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Evaluates: MAX16193

MAX16193 Evaluation Kit

General Description

The MAX16193 evaluation kit (EV kit) is a fully tested and assembled circuit that demonstrates the capabilities of the MAX16193, a dual-channel, low voltage window-detector supervisor circuit. The MAX16193 EV kit is designed to facilitate the evaluation of the MAX16193's 0.3% over-voltage/undervoltage fault detection capability. A jumper, JP1, provides the option to connect the reset output's pullup resistor to a voltage other than VDD. Refer to the MAX16193 IC datasheet for absolute maximum voltage ratings voltage on the reset output. The MAX16193 EV kit is available in a 1.5" x 1.5" PCB and operates over the automotive temperature range of -40°C to +125°C.

Benefits and Features

- ±0.3% Threshold Accuracy
- 0.9V/3.28V Nominal Threshold
- ±4%/±3% UV/OV Monitoring Range
- 10ms Reset Timeout for $\overline{RST1}$ and $\overline{RST2}$ Signal
- Two Reset Output Pull-Up Voltage Options
- Proven 1.5" x 1.5" 2-Layer 2oz Copper PCB Layout
- Demonstrates Compact Solution Size
- Fully Assembled and Tested

MAX16193 EV Kit Files

FILE	DECRIPTION
max16193_evkit_p1_Schematic	EVKIT schematic
MAX16193_EVKIT_P1_MARKETING_PCB	EVKIT PCB LAYOUT
build_bom_max16193_evkit_p1	EVKIT Bill of Materials
max16193_evkit_p1_odb	EVKIT ODB

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

MAX16193 EV Kit Photo

319-100881; Rev 1; 3/22

Quick Start

Required Equipment

- MAX16193 EV kit
- 5V/100mA DC power supply
- 1V/50mA high-precision DC power supply
- 5V/50mA high-precision DC power supply
- Two digital multimeters (DMM1 and DMM2)
- Four-channel oscilloscope

Procedure

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

Caution: Do not turn on power supply until all connections are completed.

1) Connect the positive terminal of the 5V/100mA power supply to VDD pad. Connect the ground terminal of the power supply to GND pad.
2) Connect the positive terminal of the 1V/50mA DC power supply to VMON1 pad. Connect the ground terminal of the power supply to GND pad.
3) Connect the positive terminal of the 5V/50mA DC power supply to VMON2 pad. Connect the ground terminal of the power supply to GND pad.
4) Connect the positive terminal of the DMM1 to VMON1_TP test point and the negative terminal of the DMM1 to GND.

