

MAX17691B Evaluation Kit

Evaluates: MAX17691B 5V Output-Voltage Application

General Description

The MAX17691B evaluation kit (EV kit) provides a proven design to evaluate the performance of the MAX17691B IC. This fully assembled and tested circuit evaluates the MAX17691B, 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 MAX17691B EV kit output is configured for an isolated +5V and provides up to 1.5A of output current over an 18V to 36V input range. The device has a 150kHz switching frequency. The EV kit regulates the output voltage within $\pm 5\%$ 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/1.5A DC
- Compact Design with High Frequency (150kHz) Switching
- 87% Peak Efficiency
- Resistor Programmable Input Enable/UVLO Protection
- External Loop Compensation with Design Flexibility
- 5ms Internal Soft-Start Time
- Temperature Compensated Output Voltage Over -40°C to $+125^{\circ}\text{C}$ Operating Temperature
- Provision to External Clock Synchronization and Frequency Dithering
- V_{CC} Overdrive to Improve Efficiency
- Minimum Number of External Components
- CISPR22 (EN55022) Class B Compliant
- Proven PCB Layout
- Fully Assembled and Tested

Ordering Information appears at end of data sheet.

Quick Start

Recommended Equipment

- MAX17691BEVKIT#
- One 18V to 36V DC, 1.5A power supply
- 7.5W resistive load with 1.5A 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 a DC voltage of +24V. 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 (see [Table 1](#) for details).
- 5) Verify that shunts are not installed for pins 1–2 on jumper JU2 (see [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 3mA to 1.5A, and verify that output voltage is 5V.

Detail Description

The MAX17691B EV kit provides a proven design to evaluate the MAX17691B 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 MAX17691B 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	MAX17691B 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.

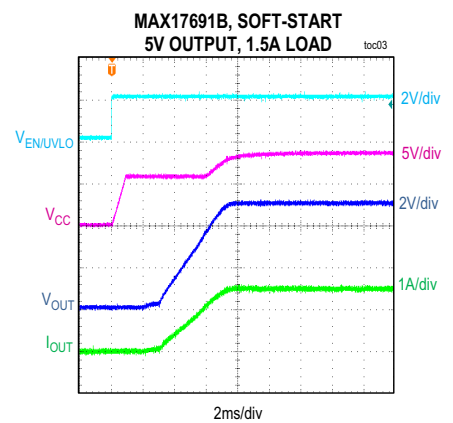
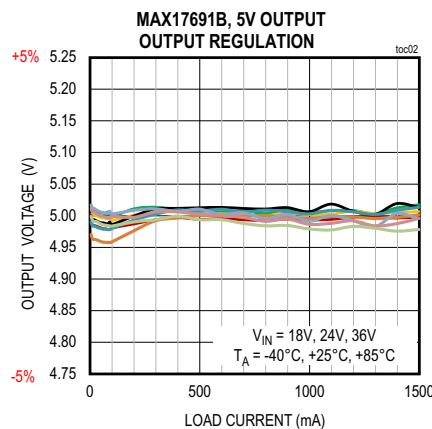
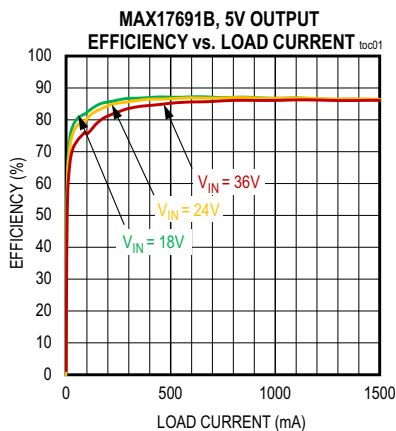
Table 2. Converter EN/UVLO Jumper (JU2) Settings

SHUNT POSITION	EN/UVLO PIN	MAX17691B
1-2	Connected to VIN.	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 VIN and GND

*Default position.

