-7101 Digi-Key WM26910-ND
J6, J7	2	DB-9 PC-mount connectors Amp/Tyco 5747844-4 Digi-Key A32117-ND
JU1, JU2, JU4, JU7–JU10, JU12–JU16, JU20–JU23, JU26, JU29, JU30, JU32, JU34, JU36, JU37, JU38, JU41–JU66	50	2-pin headers, 0.100in Molex 22-28-4021 Digi-Key WM6602-ND
JU17, JU18, JU19, JU25, JU28, JU31, JU33, JU35, JU39, JU40, JU67, JU68	12	3-pin headers, 0.100in Molex 22-28-4031 Digi-Key WM6603-ND
L4	1	15 $\mu$ H $\pm$ 10% surface-mount inductor TDK NLC453232T-150K-PF Digi-Key 445-1958-1-ND
Q1	1	npn transistor ON Semi MMBT3904LT1G Digi-Key MMBT3904LT1GOSCT-ND
R1	1	100k $\Omega$ $\pm$ 10% NTC thermistor Vishay (Dale) NTHS1206N01N1003KE Digi-Key 541-1145-1-ND
R2	1	100k $\Omega$ $\pm$ 1% precision thick-film-chip resistor Panasonic ERJ-6ENF1003V Digi-Key P100KCCT-ND

DESIGNATION	QTY	DESCRIPTION
R3, R18	2	15k $\Omega$ $\pm$ 1% precision thick-film-chip resistors Panasonic ERJ-6ENF1502V Digi-Key P15.0KCCT-ND
R5, R19	2	12.1k $\Omega$ $\pm$ 1% precision thick-film-chip resistors Panasonic ERJ-6ENF1212V Digi-Key P12.1KCCT-ND
R6, R14	2	33.2 $\Omega$ $\pm$ 1% precision thick-film-chip resistors Panasonic ERJ-14NF33R2U Digi-Key P33.2AACT-ND
R8, R9, R10	3	10k $\Omega$ $\pm$ 1% precision thick-film-chip resistors Panasonic ERJ-6ENF1002V Digi-Key P10.0KCCT-ND
R11, R15, R16	3	133 $\Omega$ $\pm$ 1% precision thick-film-chip resistors Panasonic ERJ-6ENF1330V Digi-Key P133CCT-ND
R12, R13	2	1k $\Omega$ $\pm$ 1% precision thick-film-chip resistors Panasonic ERJ-6ENF1001V Digi-Key P1.00KCCT-ND
R17, R20	2	17.8k $\Omega$ $\pm$ 1% precision thick-film-chip resistors Panasonic ERJ-6ENF1782V Digi-Key P17.8KCCT-ND
R21	1	19.1k $\Omega$ $\pm$ 1% precision thick-film-chip resistor Panasonic ERJ-6ENF1912V Digi-Key P19.1KCCT-ND
R22	1	50k $\Omega$ carbon composition trimmer potentiometer Panasonic EVN-D2AA03B54 Digi-Key D1AA54-ND
R23	1	9.76k $\Omega$ $\pm$ 1% precision thick-film-chip resistor Panasonic ERJ-6ENF9761V Digi-Key P9.76KCCT-ND
SW1, SW2, SW3	3	Momentary PCB switches Omron B3S-1000 Mouser 653-B3S-1000

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## Component List (continued)

DESIGNATION	QTY	DESCRIPTION
U1	1	Low-power LCD microcontroller (68 QFN-EP*) Maxim MAXQ2000-RAX+
U2	1	Low-voltage analog temp sensor (5 SC70) Maxim MAX6607IXK+
U3	1	Smart data-acquisition system (40 TQFN-EP*) Maxim MAX1358BETL+
U4	1	4kB SPI EEPROM Atmel AT25320AN-10SU-1.8 Digi-Key AT25320AN10SU-1.8-ND
U5	1	2kB I <sup>2</sup> C EEPROM Atmel AT24C16BN-SH-B Digi-Key AT24C16BN-SH-B-ND
U6	1	4kb 1-wire EEPROM (8 SO) Maxim DS2433S+
U7	1	Octal buffer/driver with three-state outputs Texas Instruments SN74LV244ANSR Digi-Key 296-13230-1-ND
U8	1	1μA, 1.8V, RS-232 transceiver (20 SSOP) Maxim MAX3218CAP+
U9	1	USB peripheral controller with SPI interface (24 TQFN-EP*) Maxim MAX3420EETG+

DESIGNATION	QTY	DESCRIPTION
U10	1	150mA LDO linear regulator (6 SOT23) Maxim MAX6349TLUT+
U11, U12, U13	3	16.5V input, 300mA LDO regulators (8 SO) Maxim MAX1658ESA+
U14	1	Low-input-voltage, 300mA LDO regulator (6 thin SOT23) Maxim MAX1976AEZT250+
Y1, Y4	2	32.768kHz tuning-fork crystals ECS ECS-327-6-17X-TR Digi-Key XC1307CT-ND
Y2	1	7.3728MHz quartz crystal ECS ECS-73-20-5PXDND-TR Digi-Key XC1296CT-ND
Y3	1	12MHz quartz crystal ECS ECS-120-20-5PXDND-TR Digi-Key XC1298CT-ND
Y5	1	Piezoelectric buzzer, 13mm Murata PKM13EPYH4002-B0 Mouser 81-PKM13EPYH4002-B0
—	30	Shunts, 2-pin (see Table 1) Kycon S1100-B Jameco 160882 or equivalent
—	1	PCB: MAX1358 EVALUATION KIT#

\*EP = Exposed pad.

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## Component Suppliers

SUPPLIER	PHONE	WEBSITE
Digi-Key Corp.	800-344-4539	www.digikey.com
ECS, Inc. International	800-237-1401	www.ecsxtal.com
Jameco Electronics	—	www.jameco.com
KEMET Corp.	864-963-6300	www.kemet.com
Kycon, Inc.	408-494-0330	www.kycon.com
Keystone Electronics Corp.	209-796-2032	www.keyelco.com
Littelfuse	—	www.littelfuse.com
Molex	800-786-6539	www.molex.com
Mouser Electronics	—	www.mouser.com
Murata Electronics North America, Inc.	770-436-1300	www.murata-northamerica.com
Panasonic Corp.	800-344-2112	www.panasonic.com
ON Semiconductor	602-244-6600	www.onsemi.com
TDK Corp.	847-803-6100	www.component.tdk.com
Vishay	402-563-6866	www.vishay.com

**Note:** Indicate that you are using the MAX1358 when contacting these component suppliers.

## Quick Start

### Required Equipment

- MAX1358 EV kit PCB
- RS-232 serial-port cable for GUI
- 12V, 1.5A DC power supply
- MAX1358 EV kit quick-start CD-ROM
- Additional shunts for jumper configuration

### Detailed Description of Hardware

The MAX1358 has an analog front-end featuring a 16-bit sigma-delta ADC and dual 10-bit force-sense DACs. Refer to the MAX1358 IC data sheet for complete details.

### Power Supply

The MAX1358 EV kit is powered by the external 12V DC power supply that is included in the kit. The external power supply provides power to the voltage regulators used for AVDD, DVDD, and VDD.

