

## MAX40658 Evaluation Kit

Evaluates: MAX40658/MAX40569

### General Description

The MAX40658 evaluation kit (EV kit) is a fully assembled electrical demonstration kit that provides a proven design to evaluate the MAX40658 and MAX40659 transimpedance amplifier.

Note that the MAX40658 EV kit provides an electrical interface to the IC that is similar, but not identical to, a photodiode.

The MAX40658 EV kit PCB comes with a MAX40658AETA+ 18.3k $\Omega$  transimpedance device installed. To evaluate the MAX40659AETA+ (36.6k $\Omega$  transimpedance), contact the factory for free samples of the pin-compatible device.

### Features

- Easy +3.3V Electrical Evaluation of MAX40658
- EV Kit Designed for 50 $\Omega$  Interfaces
- -40°C to +85°C Temperature Range
- Evaluated 8-TDFN-EP MAX40658AETA+ Device
- Accommodates Easy-to-Use Components
- Proven PCB Layout
- Fully Assembled and Tested

Ordering Information appears at end of data sheet.

### Quick Start

#### Required Equipment

- MAX40658 EV kit
- +3.6V, 100mA DC power supply
- Signal source up to 1GHz
- A minimum 500MHz to 2.5GHz oscilloscope

#### Procedure

The MAX40658 EV kit is fully assembled and tested. Follow the below to verify board operation:

Caution: Do not turn on the power supply or the electronic load until all the connections are complete.

- 1) Connect a +3.3V supply and ground to V1\_Supply connector.
- 2) Connect a signal source to J2. Set the signal amplitude to 20mV<sub>P-P</sub> (7.07mV<sub>RMS</sub> or -30dBm). (Corresponding to 3.6 $\mu$ A<sub>P-P</sub>). Set the frequency to 100MHz.
- 3) Apply 1 $\mu$ A to the J11 DC input using a DC current source to emulate the DC component of the input signal. A voltage source connected from J11 to GND may be used if a DC current source is not available.
- 4) Connect OUT1+ (J10) and OUT- (J7) to the 50 $\Omega$  inputs of a high-speed oscilloscope.
- 5) Verify all the shunts are in default positions as shown in [Table 1](#).
- 6) The differential signal at the oscilloscope should be approximately 43mV<sub>P-P</sub> at 100MHz.

## Detailed Description of Hardware

The MAX40658 accepts a DC-coupled input from a high-speed photodiode. The MAX40658 evaluation board facilitates evaluation of MAX40658 TIA without a photodiode. The MAX40658 EV kit comes from the factory with a low input current and a high input current setup.

## Theory of Operation

The MAX40658 EV kit comes with an 8-TDFN EP with circuit providing photodiode emulation using a simplified electrical photodiode model. The model provides a 50Ω electrical input termination, resistors that convert the high-speed input voltage to high-speed current. A DC path is provided to model the average photodiode current.

## Test Interface

The MAX40658 outputs are back-terminated with 75Ω. To facilitate interface with 50Ω equipment, the MAX40658 EV kit places external 150Ω termination resistors in parallel with each output so that the EV kit will match a 50Ω environment.

Note that the output load has a direct effect on the overall gain and output signal swing. Because of the external 150Ω resistors and the 50Ω environments, the overall gain is reduced by 33%. If matching a 50Ω environment is not critical, higher gain can be achieved by increasing the load resistance.

## Current Pulse Measurements

To perform pulse measurements, the current pulses are created by providing a voltage pulse at J1 or J2 input. The input series resistance combination ( $R_5 + R_7$ ) or ( $R_6 + R_8$ ), respectively, determines the amplitude of the current pulse.

For best performance, when providing the input voltage pulse at J1, remove the DC blocking capacitors C1 and C2 and replace them with a 0Ω short to DC couple the input to the MAX40658. Remove R3.

Use the following resistor combinations as shown in [Table 1](#) to create the respective current amplitude pulses.

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Use the following resistor combinations as shown in the table below to create the respective current amplitude pulses.

## Noise measurements

Remove the input resistors and shunt capacitor before attempting noise measurement. With the input resistors and shunt capacitor removed, the total capacitance at the IN-input 0.5pF.

## Evaluation of the MAX40659

This EV kit ships with the MAX40658ETA+ included. To evaluate the MAX40659ETA+, contact the factory to obtain a MAX40659ETA+ to evaluate with this EV kit.

