

MAX5395L Evaluation Kit

Evaluates: MAX5395L—MAX5395N

General Description

The MAX5395L evaluation kit (EV kit) demonstrates the MAX5395L single, 256-tap volatile, low-voltage linear digital potentiometer. The device comes in an 8-pin TDFN-EP package. The EV kit provides controls to adjust the wiper and shutdown modes.

The digital potentiometer is controlled by an on-board MAXQ® microcontroller that provides an I²C interface. The EV kit features Windows XP®, Windows Vista®, and Windows® 7-compatible software that provides a simple graphical-user interface (GUI) for exercising the device features.

The EV kit comes with the MAX5395LATA+ (10kΩ end-to-end resistance) installed. Contact the factory for samples of the pin-compatible MAX5395MATA+ (50kΩ end-to-end resistance) and MAX5395NATA+ (100kΩ end-to-end resistance).

Component List

DESIGNATION	QTY	DESCRIPTION
BYP, CS ADDR0 CS/L, DIN SDA UD, H, L, QPEDB ADDR1, SCLK SCL INC/L, W	8	White test points
B_INC/L	1	Pushbutton switch
C1, C3, C23	3	0.1µF ±10%, 16V X7R ceramic capacitors (0603) TDK C1608X7R1C104K
C2	1	100pF ±5%, 50V C0G ceramic capacitor (0603) Murata GQM1885C1H101J
C5–C18, C24	15	1µF ±10%, 16V X5R ceramic capacitors (0603) Murata GRM188R61C105K
C19, C20	2	18pF ±5%, 50V C0G ceramic capacitors (0603) Murata GRM1885C1H180J

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Features

- 1.7V to 5.5V Wide Input Supply Range
- Supports All I²C Family of Devices: 10kΩ, 50kΩ, and 100kΩ End-to-End Resistance
- On-Board Microcontroller to Generate I²C Commands
- Windows XP-, Windows Vista-, and Windows 7-Compatible Software
- USB-Powered (Cable Included)
- Fully Assembled and Tested with Proven PCB Layout

[Ordering Information](#) appears at end of data sheet.

DESIGNATION	QTY	DESCRIPTION
C21	1	1000pF ±10%, 50V X7R ceramic capacitor (0603) Murata GRM188R71H102K
C25	0	Not installed, ceramic capacitor (0603)
GND	1	Black test point
J1	1	USB type-B right-angle PC-mount receptacle
J2	0	Not installed, 10-pin (2 x 5) header
J3	1	4-pin header
JU1	1	3-pin header
JU2	1	5-pin header
JU3, JU4	2	10-pin (2 x 5) headers
JU5	1	4-pin header
JU6, JU7	2	2-pin headers
JU_ID0–JU_ID3	0	Not installed. 2-pin headers
L1	1	Ferrite bead (0603) TDK MMZ1608R301A
R1–R3, R5–R9	8	4.7kΩ ±5% resistors (0603)

Component List (continued)

DESIGNATION	QTY	DESCRIPTION
R12	1	100Ω ±5% resistor (0603)
R13	1	10kΩ ±5% resistor (0603)
SW_A0, SW_A1, SW_UD	3	DIP switches
TP1–TP3	0	Not installed, test points
U1	1	50kΩ SPI digital potentiometer (8 TDFN-EP*) Maxim MAX5395LATA+
U2	0	Not installed, digital potentiometer (10 μMAX®)
U3–U5	3	Level translators (10 μMAX) Maxim MAX1840EUB+
U7	1	Microcontroller (64 LQFP) Maxim MAXQ622G-0000+

DESIGNATION	QTY	DESCRIPTION
U8	1	3.3V LDO (5 SC70) Maxim MAX8511EXK33+
U9	1	1.8V LDO (5 SC70) Maxim MAX8511EXK18+
U10	0	Not installed, ESD protector (6 SOT23)
VDD	1	Red test point
Y1	1	12MHz crystal (HCM49)
—	1	USB high-speed A-to-B cables, 6ft
—	6	Shunts
—	1	PCB: MAX5395L EVKIT

*EP = Exposed pad.

Component Suppliers

SUPPLIER	PHONE	WEBSITE
Murata Americas	800-241-6574	www.murataamericas.com
TDK Corp.	847-803-6100	www.component.tdk.com

Note: Indicate that you are using the MAX5395L when contacting these component suppliers.

MAX5395L EV Kit Files

FILES	DESCRIPTION
INSTALL.EXE	Installs the EV kit files on your computer
MAX539XVxx.EXE	Application program
USBConverterDLL.DLL	Application library
UNINSTALL.EXE	Uninstalls the EV kit software

Quick Start

Required Equipment

- MAX5395L EV kit (USB cable included)
- Windows XP, Windows Vista, or Windows 7 PC with a spare USB port
- Digital voltmeter (DVM)

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.