### Temperature Sensors

The MAX1358 IC contains an internal temperature sensor and the EV kit contains three external temperature sensors. One external temperature sensor is a common 2N3904 transistor connected as a pn junction. The

application software sets two current sources and measures the voltage across the junction for each current. The junction temperature is then determined through a simple equation. The second external sensor is the MAX6607, which provides a linear voltage with temperature. The output voltage is measured using an ADC input and the temperature is calculated using the MAX6607 transfer function. The third temperature sensor is a precision thermistor with a negative temperature coefficient. The voltage across the thermistor is measured with the ADC and the temperature is calculated from the thermistor equation.

### External LCD

The EV kit's MAXQ2000 (U1) contains an LCD driver capable of driving a 100/132-segment LCD display. The LCD driver signals are brought out on connector J1.

### Utility LEDs

The MAX1358 EV kit contains three LEDs (red, amber, and green), which can be configured using general-purpose I/O bits.

### Prototype Header

The MAX1358 analog inputs and associated switches and GPIOs are brought out on connector J2. These pins can be used with the prototype area to configure the user's end application.

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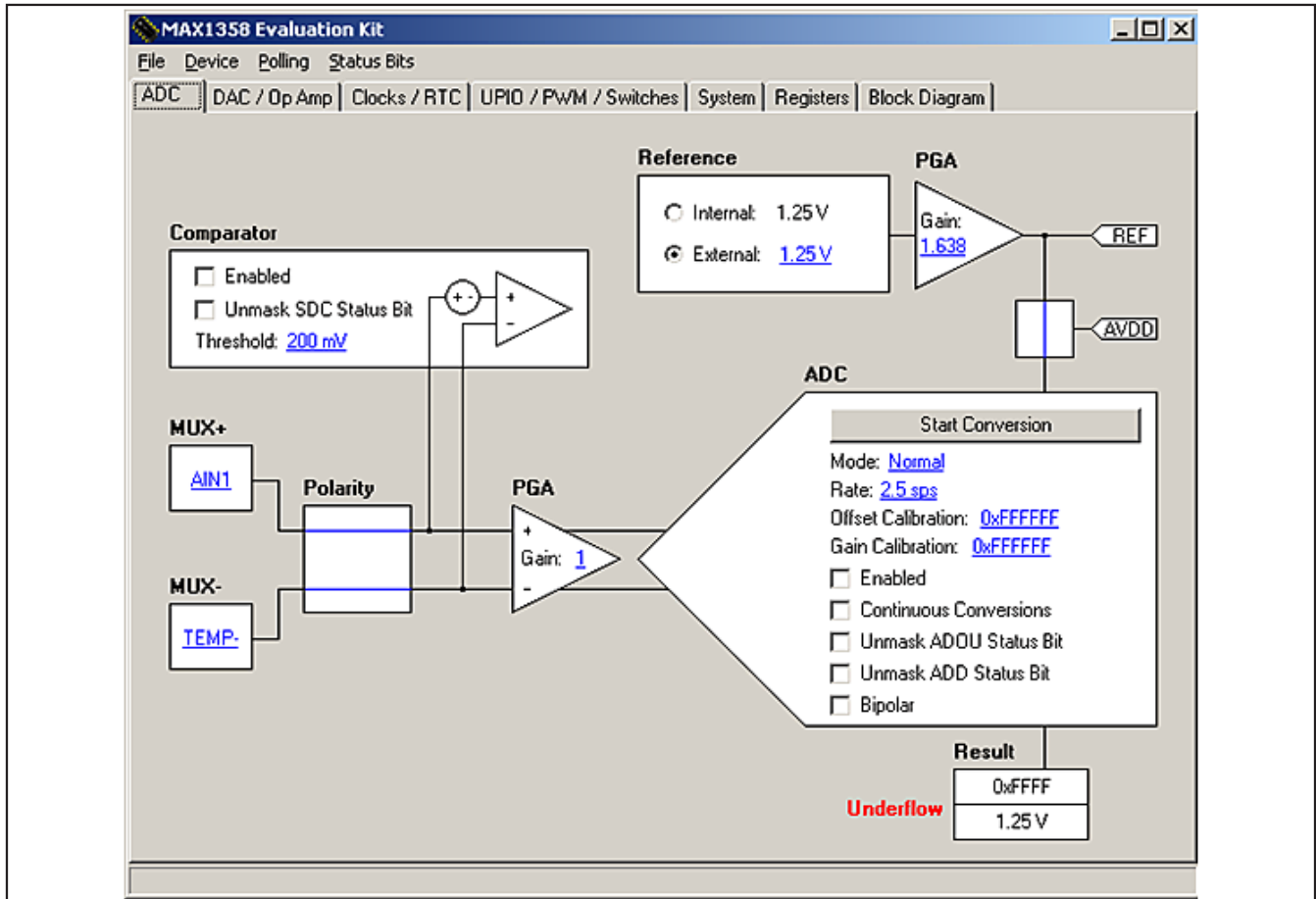


Figure 1. MAX1358 Graphical User Interface

## SPI-to-USB Interface

A MAX3420 SPI-to-USB interface is provided for the user to develop communication from the MAXQ2000 SPI bus to an external USB interface.

## RS-232 Ports

The MAXQ2000 has two UART ports available for serial communication. The first port (UART 1 on J7) is reserved for communication with the GUI. The second UART port (UART2) is available on J6 for user-code development.

## JTAG Interface

The MAXQ2000 can be reprogrammed through the JTAG interface. The standard 10-pin connector (J5) is reserved for the JTAG interface. A separate JTAG interface board (not included) is available for MAXQ2000 code development.

## Getting Started with the Graphical User Interface (GUI)

The MAXQ2000 comes preloaded with application firmware for communication with the GUI. The EV kit quick-start CD-ROM contains the application software for the PC. Copy the MAX1358R10.exe file from the CD to an appropriate directory on the PC hard drive.

## Connect the PC to the EV Kit

The serial port on the PC controls the EV kit. The EV kit uses the MAXQ2000 UART to communicate with the PC. Connect the PC serial port cable from the PC's serial port to J7 on the EV kit.

## MAX1358 EV Kit GUI

To exercise the features of the MAX1358, the GUI developed for the EV kit is used. To invoke the GUI, select the file MAX1358R10.exe. The application launches and appears, as shown in Figure 1.

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### Select the Serial Port

The serial port that will be used to communicate with the EV kit needs to be set. From the applications File menu, select the Connect menu item. A popup box appears, as shown in Figure 2. Select the COM port that will be used to communicate with the EV kit.

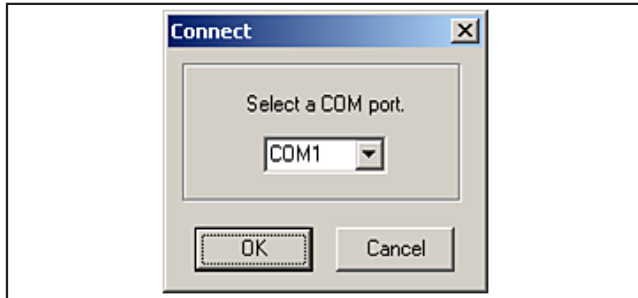


Figure 2. MAX1358 GUI Connect Box

### Default Jumper Settings

The MAX1358 has a number of jumpers configured by default to quickly start using the EV kit. The default settings are shown in Table 1. For additional jumper settings, see the MAX1358 EV kit schematics.

