General Description

The MAX38902 evaluation kit (EV kit) evaluates the MAX38902A/B/C/D IC family of low noise linear regulators. The MAX38902 EV kit features two independent circuits to evaluate two different IC packages of the MAX38902A/B/C/D family. Both circuits on the EV kit operate over an input range of 1.7V to 5.5V, and provide any output voltage range of 0.6V to 5.3V. The TDFN circuit evaluates the MAX38902A/B, while the wafer-level package (WLP) circuit evaluates the MAX38902C/D. Each circuit output on the EV kit delivers up to 500mA of current.

The EV kit comes with the MAX38902A-ATA+ and the MAX38902C-ANT+ installed.

Features

- Two Independent Circuits on One Board
  - Evaluates the MAX38902A/B IC in an 8-pin (2mm x 2mm) TDFN
  - Evaluates the MAX38902C/D IC in a 6-ball (1.45mm x 0.86mm) WLP
- 1.7V to 5.5V Input Range
- 1.2V to 5.0V Jumper Configurable Output Voltage (MAX38902A, On Board)
- 0.6V to 5.3V Resistor Configurable Output Voltage (MAX38902B, with IC Replacement)
- 0.6V to 5.3V Resistor Configurable Output Voltage (MAX38902C, On Board)
- 1.2V to 5.0V Factory-Preset Output Voltage (MAX38902D, with IC Replacement)
- Up to 500mA Output Current
- Proven 2-Layer 1-oz Copper PCB Layout
- Demonstrates Compact Solution Size
- Fully Assembled and Tested

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

MAX38902 EV Kit Files

FILE	DESCRIPTION
MAX38902 EV BOM	EV Kit Bill of Material
MAX38902 EV PCB Layout	EV Kit Layout
MAX38902 EV Schematic	EV Kit Schematic
MAX38902 EV Minimal Component Schematic	Minimal Component Circuit

Quick Start

Required Equipment

- MAX38902 EV kit
- 5.5V, 1A DC power supply
- Electronic load capable of 500mA
- Digital voltmeter (DVM)

Procedure

Testing the (WLP) OUT1 Output Circuit

The EV kit is fully assembled and tested. Follow the steps below to verify board operation.

Caution: Do not turn on power supply until all connections are completed.

1) Verify that jumper JU1 is in its default position as shown in Table 1.
2) Connect the 5.5V power supply between the IN1 and nearest GND1 terminal posts.
3) Connect the 500mA electronic load between the OUT1 and nearest GND1 terminal posts.
4) Connect the DVM between the OUT1 and nearest GND1 terminal posts.
5) Turn on the power supply.
6) Enable the electronic load.
7) Verify that the voltage at the OUT1 terminal post is approximately 3.3V.

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Procedure
Testing the (TDFN) OUT Output Circuit

The EV kit is fully assembled and tested. Follow the steps below to verify board operation.

Caution: Do not turn on power supply until all connections are completed.

8) Verify that jumpers JU101, SELA and SELB are in their default positions, as shown in Table 2 and Table 3.
9) Connect the 5.5V power supply between the IN and nearest GND terminal posts.
10) Connect the 500mA electronic load between the OUT and nearest GND terminal posts.
11) Connect the DVM between the OUT and nearest GND terminal posts.
12) Turn on the power supply.
13) Enable the electronic load.
14) Verify that the voltage at the OUT terminal post is approximately 5V.

Detailed Description of Hardware

The MAX38902 EV kit evaluates the MAX38902A/B/C/D IC family. The MAX38902A/B/C/D are low noise linear regulators that deliver 500mA of output current with only $12\mu V_{RMS}$ of output noise from 10Hz to 100kHz. These regulators require only 100mV of input-to-output headroom at full load.

The MAX38902 EV kit features two independent circuits to evaluate two different IC packages of the MAX38902A/B/C/D family. Both circuits on the EV kit operate over an input range of 1.7V to 5.5V. The TDFN circuit evaluates the MAX38902A/B, while the WLP circuit evaluates the MAX38902C/D. Each circuit output on the EV kit delivers up to 500mA of current.