**Table 1. Different Values of  $R_s$  ( $R_5 + R_7$ ) for Different Input Current Pulse Amplitudes.**

INPUT SERIES RESISTANCE $R_s$ (Ω)	GENERATOR INPUT AMPLITUDE STEP (V)	GENERATED INPUT CURRENT STEP (mA)
2200	0.55	0.1
100	0.35	1
9.4	4.6	92

## Ordering Information

PART	TYPE
MAX40658EVKIT#	EV Kit

#Denotes RoHS compliant.

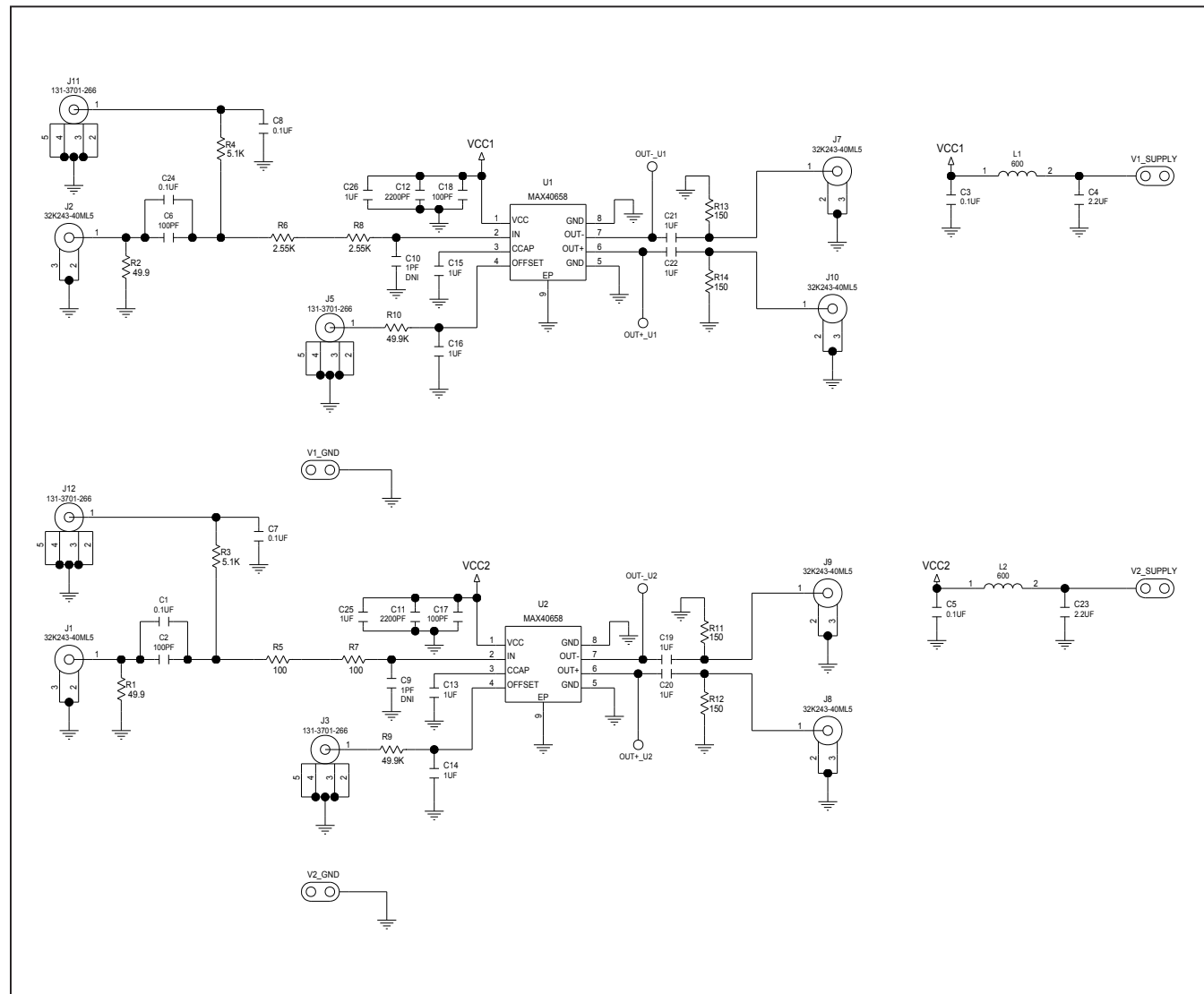
# MAX40658 Evaluation Kit

Evaluates: MAX40658/MAX40659

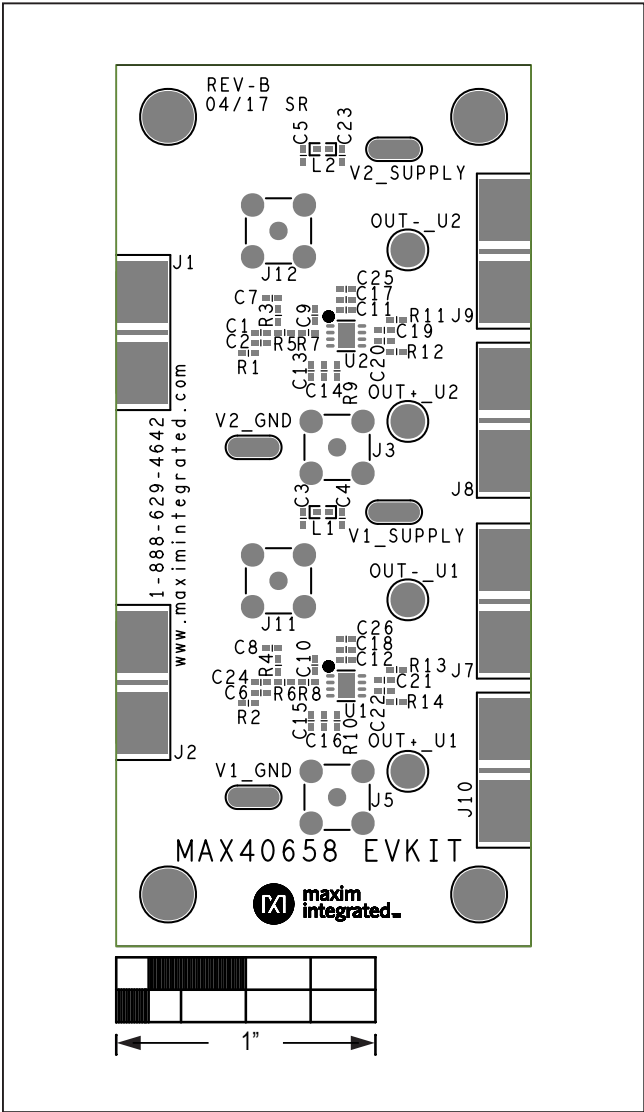
## MAX40658 EV Kit Bill of Materials

ITEM	REF_DES	DNI/DNP	QTY	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION	COMMENTS
1	C1, C3, C5, C7, C8, C24	-	6	GRM155R61C104KA88	MURATA	0.1UF	CAPACITOR; SMT (0402); CERAMIC; 0.1UF; 16V; TOL=10%; MODEL=GRM SERIES; TG=-55 DEGC to +85 DEGC; TC=X5R	
2	C2, C6, C17, C18	-	4	C0402C101J5GAC; NMC0402NPO101J; CC0402JRNPO9BN101; GRM1555C1H101JA01; C1005C0G1H101J050	KEMET/NIC COMPONENTS CORP. / YAGEO PHICOMP/MURATA/TKD	100PF	CAPACITOR; SMT (0402); CERAMIC CHIP; 100PF; 50V; TOL=5%; TG=-55 DEGC TO +125 DEGC; TC=C0G	