Table 1. Jumper Settings

JUMPER	DEFAULT JUMPER POSITION
JU18–JU23, JU25, JU26, JU28, JU29, JU31–JU34, JU36, JU38, JU39, JU40, JU42, JU43, JU44, JU53, JU57–JU60, JU62–JU65	1-2
JU67, JU68	2-3

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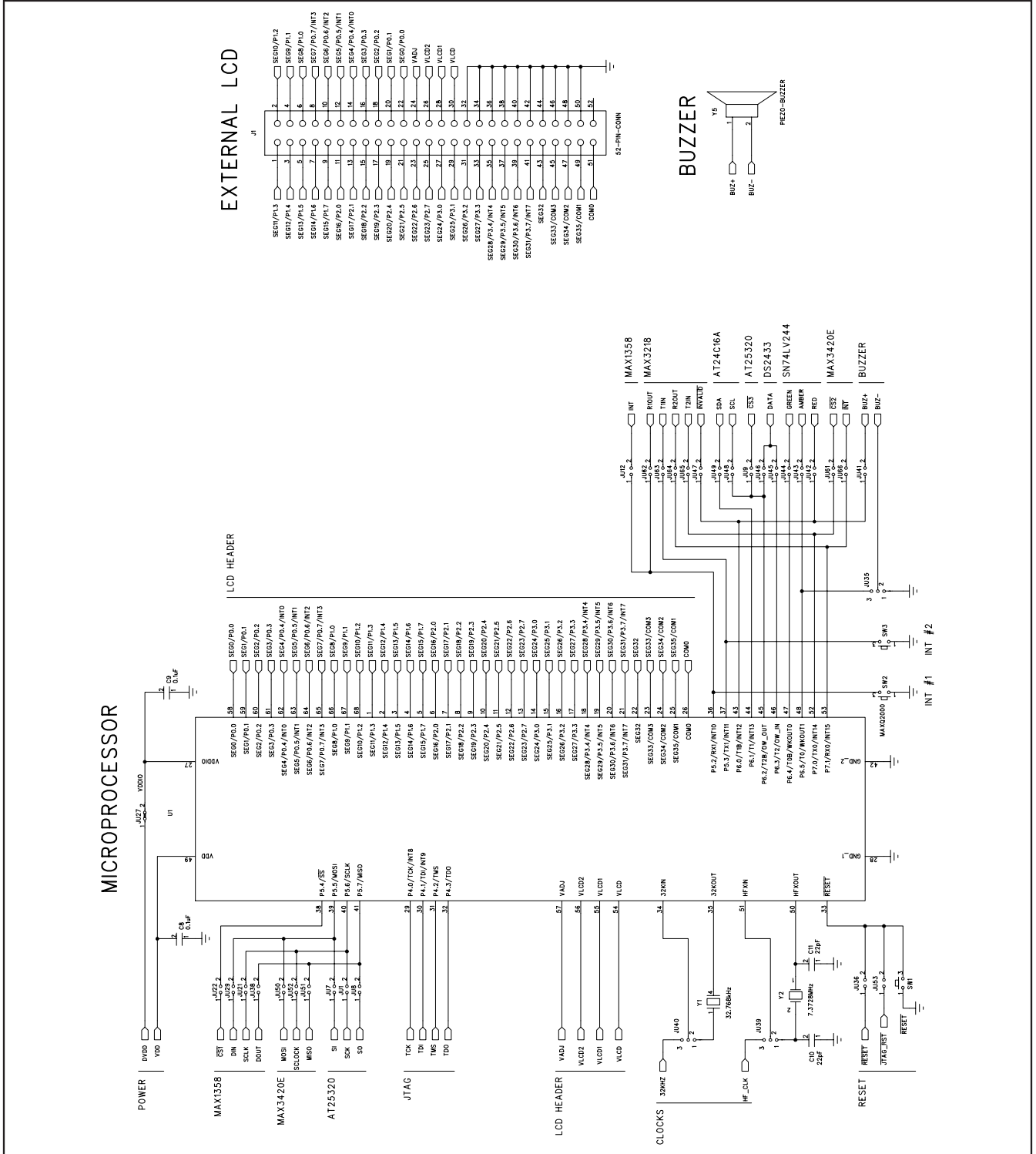


Figure 3a. MAX1358 Evaluation Kit Schematic (Sheet 1 of 5)

# MAX1358 Evaluation Kit

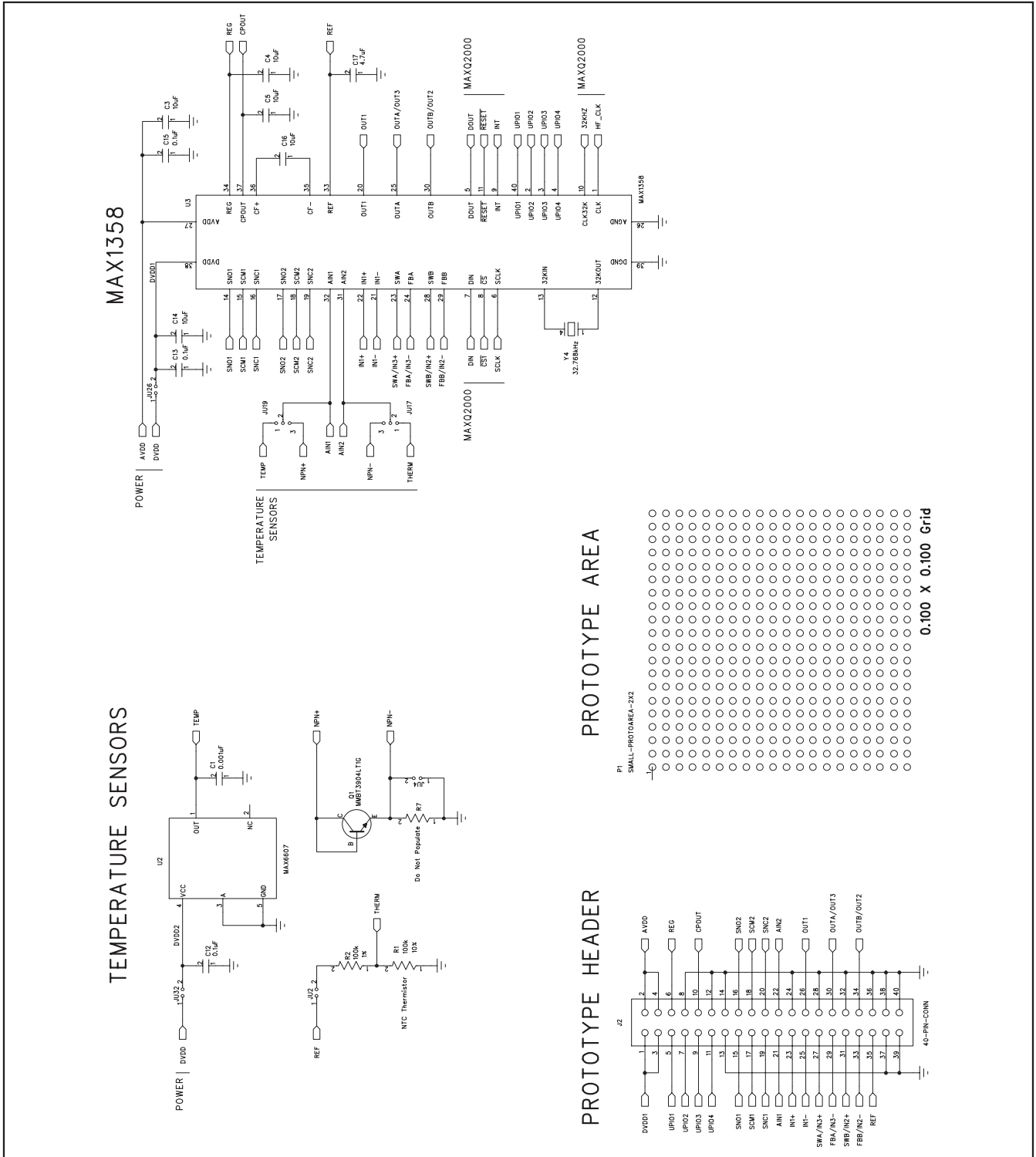


Figure 3b. MAX1358 Evaluation Kit Schematic (Sheet 2 of 5)