The MAX38902 (TDFN) circuit on the EV Kit comes with the MAX38902A-ATA+ installed and the output is jumper configurable between 1.2V and 5.0V (Table 3), and can deliver 500mA of current.

The MAX38902 (WLP) circuit on the EV kit comes with the MAX38902C-ANT+ installed and the output is resistor configured to 3.3V, and can deliver 500mA of current. The output voltage on the MAX38902C can be reconfigured to other voltages from 0.6V to 5.3V by replacing feedback resistors R1 and R2. Refer to the *MAX38902 IC data sheet* for feedback resistor calculation.

EN for the MAX38902C/D (WLP) Circuit

The MAX38902C/D (WLP) circuit on the EV kit provide a jumper JU1 to enable or disable the MAX38902C (or the MAX38902D after IC replacement). Refer to Table 1 for jumper setting of jumper JU1.

EN for the MAX38902A/B (TDFN) Circuit

The MAX38902A/B (TDFN) circuit on the EV kit provide a jumper JU101 to enable or disable the MAX38902A (or the MAX38902B after IC replacement). Refer to Table 2 for jumper setting of jumper JU101.

Table 1. EN on MAX38902C/D (JU1)

JU1 SHUNT POSITION	DESCRIPTION
1-2*	Enabled. EN = IN1
2-3	Disabled. EN = GND1

**Default Position*

Table 2. EN on MAX38902A/B (JU101)

JU1 SHUNT POSITION	DESCRIPTION
1-2*	Enabled. EN = IN
2-3	Disabled. EN = GND

**Default Position*

Output Selection (SELA and SELB) for the MAX38902A/B (TDFN) Circuit

The MAX38902A/B (TDFN) circuit on the EV kit provide a set of jumpers SELA and SELB to configure the output voltage of the MAX38902A. Refer to Table 3 for jumper setting of jumpers SELA and SELB.

Evaluating the MAX38902B

The MAX38902A/B (TDFN) circuit can evaluate the MAX38902B after IC (U101) replacement. When evaluating the MAX38902B, modify the EV Kit with the steps listed below:

1) Replace U101 with the MAX38902B-ATA+.
2) Install feedback resistors R101 and R102 to obtain the desired output voltage between 0.6V and 5.3V (Refer to the MAX38902 IC data for feedback resistor calculations).
3) Install a shunt on jumper SELA pins 2 and 3 (GS = GND).
4) Remove shunt from jumper SELB. $\overline{POK}$ is accessible on the $\overline{POK}$ test point.
5) Install a 100kΩ resistor on R103. $\overline{POK}$ open-drain is pulled up via resistor R103 (When the regulator output reaches its regulation, $\overline{POK}$ goes low).

Evaluating the MAX38902D

The MAX38902C/D (WLP) circuit can evaluate the MAX38902D after IC (U1) replacement. The MAX38902D can be factory trimmed to any voltage between 0.7V and 5.3V in 50mV steps. Contact the factory to order the MAX38902D with the desired factory-preset output voltages.

Table 3. SELA and SELB on MAX38902A (SELA, SELB)

SELA		SELB		OUTPUT VOLTAGE
SHUNT POSITION	SELA CONNECTION	SHUNT POSITION	SELB CONNECTION	
Not Installed	Hi-Z	1-2	IN	1.2
1-2	IN	Not Installed	Hi-Z	1.5
Not Installed	Hi-Z	2-3	GND	1.8
Not Installed	Hi-Z	Not Installed	Hi-Z	2.5
2-3	GND	2-3	GND	3.0
2-3	GND	1-2	IN	3.1
2-3	GND	Not Installed	Hi-Z	3.3
1-2	IN	2-3	GND	4.0
1-2*	IN	1-2*	IN	5.0

**Default Position*

Ordering Information

PART	TYPE
MAX38902EVKIT#	EV Kit

#Denotes RoHS compliant.

