MAX17693A Evaluation Kit

Evaluates: MAX17693A in 5V Output-Voltage Application

General Description

The MAX17693A evaluation kit (EV kit) provides a proven design to evaluate the performance of the MAX17693A IC. This fully assembled and tested circuit is implemented using the MAX17693A, the No-Opto Flyback converter with an integrated 76V nMOSFET, available in a 12-pin TDFN package with an exposed pad. The IC data sheet provides a complete description of the part and should be read in conjunction with this EV kit data sheet prior to operating the EV kit.

The MAX17693A EV kit output is configured for an isolated +5V and provides up to 0.25A of output current over an 18V to 36V input-voltage range. The device has a 150kHz switching frequency. The EV kit regulates the output voltage within ±5% over the line, load, and temperature by sensing the output voltage on the primary-side. The converter does not need an opto-coupler for the isolated output-voltage sensing.

Features

- 18V to 36V Input Range
- Isolated Output: 5V/0.25A DC
- Compact Design with High Frequency (150kHz) Switching
- 88% Peak Efficiency
- Resistor Programmable Input Enable/UVLO Protection
- Resistor Programmable Input Overvoltage Protection
- Internal Loop Compensation Reduce External Components
- 20ms Soft-Start Time
- Temperature Compensated Output Voltage Over -40°C to +125°C Operating Temperature
- Provision to External Clock Synchronization and Frequency Dithering
- VCC Overdrive to Improve Efficiency
- Minimum Number of External Components
- Proven PCB Layout
- Fully Assembled and Tested

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

Quick Start

Recommended Equipment

- MAX17693AEVKIT#
- One 18V to 36V DC, 0.25A power supply
- 1.25W resistive load with 0.25A sink capacity
- Four digital multimeters (DMM)

Warning:

- Do not turn on the power supply until all connections are completed.
- Do not touch any part of the circuit with bare hands or conductive materials when powered up.
- Make sure all high-voltage capacitors are fully discharged before handling. Allow 5 minutes after disconnecting the input power source before touching circuit parts.

Equipment Setup and Procedure

1) Set the power supply to +24V_{DC}. Disable the power supply output.
2) Connect the positive terminal of the power supply to the VIN PCB pad and the negative terminal to the nearest PGND PCB pad. Connect the positive terminal of the electronic load to the VOUT PCB pad and the negative terminal to the nearest GND0 PCB pad.
3) Connect a DMM configured in voltmeter mode across the VOUT PCB pad and the nearest GND0 PCB pad.
4) Verify that a shunt is installed across pins 1–2 on jumper JU1 for proper operation. Refer to Table 1 for details.
5) Verify that shunts are not installed for pins 1–2 on jumpers JU2 and JU3. Refer to Table 2 and Table 3 for details.
6) Enable the power supply.
7) Verify that the output voltmeter displays 5V and, if required, measure the output current using a DMM in Ammeter mode.
8) If required, vary the input voltage from 18V to 36V, the load current from 1mA to 0.25A, and verify that the output voltage is 5V.

319-100740; Rev 0; 4/21

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Detailed Description

The MAX17693A EV kit provides a proven design to evaluate the MAX17693A high-efficiency DC-DC flyback converter. The device uses a novel sampling technique to eliminate the optocoupler in sensing and regulating the isolated output voltage. The device integrates a 76V nMOSFET and reduces the external component count. The transformer design, as well as the selection of different components, are detailed in the MAX17693A IC data sheet. All passive components selected for this EV kit are available from multiple component vendors.

Table 1. Converter SYNC Jumper (JU1) Settings

SHUNT POSITION	SYNC/DITHER PIN	MAX17693A OPERATION
1–2*	Connected to GND	SYNC/DITHER function disabled
Not installed	Need to connect JU1 to an external clock for external synchronization or implement dithering on the SYNC/DITHER pin	External clock synchronization or frequency dithering

**Default position.*

Table 2. Converter EN/UVLO Jumper (JU2) Settings

SHUNT POSITION	EN/UVLO PIN	MAX17693A
1–2	Connected to V_{IN}	Converter is always enabled
Not installed*	Connected to the center node of resistor divider R2 and R3	UVLO level is set by the resistor divider between V_{IN} and GND

