

# MAX40088 Evaluation Kit

Evaluates: MAX40075/MAX40088/  
MAX40079/MAX40087

## General Description

The MAX40088 evaluation kit (EV kit) is a fully assembled and tested circuit board that contains all the components necessary to evaluate the MAX40075/MAX40088/MAX40079/MAX40087 ICs. The MAX40088 EV kit printed circuit board (PCB) comes installed with MAX40088AUT+ in 6-SOT23 package.

The device is a rail-to-rail output op amp offering 10MHz Gain Bandwidth product (MAX40075/MAX40079) and 42MHz Gain Bandwidth product (MAX40088/MAX40087). The EV kit operates from a single 2.7V to 5.5V DC power supply or from  $\pm 1.35V$  to  $\pm 2.75V$  split supply.

## Features

- +2.7V to +5.5V Supply Voltage Range across  $V_{DD}$  and  $V_{SS}$
- 42MHz Gain Bandwidth Product (MAX40088/MAX40087), Gain = 5V/V Stable
- 10MHz Gain Bandwidth Product (MAX40075/MAX40079), Gain = 1V/V Stable
- Ultra-Low Distortion (0.0002% with 1k $\Omega$  load)
- Proven PCB Layout
- Fully Assembled and Tested

Ordering Information appears at end of data sheet.

## Quick Start

### Required Equipment

Before beginning, the following equipment is needed:

- MAX40088 EV kit
- 2.7V to 5.5V, 100mA DC power supply
- Precision voltage calibrator
- Digital multimeter

### Procedure

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

**Caution:** Do not turn on power supplies until all connections are completed and turn on  $V_{DD}$ ,  $V_{SS}$  supplies before turning on voltage calibrator on the input pins.

- 1) Make sure JU1 jumper is uninstalled and JU2 jumper is in 1-2 position before applying supply voltage.
- 2) Connect positive terminal of the +5V supply to the VDD test point and the GND terminal of supply to the GND test point. Make sure JU3 is in 1-2 position and JU4 is un-installed. JU4 is opened if split supply operation is desired.
- 3) Connect the positive terminal of the precision voltage calibrator to the INP/TP3 test point.
- 4) Connect the DMM to monitor the voltage on the OUTA/TP11 test point.
- 5) Turn on the 5V power supply connected to VDD test point, turn on the precision voltage calibrator on INP/TP3 test point and set 0.1V. Observe the output at the OUTA/TP11 test point on the DMM. DMM should read approximately 1V. Also, vary IN+ voltage between 0V to 0.45V and see if DMM on OUTA test point is showing a gain of 10V/V to the voltage applied on INP test point. Once above step is confirmed, EV kit is tested for functionality.

### Detailed Description of Hardware

The MAX40088 EV kit contains the MAX40088 IC, which is rail-to-rail output op amps with low noise and wide bandwidth in 6-SOT23 package. The EV kit operates from a single 2.7V to 5.5V DC power supply. The EV kit is meant to work using split supplies as well where the voltage between  $V_{DD}$  and  $V_{SS}$  is +2.7V to +5.5V.

#### Default Application Circuit

The EV kit comes preconfigured in a Non-Inverting amplifier configuration with Gain set as 10V/V.

#### Op Amp Configurations

The EV kit provides flexibility to easily reconfigure the op amp into any of the three common circuit topologies: inverting amplifier, non-inverting amplifier and Differential amplifier.

These configurations are described in the next few sections.

#### Noninverting Configuration

The MAX40088 EV kit comes preconfigured as a non-inverting amplifier. The gain is set by the ratio of R8 and R9. The MAX40088 EV kit comes preconfigured for a gain of 10. The output voltage for the non-inverting configuration is given by the equation below:

$$V_{OUTA} = \left(1 + \frac{R8}{R9}\right) V_{INP}$$

#### Inverting Configuration

To configure the EV kit as an inverting amplifier, remove the shunt 1-2 on JU2 and install a shunt on jumper JU1 on position 1-2 and feed an input signal on the INM pad.

$$V_{OUTA} = -\left(\frac{R8}{R9}\right) V_{INM}$$

#### Differential Amplifier

To configure the MAX40088 EV kit as a differential amplifier, replace R2, R3, R8, and R9 with appropriate resistors. When  $R2 = R8$  and  $R3 = R9$ , the CMRR of the differential amplifier is determined by the matching of the resistor ratios  $R2/R3$  and  $R8/R9$ .