Component Suppliers

SUPPLIER	WEBSITE
Murata/TOKO	www.murata.com
TDK	www.tdk.com
Samsung Electro-Mechanics America. Inc.	www.samsungsem.com

Note: *Indicate that you are using the MAX38902A/B/C/D when contacting these component suppliers.*

MAX38902 EV Kit Bill of Materials

ITEM	QTY	REF DES	VAR STATUS	MAXINV	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION
1	2	C1, C101	Pref	20-00U01-77	C1608C0G1H103J; CGA3E2C0G1H103J080AD; GRM1885C1H103JA01	TDK; MURATA	0.01µF	CAPACITOR; SMT (0603); CERAMIC CHIP; 0.01µF; 50V; TOL = 5%; TG = -55°C to +125°C; TC = C0G
2	4	C2, C3, C102, C103	Pref	20-004U7-R1	GMC10X7R475K6R3NT; CL10B475KQ8NQNC	CAL-CHIP ELECTRONIC INC./ SAMSUNG EL	4.7µF	CAPACITOR; SMT (0603); CERAMIC CHIP; 4.7µF; 6.3V; TOL = 10%; MODEL = TG = -55°C TO +125°C; TC = X7R; NOT RECOMMENDED FOR NEW DESIGN-USE 20-004u7-16
3	8	IN, GND, IN1, OUT, GND1, OUT1, GND_OUT, GND1_OUT	Pref	02-15142-00	1514-2	KEYSTONE	1514-2	TERMINAL; TURRET; PIN DIA = 0.090IN; TOTAL LENGTH = 0.105IN; BOARD HOLE = 0.098IN; BRASS; TIN PLATING; RECOMMENDED FOR BOARD THICKNESS = 0.062IN
4	4	JU1, JU101, SELECTA, SELECTB	Pref	01-PEC03SAAN3P-21	PEC03SAAN	SULLINS	PEC03SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 3PINS
5	1	POK	Pref	02-TPMINI5002-00	5002	KEYSTONE	N/A	TEST POINT; PIN DIA = 0.1IN; TOTAL LENGTH = 0.3IN; BOARD HOLE = 0.04IN; WHITE; PHOSPHOR BRONZE WIRE SILVER; NOT FOR COLD TEST
6	1	R1	Pref	80-0909K-AA4	CRCW0603909KFK	VISHAY DALE	909K	RESISTOR; 0603; 909KΩ; 1%; 100PPM; 0.1W; THICK FILM
7	1	R2	Pref	80-0200K-24	CRCW06032003FK	VISHAY DALE	200K	RESISTOR; 0603; 200K; 1%; 100PPM; 0.10W; THICK FILM
8	1	R101	Pref	80-0000R-AA6	CRCW0603000Z0	VISHAY DALE	0	RESISTOR; 0603; 0Ω; 0%; JUMPER; 0.1W; THICK FILM
9	4	SU1-SU4	Pref	02-JMPFSTC02SYAN-00	STC02SYAN	SULLINS ELECTRONICS CORP.	STC02SYAN	TEST POINT; JUMPER; STR; TOTAL LENGTH = 0.256IN; BLACK; INSULATION = PBT CONTACT = PHOSPHOR BRONZE; COPPER PLATED TIN OVERALL
10	4	TP3, TP4, TP5, TP6	Pref	01-131435300-10	131-4353-00	TEKTRONICS	131-4353-00	CONNECTOR; WIREMOUNT; CIRCUIT BOARD TEST POINT MINIATURE PROBE; STRAIGHT; 4PINS
11	2	TP_GND, TP_GND1	Pref	02-TPMINI5001-00	5001	KEYSTONE	N/A	TEST POINT; PIN DIA = 0.1IN; TOTAL LENGTH = 0.3IN; BOARD HOLE = 0.04IN; BLACK; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH; RECOMMENDED FOR BOARD THICKNESS = 0.062IN; NOT FOR COLD TEST
12	2	TP_OUT, TP_OUT1	Pref	02-TPMINI5000-00	5000	KEYSTONE	N/A	TEST POINT; PIN DIA = 0.1IN; TOTAL LENGTH = 0.3IN; BOARD HOLE = 0.04IN; RED; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH; RECOMMENDED FOR BOARD THICKNESS = 0.062IN; NOT FOR COLD TEST
13	1	U1	Pref	00-SAMPLE-01	MAX38902C-ANT+	MAXIM	MAX38902C-ANT+	EVKIT PART - IC; MAX38902C-ANT+; WLP6; PACKAGE OUTLINE DEVICE: 21-100055; PKG. CODE: N60C1+1
14	1	U101	Pref	00-SAMPLE-02	MAX38902A-ATA+	MAXIM	MAX38902A-ATA+	EVKIT PART - IC; MAX38902A-ATA+; PACKAGE OUTLINE DEVICE: 21-0168; PACKAGE CODE XXXX
15	1	PCB	-	EPCB	MAX	MAXIM	PCB	PCB:MAX
TOTAL	37							

