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## Evaluates: MAX40080

## MAX40080 Evaluation Kit

### General Description

The MAX40080 evaluation system (EV system) provides a single platform to evaluate the MAX40080 precision digital current-sense amplifier. The EV system consists of two boards connected through headers, a MAX32666FTHR microcontroller board, and the MAX40080 EV kit board. The MAX32666FTHR contains the firmware necessary to use the PC GUI program and provides power to the MAX40080 EV kit board. The MAX40080 EV kit board ships with jumpers preinstalled for quick evaluation of the MAX40080.

### Benefits and Features

- Easy-to-Reach Test Points
- Fully Assembled and Tested
- Windows 7, 8, and 10-Compatible Software

The GUI and other documentation to use this EV system are available in the MAX40080EVSYS# EV system Design Resources tab.

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

### Quick Start

#### Required Equipment

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

- MAX40080 EV Kit Board
- 0-36V, 3A DC Power Supply for VCM Input
- MAX32666FTHR
- Micro-USB Cable
- Windows PC with USB Port

#### Procedure

The EV system is tested and ships in two pieces: MAX40080 EV kit board and MAX32666FTHR. The EV kit is fully assembled and tested. Follow these steps to verify the board:

**CAUTION:** Do not turn on the power supply or the electronic load until all the connections are complete.

- 1) Plug the MAX32666FTHR into the MAX40080 EV kit board.
- 2) Set the EV system hardware on a non-conductive surface to ensure nothing on the PCB gets shorted to the workspace.
- 3) Set the Jumper on MAX40080EVKIT ([Table 1](#)).
- 4) Connect the positive terminal of the +0 to +36V DC power supply to the RS+ input and the negative terminal to the GND. Set the voltage level to 12V.
- 5) Set the electronic load to sink 300mA.
- 6) Connect the positive terminal of the electronic load to the RS- input and the negative terminal of the electronic load to the nearest GND input on board.
- 7) Prior to starting the GUI, connect the EV kit hardware to a PC using the supplied micro-USB cable.

Windows is a registered trademark of Microsoft Corporation.

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- 8) Windows automatically begins installing the necessary device driver. Once the driver installation is complete, a Windows message appears near the system icon menu, indicating the hardware is ready to use. Do not attempt to tune the GUI prior to this message. To do so, close the application and restart it once the driver installation is complete. On some versions of Windows, administrator privileges are required to install the USB device.
- 9) Once the device drivers are installed, download the software from the MAX40080EVSYS# EV system **Design Resources** tab and extract it to a temporary folder.
- 10) Open the extracted zip folder and double-click the .exe file to run the installer. If a message box stating '**The publisher could not be verified. Are you sure you want to run this software?**' appears, select **YES**.
- 11) When the installer GUI appears, click **NEXT**. Select the installation paths and to create a shortcut on the desktop, when prompted, press **Install**. Once complete, click **Close**.
- 12) If a shortcut is created, double-click the shortcut to start the GUI. Alternatively, go to **Start/All** programs. Look for the **MAX40080EVKIT Tool** folder and click the **MAX40080EVKITtool.exe** file in the folder.
- 13) When the GUI appears, select the resistor value under the address setting to R0(100K $\Omega$ ) and configure I2C address A6, A5. Click **Scan Devices**. The status log shows '**Found number of devices currently connected to COM port**'. Select the COM port with the MAX40080 EVKIT connected from the select COM port menu and click **Connect**. Status log shows '**Connected to device COMX**'.
- 14) Under **Configuration Register**, with the selection mode to active, select '**Input Range to 50mV**'.
- 15) Under the FIFO configuration, select current and voltage.
- 16) Enter the value of R<sub>SENSE</sub> to 50m.
- 17) Turn on the +0 to +36V DC power supply. Then turn on the electronic load.
- 18) Enable the electronic load.
- 19) Click **Read** under FIFO read. Verify the current reading is around 300mA and voltage reading is around 12V.
- 20) After the functions are verified, turn off the electronic load and power supply.

## Detailed Description of Software

### Software Startup

If the EV system is connected while the software is open, the software first initializes the hardware to communicate. The software then reads the device registers and updates all the associated control fields displayed on the GUI.

