Click here for production status of specific part numbers.

MAX17691A Evaluation Kit

Evaluates: MAX17691A in 5V Output-Voltage Application

General Description

The MAX17691A evaluation kit (EV kit) provides a proven design to evaluate the performance of MAX17691A IC. This fully assembled and tested circuit is implemented using the MAX17691A, 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 MAX17691A EV kit output is configured for an isolated +5V and provides up to 1.5A of output current over a 18V to 36V input range. The device switches at 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 optocoupler for the isolated output voltage sensing.

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

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
- Resistor Programmable Input Overvoltage Protection
- Internal Loop Compensation Reduces External Components
- 5mS Internal Soft-Start Time
- Temperature Compensated Output Voltage Over -40°C to +125°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

319-100564; Rev 2; 5/21

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Quick Start

Recommended Equipment

- MAX17691AEVKIT#
- 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 +24VDC. 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 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 jumpers JU2 and JU3. See 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 3mA to 1.5A, and verify that output voltage is 5V.

Detailed Description

The MAX17691A EV kit provides a proven design to evaluate the MAX17691A high-efficiency DC-DC flyback converter. The device use 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 MAX17691A 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	MAX17691A OPERATION
1-2*	Connected to GND	SYNC/DITHER function disabled
Not installed	Need to connect JU1 to 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	MAX17691A
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*

Table 3. Converter OVI Jumper (JU3) Settings

SHUNT POSITION	OVI PIN	MAX17691A OPERATION
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 VIN and GND

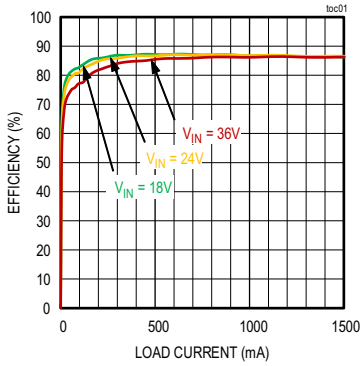
**Default position*

Note: Refer to MAX17691A data sheet equations for calculating appropriate R2, R3, and R10 based on the preferred setting for JU2 and JU3.

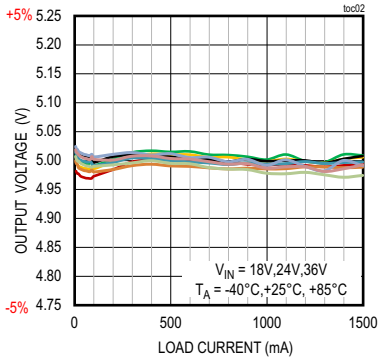
EV Kit Performance Report

(V_{IN} = 24V, unless otherwise noted.)

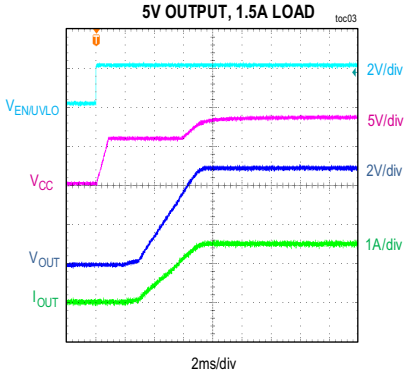
MAX17691A, 5V OUTPUT EFFICIENCY vs. LOAD CURRENT



