MAX15095A Evaluation Kit

Evaluates: MAX15095A/MAX15095/MAX15095D

General Description

The MAX15095A evaluation kit (EV kit) provides a proven design to evaluate the MAX15095A hot-swap controller with an integrated 6.6A MOSFET. The EV kit is configured to pass 6.6A in a 2.7V to 18V hot-swap application, thus providing a fully integrated solution. The EV kit uses the MAX15095AGFC+ in a 2.5mm X 2.5mm, 12-pin, 0.5mm pitch FC2QFN package with a proven four-layer PCB design. As configured, the EV kit is optimized to operate at 12V.

The EV kit can be used to evaluate all MAX15095 and MAX15095D variants.

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

Features

- 2.7V to 18V Operating Voltage Range
- Up to 6.6A Configurable Load Current Capability
- Banana Jacks for Input and Output Voltage
- Programmable Slew-Rate Control
- Selectable/Configurable Circuit-Breaker Threshold
- Configurable Overvoltage/Undervoltage Lockout
- Programmable Fast Comparator Response
- PG Output
- Defined Safe Operation Area
- Proven PCB Layout
- Fully Assembled and Tested

319-100159; Rev 0; 3/18

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Quick Start

Required Equipment

- MAX15095A EV kit
- 12V, 6.6A DC power supply
- Voltmeter

Procedure

The EV kit is fully assembled and tested. Follow the steps below to verify board operation. **Caution: Do not turn on the power supply until all connections are completed.**

1) Verify that a shunt is installed across pins 1-2 on jumper JU1. Also ensure that jumpers JU2 and JU4 are opened and jumpers JU3 and JU5 are closed.
2) Turn on the power supply and set the supply to 12V, then disable the power supply.
3) Connect the positive terminal of the power supply to the IN banana jack on the EV kit. Connect the negative terminal of the power supply to the GND banana jack.
4) Enable the power supply.
5) Verify that the voltage between the OUT and GND banana jacks is 12V.
6) Verify that the internal regulator voltage (REG) is 3.3V.
7) The EV kit is now ready for additional evaluation.

Detailed Description of Hardware

The MAX15095A EV kit provides a proven design to evaluate the MAX15095A. The EV kit can be conveniently connected between the system power and the load using the banana jacks provided for the input and output. PCB pads are provided to monitor and control the device signals. The EV kit operates between 2.7V and 18V up to 6.6A load current capability.

Evaluating the MAX15095A

The EV kit can be used to evaluate the MAX15095A, with the MAX15095AGFC+ installed. The MAX15095/MAX15095D are pin-to-pin compatible with the MAX15095A. Refer to the device data sheet for details on the MAX15095/MAX15095D.

Circuit Breaker (CB)

Jumper JU1 sets the current limit for the internal circuit breaker (CB) of the device. The CB pin can be connected to a fixed resistor (R5) or a potentiometer (R11) to set the current limit. See Table 1 for shunt positions.

The circuit-breaker threshold can be set according to the following formula:

$$I_{CB} = (R_{CB} / 5920) - (V_{IN} / 33)$$

where I_{CB} is in A and R_{CB} (the resistor between CB and ground) is in Ω.

Setting the Output Slew Rate

An external capacitor (C3) is connected from GATE to GND on the IC to reduce the output slew rate during startup. During startup, a 5.9µA (typ) current is sourced to enhance the internal MOSFET with 10V/ms (typ). C3 can be calculated according to the following formula:

$$C3 = (I_{GATE} \times \Delta t)/\Delta V_{GATE}$$

where I_{GATE} is 5.9µA (typ), Δt is the desired slew rate, and ΔV_{GATE} is the voltage at the gate of the internal MOSFET at turn-on.

Table 1. JU1 Jumper Selection (CB)

SHUNT POSITION	CB PIN CONNECTED TO	CURRENT LIMIT
1-2*	R5	6.6A
2-3	R11	Adjustable

**Default position.*

Enable/Present-Detect Inputs

The EV kit features jumpers JU2 and JU3 to enable/disable the output. JU3 allows simulation of PC Express card being plugged in. OUT is enabled when $\overline{PRSNT}$ is pulled low and EN is pulled high . If $\overline{PRSNT}$ is high, OUT is not enabled, regardless of EN logic state See Table 2 for jumper positions.

Undervoltage/Overvoltage Lockout

The EV kit provides an option to configure the undervoltage/overvoltage-lockout threshold using a resistive divider, R1 and R2 from IN to ground with the center tap connected to UVOV. The EV kit's undervoltage-lockout threshold is set to 7.1V (typ) and the overvoltage-lockout threshold is set to 15.8V (typ). Refer to the device data sheet for mor details.