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Procedure

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

- 1) Verify that all jumpers are in their default positions, as shown in Table 1.
- 2) Set the DVM to measure resistance. Connect the negative terminal of the DVM to the L test point and connect the positive terminal to the W test point.
- 3) Visit www.maximintegrated.com/evkitsoftware to download the latest version of the EV kit software, MAX539XGUISetupVxx.ZIP. Save the EV kit software to a temporary folder and uncompress the ZIP file.
- 4) Install the EV kit software on your computer by running the INSTALL.EXE program inside the temporary folder. The program files are copied to your PC and icons are created in the Windows **Start | Programs** menu.
- 5) Connect the USB cable from the PC to the EV kit board; the USB driver is installed automatically.

- 6) Start the EV kit software by opening its icon in the **Start | Programs** menu. The EV kit software main window appears, as shown in Figure 1.
- 7) Move the wiper scrollbar up until the edit box shows **255**.
- 8) Press the **H = Open, W = Unchanged** button in the **Standby Commands** group box.
- 9) Verify that the DVM measures 10kΩ.

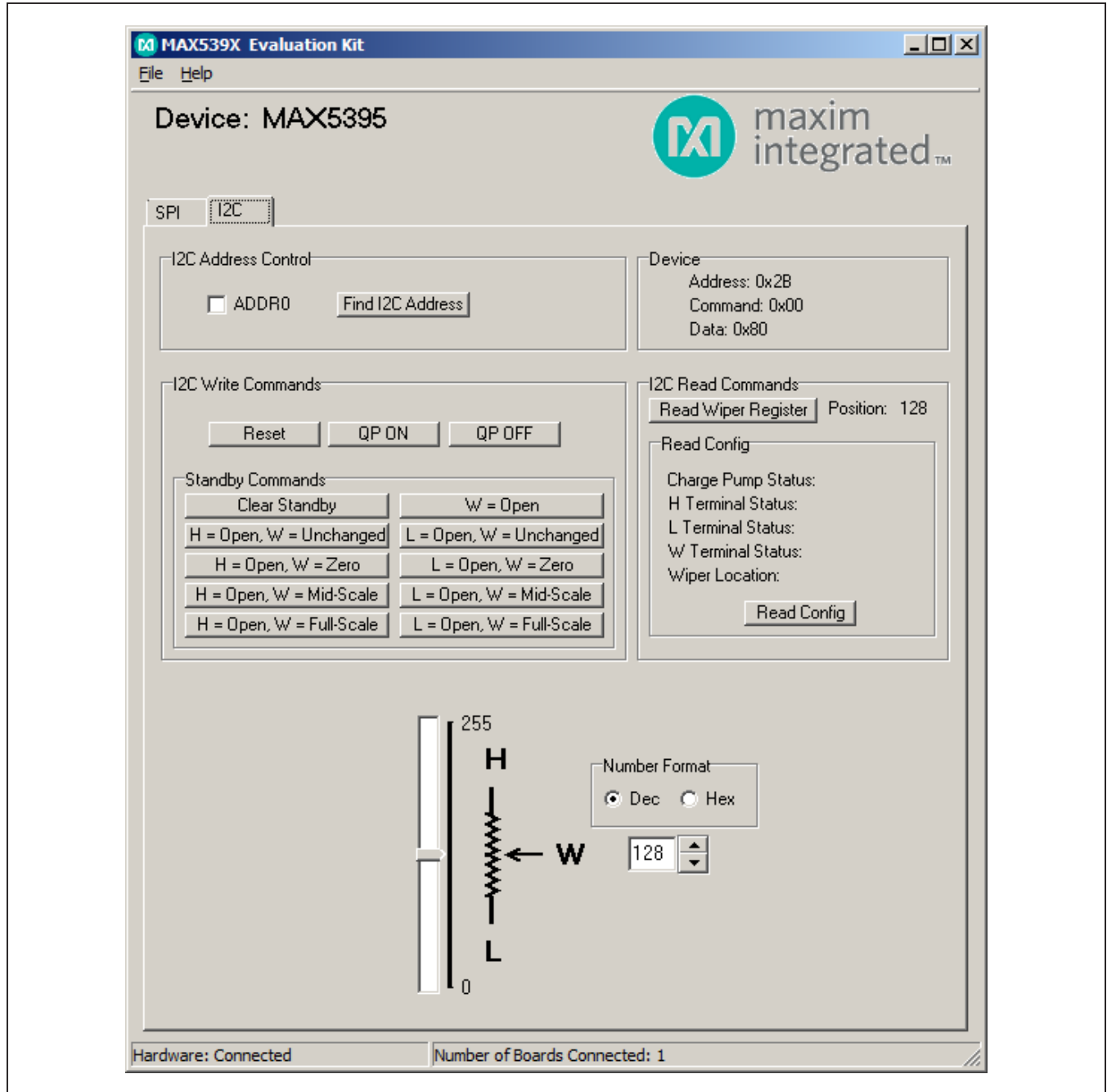


Figure 1. MAX5395L EV Kit Software Main Window

Detailed Description of Software

The MAX5395L EV kit software provides controls to adjust the wiper and shutdown modes.