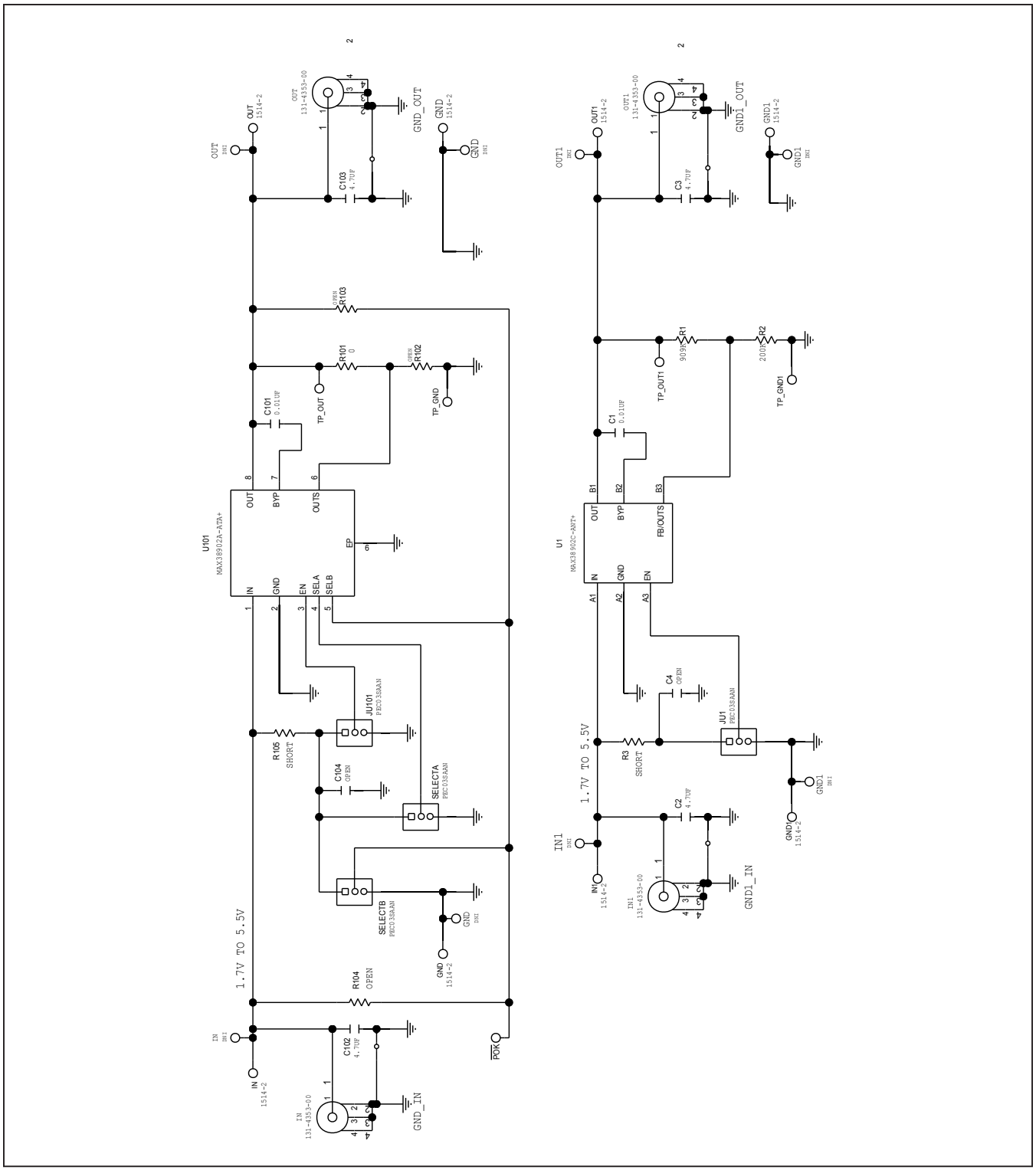
DO NOT PURCHASE(DNP)

