

MAX16545BEVKIT120# Evaluation Kit

Evaluates: MAX16545B/MAX16545C,
MAX16543

General Description

This evaluation kit (EV kit) serves as a reference for evaluating Maxim's MAX16545B/MAX16545C integrated protection ICs on a 12V bus. The MAX16545B/MAX16545C are circuit-breaker protection ICs with an integrated low resistance MOSFET and lossless current sense circuitry featuring PMBus control and reporting.

The MAX16545BEVKIT120# is assembled with two MAX16543 follower ICs, increasing the total current capability to 120A. One or both follower ICs can be removed to reduce the capability to 90A or 60A in a smaller footprint.

With appropriate changes to external components, this EV kit can be used to evaluate many of Maxim's monolithic hot-swap and protection devices, such as the MAX16550, MAX16545, and MAX16551.

Features

- 12V Nominal Operating Voltage
- Up to 120A Load Current Capability
- Resistor-Configurable Overcurrent Threshold
- Resistor-Configurable Undervoltage Lockout
- Power-Good Output
- PMBus Configuration, Control, and Monitoring

Quick Start

Required Equipment

- MAX16545BEVKIT120# assembly
- 12V DC power supply with adequate current output (up to 120A)
- Voltmeter

Optional Equipment

- Oscilloscope
- MAXPOWERTOOL002# USB-to-SMBus interface device
- PC with Maxim PowerTool PMBus GUI installed
- Electronic load for testing, or +12V circuitry to be powered from the EV kit output

Procedure

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

- 1) Connect the MAXPOWERTOOL002 dongle to the PC. The dongle LED should be green
- 2) Turn on the power supply and set the supply to 12V, then disable the power supply
- 3) Check that a shunt is installed across pins 1-2 on jumper J1 to connect the 3.3V aux supply to the circuitry
- 4) Check that switch S2 is in the off position

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

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- 5) Connect the power supply positive lead to J3 (V_{IN})
- 6) Connect the power supply negative (ground) lead to J4 (GND)
- 7) Enable the power supply
- 8) Check that there is no current (or very little current) drawn from the supply
- 9) Use the multimeter to verify that +12V power is not present at the output (between V_{OUT} and GND banana jacks J2 and J9)
- 10) Check that the GUI shows a connection to a “VT505/MAX16545” device as shown in [Figure 1](#).
- 11) Switch on S2 to enable the EV kit output. Check that the toggle of S2 illuminates green. The GUI should not show that the output is enabled, as shown in [Figure 2](#).
- 12) Use the multimeter to verify that the voltage between the V_{OUT} and GND connectors JMP2 to JMP9 is 12V
- 13) Apply load to the EV kit output
- 14) Switch off S2 to disable the output if desired