TIMER

Jumper JU5 connects TIMER to REG, which sets the total response time of the fast-trip comparator to less than 200ns (typ). For adjustable response time, open JU5 and close JU4. JU4 connects TIMER to a 500kΩ potentiometer (R6).See Table 3 for shunt positions.

Use the following formula to set the fast-trip comparator's response time:

$$t_{FCD} = 0.2 + R6 \times 22.9 \times 10^{-3}$$

where t_{FCD} is the fast-trip comparator response time in µs and R6 is the total resistance from TIMER to ground in kΩ set by the 500kΩ potentiometer. Refer to the device data sheet for more details.

Table 2. JU2 and JU3 Jumpers Selection

SHUNT POSITION	EN/$\overline{PRSNT}$ CONNECTIONS	EV KIT OPERATION
Not installed (JU2)	EN pulled to REG with a 100kΩ pullup	OUT enabled with $\overline{PRSNT}$ low
Installed (JU3)	$\overline{PRSNT}$ forced to GND	OUT enabled with EN high

**Default position.*

Table 3. JU4 and JU5 Jumpers Selection

SHUNT POSITION	TIMER CONNECTED TO	t_{FCD}
Not installed (JU4)	R6	Adjustable
Installed (JU5)	REG	200ns

Component Suppliers

SUPPLIER	PHONE	WEBSITE
Fairchild Semiconductor	888-522-5372	www.fairchildsemi.com
Murata Electronics North America, Inc.	770-436-1300	www.murata-northamerica.com
STMicroelectronics	408-452-8585	www.us.st.com
TDK Corp.	847-803-6100	www.component.tdk.com

Note: *Indicate that you are using the MAX15095A when contacting these component suppliers.*