3	C4, C23	-	2	C0402X5R6R3-225MNP; C0402C225M9PAC; GRM155R60J225ME; JMK105BJ225MV	VENKEL/KEMET/MURATA/ TAIYO YUDEN	2.2UF	CAPACITOR; SMT (0402); CERAMIC; 2.2uF; 6.3V; 20%; X5R; -55degC to + 85degC; 0 +/-15% degC MAX.	
4	C11, C12	-	2	C0402X7R500-222KNE; GRM155R71H222KA01	VENKEL LTD./MURATA	2200PF	CAPACITOR; SMT (0402); CERAMIC CHIP; 2200PF; 50V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R	
5	C13-C16, C19-C22, C25, C26	-	10	C0402X5R100-105KNE; GRM155R61A105KE15	VENKEL LTD./MURATA	1UF	CAPACITOR; SMT (0402); CERAMIC CHIP; 1UF; 10V; TOL=10%; MODEL=; TG=-55 DEGC TO +85 DEGC; TC=X5R	
6	J1, J2, J7-J10	-	6	32K243-40ML5	ROSENBERGER	32K243-40ML5	CONNECTOR; FEMALE; SMT; SMA JACK PCB; RIGHT ANGLE; 2PINS	
7	J3, J5, J11, J12	-	4	131-3701-266	JOHNSON COMPONENTS	131-3701-266	CONNECTOR; MALE; THROUGH HOLE; SMB JACK VERTICAL PCB MOUNT; STRAIGHT; 5PINS	
8	L1, L2	-	2	BLM15BD601SN1	MURATA	600	INDUCTOR; SMT (0402); FERRITE-BEAD; 600; TOL=+/-25%; 0.2A	
9	OUT+_U1, OUT+_U2, OUT-_U1, OUT-_U2	-	4	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;	