**Default position.*

Table 3. Converter OVI Jumper (JU3) Settings

SHUNT POSITION	OVI PIN	MAX17693A OUTPUT
1–2	Connected to GND	OVI function is disabled
Not installed*	Connected to the center node of resistor divider R3 and R10	OVI level is set by the resistor divider between V_{IN} and GND

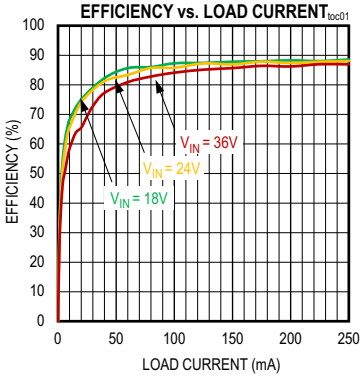
**Default position.*

Note: *Refer to the MAX17693A data sheet equations for calculating appropriate R2, R3, and R10 based on the preferred setting for JU2 and JU3.*

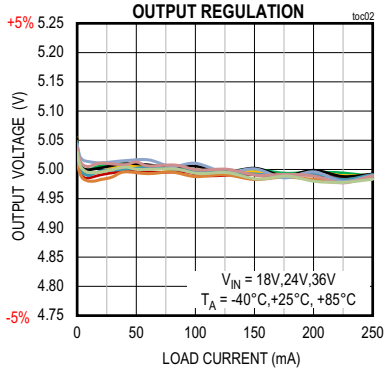
EV Kit Performance Report

(VIN = 24V, unless otherwise noted.)

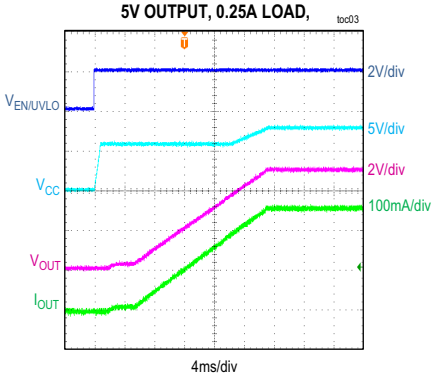
MAX17693A, 5V OUTPUT EFFICIENCY vs. LOAD CURRENT toc01



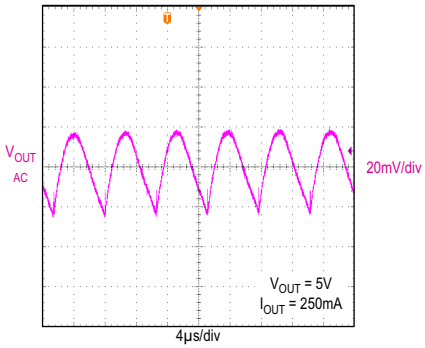
MAX17693A, 5V OUTPUT OUTPUT REGULATION toc02



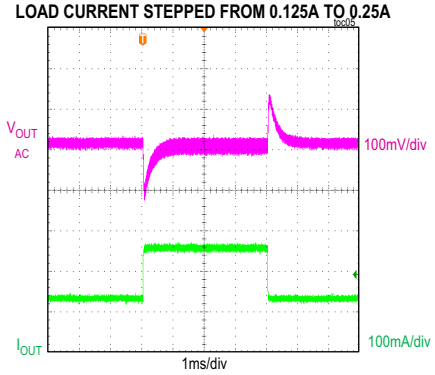
MAX17693A, SOFT-START 5V OUTPUT, 0.25A LOAD, toc03



MAX17693A OUTPUT-VOLTAGE RIPPLE toc04



MAX17693A, LOAD TRANSIENT RESPONSE LOAD CURRENT STEPPED FROM 0.125A TO 0.25A toc05



Component Supplier

SUPPLIER	WEBSITE
Sumida Corp	www.sumida.com
Coilcraft Inc	www.coilcraft.com
Murata Manufacturing	www.murata.com
Wurth Electronics	www.we-online.com
Vishay Dale	www.vishay.com

Note: Indicate that you are using the MAX17693A EV when contacting these component suppliers.