Wiper

The wiper register stores an 8-bit data that ranges from 0–255. There are two ways of changing the wiper register. First is by using the vertical scrollbar, and the other way is through pressing the up/down arrows to the right of the edit box. Numbers in the edit box can be in decimal or hexadecimal format by selecting the corresponding radio buttons in the **Number Format** group box.

Standby Commands

The buttons within the **Standby Commands** group box allows the user to change the H, W, or L terminals to open with the wiper position set to zero code, mid code, full code, or the value contained in the wiper register. The **Clear Standby** button is used to remove any shutdown conditions and return the wiper register to its original stored value. Refer to the MAX5395 IC data sheet for a detailed description of the standby commands.

Reset

Press the **Reset** button to return to the POR settings. This resets the wiper register to midscale (0x80), enables the charge pump, and deasserts any shutdown modes.

Charge Pump

Press the **QP ON** button in the **I²C Write Commands** group box to enable the internal charge pump that allows low-supply voltage operation. To disable the internal charge pump, press the **QP OFF** button. The device's

minimum supply voltage with charge pump disabled is limited to 2.6V and the terminal voltage cannot exceed -0.3V to ($V_{DD} + 0.3V$).

Detailed Description of Hardware

The MAX5395L EV kit provides a proven layout for the MAX5395L. An on-board MAXQ622 microcontroller and jumpers to disconnect the on-board microcontroller are included on the EV kit.

User-Supplied Power Supply

The EV kit is powered completely from the USB port by default. To power the device with a user-supplied power supply, move the shunt on jumper JU1 to the 2-3 position and apply a 1.7V to 5.5V power supply at the VDD test point and the GND test point on the EV kit.

User-Supplied I²C

To evaluate the EV kit with a user-supplied I²C bus, move the shunt on jumper JU2 to the 1-4 position, jumper JU3 to the 7-8 position, and jumper JU4 to the 7-8 position. Apply the user-supplied ADDR0 to the \overline{CS} |ADDR0|CS/L test point, SDA to the DIN|SDA|UD test point, and SCL to the SCLK|SCL|INC/L test point.

User-Supplied H and L

Remove the shunts from jumpers JU6 and JU7 and apply a user-supplied voltage at the H and L test points. The voltage range for H and L is 0 to 5.25V and is independent of the V_{DD} operating voltage.

Table 1. EV Kit Jumper Settings

JUMPER	SHUNT POSITION	DESCRIPTION
JU1	1-2*	Connects the V _{DD} pin of the U1 device to the on-board 1.8V supply.
	1-3	Connects the V _{DD} pin of the U1 device to a user-supplied power supply between 1.7V to 5.5V.
JU2	1-2	Do not install.
	1-3	Do not install.
	1-4	Connects the ADDR0 pin of the U1 device to a user-supplied ADDR0 signal.
	1-5*	Connects the ADDR0 pin of the U1 device to the SW_A0 switch.
JU3	1-2	Do not install.
	3-4*	Connects the SDA pin of the U1 device to the SDA signal of the on-board microcontroller.
	5-6	Do not install.
	7-8	Connects the SDA pin of the U1 device to a user-supplied SDA signal. Apply appropriate signal to the DIN SDA UD test point.
	9-10	Do not install.
JU4	1-2	Do not install.
	3-4*	Connects SCL pin of the U1 device to the SCL signal of the on-board microcontroller.
	5-6	Do not install.
	7-8	Connects the SCL pin of the U1 device to a user-supplied SCL signal. Apply appropriate signal to the SCLK SCL INC/L test point.
	9-10	Do not install.
JU6	Installed*	Connects the H pin to the V _{DD} pin of the U1 device.
	Not installed	User-supplied H. The user must apply a voltage at the H test point. The voltage range for the H pin is 0 to 5.25V.
JU7	Installed*	Connects the L pin of the U1 device to ground.
	Not installed	User-supplied L. The user must apply a voltage at the L test point. The voltage range for the L pin is 0 to 5.25V.

*Default position.