If the EV system is not connected on start-up, the GUI starts up with no devices displayed in the **Devices** section of the GUI. The status bar at the bottom of the GUI states **Not Connected**.

### ToolStrip Menu Bar

The **ToolStrip** menu bar (Figure 1) is located at the top of the GUI window. This bar comprises the **File**, **Options**, and **Help** menus, the functions of which are detailed in the following sections.

### File Menu

The **File** menu contains the option to exit the GUI program.

### Options Menu

The **Options** menu provides clear current samples and option to export each data samples being measured by the device. After selecting the data to export, a prompt appears to choose a name for the comma-separated value (CSV) log file, as well as the location to save the generated file.

### Help Menu

The **About** option displays the GUI splash screen, which names the GUI version being used.



Figure 1. ToolStrip Menu Bar

## Tab Control

The main interface structure of the GUI consists of an **Application** tab, where each tab contains controls relevant to various blocks of the device. Changing these interactive controls triggers a write operation to

the MAX40080 to update the register contents. Likewise, these controls are refreshed when reading from the device. The **Register Map** tab allows to read and write to individual registers.

## Application Tab

The **Application** tab (Figure 2) displays a general overview of the MAX40080. The tab provides a list of the devices currently connected, register setting, and cur-

rent/voltage measurement for a selected device, as well as controls for select registers. Note that in the active mode, when selecting current and voltage measurement, ADC sampling rate is available at 0.5Ksps only. All other sampling rates are available when selecting the current/voltage measurement.

## Register Map

The **Register Map** tab (Figure 3) provides more direct access to the internal registers of the MAX40080. From this tab, it is possible to read the contents of individual registers and to manually enter the desired bit settings for a write operation. Full descriptions of each bit are available in the table on the right for quick reference.