ITEM	QTY	REF DES	VAR STATUS	MAXINV	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION
1	8	TP_IN, TP_IN1, TP1_OUT, TP1_OUT1, TP_GND_IN, TP_GND1_IN, TP1_GND_OUT, TP1_GND1_OUT	DNP	02-TPMINI5002-00	5002	KEYSTONE	N/A	TEST POINT; PIN DIA = 0.1IN; TOTAL LENGTH = 0.3IN; BOARD HOLE = 0.04IN; WHITE; PHOSPHOR BRONZE WIRE SILVER; NOT FOR COLD TEST
2	0	C1	DNP	20-00U01-R0	C1608C0G1E103J	TDK	0.01UF	CAPACITOR; SMT (0603); CERAMIC CHIP; 0.01µF; 25V; TOL = 5%; MODEL=; TG = -55°C TO +125°C; TC = C0G
3	0	C2	DNP	20-004U7-18	C1608X5R1C475K080AC	TDK/TAIYO YUDEN	4.7µF	CAPACITOR; SMT (0603); CERAMIC CHIP; 4.7µF; 16V; TOL = 10%; MODEL=; TG = -55°C TO +85°C; TC = X5R
4	0	C2	DNP	20-004U7-A66	GRM188C71A475KE11; C1608X7S1A475K080AC	MURATA; TDK	4.7µF	CAPACITOR; SMT (0603); CERAMIC CHIP; 4.7µF; 10V; TOL = 10%; TG = -55°C TO +125°C; TC = X7S
5	2	C4, C104	DNP	N/A	N/A	N/A	OPEN	PACKAGE OUTLINE 0603 NON-POLAR CAPACITOR - EVKIT
6	2	R3, R105	DNP	N/A	N/A	N/A	SHORT	PACKAGE OUTLINE 0603 RESISTOR - EVKIT
7	3	R102-R104	DNP	N/A	N/A	N/A	OPEN	PACKAGE OUTLINE 0603 RESISTOR - EVKIT
TOTAL	15							

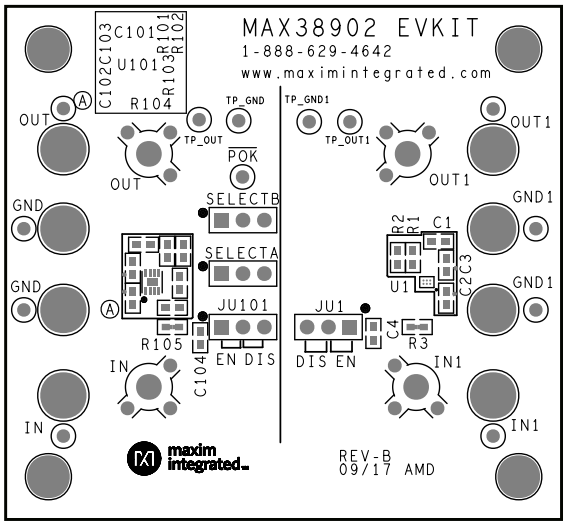
PACKOUT (These are purchased parts but not assembled on PCB and will be shipped with PCB)

ITEM	QTY	REF DES	VAR STATUS	MAXINV	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION
1	1	PACKOUT_BOX	Pref	88-00711-SML	88-00711-SML	N/A	?	BOX;SMALL BROWN 9 3/16X7X1 1/4 - PACKOUT
2	1	PACKOUT_BOX	Pref	87-02162-00	87-02162-00	N/A	?	ESD BAG;BAG;STATIC SHIELD ZIP 4inX6in;W/ESD LOGO - PACKOUT
3	1	PACKOUT_BOX	Pref	85-MAXKIT-PNK	85-MAXKIT-PNK	N/A	?	PINK FOAM;FOAM;ANTI-STATIC PE 12inX12inX5MM - PACKOUT
4	1	PACKOUT_BOX	Pref	EVINSERT	EVINSERT	N/A	?	WEB INSTRUCTIONS FOR MAXIM DATA SHEET
5	1	PACKOUT_BOX	Pref	85-84003-006	85-84003-006	N/A	?	LABEL(EV KIT BOX) - PACKOUT
6	4	BUMP1-BUMP4	DNI	02-SJ5003-00	SJ-5003(BLACK)	3M ELECTRONIC SOLUTIONS DIVISION	SJ-5003(BLACK)	BUMPER; BLACK-HEMISPHERICAL SHAPE EVKIT EH0231; 0.44D/0.2BH; RESILIENT ELASTOMER POLYURETHANE
TOTAL	9							