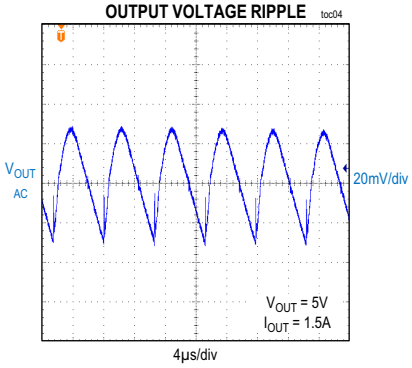
MAX17691A, 5V OUTPUT OUTPUT REGULATION



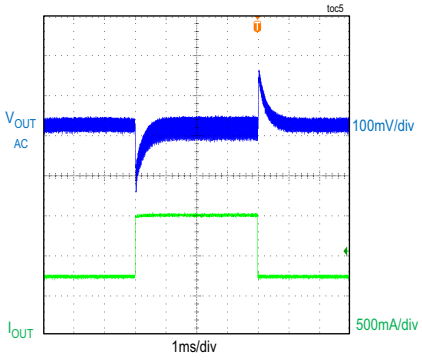
MAX17691A, SOFT-START 5V OUTPUT, 1.5A LOAD



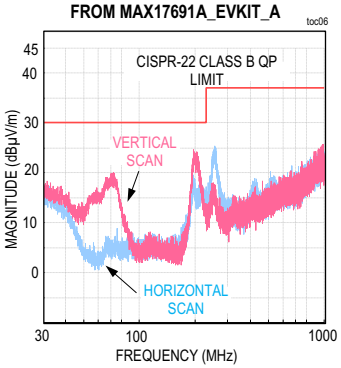
MAX17691A OUTPUT VOLTAGE RIPPLE



MAX17691A, LOAD TRANSIENT RESPONSE LOAD CURRENT STEPPED FROM 0.75A TO 1.5A

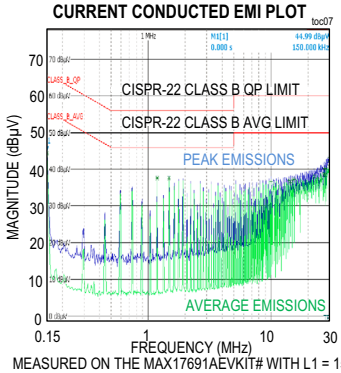


RADIATED EMISSION PLOT FROM MAX17691A_EVKIT_A



CONDITION : V_{IN} = 24V, V_{OUT} = 5V, I_{OUT} = 1.5A
NO DITHERING

MAX17691A, 5V OUTPUT, 1.5A LOAD CURRENT CONDUCTED EMI PLOT



MEASURED ON THE MAX17691AEVKIT# WITH L1 = 15µH, C17,C18 = 4.7µF/1206/100V/X7R, C2,C20 = 10µF/1210/50V/X7R
NO DITHERING

Component Suppliers

SUPPLIER	WEBSITE
Wurth Electronics	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 MAX17691A EV when contacting these component suppliers.*

