MAX17693B Evaluation Kit

Evaluates: MAX17693B in 5V Output-Voltage Application

General Description

The MAX17693B evaluation kit (EV kit) provides a proven design to evaluate the performance of the MAX17693B IC. This fully assembled and tested circuit is implemented using the MAX17693B, 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 pro¬vides 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 MAX17693B EV kit output is configured for an isolated +5V and provides up to 0.25A of output current over 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
- External Loop Compensation with Design Flexibility
- 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

- MAX17693BEVKIT#
- 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 jumper JU2. Refer to Table 2 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.

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Detailed Description

The MAX17693B EV kit provides a proven design to evaluate the MAX17693B 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 MAX17693B 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	MAX17693B 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 SYNC/DITHER pin	External clock synchronization or frequency dithering

**Default position.*

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

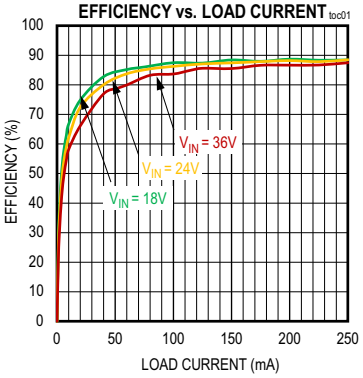
SHUNT POSITION	EN/UVLO PIN	MAX17693B
1–2	Connected to V_{IN}	Converter is always enabled
Not installed*	Connected to the center node of resistor divider R2 and R12	UVLO level is set by the resistor divider between V_{IN} and GND

**Default position.*

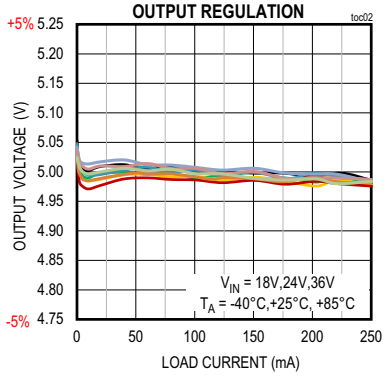
EV Kit Performance Report

(VIN = 24V, unless otherwise noted.)

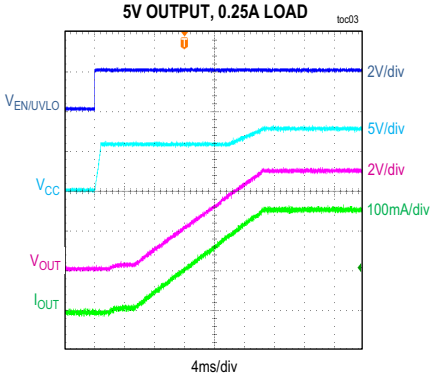
MAX17693B, 5V OUTPUT EFFICIENCY vs. LOAD CURRENT



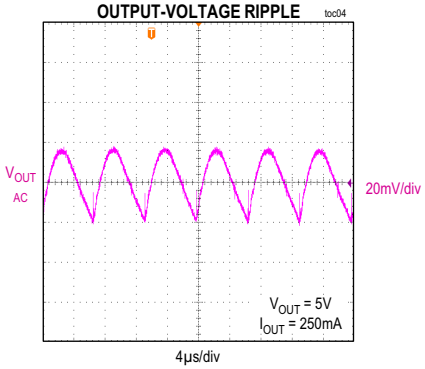
MAX17693B, 5V OUTPUT OUTPUT REGULATION



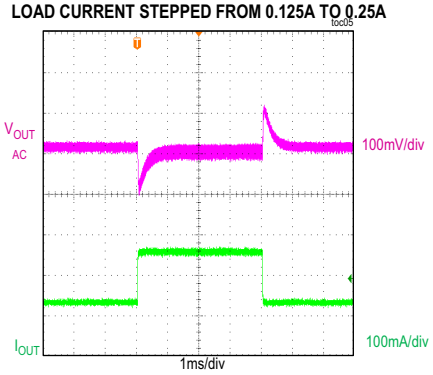
MAX17693B, SOFT-START 5V OUTPUT, 0.25A LOAD



MAX17693B OUTPUT-VOLTAGE RIPPLE



MAX17693B, LOAD TRANSIENT RESPONSE LOAD CURRENT STEPPED FROM 0.125A TO 0.25A



Component Suppliers

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 MAX17693B EV when contacting these component suppliers.