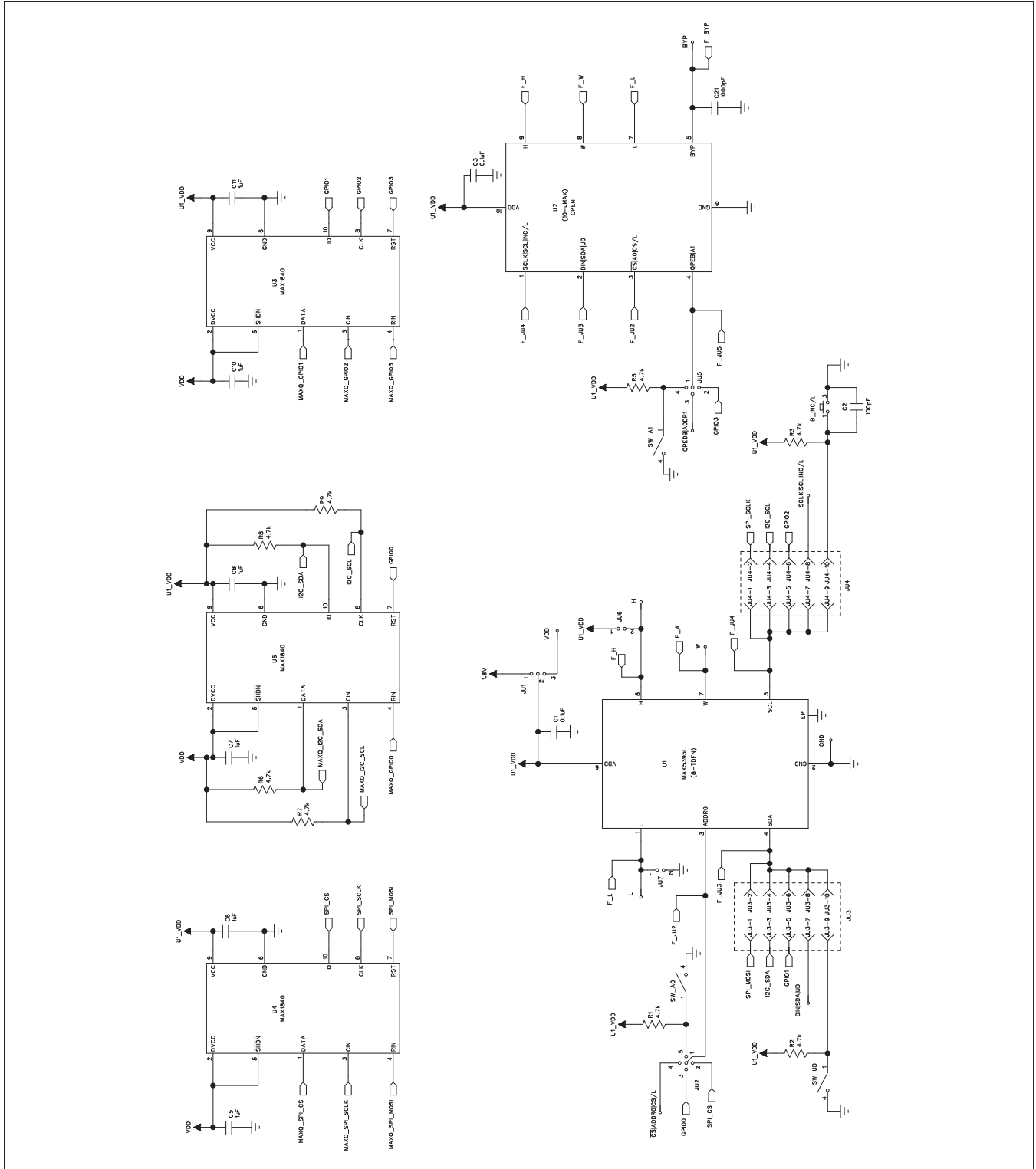


Figure 2a. MAX5395L EV Kit Schematic (Sheet 1 of 2)