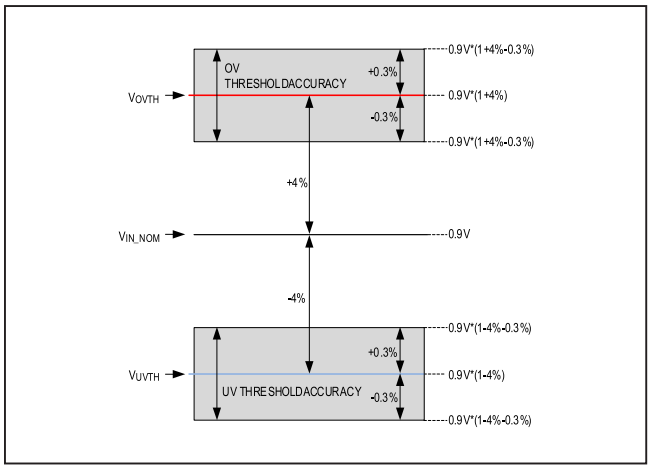


Figure 1. Undervoltage/Overvoltage Threshold Accuracy

5) Connect the positive terminal of the DMM2 to VMON2_TP test point and the negative terminal of the DMM2 to GND.
6) Ensure that jumper JP1 is in its default setting, see Table 1 for more detail.
7) Connect oscilloscope channel 1 to IN1 test point and channel 2 to $\overline{RST1}$ test point.
8) Connect oscilloscope channel 3 to IN2 test point and channel 4 to $\overline{RST2}$ test point.
9) Turn on the 5V/100mA power supply and slowly increase its output voltage to 5V.
10) Turn on the 1V/50mA DC power supply and slowly increase its output voltage to 0.9V.
11) Turn on the 5V/50mA DC power supply and slowly increase its output voltage to 3.28V.
12) Verify that the reading on DMM1 and DMM2 are 0.9V and 3.28V, respectively.
13) Increase the 1V/50mA DC power supply voltage from 0.9V to 0.939V in approximately 1mV steps and verify that the $\overline{RST1}$ signal on the oscilloscope pulls low around VIN1's V_{OVTH} value.
14) Decrease the 1V/50mA DC power supply voltage from 0.9V to 0.861V in approximately 1mV steps and verify that the $\overline{RST1}$ signal on the oscilloscope pulls low around VIN1's V_{UVTH} value.
15) Increase the 5V/50mA DC power supply voltage from 3.28V to 3.389V in approximately 1mV steps and verify that $\overline{RST2}$ signal on the oscilloscope pulls low around VIN2's V_{OVTH} value.
16) Decrease the 5V/50mA DC power supply voltage from 3.28V to 3.171V in approximately 1mV steps and verify that the $\overline{RST2}$ signal on the oscilloscope pulls low around VIN2's V_{UVTH} value.
17) The EV kit is ready for further testing.

Table 1. Jumper, JP1, settings

JUMPER	SHUNT POSITION	DESCRIPTION
JP1	1-2*	$\overline{RST1}$ and $\overline{RST2}$ are pulled up to VDD.
	2-3	$\overline{RST1}$ and $\overline{RST2}$ are pulled up to VEXT.

**Default Jumper Position.*

Calculating OV/UV Threshold Voltage

The MAX16193 monitors a system supply voltage for undervoltage/overvoltage window-threshold. Depending on the system supply tolerance requirement, the undervoltage/overvoltage thresholds can be factory-trimmed from ±2% to ±5% with respect to the selected nominal input threshold voltage. The following is a detailed calculation of how to determine the undervoltage/overvoltage threshold levels with ±0.3% threshold accuracy.

$$V_{IN\_NOM} = 0.9V$$

$$TOL = \pm 4\%$$

$$V_{UVTH} = V_{IN\_NOM} (1 - 4\%) = 0.9V * (1 - 0.04) = 0.864V$$

$$V_{OVTH} = V_{IN\_NOM} (1 + 4\%) = 0.9V * (1 + 0.04) = 0.936V$$

Where V_{IN_NOM} is the selected nominal input threshold voltage, TOL is the input tolerance, V_{UVTH} is undervoltage threshold voltage, and V_{OVTH} is the overvoltage threshold voltage.

The MAX16193 monitors the supply voltage with ±0.3% accuracy over the operating temperature and supply range. The accuracy range is shown as follows:

$$V_{UVTH\_A} = V_{IN\_NOM} (1 - 4\% \pm 0.3\%)$$

$$V_{OVTH\_A} = V_{IN\_NOM} (1 + 4\% \pm 0.3\%)$$

Where V_{UVTH_A} is the undervoltage threshold accuracy range and V_{OVTH_A} is the overvoltage threshold accuracy.

Component Suppliers

SUPPLIER	PHONE	WEBSITE
TDK	+81 3 67 78 10 00	www.tdk-electronics.tdk.com
KEYSTONE	(516) 328-7500	www.keyelco.com
WURTH ELECTRONICS INC	+1 877 6902207	www.we-ics.com
KEMET	+91-95131-45888	www.kemet.com/en/us.html
AVX	+1 (864) 967-2150	www.avx.com
LITE-ON ELECTRONICS INC.	0515-83368598	www.liteon.com/en-us
SAMTEC	1-800-726-8329	www.samtec.com
VISHAY	1-800-344-4539	www.vishay.com
PANASONIC	0571-87257895	www.panasonic.cn
BOURNS	+1 951-781-5500	www.bourns.com
YAGEO	+886 2 6629 9999	www.yageo.com/en/Home

Note: *Indicate that you are using the MAX16193 when contacting these component suppliers.*