Ordering Information

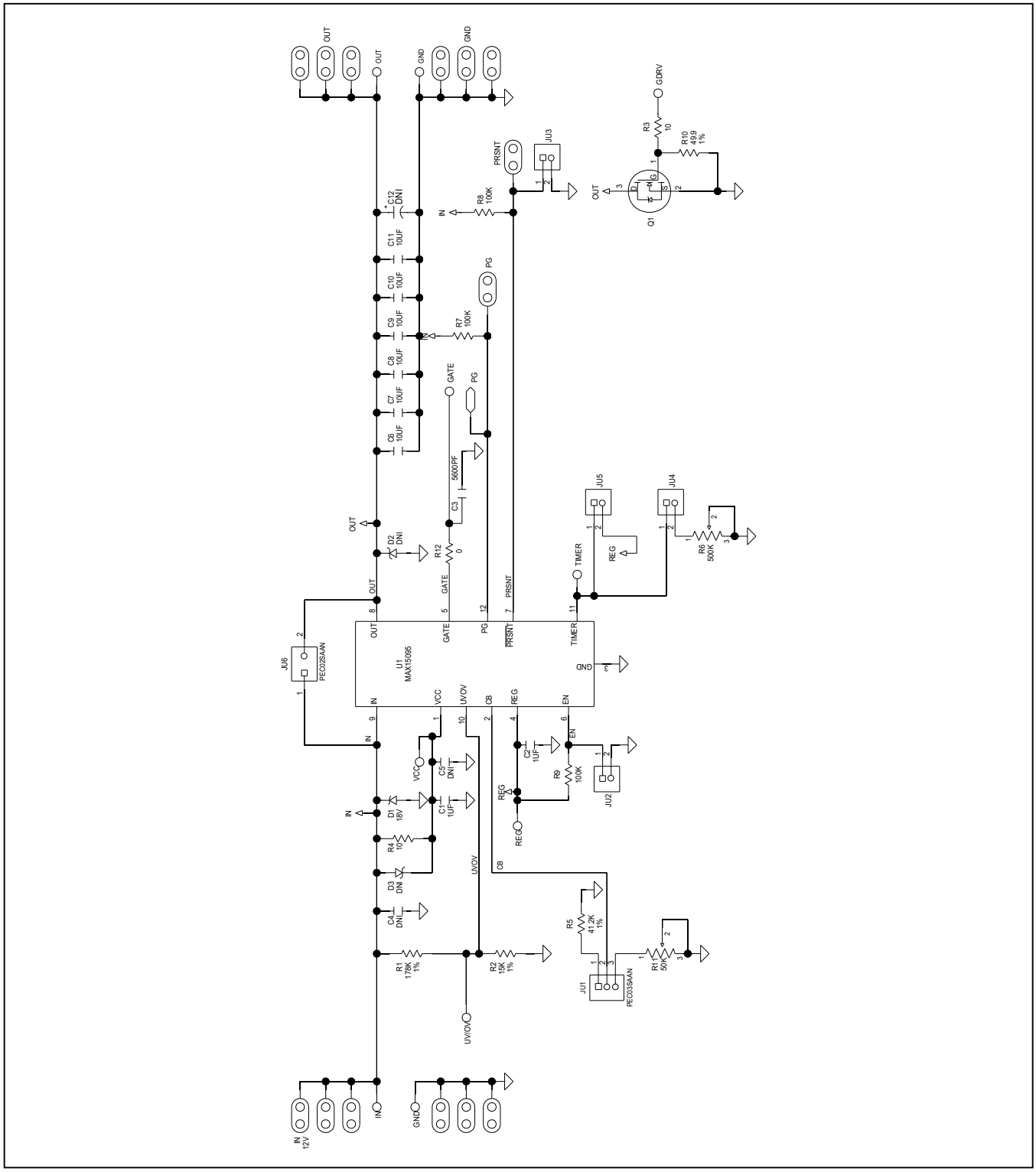
PART	TYPE
MAX15095AEVKIT#	EV Kit

#Denotes RoHS compliant.