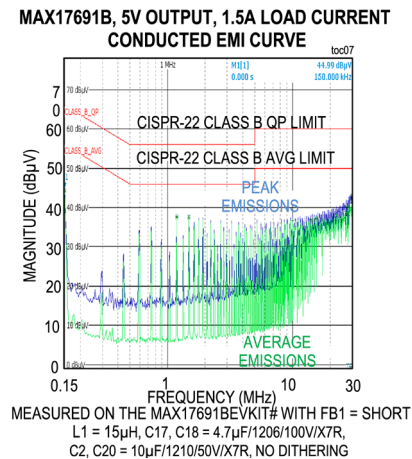
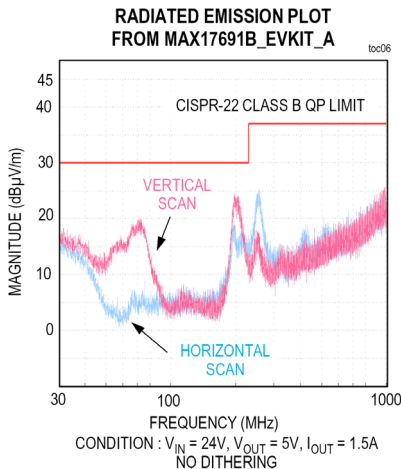
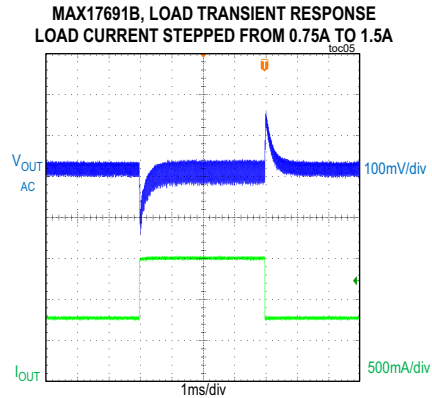
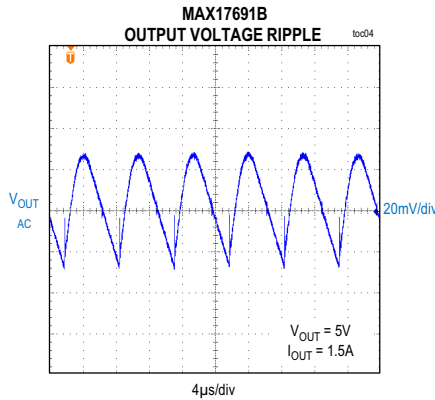
EV Kit Performance Report

(VIN = 24V, unless otherwise noted.)



EV Kit Performance Report (continued)

(VIN = 24V, unless otherwise noted.)



Component Suppliers

SUPPLIER	WEBSITE
Wurth Electronic	www.we-online.com
Coilcraft Inc	www.coilcraft.com
Murata Manufacturing	www.murata.com
Panasonic Corp	www.panasonic.com
Vishay Dale	www.vishay.com

Note: Indicate that you are using the MAX17691B EV when contacting these component suppliers.