Ordering Information

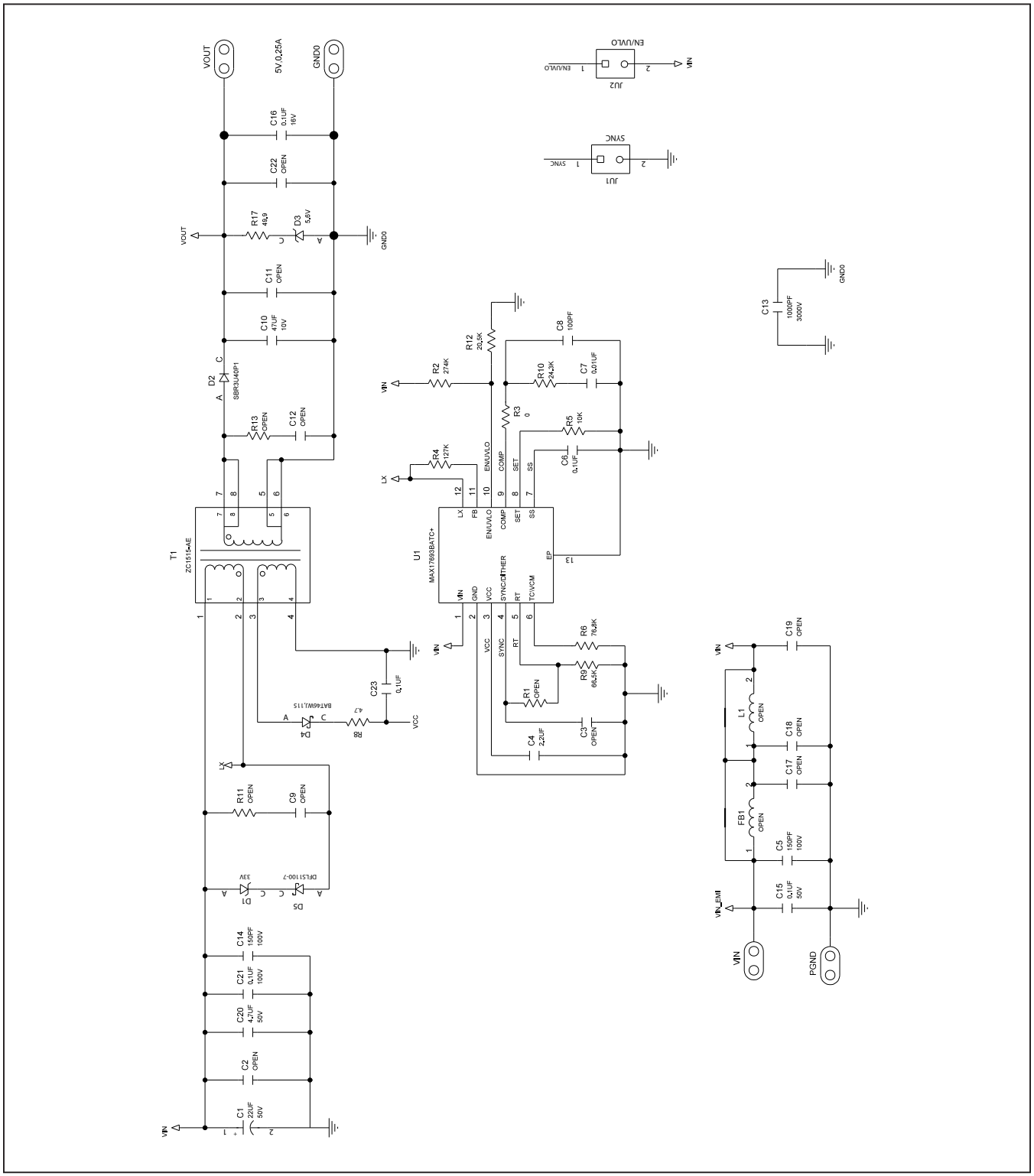
PART	TYPE
MAX17693BEVKIT#	EV Kit

#Denotes RoHS compliance.