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Evaluates: **MAX1358**

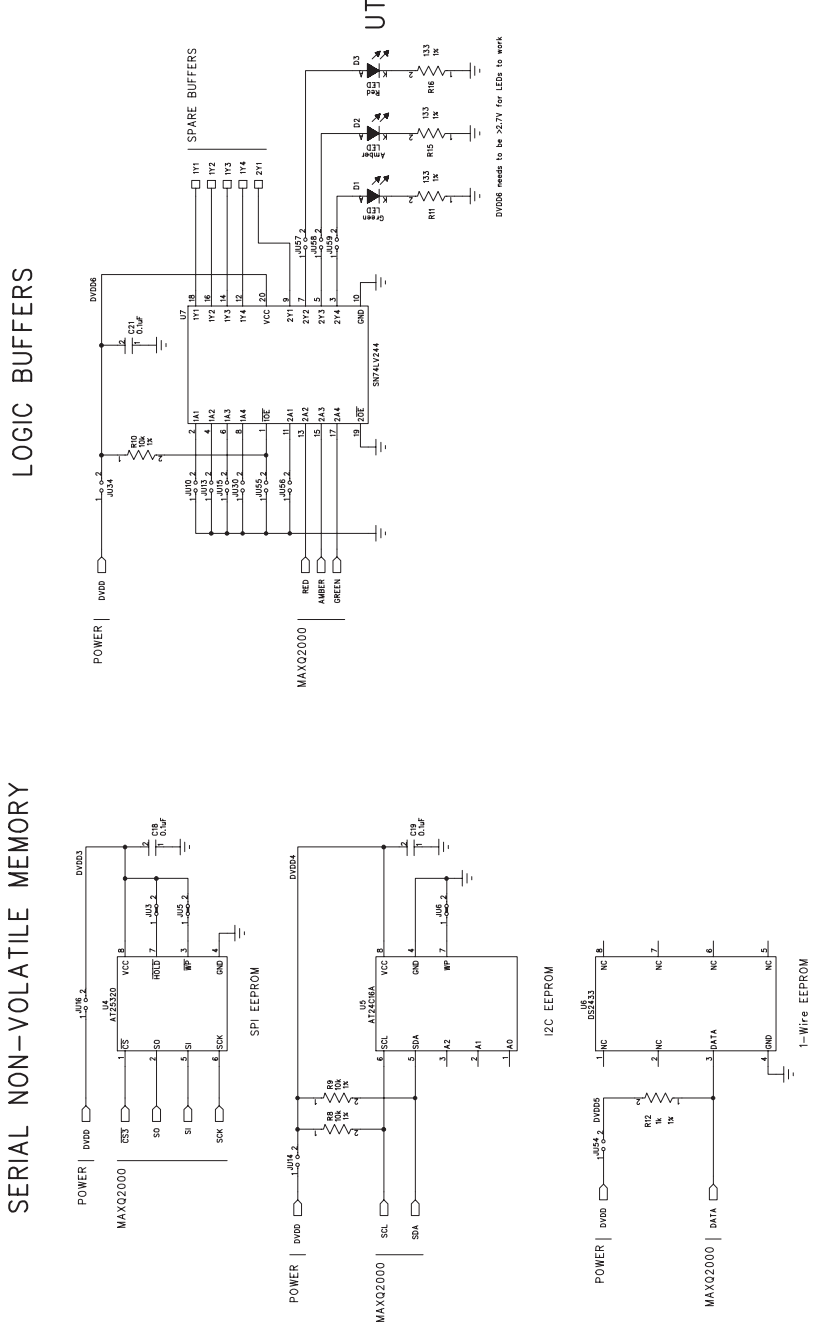


Figure 3c. MAX1358 Evaluation Kit Schematic (Sheet 3 of 5)