Ordering Information

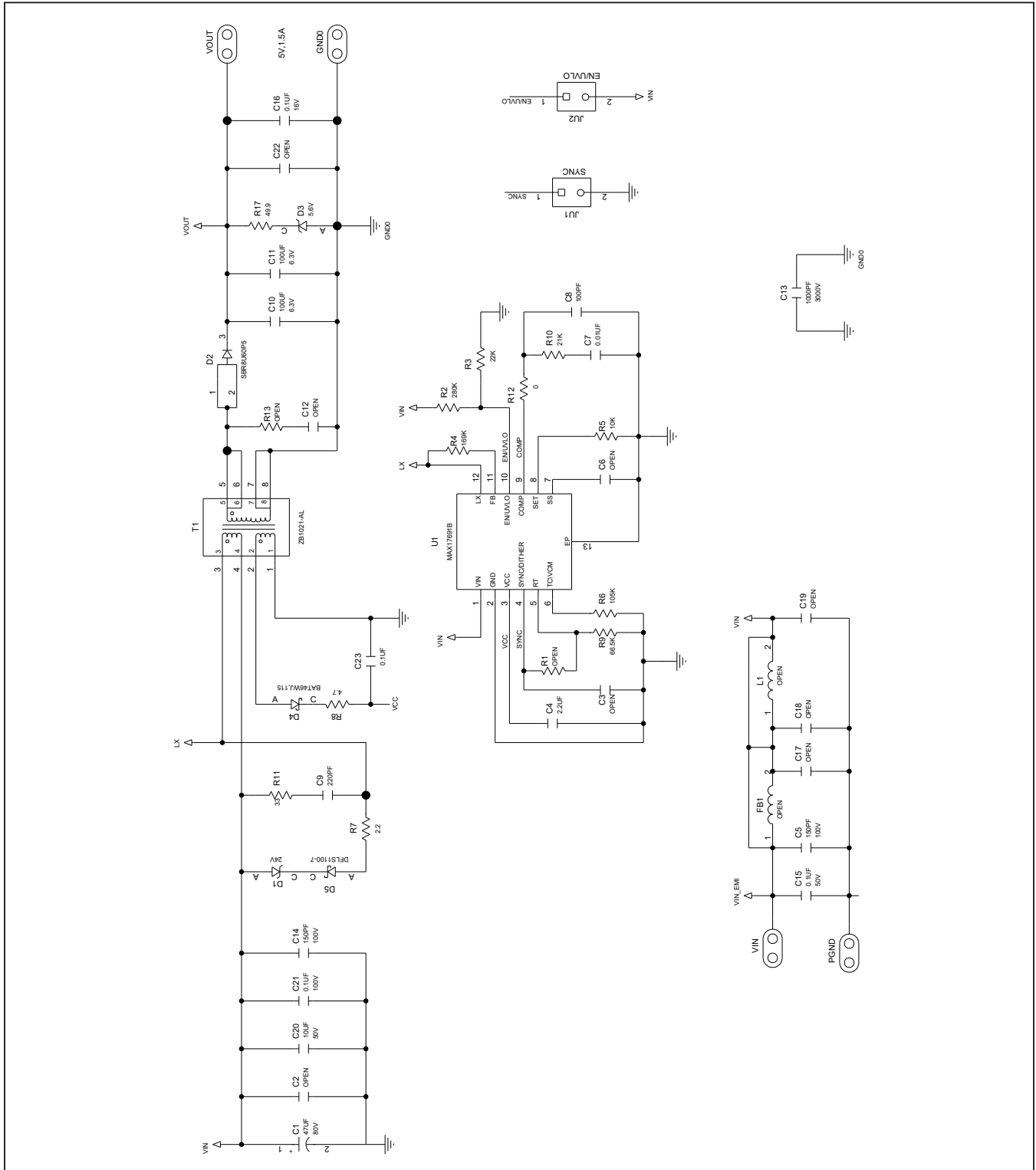
PART	TYPE
MAX17691BEVKIT#	EV Kit

#Denotes RoHS compliant.