$$V_{OUTA} = GAIN(V_{INP} - V_{INM})$$

where

$$GAIN = \frac{R8}{R9} = \frac{R2}{R3}$$

#### Transimpedance Amplifier

To configure the MAX40088 EV kit as a transimpedance amplifier (TIA), short jumper JU1 on 1-2, replace R3, R9 with a 0 ohm resistor and populate R8 pad with 100kΩ resistor. The output voltage of the TIA is the input current multiplied by the feedback resistor:

$$V_{OUT} = (I_{INM} + I_{BIAS-}) \times R8 + V_{OS}$$

where  $I_{INM}$  is the input current source applied at the INM test point,  $I_{BIAS-}$  is the input bias current into IN- pin, and  $V_{OS}$  is the input offset voltage of the op amp. Use capacitor C2 to stabilize the op amp by rolling off high-frequency gain due to a large cable capacitance if desired.

#### Capacitive Loads

Some applications require driving large capacitive loads. To improve stability of the amplifier in such cases, replace R11 with a suitable resistor value to improve amplifier phase margin.

Table 1. Default Jumper Settings

JUMPER	SHUNT POSITION	DESCRIPTION
JU1	1-2	IN+ to GND
	2-3	IN+ terminated by 50Ω to GND
	Not Installed*	IN+ terminal floating
JU2	1-2*	IN- to GND
	2-3	IN- terminated by 50Ω to GND
	Not Installed	IN- terminal floating
JU3	1-2*	Device in active or normal mode
	2-3	Device in Shutdown mode
JU4	Installed*	Single-supply operation
	Not Installed	Split-supply operation

\*Default position.

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## Component Suppliers

SUPPLIER	WEBSITE
Murata Electronics	<a href="http://www.murata-northamerica.com">www.murata-northamerica.com</a>

**Note:** Indicate that you are using the MAX40088 EV kit when contacting these component suppliers.

## Ordering Information

PART	TYPE
MAX40088EVKIT#	EV Kit

#RoHS compliant.