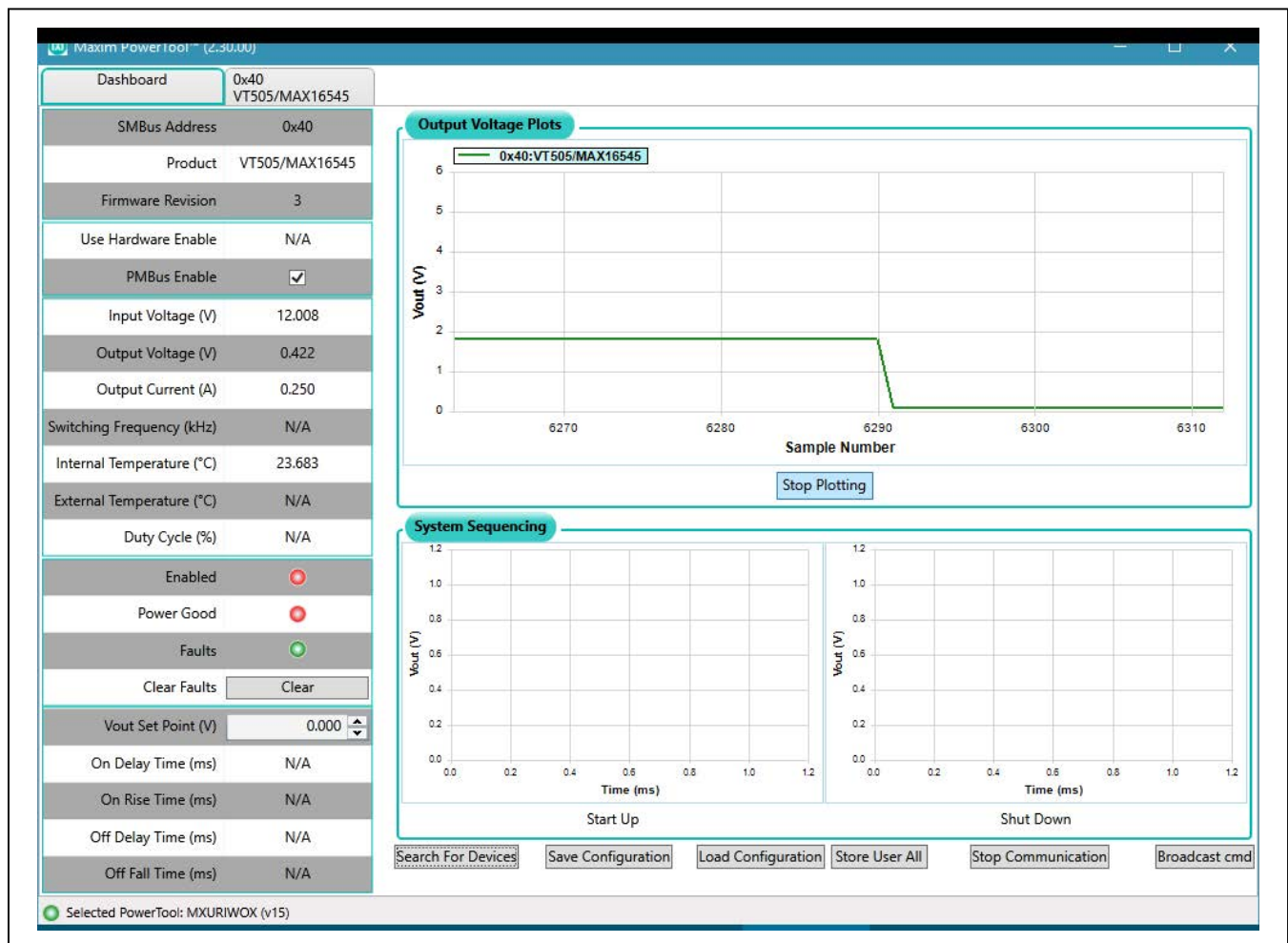


Figure 1. PowerTool GUI connected to a disabled MAX16545B/MAX16545C device

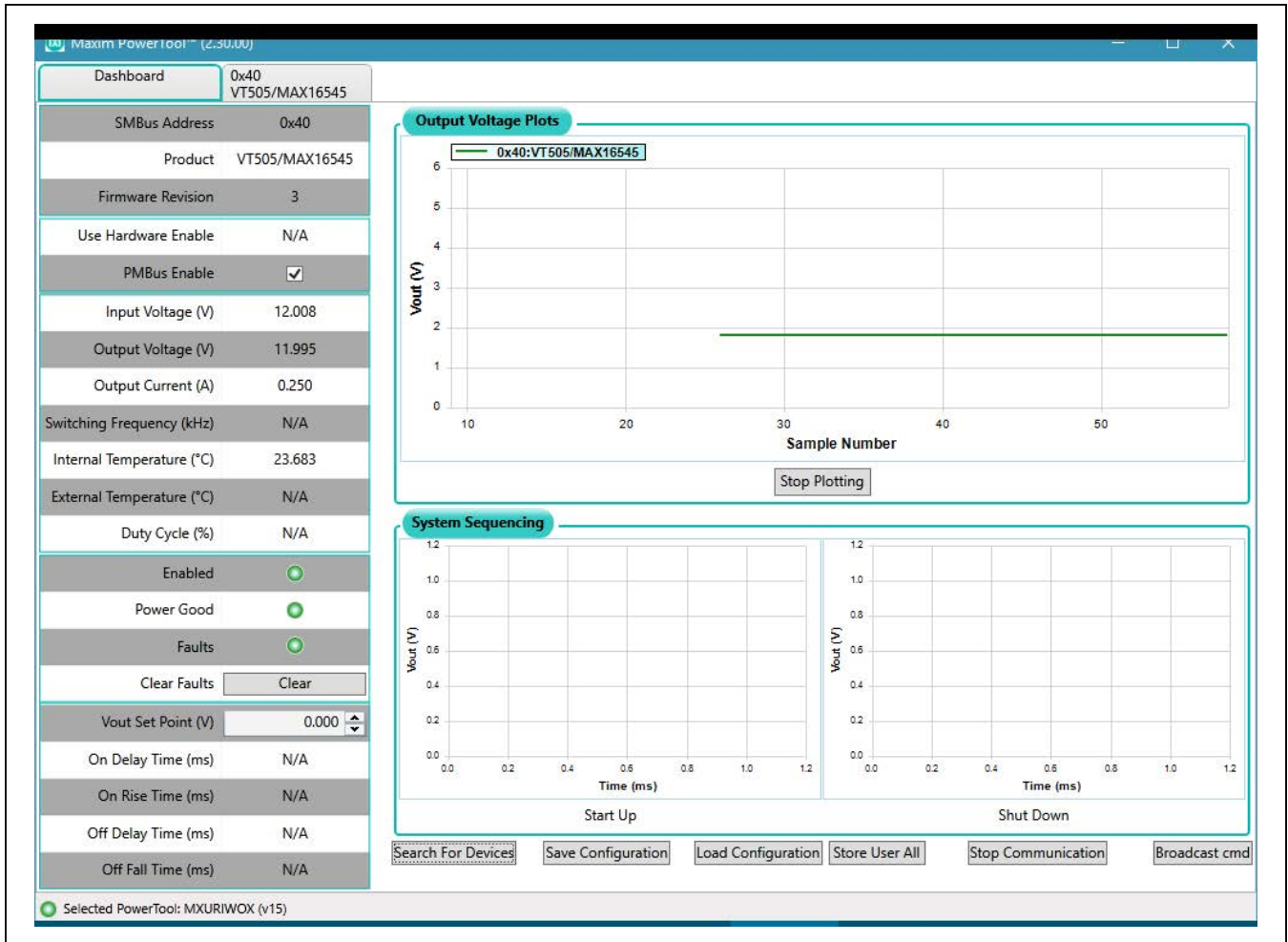


Figure 2. PowerTool GUI connected to an enabled MAX16545B/MAX16545C device

Detailed Description of Hardware

Please refer to the MAX16545B/MAX16545C device data sheets for details of the application circuit, device configuration through external component selection, and PMBus telemetry and control.