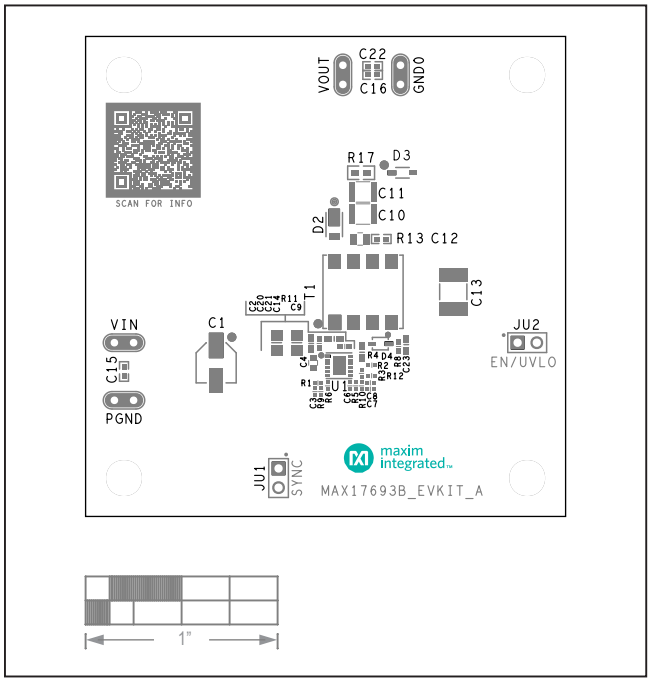
MAX17693B EV Kit Bill of Materials

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	1	0.1µF ±10%, 16V, X7R ceramic capacitor (0402)	Murata GRM155R71C104KA88
5	C7	1	0.01µF ±10%, 16V, X7R ceramic capacitor (0402)	Murata GRM155R71C103KA01
6	C8	1	100pF ±1%, 16V, C0G ceramic capacitor (0402)	Vishay VJ0402A101FXJCW1BC
7	C10	1	47µF ±10%, 10V, X7R ceramic capacitor (1210)	Murata GRM32ER71A476KE15
8	C13	1	1000pF ±10%, 3000V, X7R ceramic capacitor (1812)	Vishay HV1812Y102KXHATHV
9	C15	1	0.1µF ±10%, 50V, X7R ceramic capacitor (0402)	Murata GRM155R71H104KE14
10	C20	1	4.7µF ±10%, 50V, X7R ceramic capacitor (0805)	Murata GRM21BZ71H475KE15
11	C21	1	0.1µF ±10%, 100V, X7R ceramic capacitor (0603)	Murata GRM188R72A104KA35
12	C23	1	0.1µF ±10%, 25V, X7R ceramic capacitor (0603)	Murata GRM188R71E104KA01
13	D1	1	Zener, 33V, 0.25W	Central Semi CMDZ5257B
14	D2	1	Schottky diode, 40V,3A	Diodes SBR3U40P1
15	D3	1	Zener, 5.6V, 300mW	Nexperia BZX384-C5V6
16	D4	1	Schottky diode, 100V,0.25A	Nexperia BAT46WJ
17	D5	1	Schottky diode, 100V,1A	Diodes DFLS1100-7
18	R2	1	274kΩ, 1%, 0402	Vishay CRCW0402274KFK
19	R3	1	0Ω, 0402	Panasonic ERJ-2GE0R00
20	R4	1	127kΩ, 1%, 0603	Vishay CRCW0603127KFK
21	R5	1	10kΩ, 1%, 0402	Vishay CRCW040210K0FK
22	R6	1	76.8kΩ, 1%, 0402	Vishay CRCW040276K8FK
23	R8	1	4.7Ω, 1%, 0402	Vishay CRCW04024R70FK
24	R9	1	66.5kΩ, 1%, 0402	Vishay CRCW040268K1FK
25	R10	1	24.3kΩ, 1%, 0402	Yageo RT0402FRE0724K3L
26	R12	1	20.5kΩ, 1%, 0402	Vishay CRCW040220K5FK
27	R17	1	49.9Ω, 1%, 0603	Vishay CRCW060349R9FK
28	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
29	U1	1	4.2V-60V No-Opto Isolated Flyback Converter with Integrated FET	MAX17693BATC+
30	C2	1	OPEN: Capacitor (0805)	NA
31	L1	1	OPEN: Inductor (4mm x 4mm)	NA
32	C3, C9, C12, C22	4	OPEN: Capacitor (0402)	NA
33	C11	1	OPEN: Capacitor (1210)	NA
34	C17-C19	3	OPEN: Capacitor (1210)	NA
35	R1	1	OPEN: Resistor (0402)	NA
36	R11	1	OPEN: Resistor (0603)	NA
37	R13	1	OPEN: Resistor (0805)	NA
38	FB1	1	OPEN: Ferrite Bead (0805)	NA