Ordering Information

PART	TYPE
MAX16193EVKIT#	EV Kit

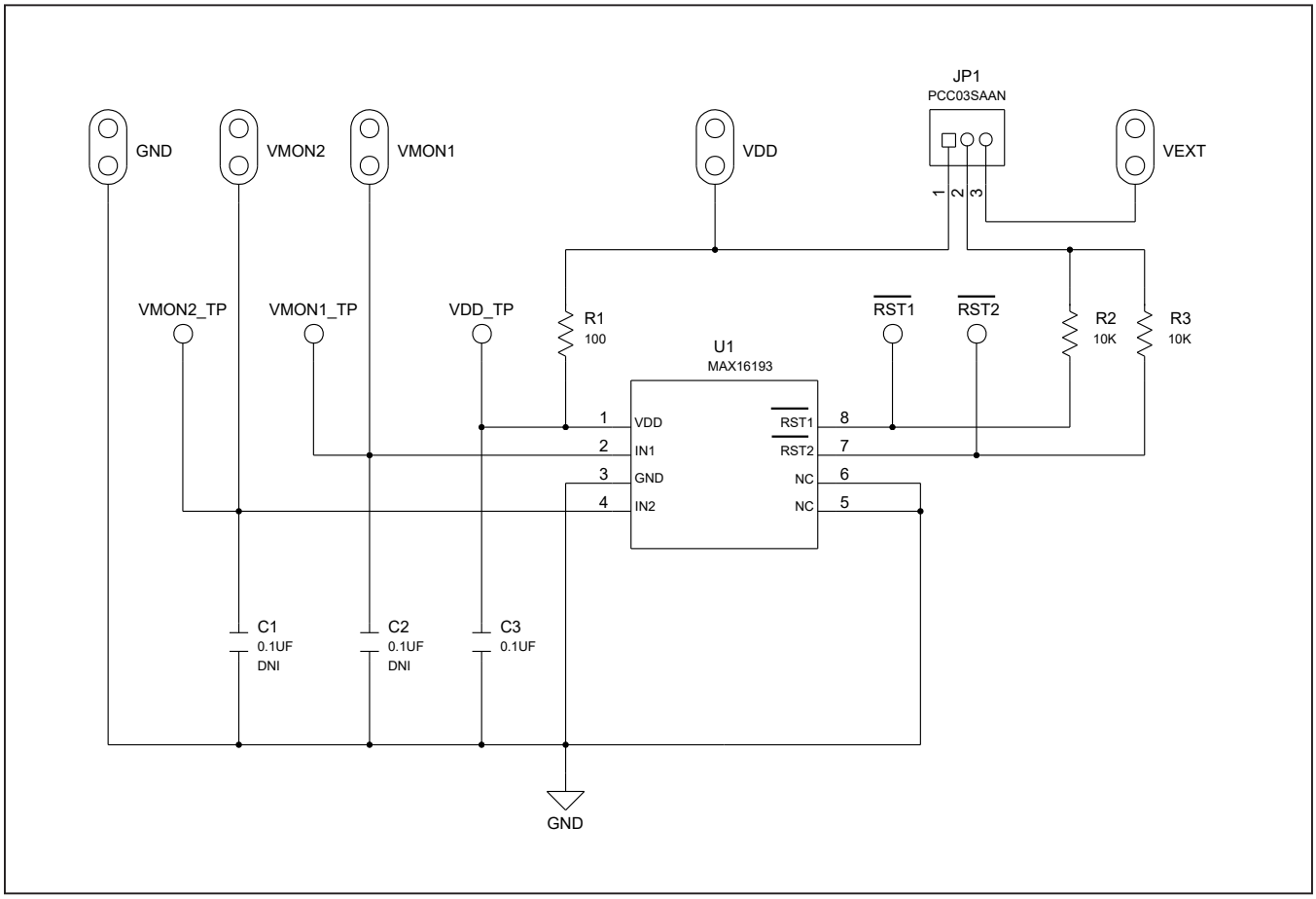
MAX16193 EV Kit Bill of Materials

ITEM	QTY	REF DES	VAR STATUS	MAXINV	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION	COMMENTS
1	1	C3	Pref	20-000U1-03	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	
2	5	GND, VDD, VEXT, VMON1, VMON2	Pref	01-9020BUSS20AWG-00	9020 BUSS	WEICO WIRE	MAXIMPAD	EVK KIT PARTS; MAXIM PAD; WIRE; NATURAL; SOLID; WEICO WIRE; SOFT DRAWN BUS TYPE-S; 20AWG	
3	1	JP1	Pref	01-PCC03SAAN3P-21	PCC03SAAN	SULLINS	PCC03SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT THROUGH; 3PINS; -65 DEGC TO +125 DEGC	
4	4	MH1-MH4	Pref	02-SOM35016H-00	9032	KEYSTONE	9032	MACHINE FABRICATED; ROUND-THRU HOLE SPACER; NO THREAD; M3.5; 5/8IN; NYLON	
5	1	R1	Pref	80-0100R-71	RG1608P-101-B; ERA-3YEB101; ERA-3AEB101	SUSUMU CO LTD.;PANASONIC; PANASONIC	100	RES; SMT (0603); 100; 0.10%; +/-25PPM/DEGC; 0.1000W	
6	2	R2, R3	Pref	80-0010K-24	CRCW060310K0FK; ERJ-3EKF1002; AC0603FR-0710KL; RMCF0603FT10K0	VISHAY DALE;PANASONIC; YAGEO	10K	RES; SMT (0603); 10K; 1%; +/-100PPM/DEGC; 0.1000W	