In general, the device provides controlled turn-on of the output when the EN/UVLO pin is above 1V. If at any time the load current exceeds the adjustable protection limits,

the device disconnects the output and indicates a fault condition. If the input voltage falls low enough to bring the EN/UVLO pin below 950mV, the device also shuts off the output to protect against undervoltage conditions.

Cable lugs on the EV kit allow for connection of heavy cables or wires to carry the high current that this EV kit is capable of controlling.

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An indicator LED in the toggle of the enable switch S2 is shows the status of the FAULT and PWRGD signals:

- Green indicates that the PWRGD output is asserted (high)
- Amber indicates that the $\overline{\text{ALERT}}$ output is asserted (low)
- Red indicates that the $\overline{\text{FAULT}}$ output is asserted (low)

If a fault condition occurs, it can be cleared (without cycling power) either by PMBus command from the GUI, or by toggling switch S2 off and back on again.

Table 1. Configuration for 120A Capability

REF DES	QTY	VALUE
R9	Change	2.26K
R23	Change	53.6k

Table 2. Configuration for 90A Capability

REF DES	QTY	VALUE
C33, C48	Remove	0.1UF
C28, C31, C50	Remove	1UF
C29	Remove	0.01UF
C24	Remove	10UF
C35	Remove	1UF
R21	Remove	10K
R15, R19	Remove	499
R9	Change	3.01K
R17	Remove	1K
R23	Change	71.5k
U3	Remove	MAX16543GPC+

Reducing the Current Capability

As delivered, the EVKIT is equipped with a full complement of MAX16545B/MAX16545C and MAX16543 devices and their external discrete components. While the ICs are capable of handling up to 120A current, the maximum telemetry value and Moderate OCP are configured to 60A by resistors R9 and R23.

To configure the EV kit current-capability to 120A, 90A, or 60A, change and remove ICs and discrete components as listed below in [Table 1](#), [Table 2](#), and [Table 3](#).

Table 3. Configuration for 60A Capability

REF DES	QTY	VALUE
C32, C33, C43, C48	Remove	0.1UF
C6, C28, C30, C31, C50, C58	Remove	1UF
C29, C59	Remove	0.01UF
C24, C53	Remove	10UF
C34, C35	Remove	1UF
R20, R21	Remove	10K
R2, R15, R18, R19	Remove	499
R16, R17	Remove	1K
U2, U3	Remove	MAX16543GPC+

Ordering Information

PART	TYPE
MAX16545BEVKIT120#	120A Evaluation Kit

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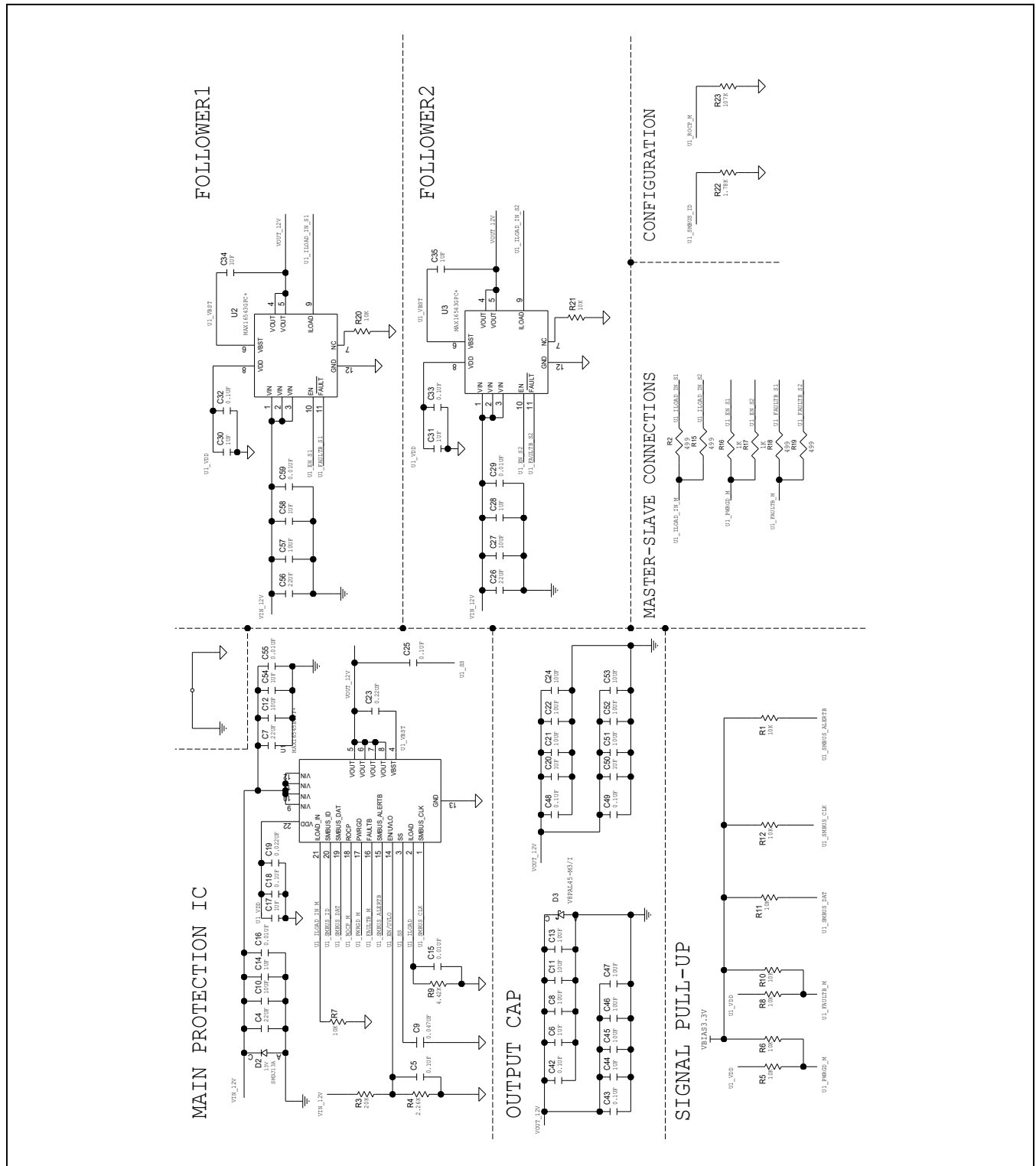
MAX16545B EV Kit Bill of Materials