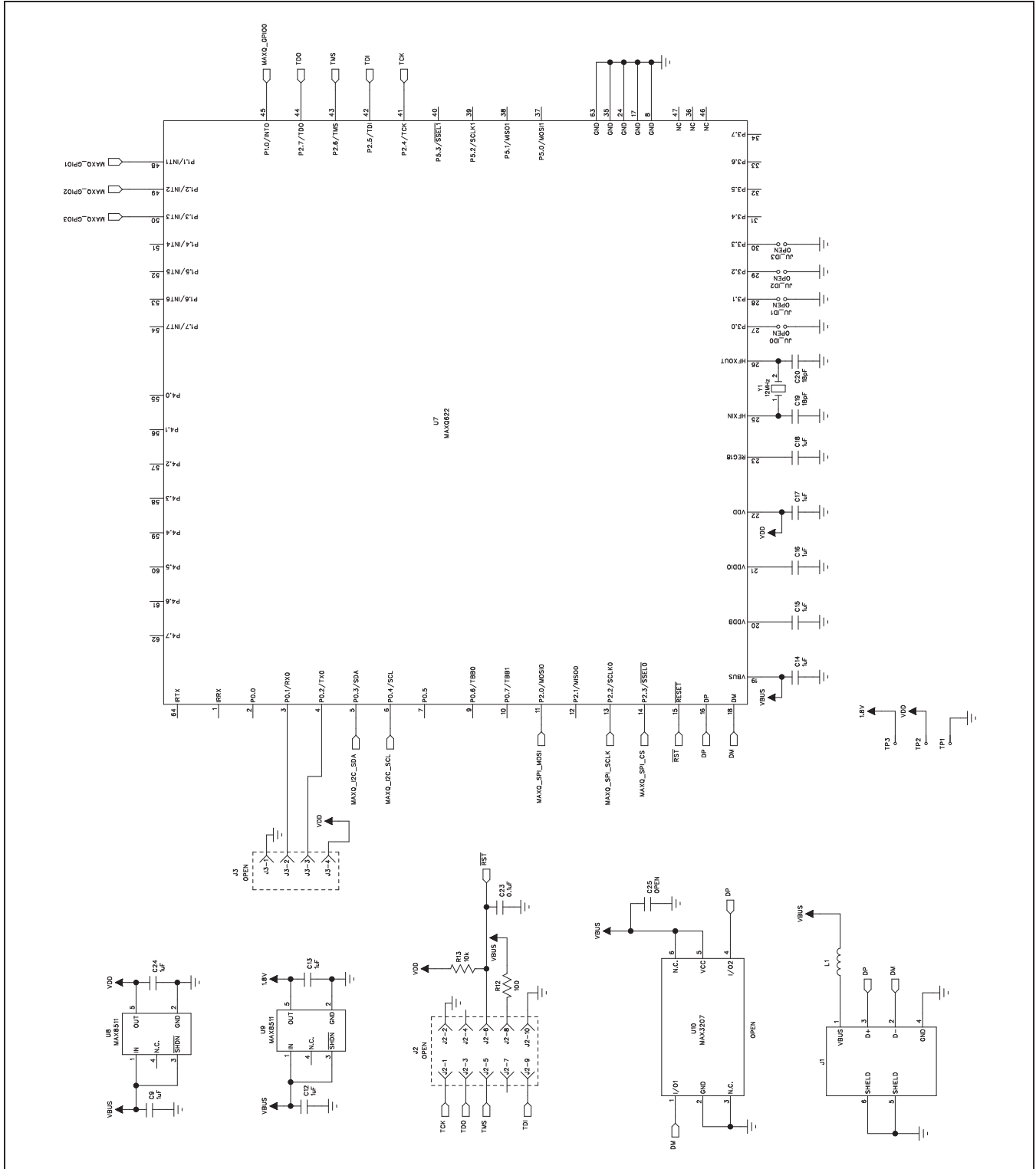


Figure 2b. MAX5395L EV Kit Schematic (Sheet 2 of 2)