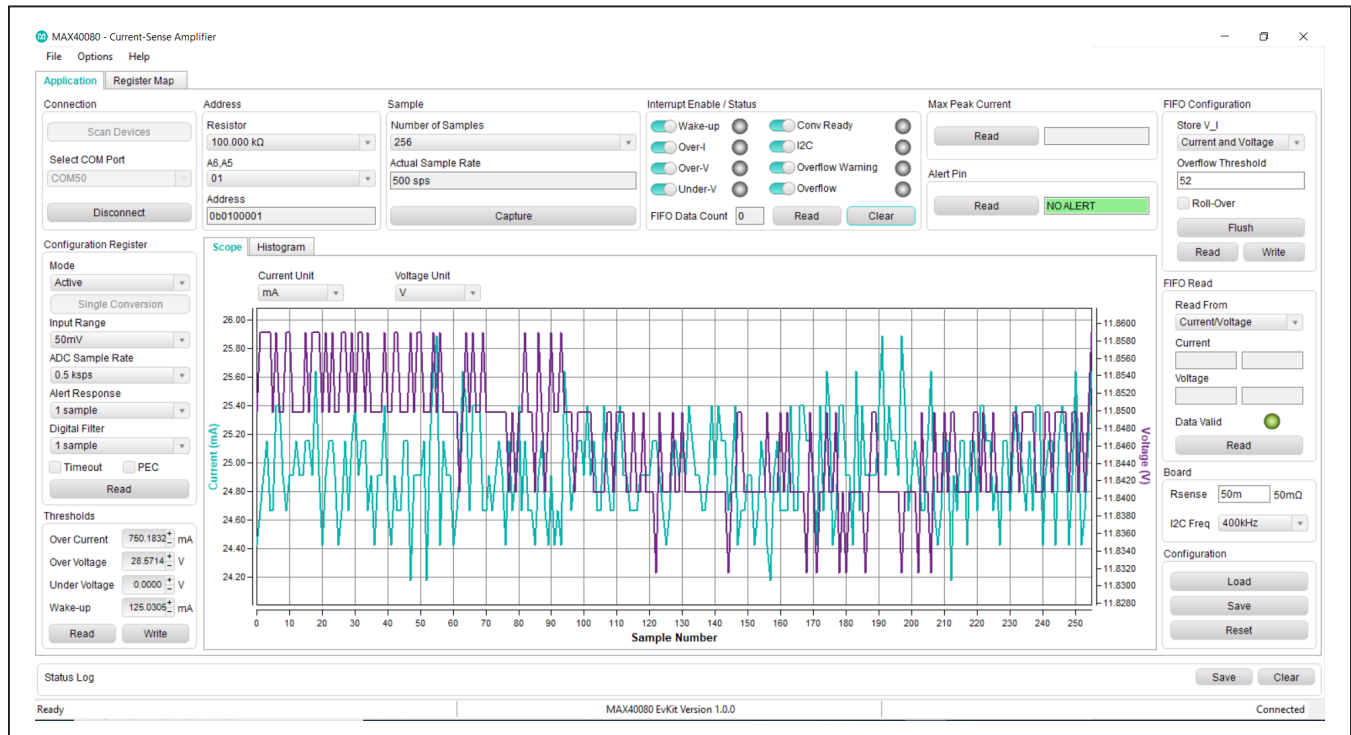


Figure 2. Application Tab

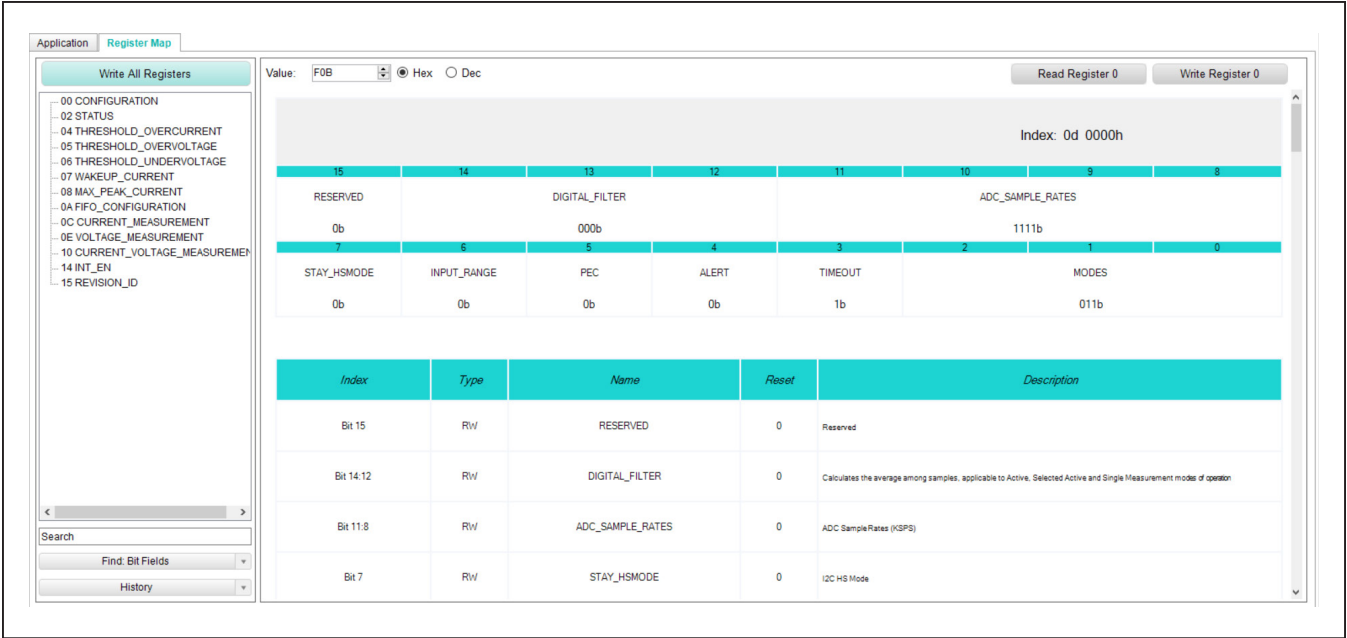


Figure 3. Register Map

Detailed Description of Hardware

The EV system utilizes the MAX32666FTHR Arm® Cortex®-M4 microcontroller with the GUI and optionally provides power to the MAX40080EVKIT.

The MAX40080 EV system provides a proven design to evaluate the MAX40080 precision digital current-sense amplifier. The device features an ultralow 16uV input offset voltage and very low 0.05% gain error. The MAX40080 includes an analog-to-digital converter with programmable sample rate and features a I2C-compliant and SMBus-compatible interface.