7	5	RST1, RST2, VDD_TP, VMON1_TP, VMON2_TP	Pref	EH111000004178	20-2137	VERO TECHNOLOGIES	N/A	TEST POINT; PIN DIA=1.65MM; TOTAL LENGTH=7.5MM; BOARD HOLE=1.02; BLACK; PHOSPHOR BRONZE WIRE; RECOMMENDED FOR BOARD THICKNESS=1.6MM ; NOTE:PURCHASE DIRECT FROM THE MANUFACTURER	
8	1	U1	Pref	00-SAMPLE-01	MAX16193	MAXIM	CS33	IC; MAX16193; TDFN; 0.3% ACCURACY DUAL-CHANNEL SUPERVISORY CIRCUIT; PACKAGE OUTLINE DRAWING: 21-100417; LAND PATTERN DRAWING: 90-0091	
9	1	PCB	-	EPCB16193	MAX16193	MAXIM	PCB	PCB:MAX16193	-
TOTAL	21								

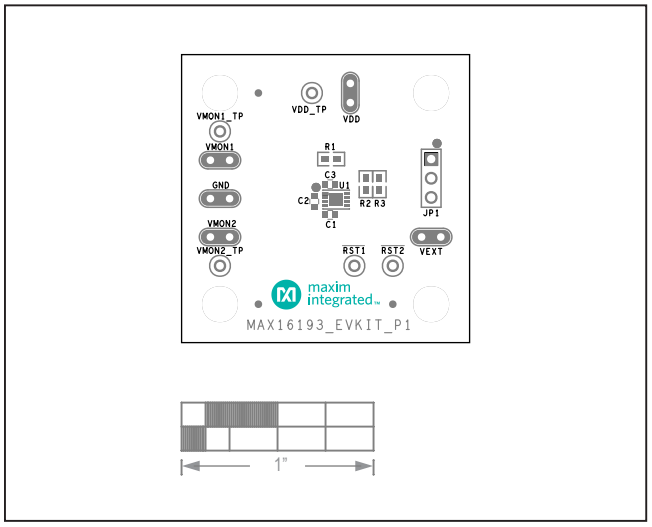
DO NOT PURCHASE(DNP)									
ITEM	QTY	REF DES	Var Status	MAXINV	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION	COMMENTS
1	2	C1, C2	DNP	20-000U1-03	885012206071; C1608X7R1E104K080AA; C0603C104K3RAC; GRM188R71E104KA01; C1608X7R1E104K; 06033C104KAT2A	WURTH ELECTRONICS INC;TDK; KEMET;MURATA;TDK;AVX	0.1UF	CAP; SMT (0603); 0.1UF; 10%; 25V; X7R; CERAMIC	
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								