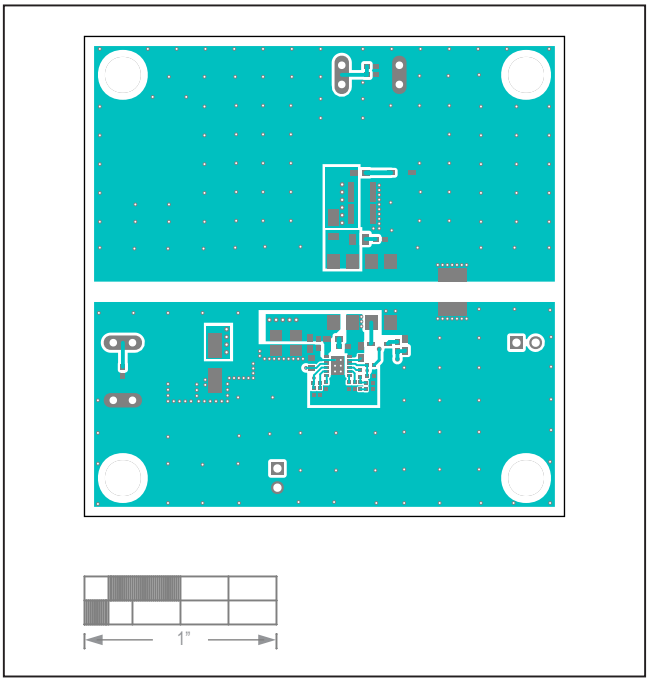
MAX17693B EV Kit Schematic



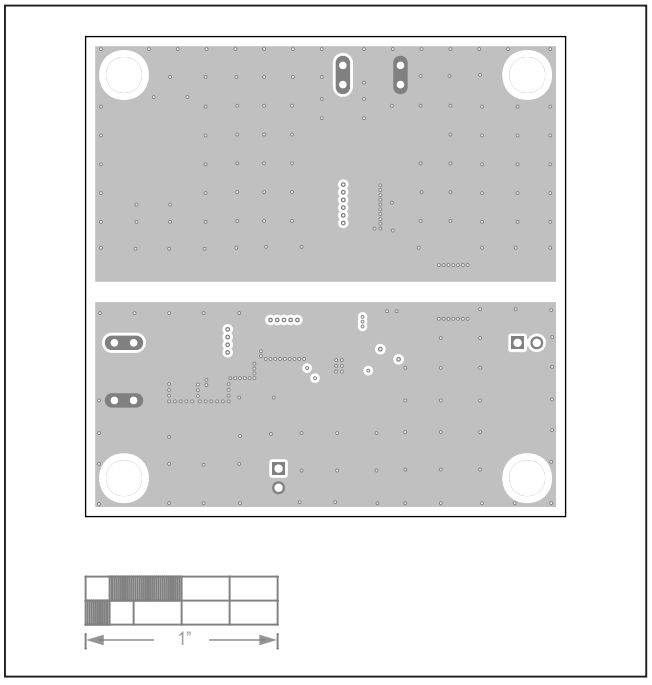
MAX17693B EV Kit PCB Layout Diagrams



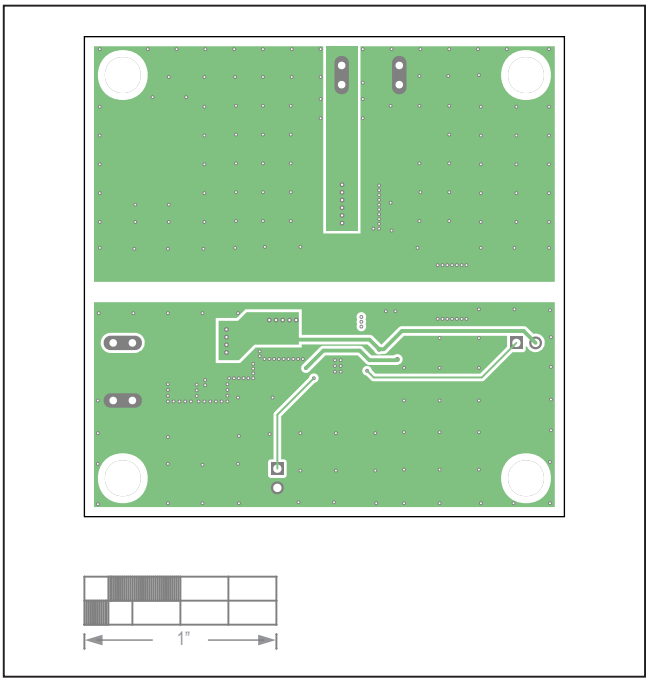
MAX17693B EV Kit Layout—Top Silkscreen



MAX17693B EV Kit Layout— Top Layer

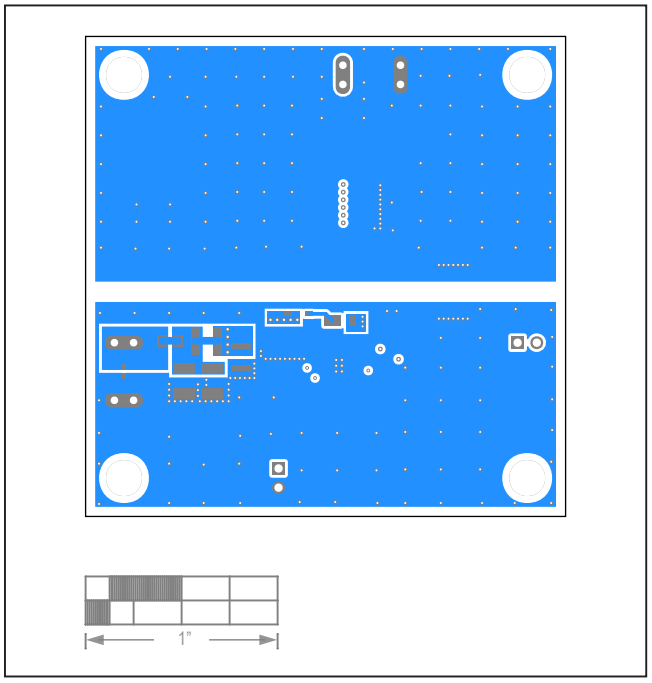