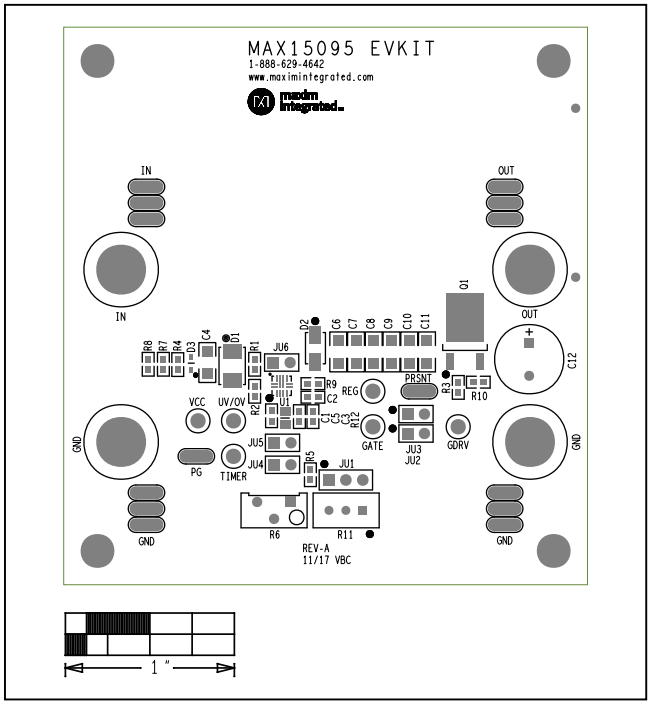
MAX15095A EV Kit Bill of Materials

ITEM	QTY	REFERENCE DESIGNATOR	MFG PART NUMBER	DESCRIPTION
1	2	C1, C2	GRM188R71E105KA12D; CGA3E1X7R1E105K; TMK107B7105KA; 06033C105KAT2A	CAPACITOR; SMT (0603); CERAMIC CHIP; 1UF; 25V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R
2	1	C3	C0603X7R500562KNP; GRM188R71H562K	CAPACITOR; SMT (0603); CERAMIC CHIP; 5600PF; 50V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R
3	6	C6-C11	GRM31CR71E106KA12L; CL31B106KAHNNN	CAPACITOR; SMT (1206); CERAMIC CHIP; 10UF; 25V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R
4	1	D1	SMBJ18A	DIODE; TVS; SMB (DO-214AA); PIV=18V; IF=20.6A
5	6	REG, VCC, GATE, GDRV, TIMER, UV/OV	5010	TESTPOINT WITH 1.80MM HOLE DIA, RED, MULTIPURPOSE
6	2	GND, GND_1	7007	CONNECTOR; PANELMOUNT; BINDING POST; STRAIGHT THROUGH; 1PIN; BLACK
7	2	IN, OUT	7006	CONNECTOR; PANELMOUNT; BINDING POST; STRAIGHT THROUGH; 1PIN; RED
8	1	JU1	PEC03SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 3PINS
9	5	JU2-JU6	PEC02SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 2PINS
10	4	MTH1-MTH4	P440.375	MACHINE SCREW; SLOTTED; PAN; 4-40IN; 3/8IN; NYLON
11	4	MTH1-MTH4	1902B	STANDOFF; FEMALE-THREADED; HEX; 4-40IN; 3/8IN; NYLON
12	14	PG, XIN1-XIN3, PRSNT, XGND1-XGND6, XOUT1-XOUT3	9020 BUSS	EVK KIT PARTS; MAXIM PAD; WIRE; NATURAL; SOLID; WEICO WIRE; SOFT DRAWN BUS TYPE-S; 20AWG
13	1	Q1	IRLR8721TRPBF	TRAN; HEXFET POWER MOSFET; NCH; DPAK; PD-(65W); I-(65A); V-(30V)
14	1	R1	ERJ-3EKF1783V	RESISTOR; 0603; 178K OHM; 1%; 100PPM; 0.10W; THICK FILM
15	1	R2	CRCW060315K0FK	RESISTOR, 0603, 15K OHM,1%, 100PPM, 0.10W, THICK FILM
16	2	R3, R4	ERA-V15J100V	RESISTOR; 0603; 10 OHM; 5%; 1500PPM; 0.063W; METAL FILM
17	1	R5	CRCW060341K2FK	RESISTOR; 0603; 41.2K OHM; 1%; 100PPM; 0.10W; METAL FILM
18	1	R6	3296Y-1-504LF	RESISTOR; THROUGH-HOLE-RADIAL LEAD; 500K OHM; 10%; 100PPM; 0.5W; SQUARE TRIMMING POTENTIOMETER
19	3	R7-R9	RC0603JR-07100KL	RESISTOR; 0603; 100K OHM; 5%; 100PPM; 0.1W; THICK FILM
20	1	R10	CRCW060349R9FK	RESISTOR; 0603; 49.9 OHM; 1%; 100PPM; 0.10W; THICK FILM
21	1	R11	3296W-1-503LF	RESISTOR; THROUGH-HOLE-RADIAL LEAD; 50K OHM; 10%; 100PPM; 0.5W; MOLDER CERAMIC OVER METAL FILM
22	1	R12	CRCW06030000Z0	RESISTOR; 0603; 0 OHM; 0%; JUMPER; 0.1W; THICK FILM
23	5	SU1-SU5	STC02SYAN	TEST POINT; JUMPER; STR; TOTAL LENGTH=0.256IN; BLACK; INSULATION=PBT CONTACT=PHOSPHOR BRONZE; COPPER PLATED TIN OVERALL
24	1	U1	MAX15095A	EVKIT PART-IC; MAX15095A; PKG. OUTLINE DWG.:21-100198; PKG. LAND PATTERN: 90-XXXX
25	1	PCB	MAX15095	PCB:MAX15095