# MAX1358 Evaluation Kit

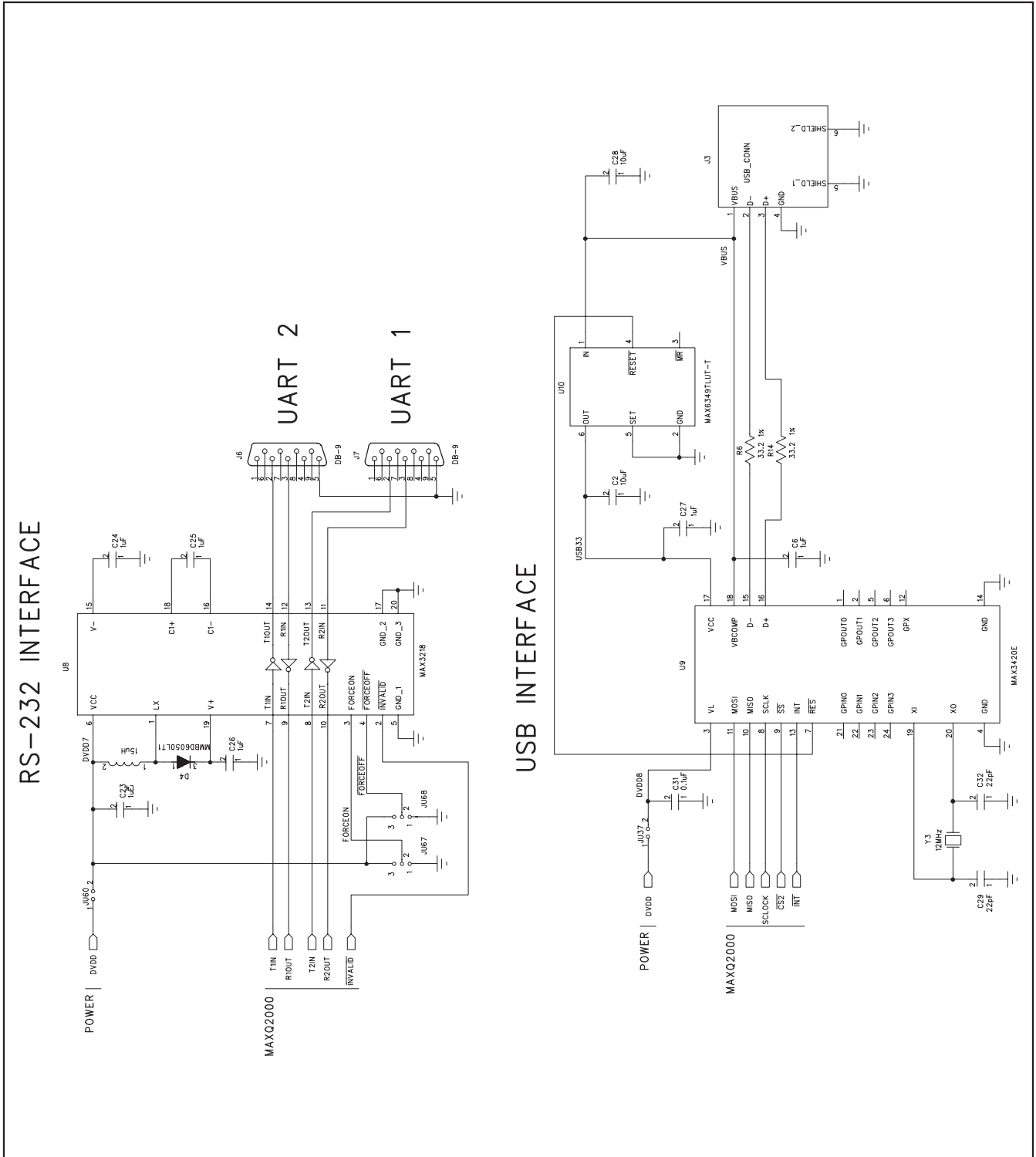


Figure 3d. MAX1358 Evaluation Kit Schematic (Sheet 4 of 5)

# MAX1358 Evaluation Kit

Evaluates: MAX1358

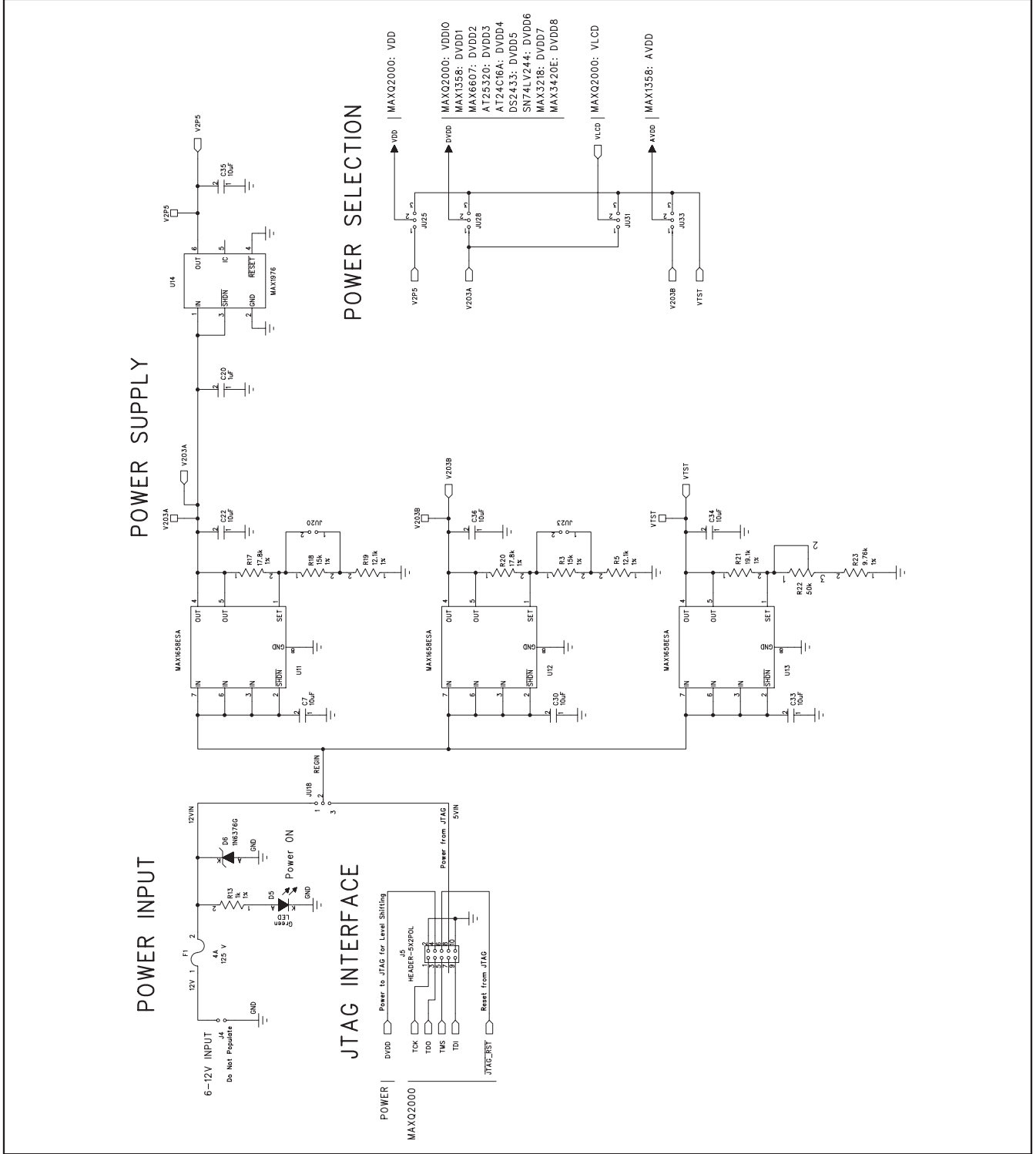


Figure 3e. MAX1358 Evaluation Kit Schematic (Sheet 5 of 5)