MAX17691B EV Kit Bill of Materials

ITEM	PART REFERENCE	QTY	SPECIFICATION	MANUFACTURER PART NUMBER
1	C1	1	47µF ±20%,80V;Aluminium capacitor	Panasonic EEE-FK1K470P
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	C7	1	0.01µF ±10%, 50V, X7R ceramic capacitor (0402)	Murata GRM155R71H103KA88
5	C8	1	100pF ±10%, 50V, COG ceramic capacitor (0402)	Murata GRM1555C1H101JA01
6	C9	1	220pF ±10%, 100V, X7R ceramic capacitor (0402)	Murata GRM155R72A221KA01
7	C10, C11	2	100µF ±20%, 6.3V, X7S ceramic capacitor (1210)	Taiyo Yuden JMK325AC7107MM-P
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	C16	1	0.1µF ±10%, 16V, X7R ceramic capacitor (0402)	Murata GRM155R71C104KA88
11	C20	1	10µF ±10%, 50V, X7R ceramic capacitor (1210)	Murata GRM32ER71H106KA12
12	C21	1	0.1µF ±10%, 100V, X7R ceramic capacitor (0603)	Murata GRM188R72A104KA35
13	C23	1	0.1µF ±10%, 25V, X7R ceramic capacitor (0603)	Murata GRM188R71E104KA01
14	D1	1	Zener, 24V, 0.25W	Central Semi CMDZ5252B
15	D2	1	Schottky diode, 60V,8A	Diodes SBR8U60P5
16	D3	1	Zener, 5.6V, 500mW	Central Semi CMZ5919B
17	D4	1	Schottky diode, 100V,0.25A	Nexperia BAT46WJ
18	D5	1	Schottky diode, 100V,1A	Diodes DFSL1100-7
19	R2	1	280kΩ, 1%, 0402	Panasonic ERJ-2RKF2803
20	R3	1	22kΩ, 1%, 0402	Vishay CRCW040222K0FK
21	R4	1	169kΩ, 1%, 0603	Panasonic ERJ-3EKF1693
22	R5	1	10kΩ, 1%, 0402	Vishay CRCW040210K0FK
23	R6	1	105kΩ, 1%, 0402	Vishay CRCW0402105KFK
24	R7	1	2.2Ω, 1%, 0603	Panasonic ERJ-3RQF2R2
25	R8	1	4.7Ω, 1%, 0402	Vishay CRCW04024R70FK
26	R9	1	66.5kΩ, 1%, 0402	Panasonic ERJ-2RKF5602
27	R10	1	21kΩ, 1%, 0402	Panasonic ERJ-2RKF2102
28	R11	1	33Ω, 1%, 0603	Vishay CRCW060333R0FK
29	R12	1	0Ω, 0%, 0402	Panasonic ERJ-2GE0R00
30	R17	1	49.9Ω, 1%, 0603	Vishay CRCW060349R9FK
31	T1	1	EP10,8-pin SMT, 1500VRMS Isolation, 22µH ±10% ,2.8A,(3-4):(5,6-7,8):(1-2)= 3:1:1.5,±1%	Coilcraft ZB1021-AL or Wurth 750318935
32	U1	1	4.2V-60V No-Opto Isolated Flyback Converter with Integrated FET	MAX17691BATC+
33	C2, C17-C19	4	OPEN: Capacitor (1210)	NA
34	L1	1	OPEN: Inductor (4mm x 4mm)	NA
35	C3, C6, C12,C22	4	OPEN: Capacitor (0402)	NA
36	R1	1	OPEN: Resistor (0402)	NA
37	R13	1	OPEN: Resistor (0805)	NA
38	FB1	1	OPEN: Ferrite Bead (0805)	NA