Ordering Information

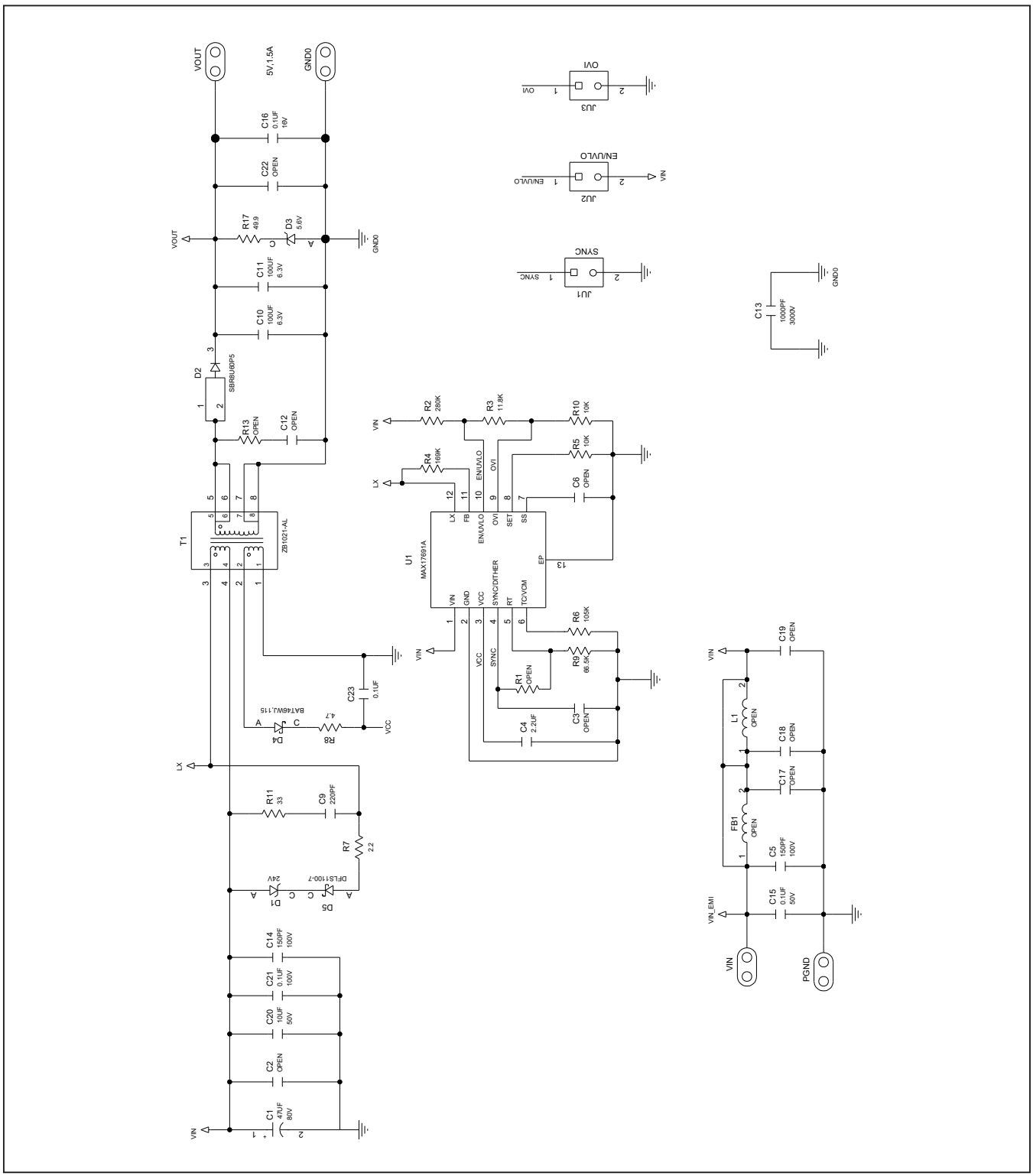
PART	TYPE
MAX17691AEVKIT#	EV Kit

#Denotes RoHS compliance.