10	R1, R2	-	2	TNPW040249R9BE; RG1005P-49R9-B-T; ERA-2AEB49R9X	SUSUMU CO LTD./PANASONIC/ VISHAY	49.9	RESISTOR; 0402; 49.9 OHM; 0.1%; 25PPM; 0.063W; THICK FILM	
11	R3, R4	-	2	CRCW04025K10FK	VISHAY DALE	5.1K	RESISTOR; 0402; 5.1K; 1%; 100PPM; 0.0625W; THICK FILM	
12	R5, R7	-	2	RG1005P-101-B-T5; ERA-2AEB101X	SUSUMU CO LTD./PANASONIC	100	RESISTOR; 0402; 100 OHM; 0.1%; 25PPM; 0.0625W; THICK FILM	
13	R6, R8	-	2	CRCW04022K55FK	VISHAY DALE	2.55K	RESISTOR; 0402; 2.55K OHM; 1%; 100PPM; 0.0625W; THICK FILM	
14	R9, R10	-	2	ERJ-2RKF4992X	PANASONIC	49.9K	RESISTOR; 0402; 49.9K OHM; 1%; 100PPM; 0.10W; THICK FILM	
15	R11-R14	-	4	CRCW0402150RFX; 9C04021A1500FL	VISHAY DALE	150	RESISTOR; 0402; 150 OHM; 1%; 100PPM; 0.0625W; THICK FILM	
16	U1, U2	-	2	MAX40658	MAXIM	MAX40658	EVKIT PART-IC; PACKAGE OUTLINE: 21-0137	
17	V1_GND, V2_GND, V1_SUPPLY, V2_SUPPLY	-	4	9020 BUSS	WEICO WIRE	MAXIMPAD	EVK KIT PARTS; MAXIM PAD; WIRE; NATURAL; SOLID; WEICO WIRE; SOFT DRAWN BUS TYPE-S; 20AWG	
18	PCB	-	1	MAX40658	MAXIM	PCB	PCB:MAX40658	-
19	C9, C10	DNP	0	C0402C109C1GAC	KEMET	1PF	CAPACITOR; SMT; 0402; CERAMIC; 1pF; 100V; 0.25pF; C0G; -55degC to + 125degC;	
TOTAL			61					