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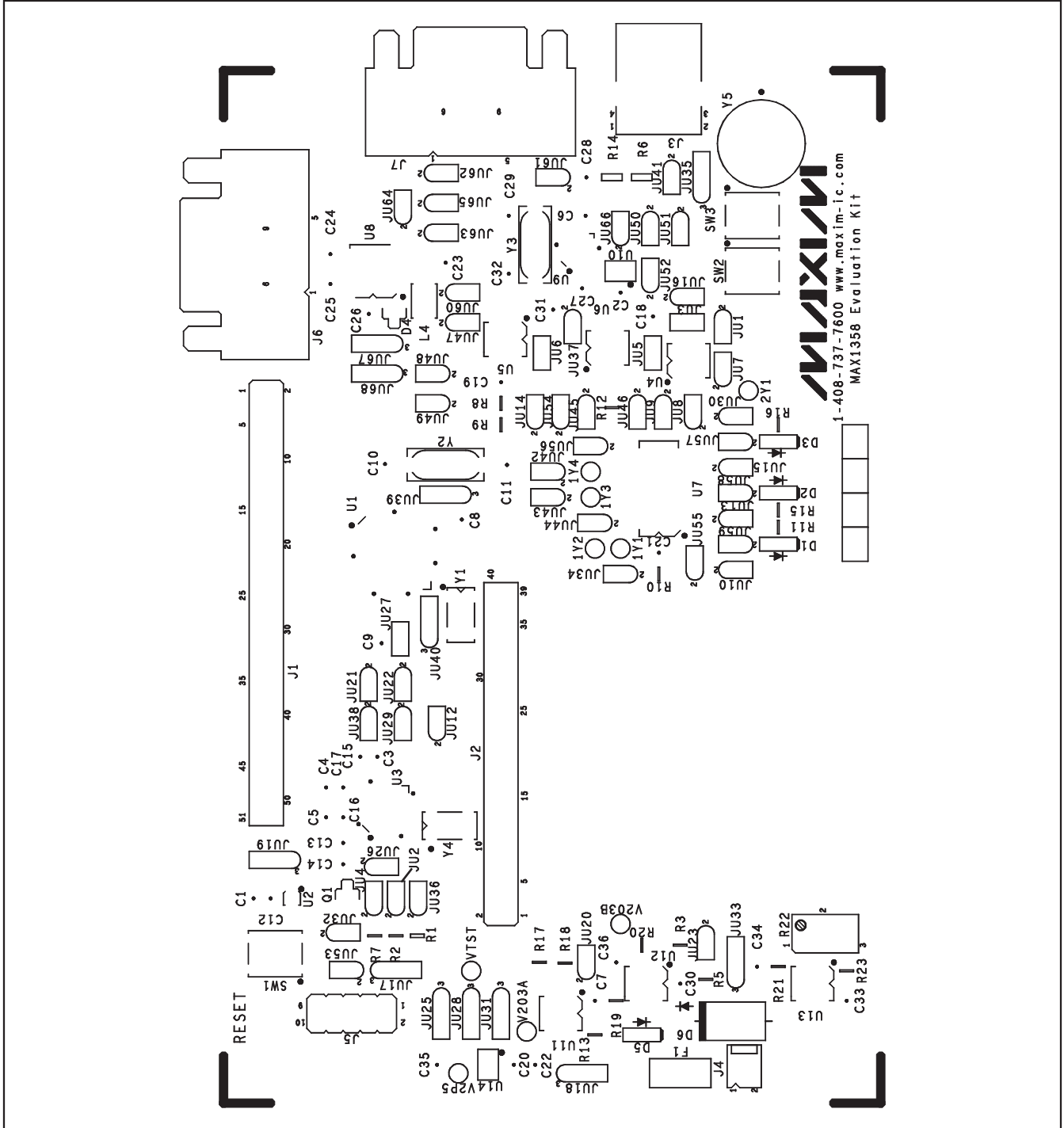