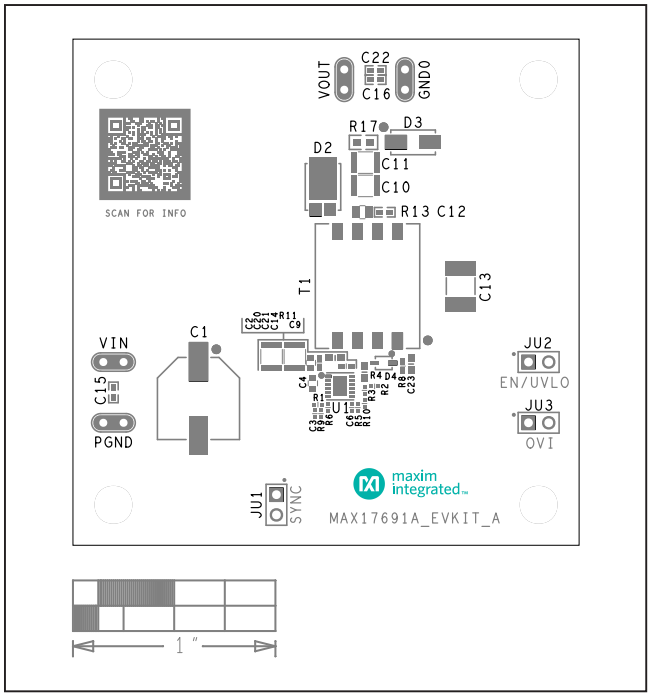
MAX17691A EV Kit Bill of Materials

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	C9	1	220pF ±10%, 100V, X7R ceramic capacitor (0402)	Murata GRM155R72A221KA01
5	C10, C11	2	100µF ±20%, 6.3V, X7S ceramic capacitor (1210)	Taiyo Yuden JMK325AC7107MM-P
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	C16	1	0.1µF ±10%, 16V, X7R ceramic capacitor (0402)	Murata GRM155R71C104KA88
9	C20	1	10µF ±10%, 50V, X7R ceramic capacitor (1210)	Murata GRM32ER71H106KA12
10	C21	1	0.1µF ±10%, 100V, X7R ceramic capacitor (0603)	Murata GRM188R72A104KA35
11	C23	1	0.1µF ±10%, 25V, X7R ceramic capacitor (0603)	Murata GRM188R71E104KA01
12	D1	1	Zener, 24V, 0.25W	Central Semi CMDZ5252B
13	D2	1	Schottky diode, 60V,8A	Diodes SBR8U60P5
14	D3	1	Zener, 5.6V, 500mW	Central Semi CMZ5919B
15	D4	1	Schottky diode, 100V,0.25A	Nexperia BAT46WJ
16	D5	1	Schottky diode, 100V,1A	Diodes DFLS1100-7
17	R2	1	280kΩ, 1%, 0402	Panasonic ERJ-2RKF2803
18	R3	1	11.8kΩ, 1%, 0402	Panasonic ERJ-2RKF1182
19	R4	1	169kΩ, 1%, 0603	Panasonic ERJ-3EKF1693
20	R5, R10	2	10kΩ, 1%, 0402	Vishay CRCW040210K0FK
21	R6	1	105kΩ, 1%, 0402	Vishay CRCW0402105KFK
22	R7	1	2.2Ω, 1%, 0603	Panasonic ERJ-3RQF2R2
23	R8	1	4.7Ω, 1%, 0402	Vishay CRCW04024R70FK
24	R9	1	66.5kΩ, 1%, 0402	Panasonic ERJ-2RKF5602
25	R11	1	33Ω, 1%, 0603	Vishay CRCW060333R0FK
26	R17	1	49.9Ω, 1%, 0603	Vishay CRCW060349R9FK
27	T1	1	EP10,8-pin SMT, 22µH ±10% ,2.8A, (3-4):(5,6-7,8)= 3:1,±1%	Coilcraft ZB1021-AL or Wurth 750317918
28	U1	1	4.2V-60V No-Opto Isolated Flyback Converter with Integrated FET	MAX17691AATC+
29	C2, C17-C19	4	OPEN: Capacitor (1210)	NA
30	L1	1	OPEN: Inductor (4mm x 4mm)	NA
31	C3, C6, C12,C22	4	OPEN: Capacitor (0402)	NA
32	R1	1	OPEN: Resistor (0402)	NA
33	R13	1	OPEN: Resistor (0805)	NA
34	FB1	1	OPEN: Ferrite Bead (0805)	NA