Powering the EV System

The MAX40080 EV system is powered directly from the MAX32666FTHR through USB to Micro-USB cable. JP5 must be connected to supply power from the MAX32666FTHR. JP10 and JP11 must each have a shunt connected to connect the serial data (SDA) and serial clock (SCL) lines from the MAX32666FTHR to the MAX40080 IC.

Bidirectional Operation

The MAX40080 EV system evaluates the MAX40080 bidirectional current-sense amplifier with digital output. The current across the sense resistor can be measured in both directions in reference to RS+ and RS-. Sense current in the digital code can be read through the I2C interface. Depending on the input current-sense range selection, the voltage across the sense resistor can be in the range of 10mV or 50mV in both directions.

Alert Pin

The MAX40080 features an open-drain Alert output when any of the following situations occur: overcurrent, over-voltage, undervoltage, FIFO overflow warning, FIFO full, conversion ready, wake-up current threshold reached, and one-minute timeout on I2C bus expired. The Alert interrupt output is pulled low if the related interrupt is enabled and occurs. The Alert output can be deasserted by clicking **Clear** on the **Application** tab.

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Table 1. Jumper Functions

JUMPER LABEL	DEFAULT POSITION	FUNCTION
JP4 (A0)	1 to 2	I2C address input, connect to 100K $\Omega$ external resistor, set last. four digits of slave address to 0b0001.
J5	1 to 2	Connect 1.8V LDO output to the MAX40080 power supply.
JP8 (ALERT)	1 to 2	Enable ALERT pin pullup resistor.
JP10 (SDA)	1 to 2	Enable SDA pin pullup resistor
JP11 (SCL)	1 to 2	Enable SCL pin pullup resistor.
JP12	1 to 2	Connect input voltage sense to current sense.

## Ordering Information

PART	TYPE
MAX40080EVSYS#	EV System (EV Kit + Master Board)
MAX40080EVKIT#	EV Kit
MAX32666FTHR#	Master Board