MAX17693B EV Kit Layout— Layer 2

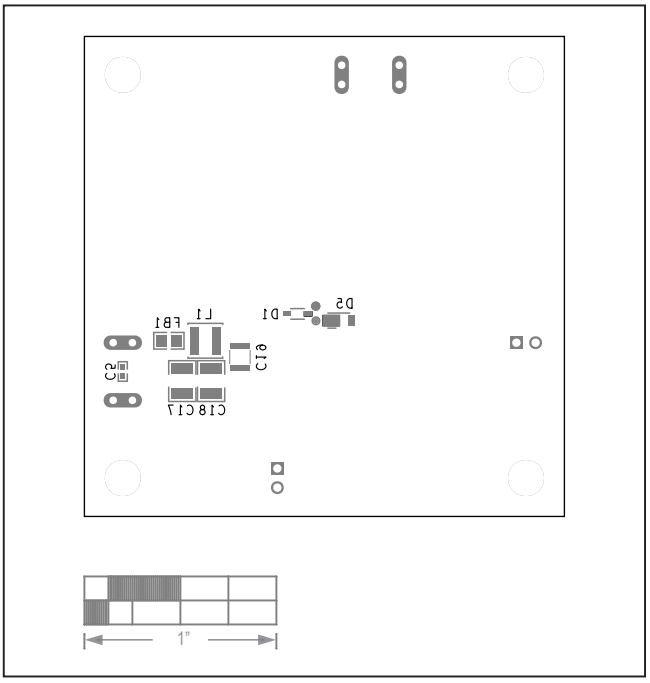


MAX17693B EV Kit Layout— Layer 3

MAX17693B EV Kit PCB Layout Diagrams (continued)



MAX17693B EV Kit Layout— Bottom Layer



MAX17693B EV Kit Layout— Bottom Silkscreen

Revision History

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