MAX40088 Evaluation Kit

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MAX40079/MAX40087

MAX40088 EV Kit Bill of Materials

ITEM	QTY	REF DES	Var Status	MAXINV	MFG PART #	MFG	VALUE	DESCRIPTION
1	2	C4, C6	Pref	20-000U1-P6B	C1608X7R1E104K08 0AA	TDK	0.1UF	CAPACITOR; SMT (0603); CERAMIC CHIP; 0.1UF; 25V; TOL=10%; MODEL=C SERIES; TG=-55 DEGC TO +125 DEGC; TC=X7R
2	2	C5, C7	Pref	20-004U7-L3	C1608X5R1E475K08 0AC; GRM188R61E475KE 11	TDK; MURATA	4.7UF	CAPACITOR; SMT (0603); CERAMIC CHIP; 4.7UF; 25V; TOL=10%; TG=- 55 DEGC TO +85 DEGC; TC=X5R
3	2	GND_GND1	Pref	02-TPMINI5011-00	5011	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; BLACK; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH; RECOMMENDED FOR BOARD THICKNESS=0.062IN; NOT FOR COLD TEST
4	3	INM_INP, OUTA	Pref	01- 31532952RFX5P- 21	31-5329-52RFX	AMPHENOL	31-5329- 52RFX	CONNECTOR; FEMALE; THROUGH HOLE; BNC 50OHM PCB RECEPTACLE; STRAIGHT; 5PINS
5	3	JU1-JU3	Pref	01-PEC03SAAN3P 21	PEC03SAAN	SULLINS	PEC03SAA N	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 3PINS
6	1	JU4	Pref	01-PEC02SAAN2P 21	PEC02SAAN	SULLINS	PEC02SAA N	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 2PINS
7	4	R1, R5, R7, R11	Pref	80-0000R-AA6	CRCW06030000Z0	VISHAY DALE	0	RESISTOR; 0603; 0 OHM; 0%; JUMPER; 0.1W; THICK FILM
8	1	R3	Pref	80-0180R-24	CRCW0603180RFK	VISHAY DALE	180	RESISTOR, 0603, 180 OHM, 1%, 100PPM, 0.10W, THICK FILM
9	2	R6, R10	Pref	80-0050R-H9	RG1608N-500-W	SUSUMU CO LTD.	50	RESISTOR; 0603; 50 OHM; 0.05%; 10PPM; 0.10W; THIN FILM
10	1	R8	Pref	80-001K8-24	CRCW06031K80FK	VISHAY DALE	1.8K	RESISTOR, 0603, 1.8K OHM, 1%, 100PPM, 0.10W, THICK FILM
11	1	R9	Pref	80-0200R-24	CRCW06032000FK	VISHAY DALE	200	RESISTOR; 0603; 200 OHM; 1%; 100PPM; 0.10W; THICK FILM
12	4	SU1-SU4	Pref	02- JMPFSTC02SYAN- 00	STC02SYAN	SULLINS ELECTRONI CS CORP.	STC02SYA N	TEST POINT; JUMPER; STR; TOTAL LENGTH=0.256IN; BLACK; INSULATION=PBT CONTACT=PHOSPHOR BRONZE; COPPER PLATED TIN OVERALL
13	4	TP1, TP2, TP4, TP5	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
14	4	TP3, TP6, TP7, TP11	Pref	02-TPMINI5012-00	5012	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; WHITE; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH; RECOMMENDED FOR BOARD THICKNESS=0.062IN; NOT FOR COLD TEST
15	1	U1	Pref	00-SAMPLE-01	MAX40088AUT+	MAXIM	MAX40088 AUT+	EVKIT PART-IC; OPAMP; OZ46; SINGLE 10MHZ; LOW NOISE LOW BIAS CURRENT OP-AMP; PKG. OUTLINE DWG.: 21-0058; SOT23-6
16	1	VDD	Pref	02-TPMINI5010-00	5010	KEYSTONE	N/A	TESTPOINT WITH 1.80MM HOLE DIA; RED; MULTIPURPOSE; NOT FOR COLD TEST
17	1	VSS	Pref	02-TPMINI5013-00	5013	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; ORANGE; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH; RECOMMENDED FOR BOARD THICKNESS=0.062IN; NOT FOR COLD TEST
18	1	PCB	-	EPCB4007540088	MAX40088EVKIT#	MAXIM	PCB	PCB:MAX4007540088
TOTAL	38							

DO NOT PURCHASE(DNP)

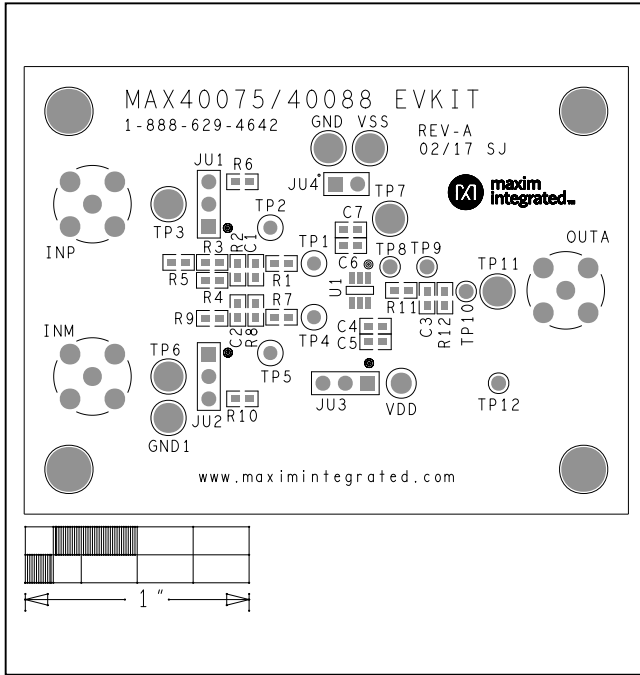
ITEM	QTY	REF DES	Var Status	MAXINV	MFG PART #	MFG	VALUE	DESCRIPTION
1	3	C1-C3	DNP	N/A	N/A	N/A	OPEN	PACKAGE OUTLINE 0603 NON-POLAR CAPACITOR - EVKIT
2	3	R2, R4, R12	DNP	N/A	N/A	N/A	OPEN	PACKAGE OUTLINE 0603 RESISTOR - EVKIT
TOTAL	6							