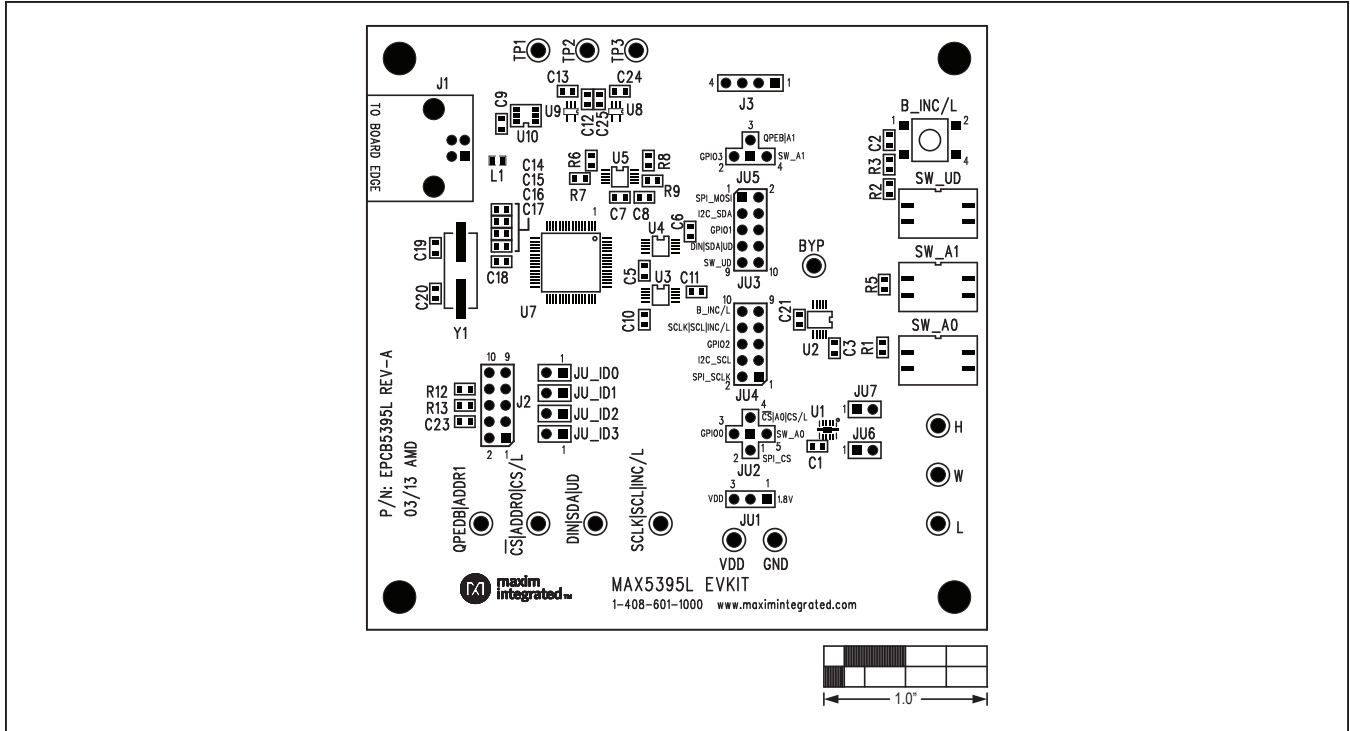


Figure 3. MAX5395L EV Kit Component Placement Guide—Component Side

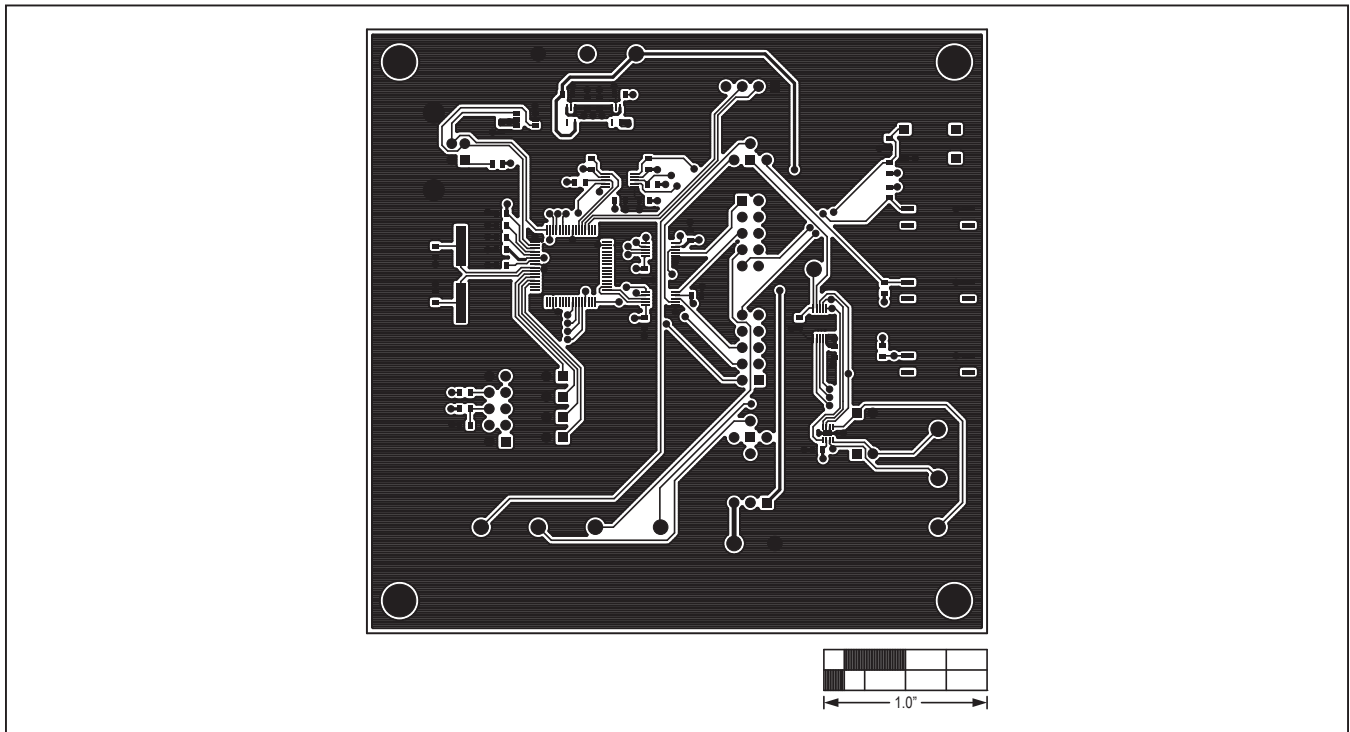


Figure 4. MAX5395L EV Kit PCB Layout—Component Side

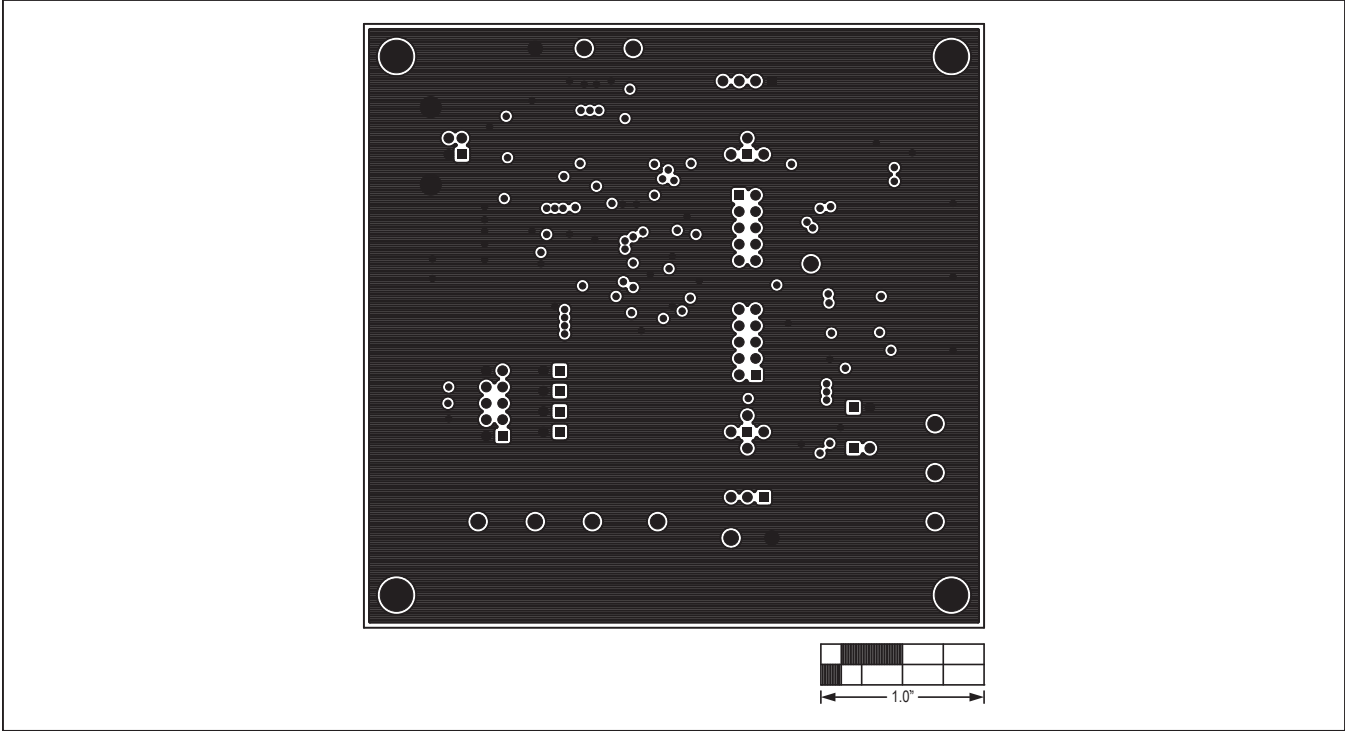


Figure 5. MAX5395L EV Kit PCB Layout—Inner Layer 2