Ordering Information

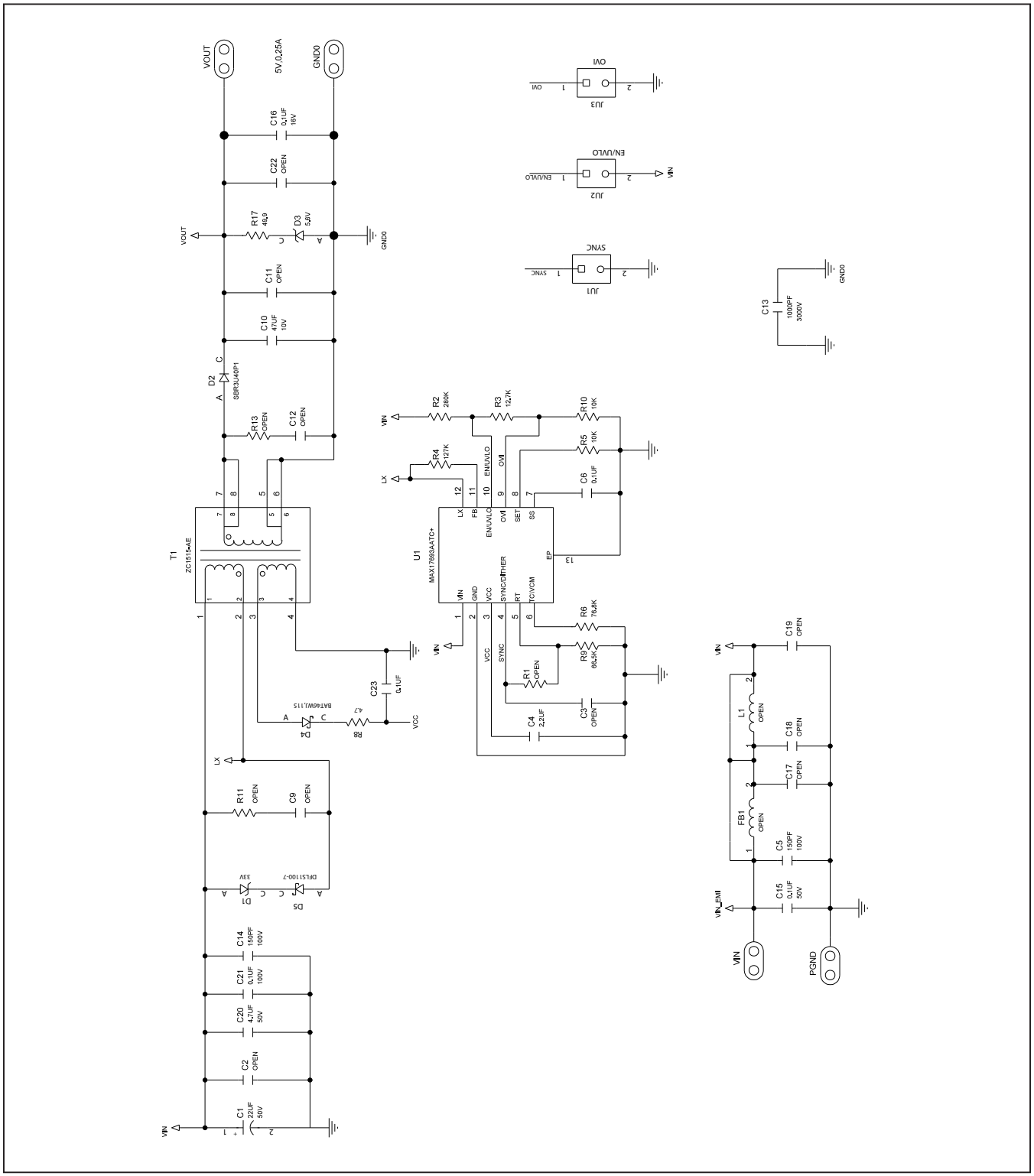
PART	TYPE
MAX17693AEVKIT#	EV Kit

#Denotes RoHS compliance.