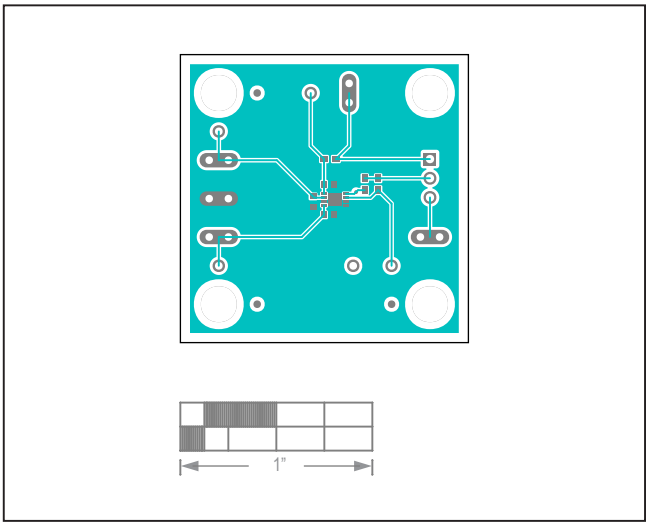
MAX16193 EV Kit Schematic



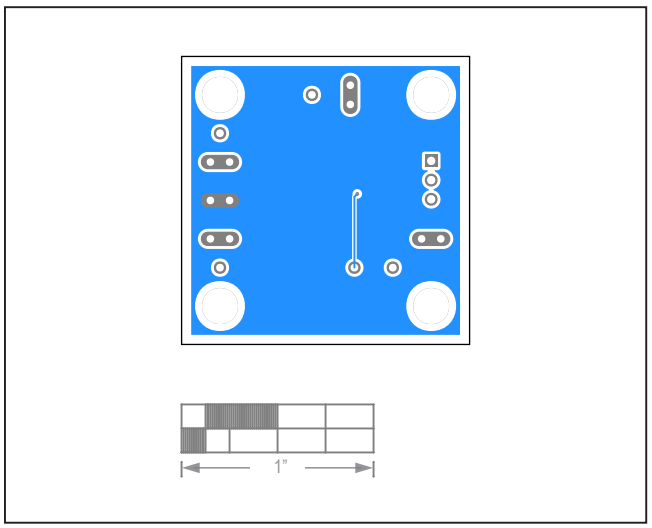
MAX16193 EV Kit PCB Layout



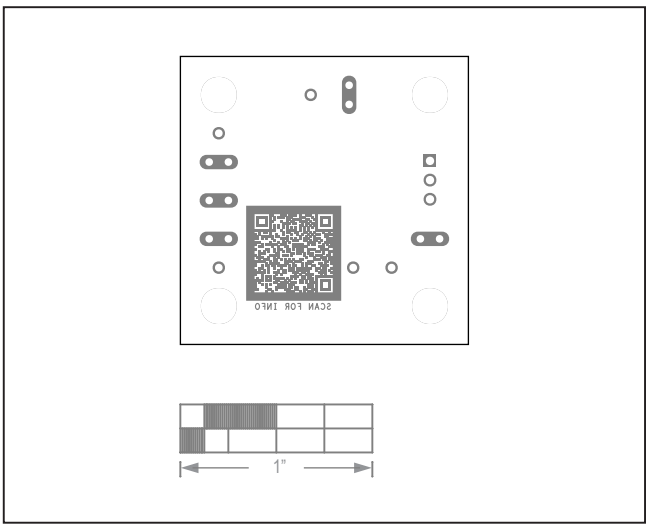
MAX16193 EV Kit PCB Layout—Top Silkscreen



MAX16193 EV Kit PCB Layout—Top



MAX16193 EV Kit PCB Layout—Bottom



MAX16193 EV Kit PCB Layout—Bottom Silkscreen

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	1/22	Initial release	—
1	3/22	Added EV Kit Photo	1