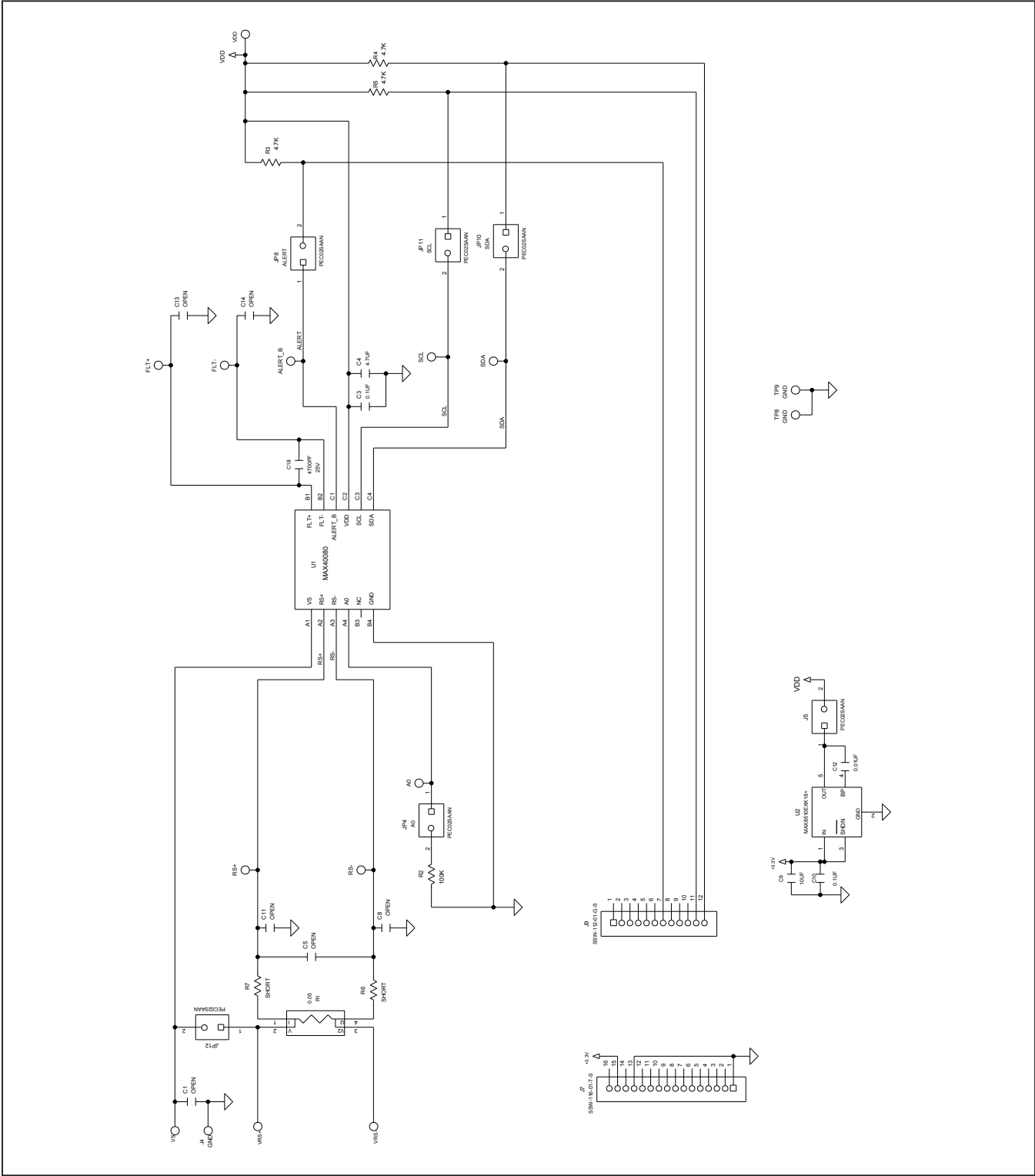
# MAX40080 Evaluation Kit

Evaluates: MAX40080

## MAX40080 EV Kit Bill of Materials

NOTE: DNI (DO NOT INSTALL) (PACKOUT); DNP (DO NOT PROCURE)							
ITEM	REF_DES		QTY	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION
1	A0, ALERT_B, FLT+, FLT-, SCL, SDA		6	5002	KEystone	N/A	TEST POINT; PIN DIA=0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; WHITE; PHOSPHOR BRONZE WIRE SILVER;
2	C3		1	885012206071;C1608X7R1E104K080AA; C0603C104K3RAC;GRM188R71E104KA01; C1608X7R1E104K;06033C104KAT2A	WURTH ELECTRONICS INC; TDK; KEMET; MURATA; TDK; AVX	0.1UF	CAP; SMT (0603); 0.1UF; 10%; 25V; X7R; CERAMIC
3	C4		1	GRM188Z71C475KE21	MURATA	4.7UF	CAP; SMT (0603); 4.7UF; 10%; 16V; X7R; CERAMIC
4	C9		1	EMK212BJ106KG	TAIYO YUDEN	10UF	CAP; SMT (0805); 10UF; 10%; 16V; X5R; CERAMIC
5	C10		1	CC0603KRX7R0BB104;GRM188R72A104KA35; HMK107B7104KA;06031C104KAT2A; GRM188R72A104K	YAGEO; MURATA; TAIYO YUDEN; AVX; MURATA	0.1UF	CAP; SMT (0603); 0.1UF; 10%; 100V; X7R; CERAMIC
6	C12		1	NMC0402X7R103K16TRP; GRM155R71C103KA01; CC0402KRX7R7BB103	NIC COMPONENTS CORP.; MURATA; YAGEO	0.01UF	CAP; SMT (0402); 0.01UF; 10%; 16V; X7R; CERAMIC
7	C18		1	C1608C0G1E472J080AA	TDK	4700PF	CAP; SMT (0603); 4700PF; 5%; 25V; C0G; CERAMIC
8	J4, RS-, TP8, TP9, VRS-		5	5011	KEystone	N/A	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; BLACK; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH
9	J5, JP4, JP8, JP10-JP12		6	PEC02SAAN	SULLINS	PEC02SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 2 PINS
10	J7		1	SSW-116-01-T-S	SAMTEC	SSW-116-01-T-S	CONNECTOR; MALE; THROUGH HOLE; SQ POST SOCKET; 16 PINS
11	J9		1	SSW-112-01-G-S	SAMTEC	SSW-112-01-G-S	CONNECTOR; FEMALE; THROUGH HOLE; .025INCH SQ POST SOCKET; STRAIGHT; 12 PINS
12	R1		1	LVK12R050DE	OHMITE MFG CO.	0.05	RESISTOR; 1206; 0.05 OHM; 0.5%; 50PPM; 0.5W; METAL FILM
13	R2		1	ERJ-3GEYJ104;CRCW0603100KJN	PANASONIC; VISHAY	100K	RES; SMT (0603); 100K; 5%; +/- 200PPM/DEGC; 0.1000W
14	R3-R5		3	ERJ-3GEYJ472	PANASONIC	4.7K	RES; SMT (0603); 4.7K; 5%; +/- 200PPM/DEGC; 0.1000W
15	RS+, VDD, VRS+, VS		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	OZ71_WLP	MAXIM INTEGRATED	OZ71_WLP	EVKIT PART - IC; OZ71; AMP; DIGITAL CURRENT SENSE AMPLIFIER; PACKAGE CODE: N121D1+1S; PACKAGE OUTLINE DRAWING: 21-100492; WLP12
17	U2		1	MAX8510EXK18+	MAXIM INTEGRATED	MAX8510EXK18+	IC; VREG; ULTRA-LOW-NOISE; HIGH PSRR; LOW-DROPOUT; 0.12A LINEAR REGULATOR; SC70-5
18	PCB		1	MAX	MAXIM INTEGRATED	PCB	PCB:MAX
19	R6, R7	DNP	0	N/A	N/A	SHORT	PACKAGE OUTLINE 0603 RESISTOR
20	C1, C5, C8, C11, C13, C14	DNP	0	N/A	N/A	OPEN	PACKAGE OUTLINE 0603 NON-POLAR CAPACITOR
TOTAL			37				