REF DES	QTY	PART #	MANUFACTURER	VALUE
C5, C18, C25, C32, C33, C43, C48	7	GRM155R71E104KE14	MURATA	0.1UF
C6, C14, C17, C28, C30, C31, C50	7	GRM188R71E105KA12	MURATA	1UF
C9	1	C1005X7R1E473K050BC	TDK	0.047UF
C15, C16, C29	3	C0402C103K5RAC	KEMET	0.01UF
C19	1	C0402X7R160-223JNP	VENKEL LTD	0.022UF
C23	1	C1005X7R1E224K050BB	TDK	0.22UF
C24, C53	2	TMK212BBJ106KG-T	TAIYO YUDEN	10UF
C34, C35	2	C1005X5R1E105K050	TDK	1UF
C61, C63	2	GRM31CR71E106KA12	MURATA	10UF
C114, C160-C163	5	CGA2B3X7R1H104K050BB	TDK	0.1UF
D2	1	SMDJ13A	LITTELFUSE	13V
D3	1	V8PAL45-M3/I	VISHAY	V8PAL45-M3/I
J1	1	TSW-101-07-L-D	SAMTEC	TSW-101-07-L-D
J2-J4, J9	4	111-2223-001	EMERSON NETWORK POWER	111-2223-001
J6	1	AWHW16G-0202-T	ASSMANN	AWHW16G-0202-T
J10, J11	2	TSW-102-07-T-S	SAMTEC	TSW-102-07-T-S
JMP1-JMP4, JMP7, JMP8, JMP11, JMP12	8	B2A PCB	INTERNATIONAL HYDRAULICS INC	B2A PCB
MECH1-MECH4	4	NYLON_ STANDOFF_6-32_1/4	MAXIM	NYLON_ STANDOFF_6-32_1/4
R1, R5, R8, R11, R12, R20, R21	7	ERJ-2RKF1002	PANASONIC	10K
R2, R15, R18, R19	4	ERJ-2RKF4990	PANASONIC	499
R3	1	CRCW040220K0FK	VISHAY DALE	20K
R4	1	CRCW04022K26FK	VISHAY DALE	2.26K
R9	1	CR0402-16W-4421FT	VENKEL LTD	4.42K