Figure 4. MAX1358 Evaluation Kit Component Placement Guide

# MAX1358 Evaluation Kit

Evaluates: MAX1358

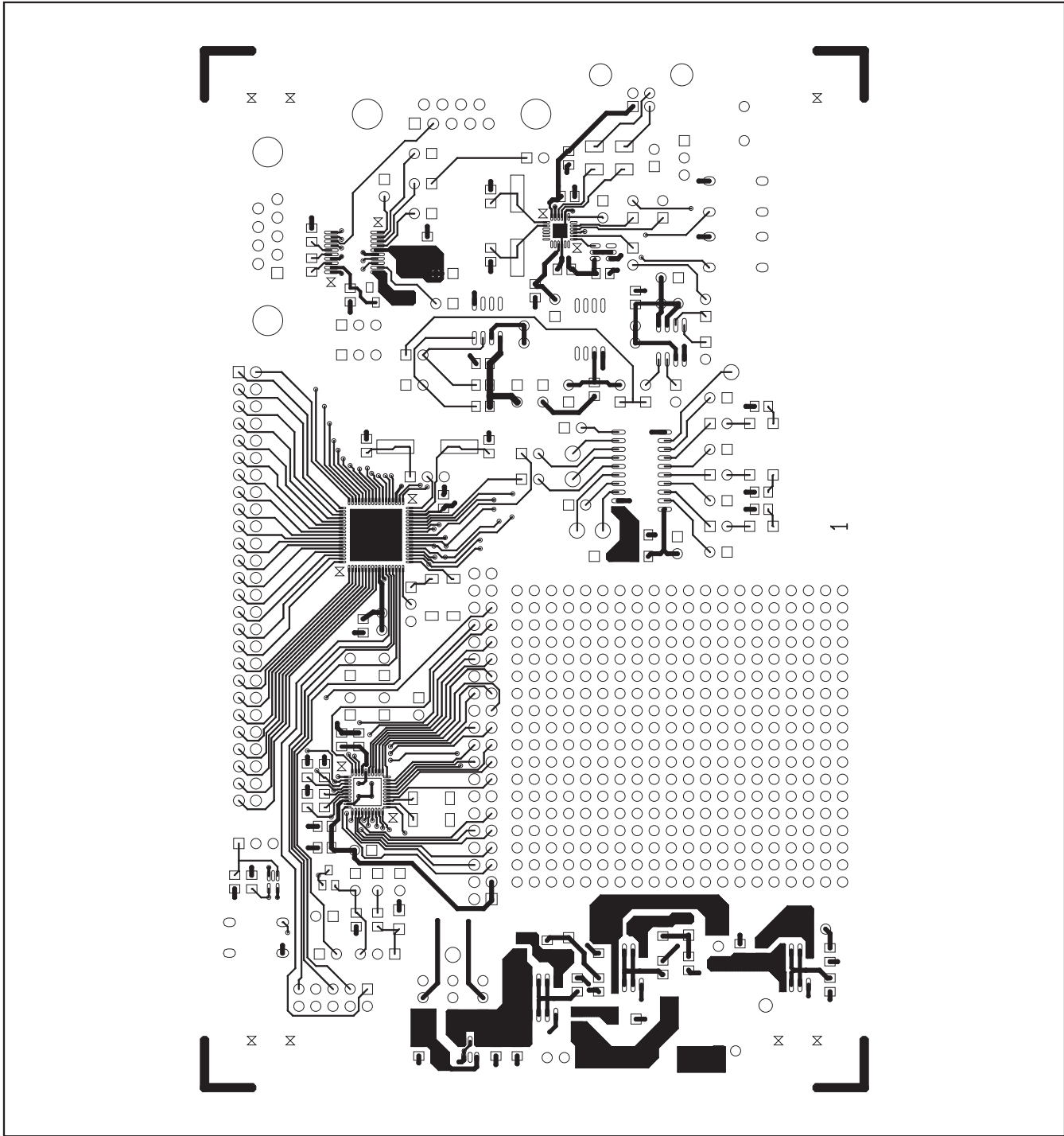


Figure 5. MAX1358 Evaluation Kit PCB Layout—Component Side

# MAX1358 Evaluation Kit

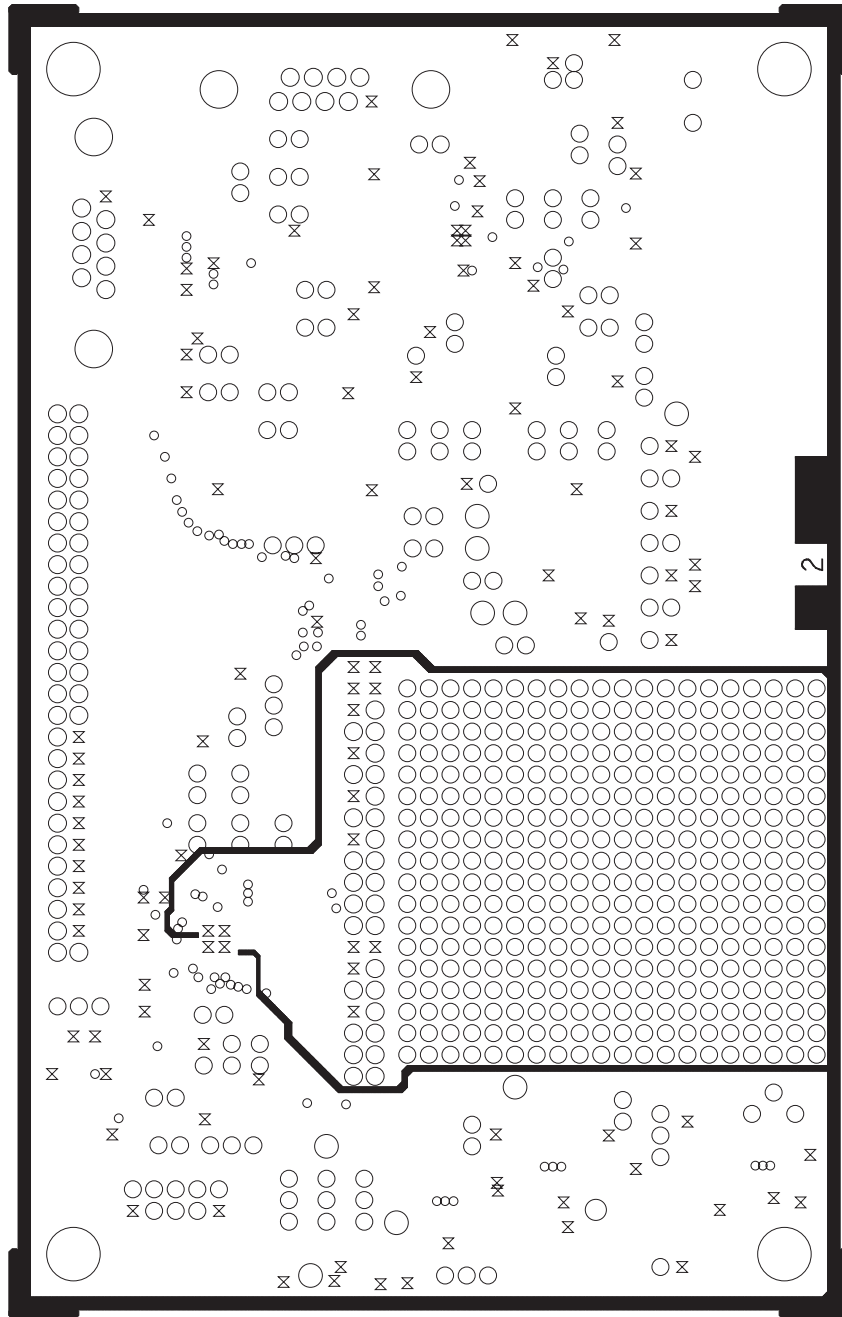


Figure 6. MAX1358 Evaluation Kit PCB Layout—Ground Layer 2

# MAX1358 Evaluation Kit

Evaluates: **MAX1358**

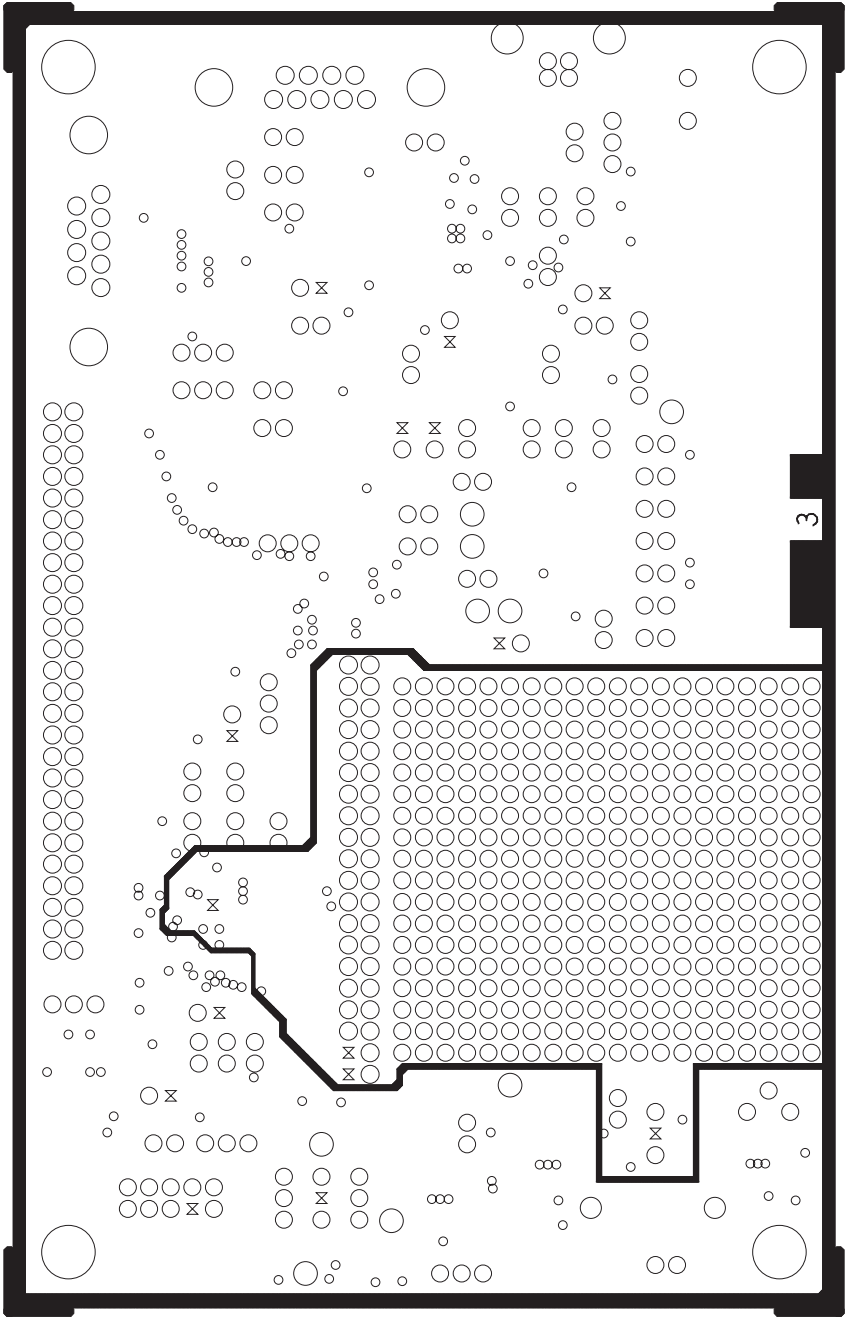