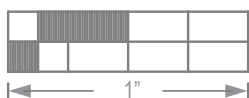
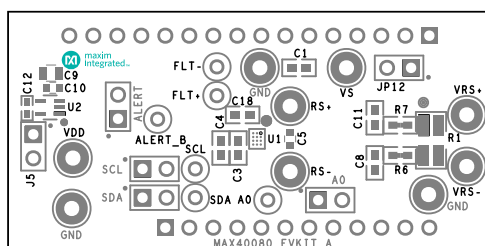
MAX40080 EV Kit Schematic



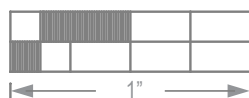
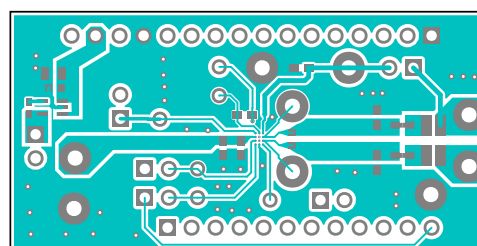
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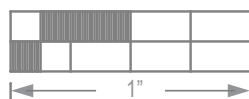
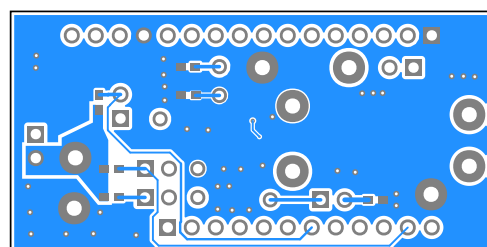
## MAX40080 EV Kit PCB Layout



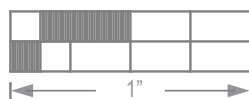
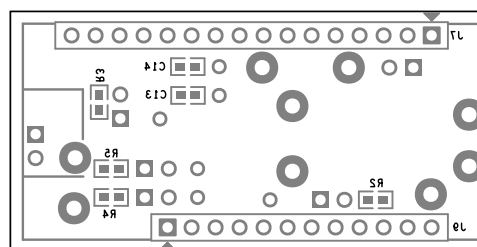
MAX40080 EV Kit–Silk Top



MAX40080 EV Kit-Top



MAX40080 EV Kit–Bottom



MAX40080 EV Kit–Silk Bottom



**Revision History**

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	9/21	Initial release	—