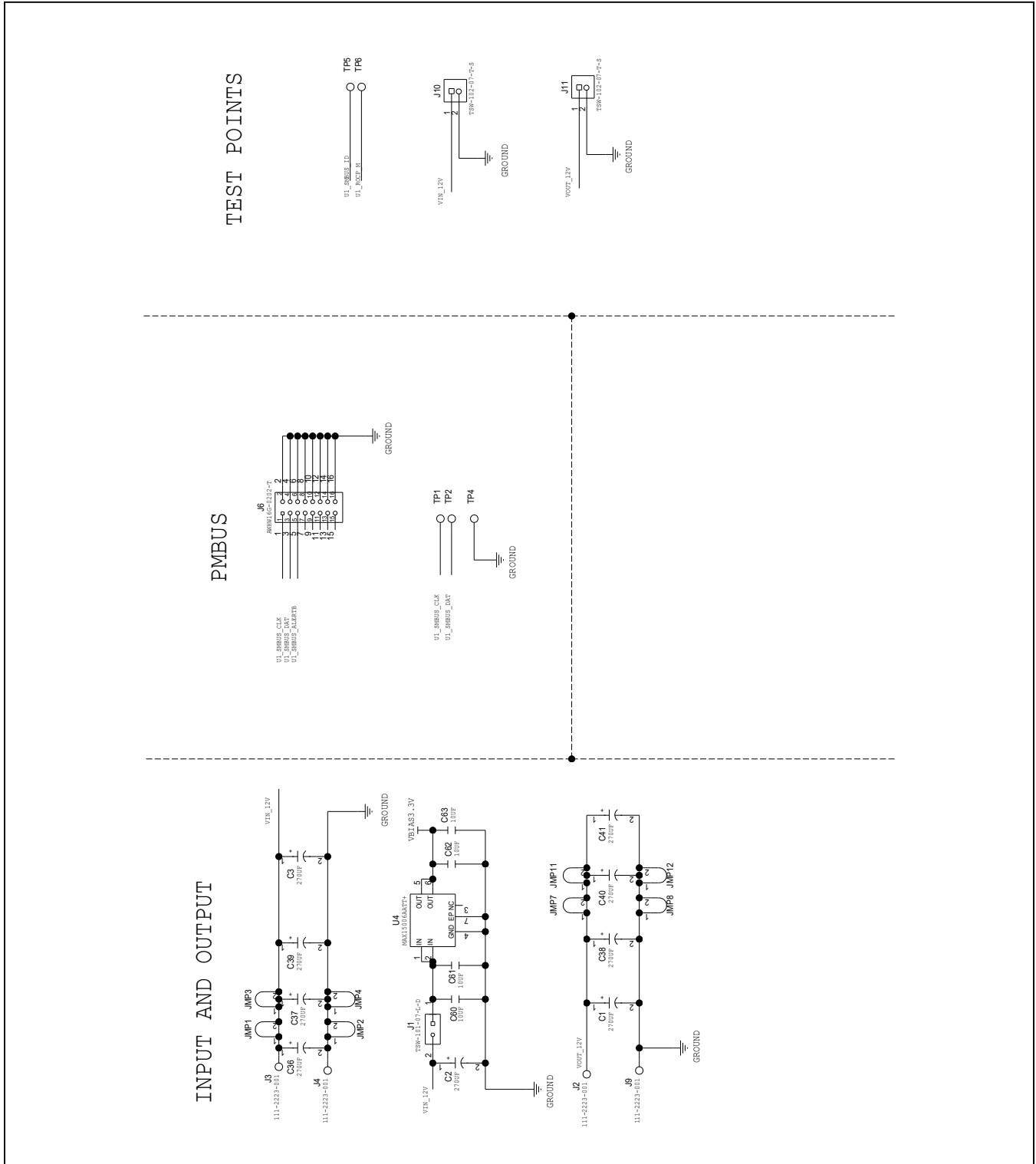
MAX16545B EV Kit Bill of Materials (continued)

REF DES	QTY	PART #	MANUFACTURER	VALUE
R13, R14, R84, R85, R88, R90	6	CRCW0402100KFK	VISHAY	100K
R16, R17	2	RCC-0402PW1001F	INTERNATIONAL MANUFACTURING SERVICE	1K
R22	1	ERJ-2RKF1781	PANASONIC	1.78K
R23	1	ERJ-2RKF1073	PANASONIC	107K
R86, R87	2	CRCW04022K00FK	VISHAY DALE	2K
R103	1	CRCW0402221RFK	VISHAY DALE	221
R104	1	CRCW0402150RFK	VISHAY DALE	150
S2	1	G12JPCF	NKK SWITCHES	G12JPCF
TP1, TP2, TP4-TP6	5	5127	KEYSTONE	N/A
TP17	1	5012	KEYSTONE	N/A
TP18	1	5126	KEYSTONE	N/A
TP20	1	5013	KEYSTONE	N/A
TP21	1	5014	KEYSTONE	N/A
U1	1	MAX16545BGPF+	MAXIM	MAX16545BGPF+
U2, U3	2	MAX16543GPC+	MAXIM	MAX16543GPC+
U4	1	MAX15006AATT+	MAXIM	MAX15006AATT+
U9, U14	2	NC7WZ38K8X	FAIRCHILD SEMICONDUCTOR	NC7WZ38K8X
U11	1	NC7SZ08L6X	FAIRCHILD SEMICONDUCTOR	NC7SZ08L6X
U12	1	NC7SZ14M5X	FAIRCHILD SEMICONDUCTOR	NC7SZ14M5X