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

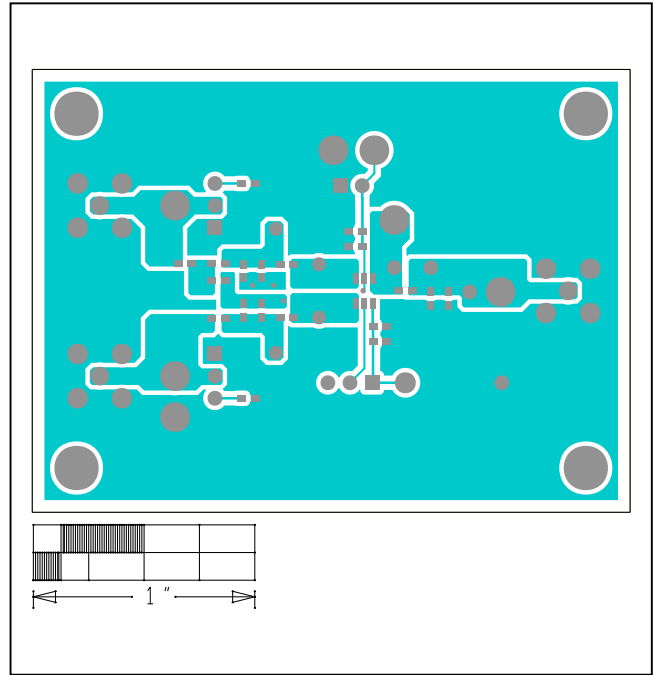
ITEM	QTY	REF DES	Var Status	MAXINV	MFG PART #	MFG	VALUE	DESCRIPTION
1	1	PACKOUT_BOX	DNI	88-00712-MDM	88-00712-MDM	N/A	?	BOX;+;MEDIUM BROWN 9 3/8" X 7 1/4" X 2 1/2
2	1	PACKOUT_BOX	DNI	87-02159-000	87-02159-000	N/A	?	ESD BAG;+;BAG; STATIC SHIELD 5X8;WESD LOGO
3	1	PACKOUT_BOX	DNI	85-MAXKIT-PNK	85-MAXKIT-PNK	N/A	?	PINK FOAM;FOAM;ANTI-STATIC PE 12inX12inX5MM - PACKOUT
4	1	PACKOUT_BOX	DNI	EVINSERT	EVINSERT	N/A	?	WEB INSTRUCTIONS FOR MAXIM DATA SHEET
5	1	PACKOUT_BOX	DNI	85-84003-006	85-84003-006	N/A	?	LABEL(EV KIT BOX) - PACKOUT
TOTAL	5							



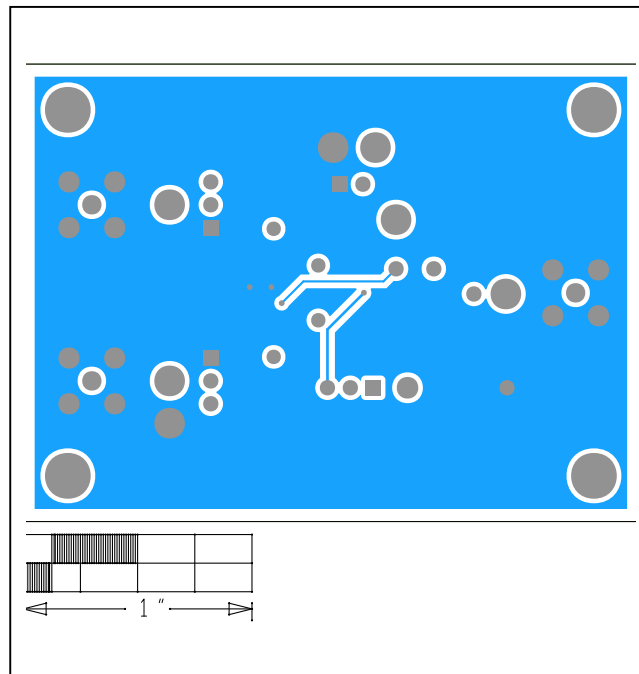
MAX40088 EV Kit PCB Layout Diagrams



MAX40088 EV Kit—Top Silkscreen



MAX40088 EV Kit—Top



MAX40088 EV Kit—Bottom

## Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	8/17	Initial release	—
1	12/17	Added MAX40079 and MAX40087 to parts able to be evaluated, <i>General Description</i> and <i>Features</i> sections, and updated schematic	1–7

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](http://www.maximintegrated.com).

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