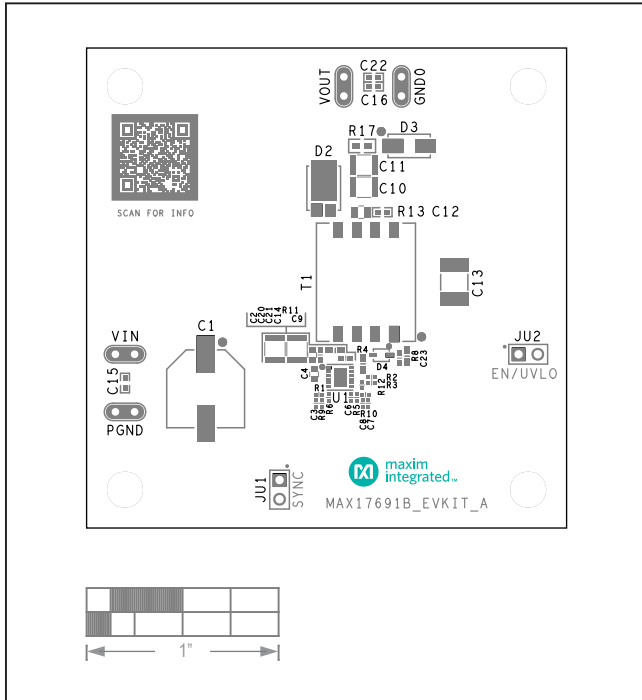
MAX17691B EV Kit Schematic



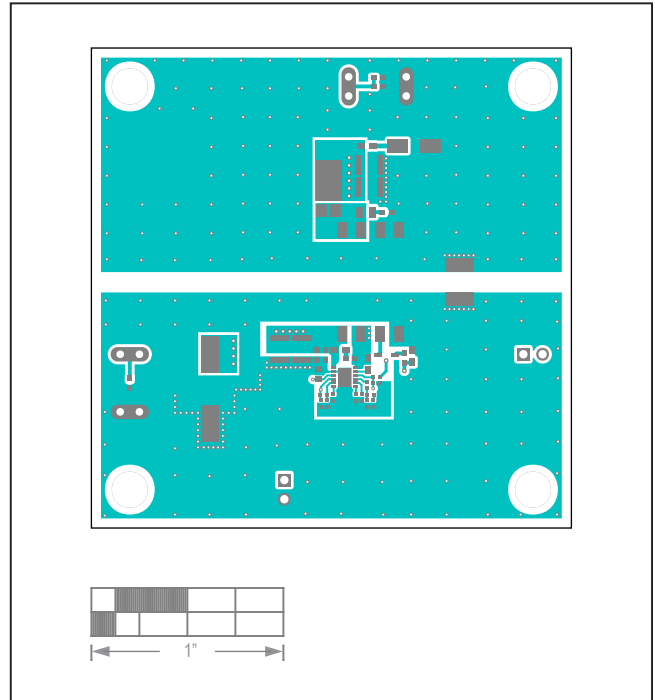
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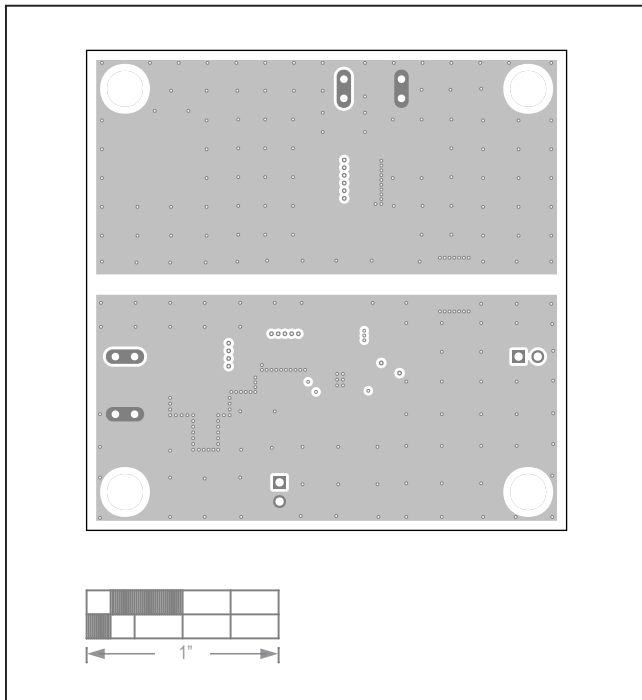
MAX17691B EV Kit PCB Layout Diagrams