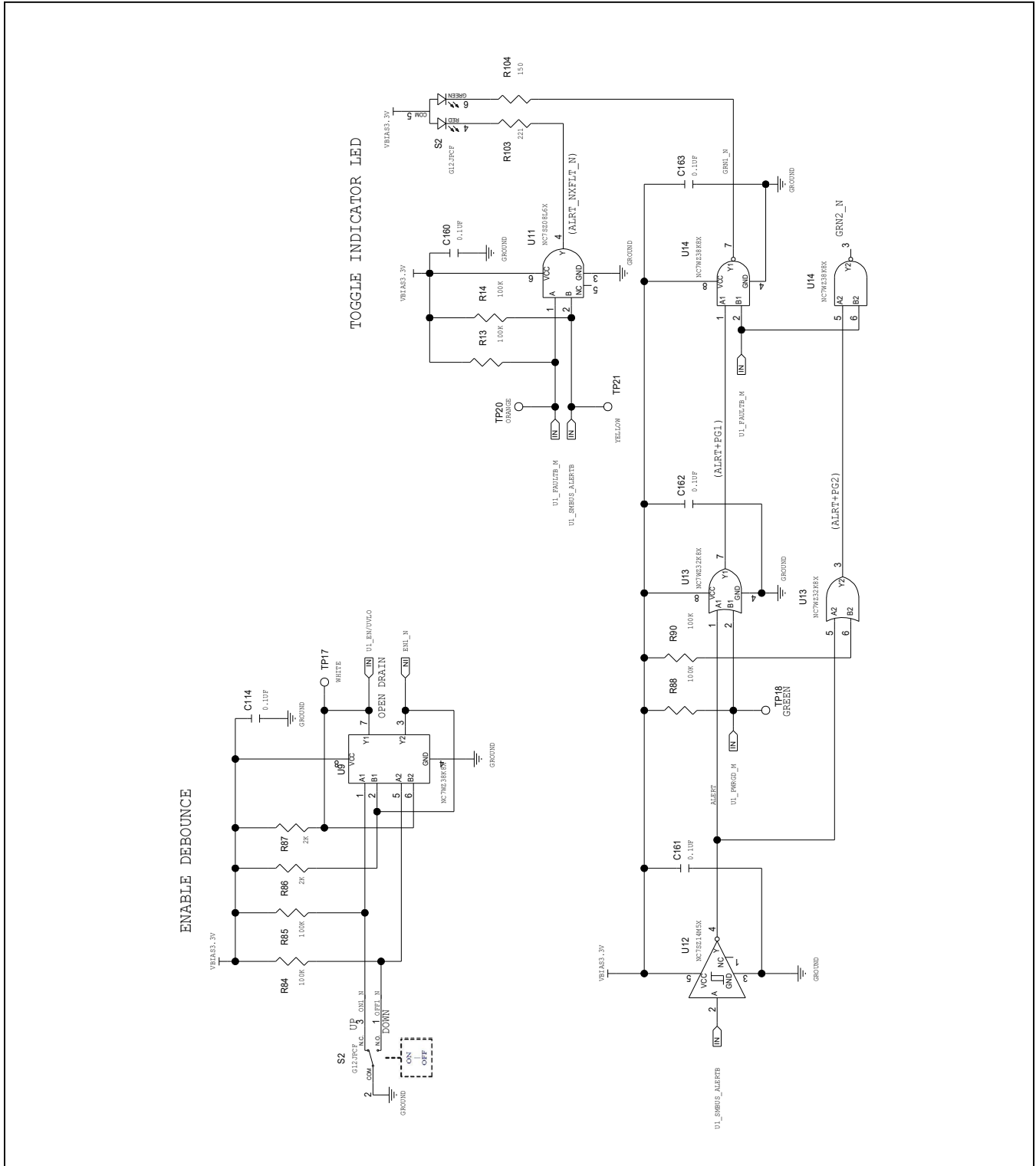
MAX16545B EV Kit Schematic



MAX16545B EV Kit Schematic (continued)



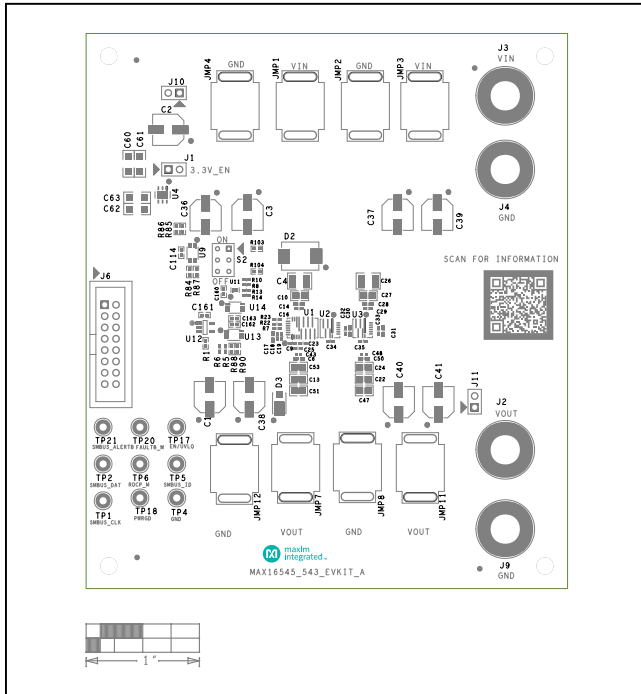
MAX16545B EV Kit Schematic (continued)