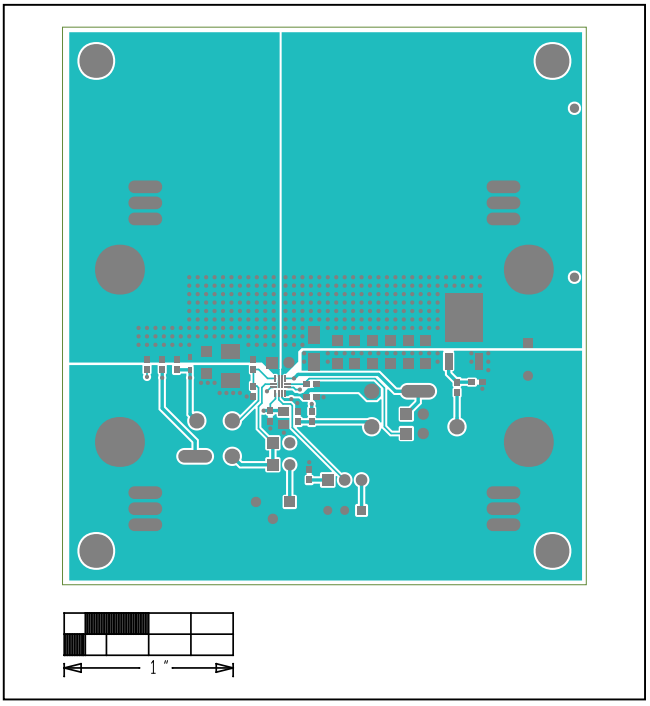
MAX15095A EV Kit Schematic



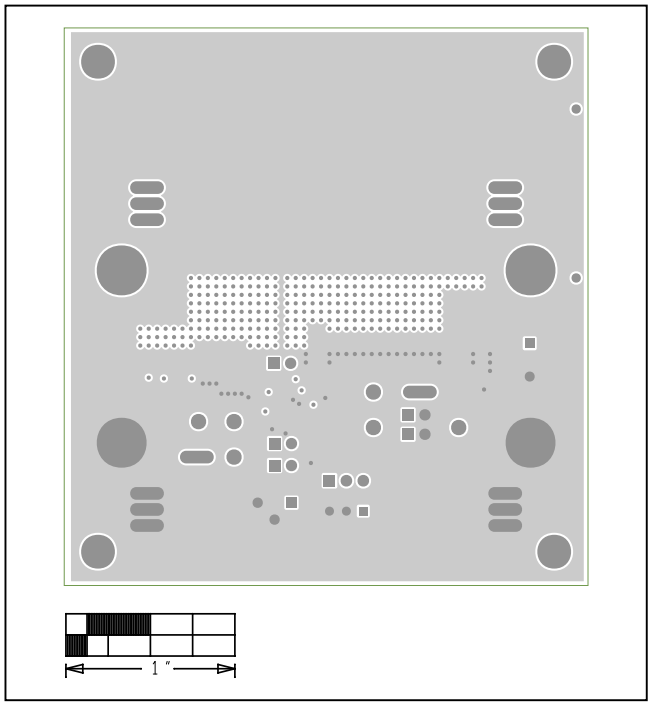
MAX15095A EV Kit PCB Layout



MAX15095A EV Kit Component Placement Guide—Component Side

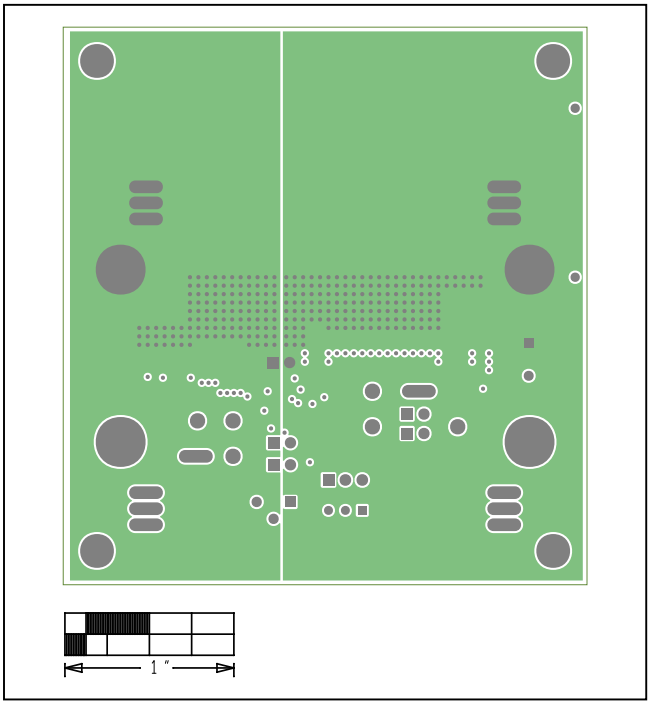


MAX15095A EV Kit PCB Layout—Component Side

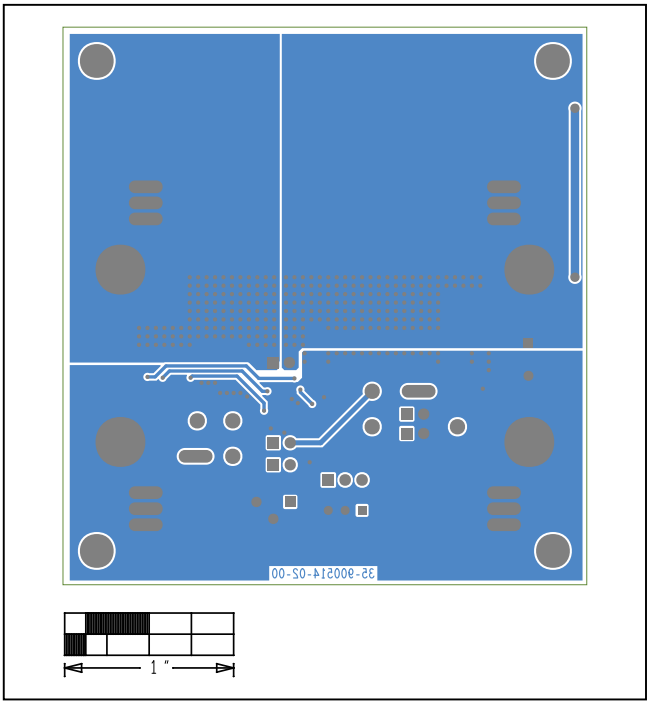


MAX15095A EV Kit PCB Layout— Layer 2

MAX15095A EV Kit PCB Layout (continued)



MAX15095A EV Kit PCB Layout—Layer 3



MAX15095A EV Kit PCB Layout—Bottom Layer

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	3/18	Initial release	—

Mouser Electronics

Authorized Distributor

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Maxim Integrated:

MAX15095AEVKIT#