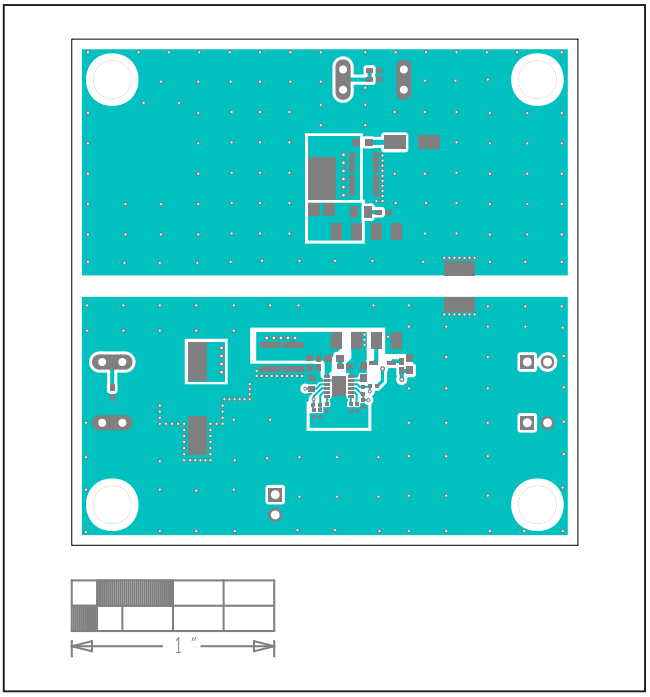
MAX17691A EV Kit Schematics



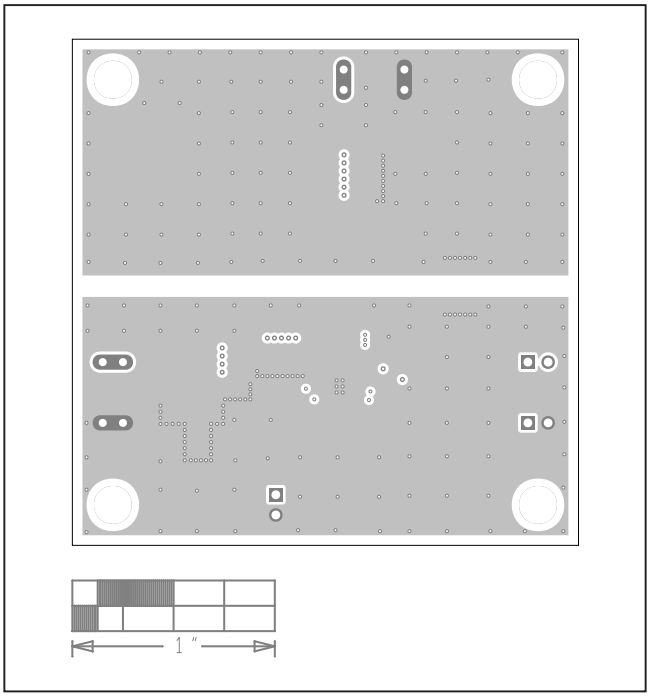
MAX17691A EV Kit PCB Layouts



MAX17691A EV Kit Component Placement Guide—Top Silkscreen

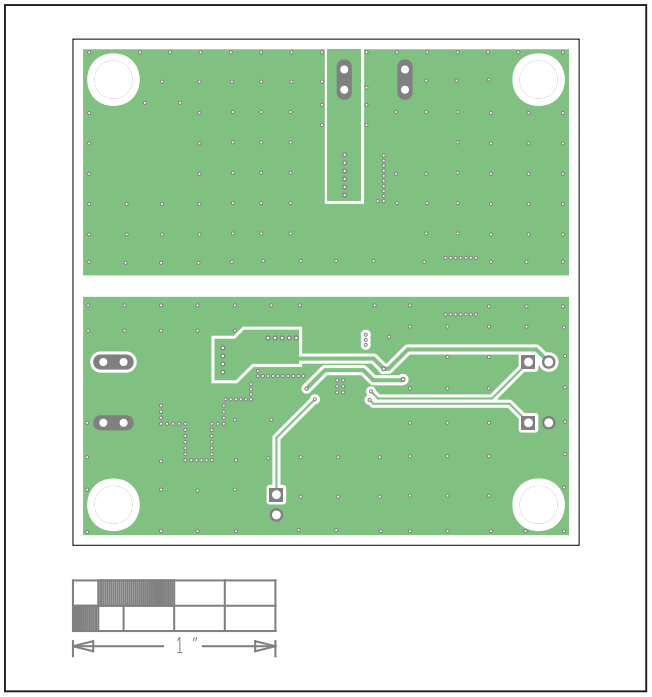


MAX17691A EV Kit PCB Layout—Top

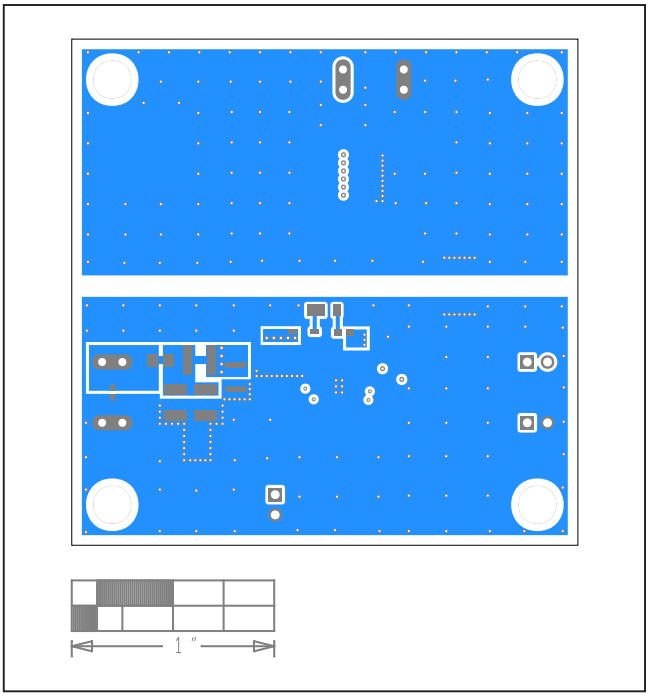


MAX17691A EV Kit PCB Layout—Layer 2

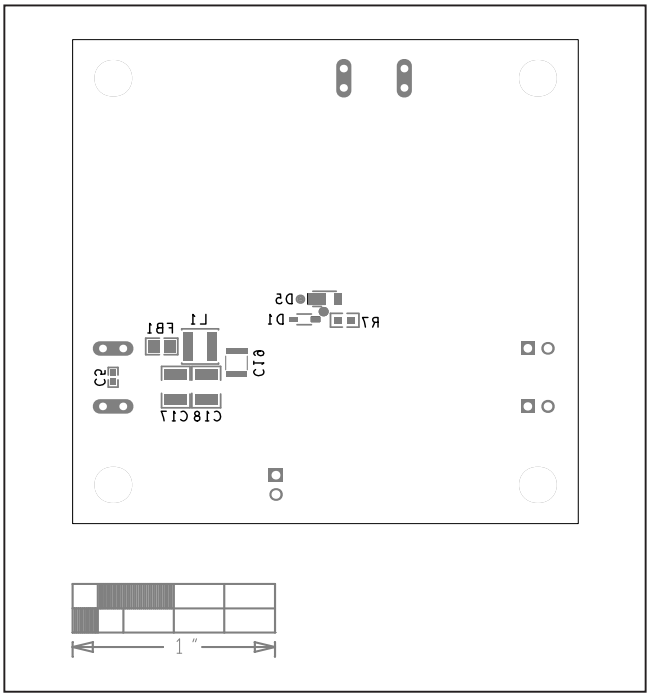
MAX17691A EV Kit PCB Layouts (continued)



MAX17691A EV Kit PCB Layout—Layer 3



MAX17691A EV Kit PCB Layout—Bottom



MAX17691A EV Kit Component Placement Guide—Bottom Silkscreen

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	7/20	Initial release	—
1	11/20	Updated *Features* section, replaced TOC 1, added TOC 7, updated *MAX17691A EV Kit Bill of Materials*, and *MAX17691A EV Kit PCB Layouts* sections	1, 3, 4, 7
2	5/21	Updated *General Description*, *Features,*and *Quick Start* sections, added Note, updated table 2, TOC 1, TOC 3, TOC 7, *Component Suppliers* table, and *MAX17691A EV Kit Bill of Materials*	1–5