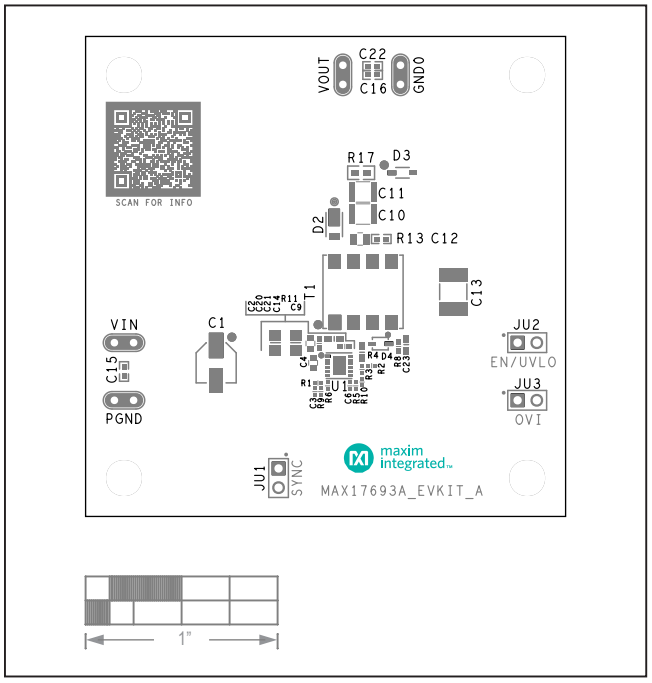
MAX17693A EV Kit Bill of Materials

ITEM	PART REFERENCE	QTY	SPECIFICATION	MANUFACTURER PART NUMBER
1	C1	1	22µF ±20%,50V;Aluminium capacitor	Panasonic EEE-FT1H220AR
2	C4	1	2.2µF ±10%, 16V, X7R ceramic capacitor (0603)	Murata GRM188Z71C225KE43
3	C5, C14	2	150pF ±5%, 100V, COG ceramic capacitor (0402)	TDK C1005C0G2A151J050BA
4	C6, C16	2	0.1µF ±10%, 16V, X7R ceramic capacitor (0402)	Murata GRM155R71C104KA88
5	C10	1	47µF ±10%, 10V, X7R ceramic capacitor (1210)	Murata GRM32ER71A476KE15
6	C13	1	1000pF ±10%, 3000V, X7R ceramic capacitor (1812)	Vishay HV1812Y102KXHATHV
7	C15	1	0.1µF ±10%, 50V, X7R ceramic capacitor (0402)	Murata GRM155R71H104KE14
8	C20	1	4.7µF ±10%, 50V, X7R ceramic capacitor (0805)	Murata GRM21BZ71H475KE15
9	C21	1	0.1µF ±10%, 100V, X7R ceramic capacitor (0603)	Murata GRM188R72A104KA35
10	C23	1	0.1µF ±10%, 25V, X7R ceramic capacitor (0603)	Murata GRM188R71E104KA01
11	D1	1	Zener, 33V, 0.25W	Central Semi CMDZ5257B
12	D2	1	Schottky diode, 40V,3A	Diodes SBR3U40P1
13	D3	1	Zener, 5.6V, 300mW	Nexperia BZX384-C5V6
14	D4	1	Schottky diode, 100V,0.25A	Nexperia BAT46WJ
15	D5	1	Schottky diode, 100V,1A	Diodes DFLS1100-7
16	R2	1	280kΩ, 1%, 0402	Panasonic ERJ-2RKF2803
17	R3	1	12.7kΩ, 1%, 0402	Panasonic ERJ-2RKF1272
18	R4	1	127kΩ, 1%, 0603	Vishay CRCW0603127KFK
19	R5, R10	2	10kΩ, 1%, 0402	Vishay CRCW040210K0FK
20	R6	1	76.8kΩ, 1%, 0402	Vishay CRCW040276K8FK
21	R8	1	4.7Ω, 1%, 0402	Vishay CRCW04024R70FK
22	R9	1	66.5kΩ, 1%, 0402	Vishay CRCW040266K5FK
23	R17	1	49.9Ω, 1%, 0603	Vishay CRCW060349R9FK
24	T1	1	EP7,8-pin SMT, 100µH ±10% ,0.5A,(1-2):(5,6-7,8):(3-4)= 1:0.45:0.675,±1%	Coilcraft ZC1515-AE
25	U1	1	4.2V-60V No-Opto Isolated Flyback Converter with Integrated FET	MAX17693AATC+
26	C2	1	OPEN: Capacitor (0805)	NA
27	L1	1	OPEN: Inductor (4mm x 4mm)	NA
28	C3, C9, C12, C22	4	OPEN: Capacitor (0402)	NA
29	C11	1	OPEN: Capacitor (1210)	NA
30	C17-C19	3	OPEN: Capacitor (1210)	NA
31	R1	1	OPEN: Resistor (0402)	NA
32	R11	1	OPEN: Resistor (0603)	NA
33	R13	1	OPEN: Resistor (0805)	NA
34	FB1	1	OPEN: Ferrite Bead (0805)	NA