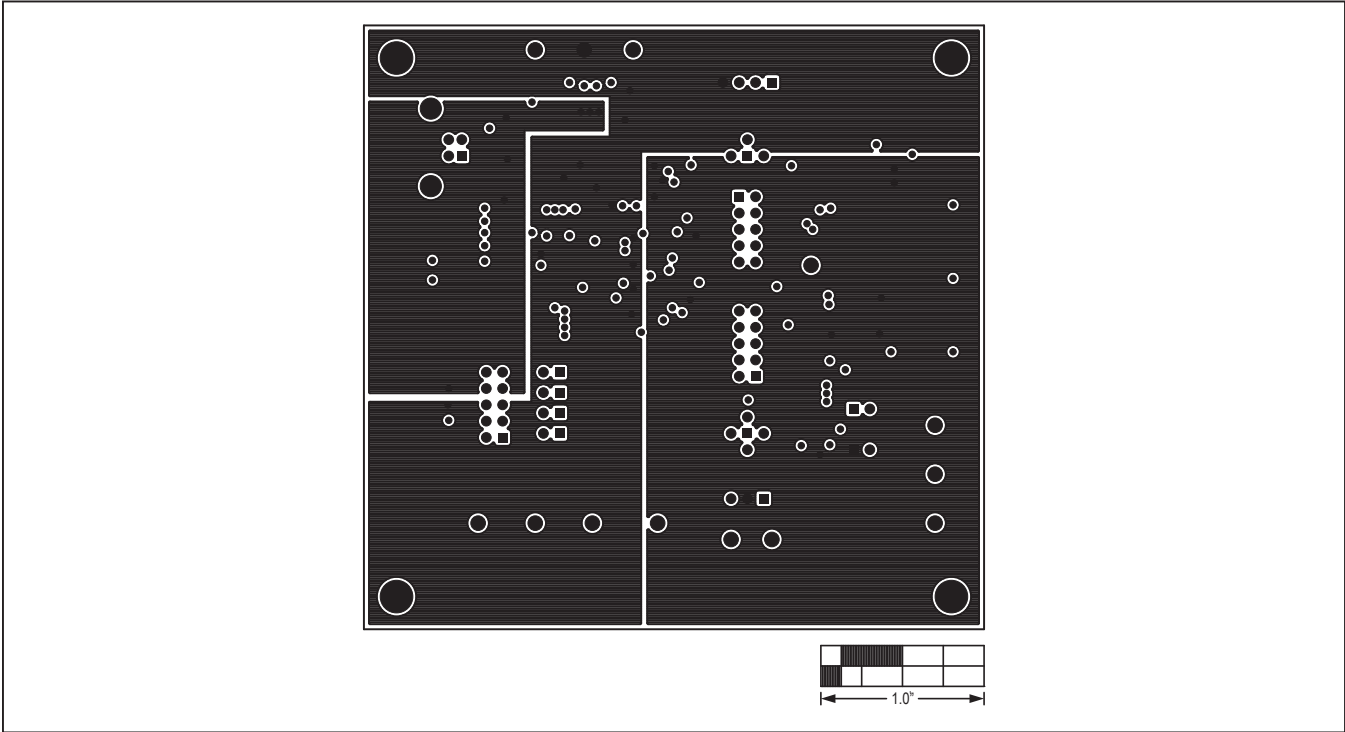


Figure 6. MAX5395L EV Kit PCB Layout—Inner Layer 3

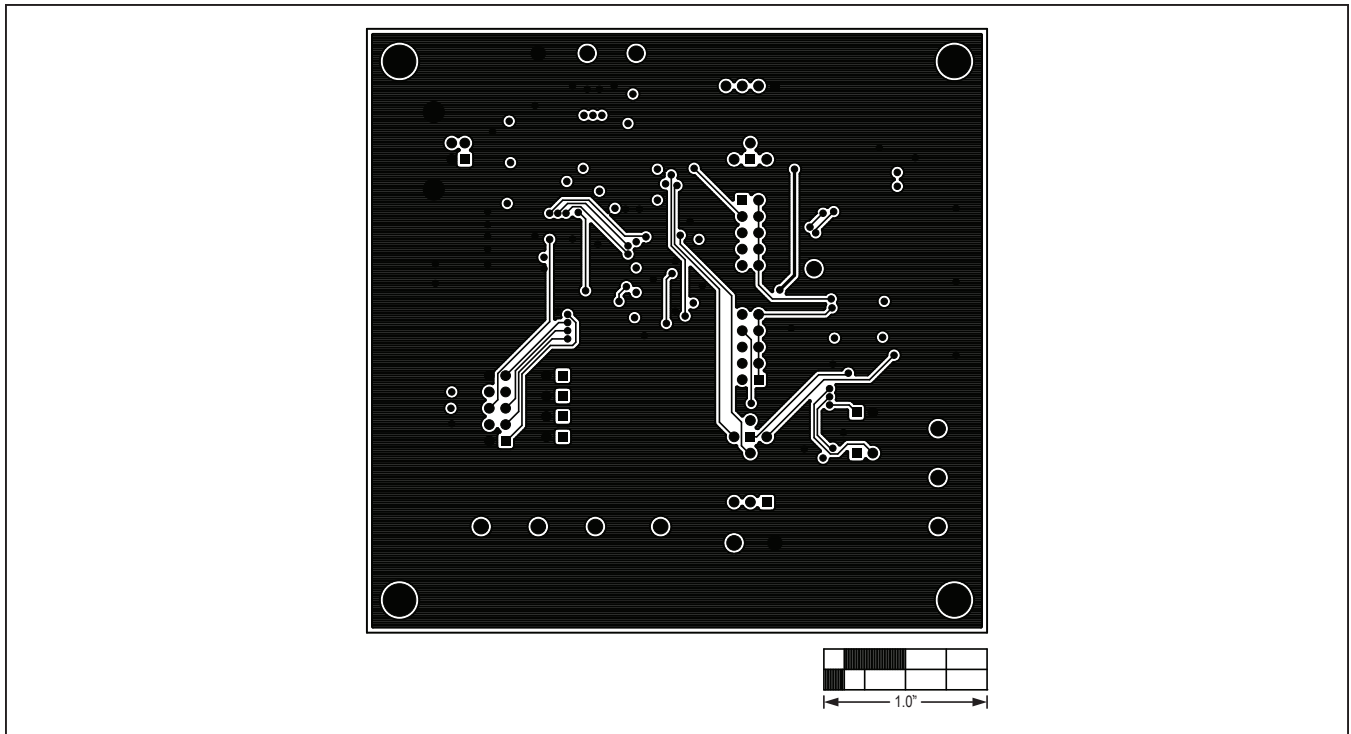


Figure 7. MAX5395L EV Kit PCB Layout—Solder Side

Ordering Information

PART	TYPE
MAX5395LEVKIT#	EV Kit

#Denotes RoHS compliant.

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	5/13	Initial release	—

For pricing, delivery, and ordering information, please contact Maxim Direct at 1-888-629-4642, or visit Maxim Integrated's website at www.maximintegrated.com.

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