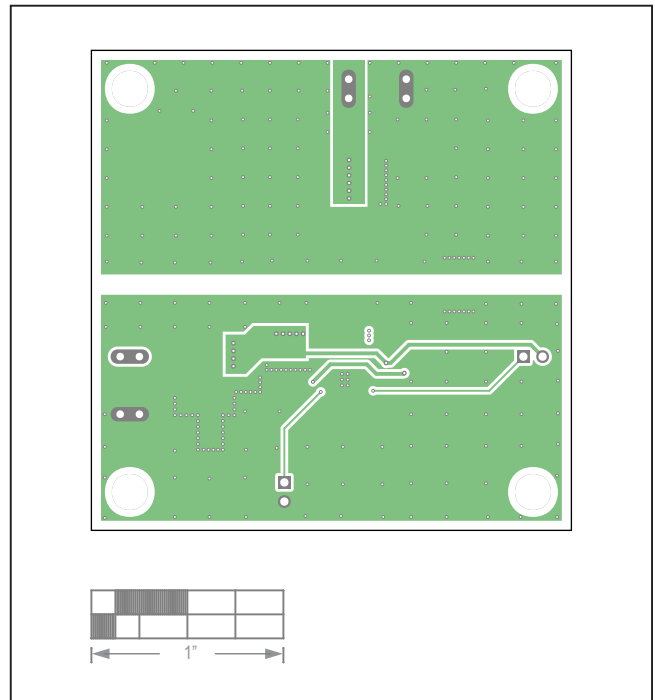
MAX17691B EV Kit Layout—Top Silkscreen



MAX17691B EV Kit Layout— Top Layer

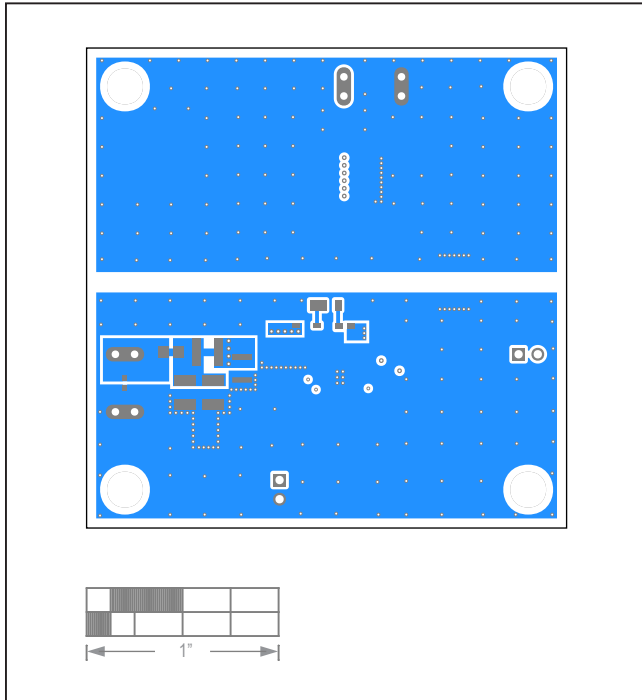


MAX17691B EV Kit Layout— Layer 2

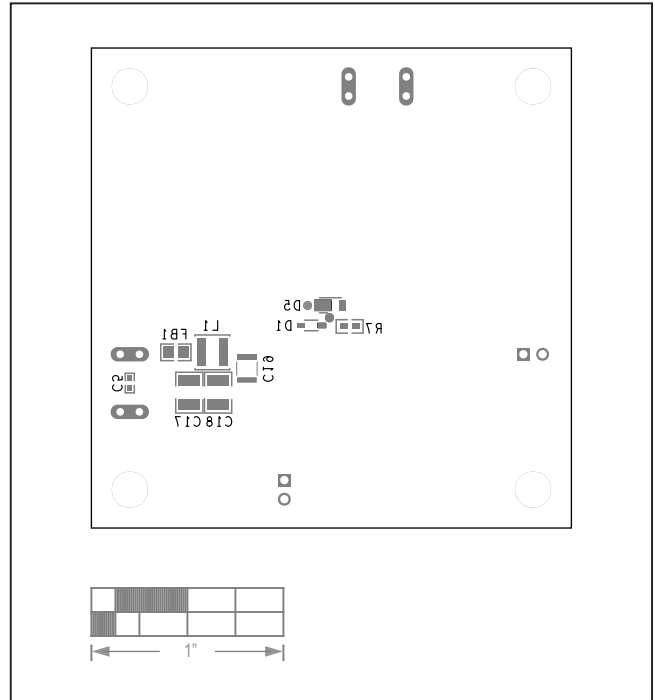


MAX17691B EV Kit Layout— Layer 3

MAX17691B EV Kit PCB Layout Diagrams (continued)



MAX17691B EV Kit Layout— Bottom Layer



MAX17691B EV Kit Layout— Bottom Silkscreen

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	10/20	Initial release	—
1	4/21	Updated the <i>General Description</i> , Table 2, and the <i>Component Supplier</i> table; added TOC07 and replaced the <i>Bill of Materials</i>	1–4

For pricing, delivery, and ordering information, please visit Maxim Integrated's online storefront at <https://www.maximintegrated.com/en/storefront/storefront.html>.

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