Figure 7. MAX1358 Evaluation Kit PCB Layout—VCC Layer 3

# MAX1358 Evaluation Kit

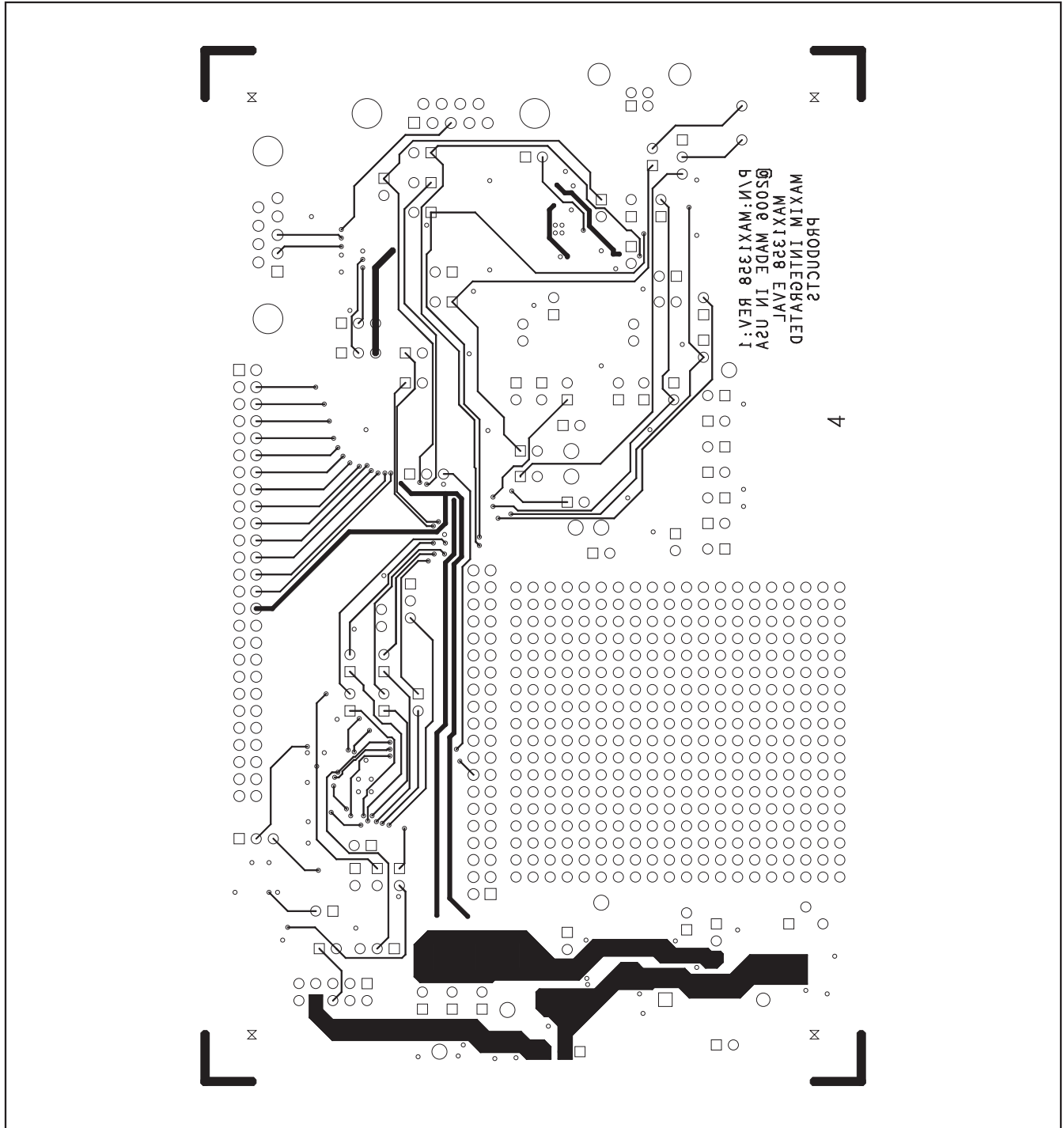


Figure 8. MAX1358 Evaluation Kit PCB Layout—Solder Side



# MAX1358 Evaluation Kit

Evaluates: MAX1358

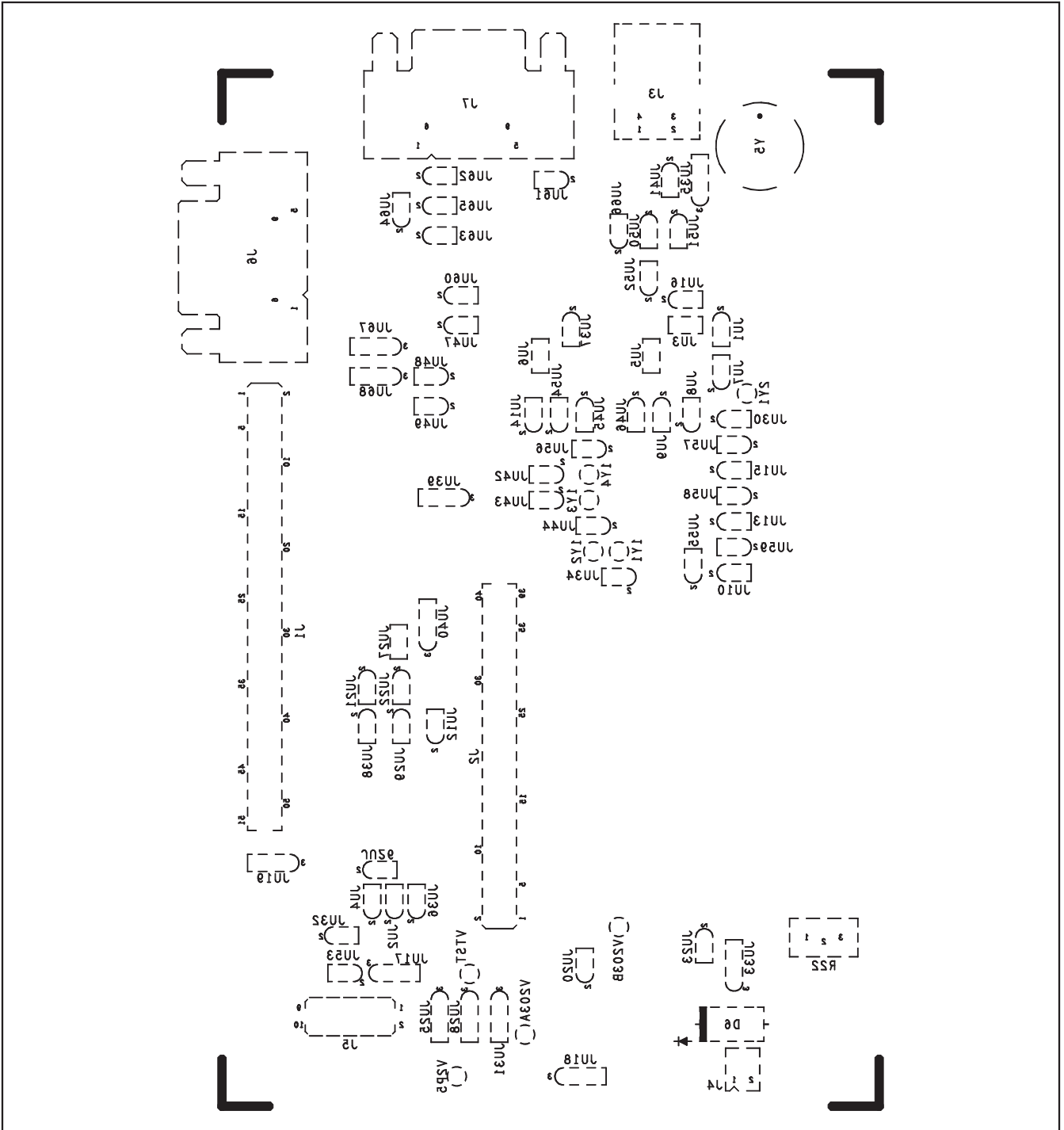


Figure 9. MAX1358 Evaluation Kit Component Placement Guide—Solder Side

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