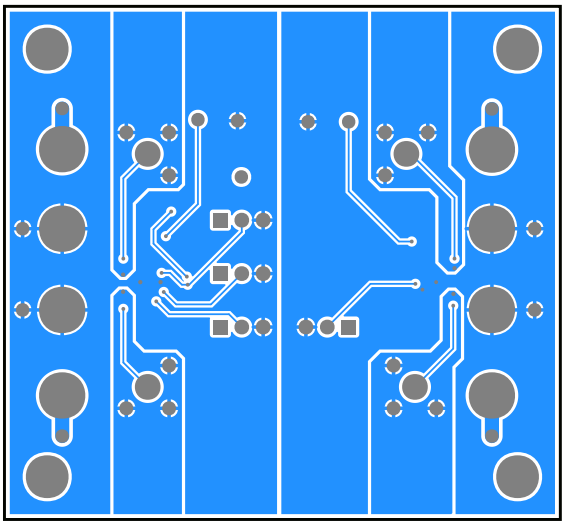
MAX38902 EV Kit Schematic



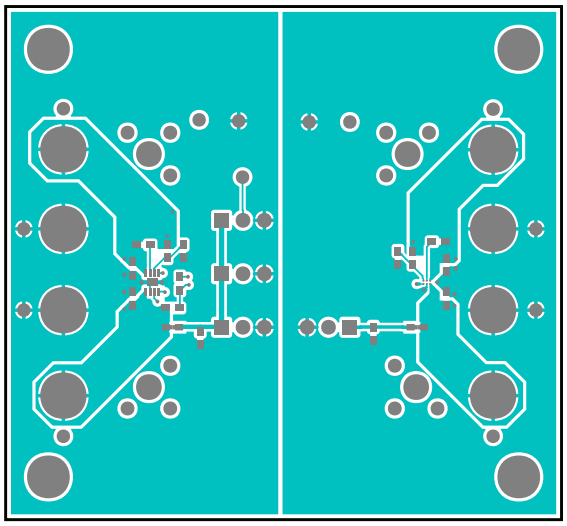
MAX38902 EV Kit PCB Layout Diagrams



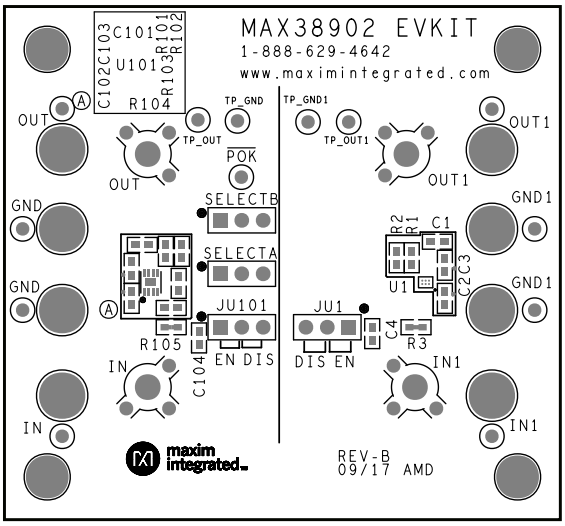
MAX38902 EV Kit—Top Silkscreen



MAX38902 EV Kit—Bottom View



MAX38902 EV Kit—Top View



MAX38902 EV Kit—Bottom Silkscreen

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	11/17	Initial release	—

For pricing, delivery, and ordering information, please contact Maxim Direct at 1-888-629-4642, or visit Maxim Integrated's website at www.maximintegrated.com.

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