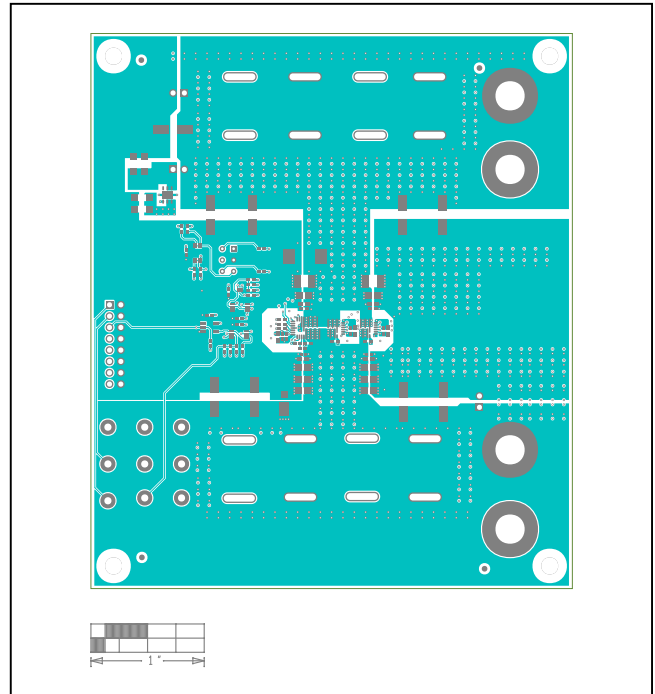
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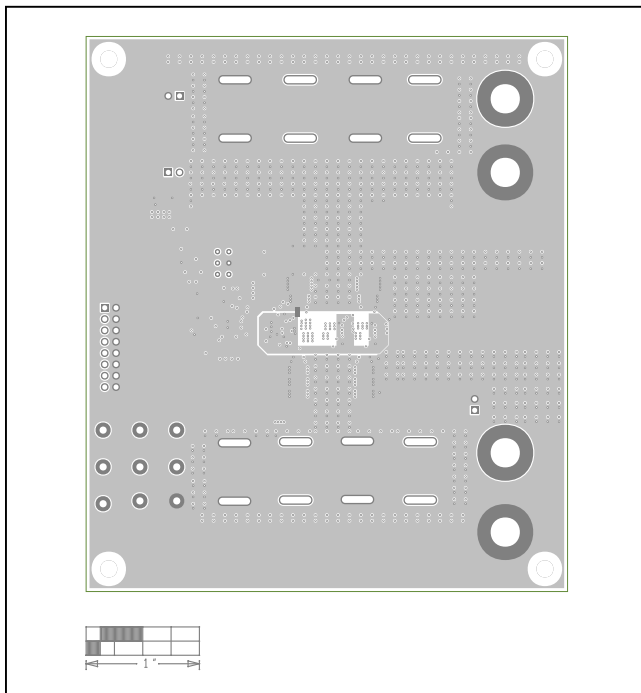
MAX16545B EV Kit PCB Layout Diagrams