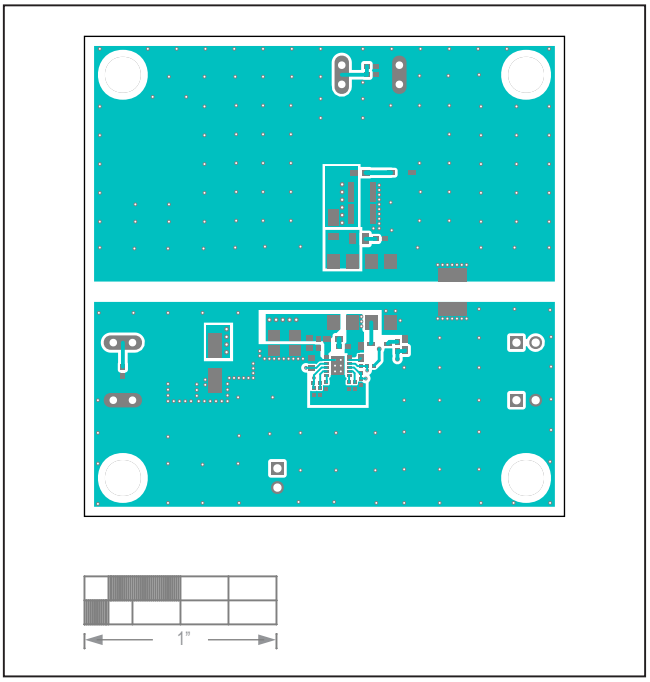
MAX17693A EV Kit Schematic



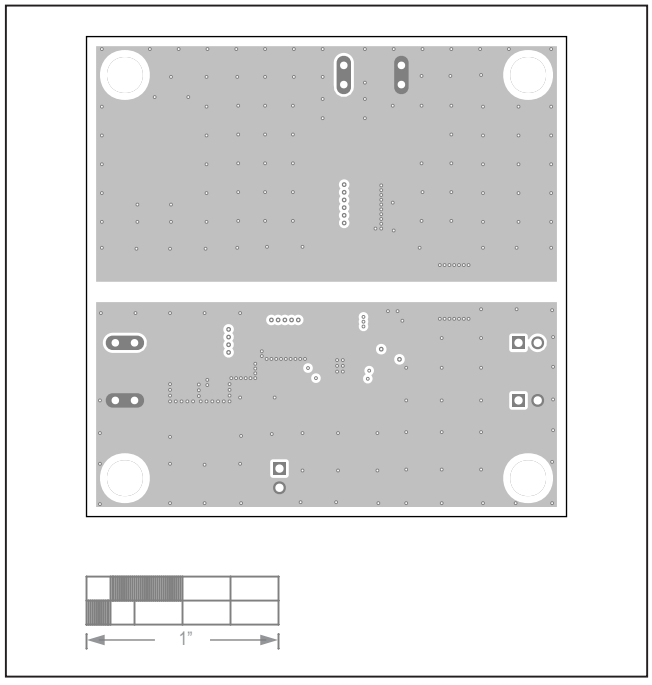
MAX17693A EV Kit PCB Layout Diagrams



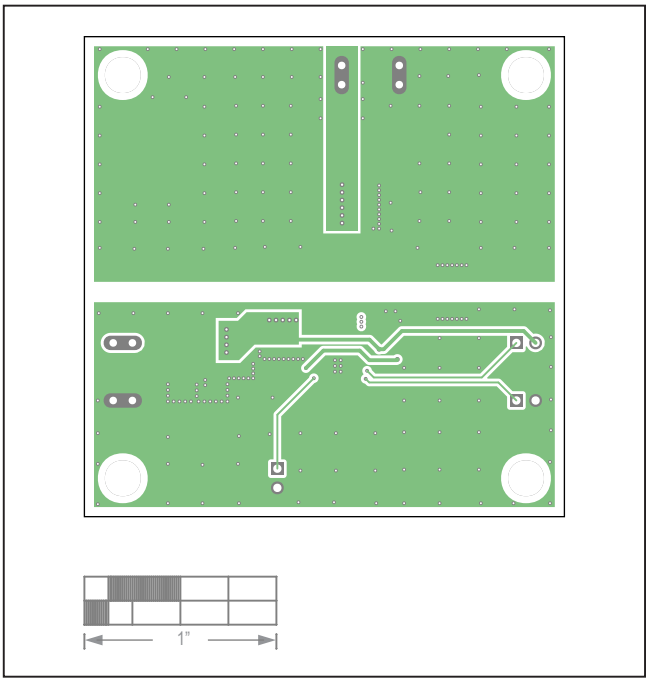
MAX17693A EV Kit Layout—Top Silkscreen



MAX17693A EV Kit Layout— Top Layer

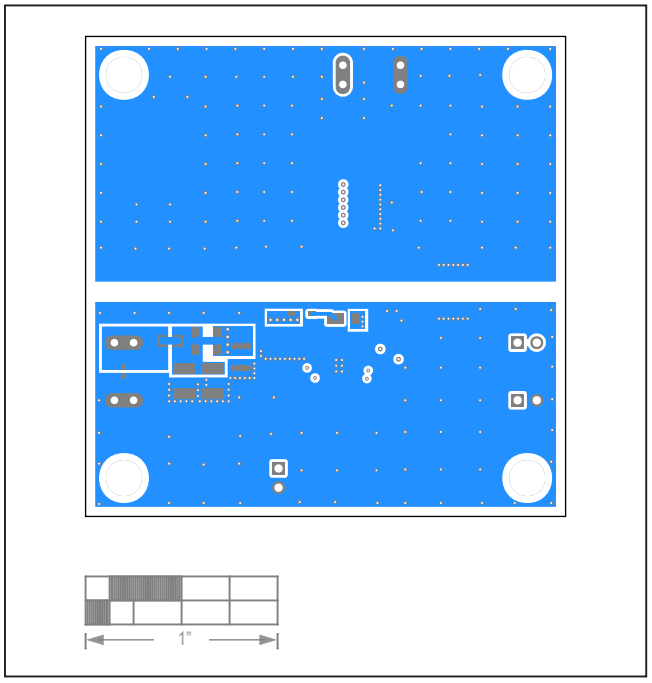


MAX17693A EV Kit Layout— Layer 2

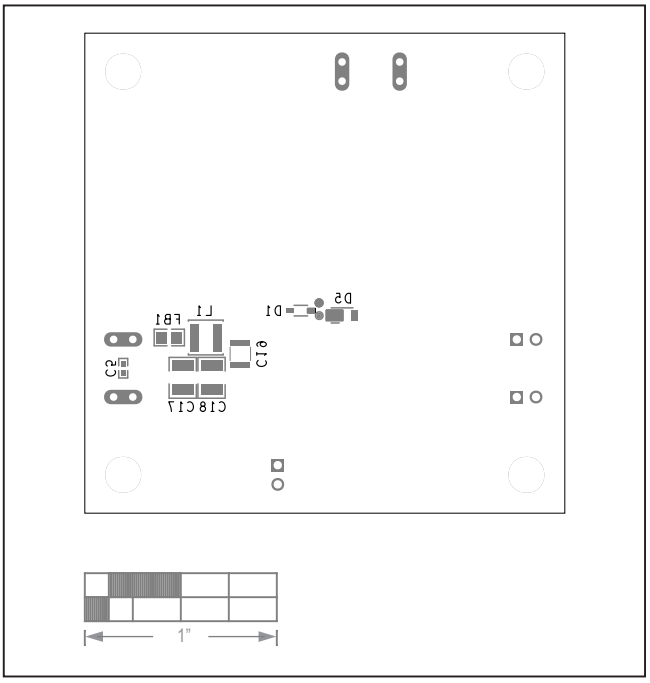


MAX17693A EV Kit Layout— Layer 3

MAX17693A EV Kit PCB Layout Diagrams (continued)



MAX17693A EV Kit Layout— Bottom Layer



MAX17693A EV Kit Layout— Bottom Silkscreen

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	4/21	Initial release	—

Mouser Electronics

Authorized Distributor

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Maxim Integrated:

MAX17693AEVKIT#