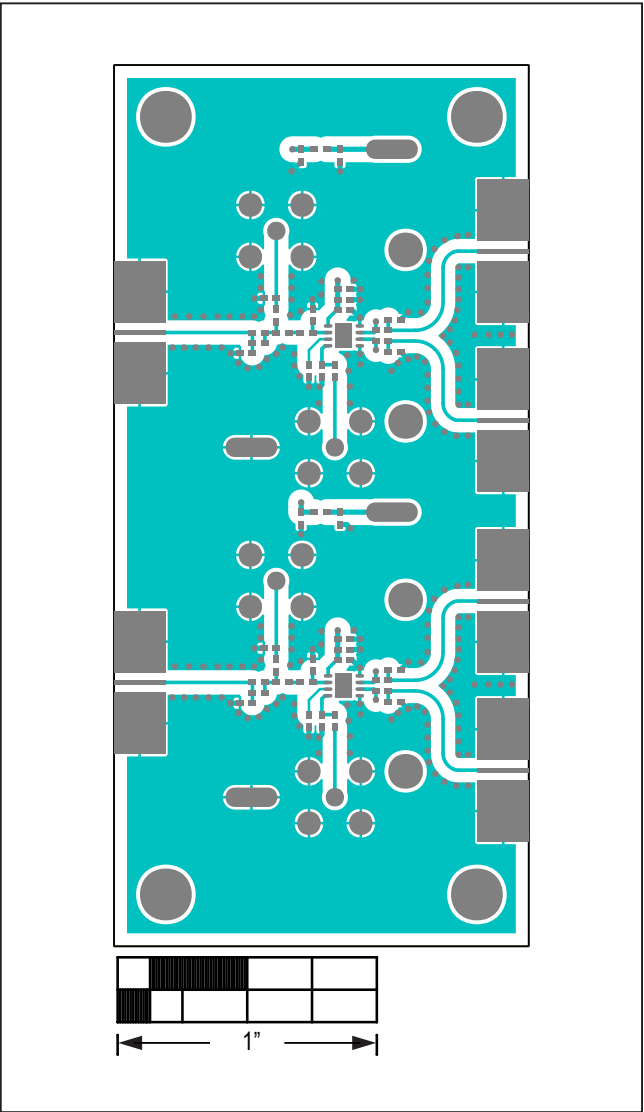
## MAX40658 EV Kit Schematic



MAX40658 EV Kit PCB Layout Diagrams

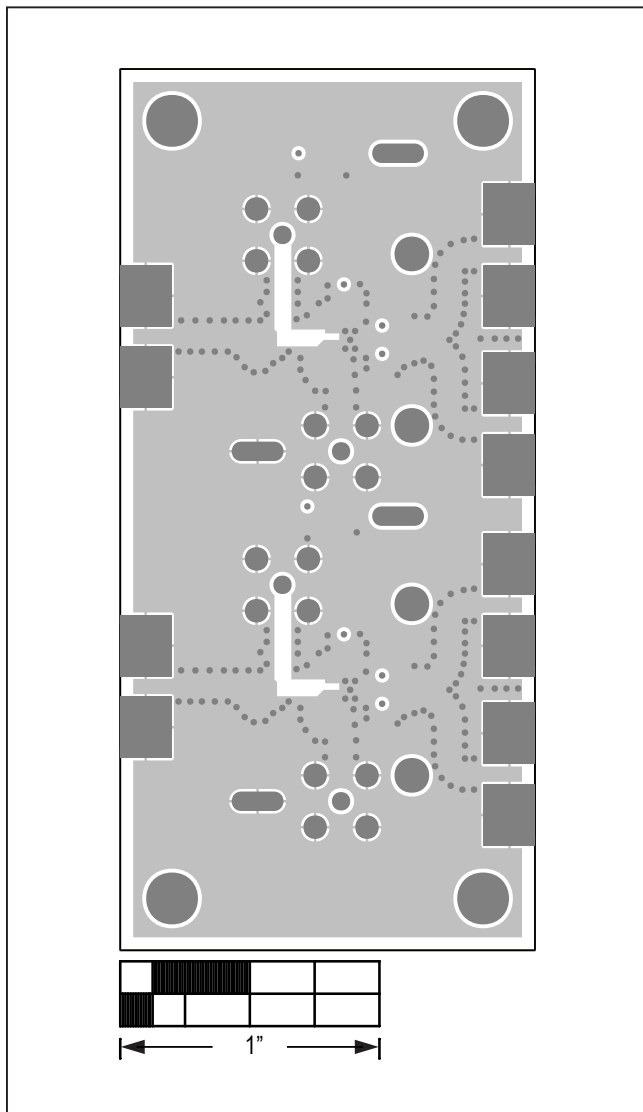


MAX40658 EV Kit—Top Silkscreen

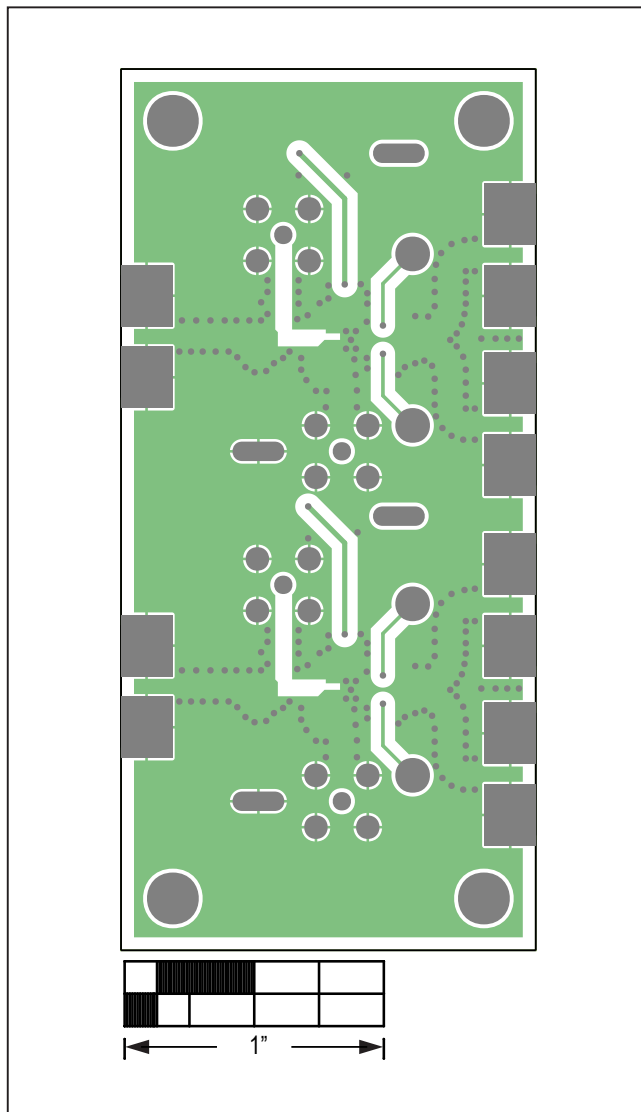


MAX40658 EV Kit—Top

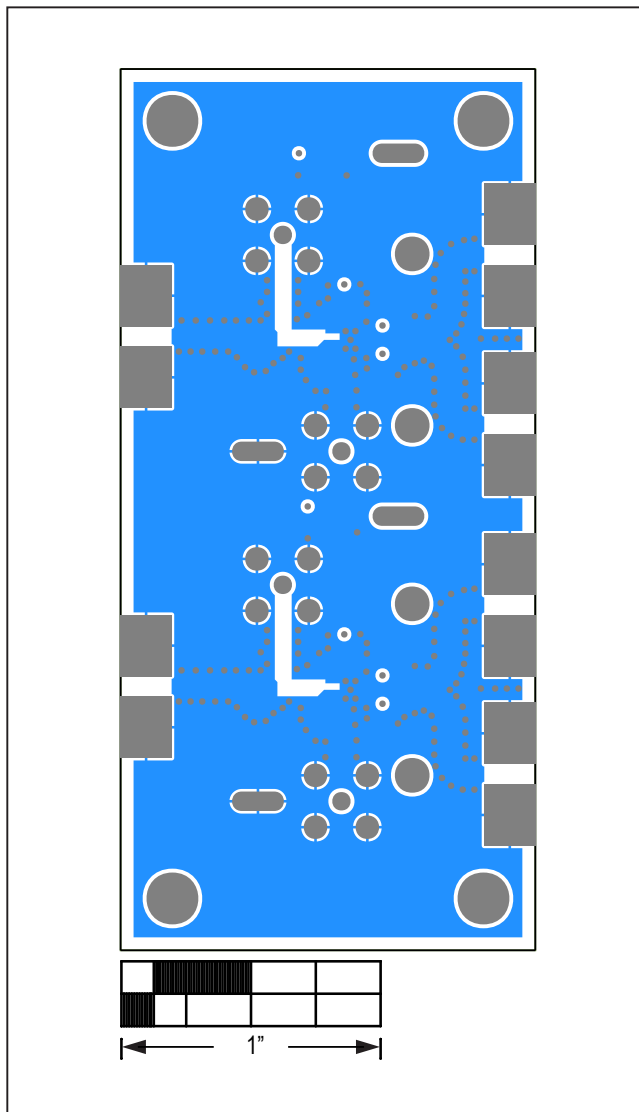
## MAX40658 EV Kit PCB Layout Diagrams (continued)



MAX40658 EV Kit—GND2



MAX40658 EV Kit—GND3

**MAX40658 EV Kit PCB Layout Diagrams (continued)***MAX40658 EV Kit—Bottom*

## Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	7/17	Initial release	—
1	10/18	Updated evaluation options to include MAX40659	1–8

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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