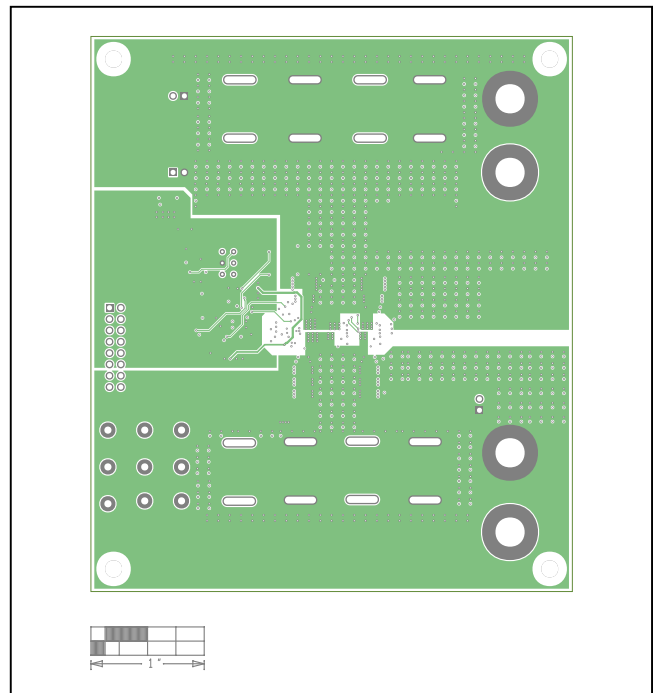
MAX16545B EV Kit—Silk_Top



MAX16545B EV Kit—Top



MAX16545B EV Kit—LAYER_2

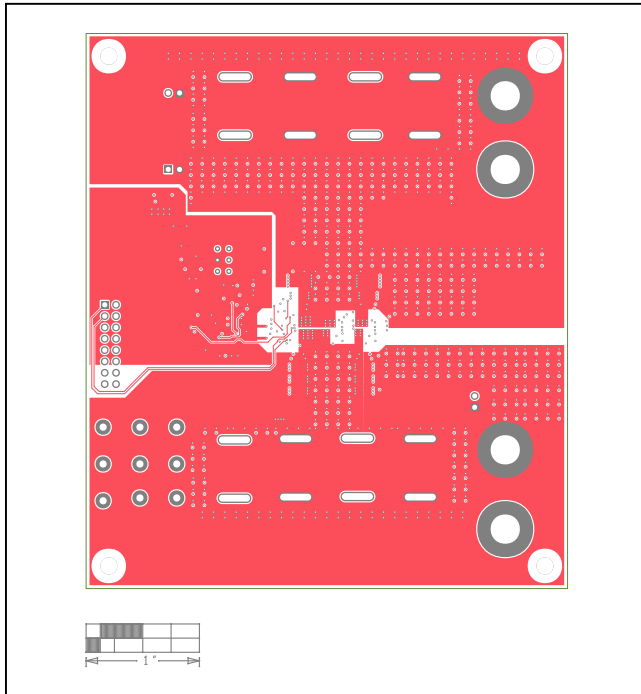


MAX16545B EV Kit—LAYER_3

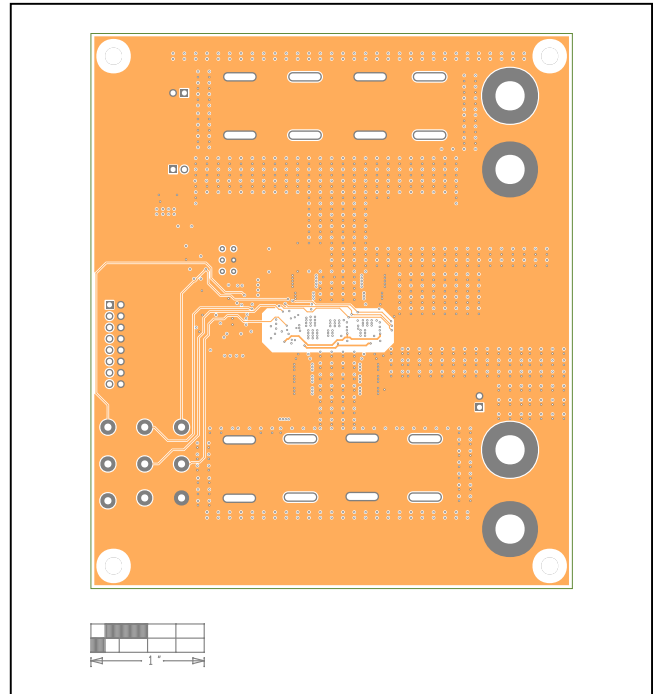
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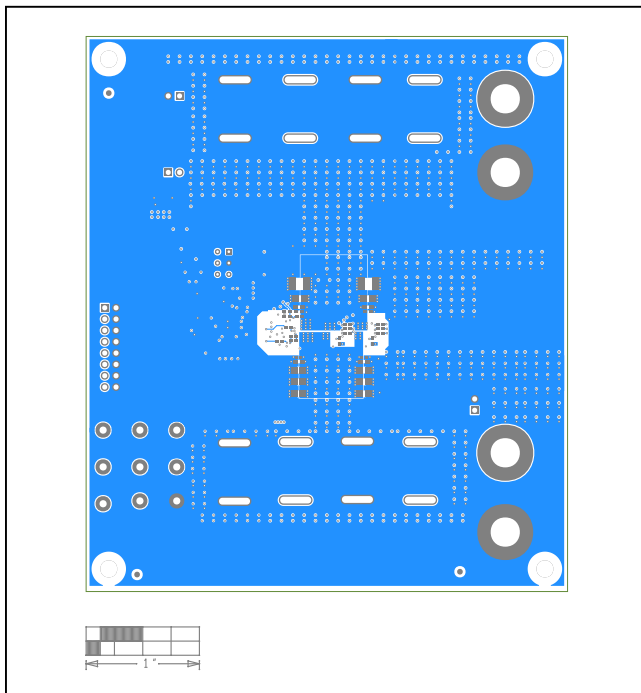
MAX16545B EV Kit PCB Layout Diagrams (continued)



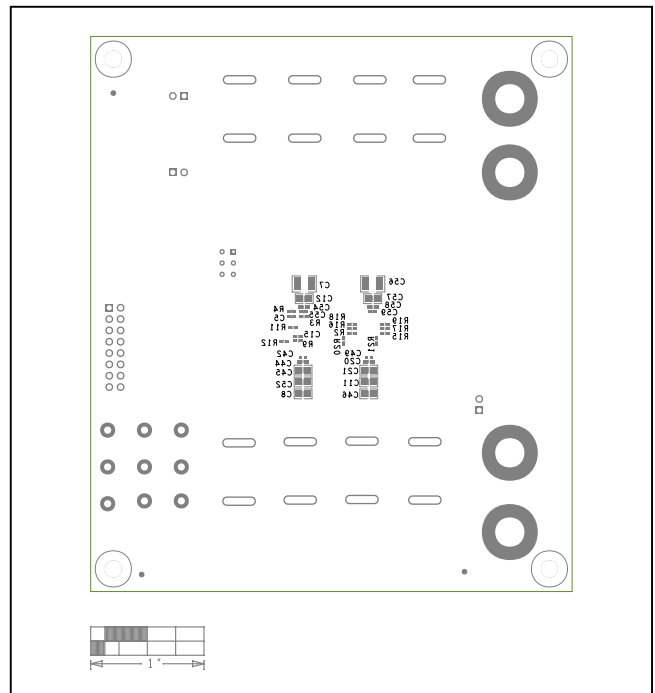
MAX16545B EV Kit—LAYER_4



MAX16545B EV Kit—LAYER_5



MAX16545B EV Kit—Bottom



MAX16545B EV Kit—Silk_Bot

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MAX16543

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	4/19	Initial release	—
1	3/20	Added MAX16545C	All

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