

General Description

The MAX258 evaluation kit (EV kit) is a fully assembled and tested PCB that demonstrates the MAX258 push-pull transformer driver. The EV kit operates from a single 3.0V to 5.5V supply and the on-board 1CT:1.3CT turns-ratio transformer sets the output voltage.

The EV kit provides up to 90% overall efficiency at 5V with up to 2.3W output power using a push-pull isolated DC-DC converter. Undervoltage lockout and thermal shutdown provide for a robust isolated supply. The surface-mount transformer provides galvanic isolation with the output powered from a push-pull rectifier circuit, reducing the output-voltage ripple.

The EV kit circuit is configured as a push-pull rectifier, with an output voltage that follows the input voltage. The EV kit is also configurable for other topologies including bipolar outputs and full-wave rectification.

Features and Benefits

- 3.0V to 5.5V Operating Voltage Range
- Up to 90% Efficiency
- Push-Pull Rectified Output
- Configurable Bipolar Outputs or Full-Wave Rectifier
- Proven PCB Layout
- Fully Assembled and Tested

Ordering Information appears at end of data sheet.

Component List

DESIGNATION	QTY	DESCRIPTION
C1, C2	2	1.0 μ F \pm 10%, 25V X7R ceramic capacitors (0603) Murata GRM188R71E105K
C3, C5	2	10 μ F \pm 10%, 25V X7R ceramic capacitors (1206) Murata GRM31CR71E106K
C4	0	Not installed, ceramic capacitor (1206)
D1, D2	2	30V, 2A Schottky diodes (SMA) Diodes Inc. B230A-13-F
D3, D4	0	Not installed, Schottky diodes (SMA)
J1, J2	2	3-pin headers

DESIGNATION	QTY	DESCRIPTION
R1	1	0 Ω \pm 5% resistor (0603)
R2	1	1k Ω \pm 5% resistor (0603)
TX1	1	1CT:1.3CT turns-ratio transformer (8 Gull Wing) Halo TGM-H240V8LF
U1	1	500mA push-pull transformer driver (8 TDFN-EP*) Maxim MAX258ATA+
—	2	Shunts
—	1	PCB: MAX258 EVKIT

*EP = Exposed pad.

Component Suppliers

SUPPLIER	PHONE	WEBSITE
Diodes Incorporated	972-987-3900	www.diodes.com
Halo Electronics, Inc.	650-903-3800	www.haloelectronics.com
Murata Electronics, North America, Inc.	770-436-1300	www.murata-northamerica.com

Note: Indicate that you are using the MAX258 when contacting these component suppliers.

Quick Start

Required Equipment

- MAX258 EV kit
- 5.0V, 1A DC power supply
- Electronic load capable of 500mA
- Ammeter
- 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 jumpers J1 and J2 are in their default positions, as shown in Table 1.
- 2) Set the DC power supply to 5.0V.
- 3) Set the electronic load to 300mA and disable the output.
- 4) Connect the voltmeter between the +VOUT and SGND PCB pads on the EV kit.
- 5) Connect the ammeter between the +VOUT PCB pad on the EV kit and the positive terminal on the electronic load. The negative terminal on the electronic load is connected to the SGND PCB pad on the EV kit.
- 6) Connect the power supply between the VDD and GND PCB pads on the EV kit.
- 7) Turn on the power supply.
- 8) Enable the electronic load.

- 9) Verify that the ammeter reads approximately 300mA.

- 10) Verify that the voltmeter reads approximately 5.5V.

Detailed Description

The MAX258 EV kit is an isolated push-pull DC-DC converter that provides an unregulated output with respect to the isolated ground. The maximum load is limited by the device and winding ratio of the transformer.

The device is an integrated primary-side controller and push-pull driver for isolated power-supply circuits. The device contains an on-board oscillator, protection circuitry, and internal MOSFETs to provide up to 500mA of current to the transformer's primary winding.

The device operates from a single-supply voltage and includes UVLO and an active-low enable input for controlled startup. If the input voltage at VDD falls below 2.55V, or the EN input is pulled above 2.0V, the device shuts down and T1 and T2 are high impedance.

Using the Internal Oscillator

The device includes an internal oscillator with a guaranteed 50% duty cycle. Place a shunt across pins 1-2 on jumper J2 to set the T1/T2 switching frequency to 600kHz (typ). Place a shunt across pins 2-3 on J2 to set the T1/T2 switching frequency to 250kHz (typ).

Evaluating Other Transformer Configurations

The EV kit PCB layout provides an easy method to reconfigure transformer TX1 secondary windings for other configurations, including bipolar outputs and full-wave rectifier. Use Table 2 to reconfigure the EV kit for the appropriate output configuration.

Table 1. Jumper Description Table (J1, J2)

JUMPER	SHUNT POSITION	DESCRIPTION
J1	1-2	$\overline{\text{EN}}$ connected to VDD.
	2-3*	$\overline{\text{EN}}$ connected to GND. Device enabled.
J2	1-2	HICLK connected to VDD. T1/T2 switch at 600kHz.
	2-3*	HICLK connected to GND. T1/T2 switch at 250kHz.

*Default position.

Using the MAX258 EV Kit with Other Transformers

The EV kit comes with the 1CT:1.3CT TGM-H240V8LF transformer from Halo Electronics installed on TX1, but the EV kit can also be used with other transformers. Table 3 is a list of available transformers from Halo Electronics designed for the MAX258 that have other winding-ratios and/or higher isolation ratings. Contact Halo Electronics to obtain samples of any of these transformers.

Note that the EV kit is designed for 4500VRMS isolation operation, with 600 mils (15.24mm) spacing between the primary ground (GND) and secondary ground (SGND) planes. Test points GND and SGND are provided on the PCB for probing the respective ground planes, or to connect the GND and SGND planes together for non-isolated evaluation of the circuit.

Table 2. Output Configurations

CONFIGURATION	D1	D2	D3	D4	C3	C4	R1
Full-wave rectifier	Installed	Installed	Installed	Installed	Installed	0Ω resistor	Not installed
Bipolar outputs	Installed	Installed	Installed	Installed	Installed	Installed	Installed
Push-pull rectifier*	Installed	Installed	Not installed	Not installed	Installed	Not installed	0Ω

*Default position.

Table 3. Available Transformers for the MAX258

PART	TURNS RATIO	ISOLATION VOLTAGE
TGM-H240V8LF	1CT:1.3CT	1500V _{RMS}
TGM-H260V8LF	1CT:2CT	1500V _{RMS}
TGM-H280V8LF	1CT:2.67CT	1500V _{RMS}
TGMR-H540V8LF	1CT:1.375CT	4500V _{RMS}
TGMR-H560V8LF	1CT:2CT	4500V _{RMS}
TGMR-H580V8LF	1CT:2.67CT	4500V _{RMS}

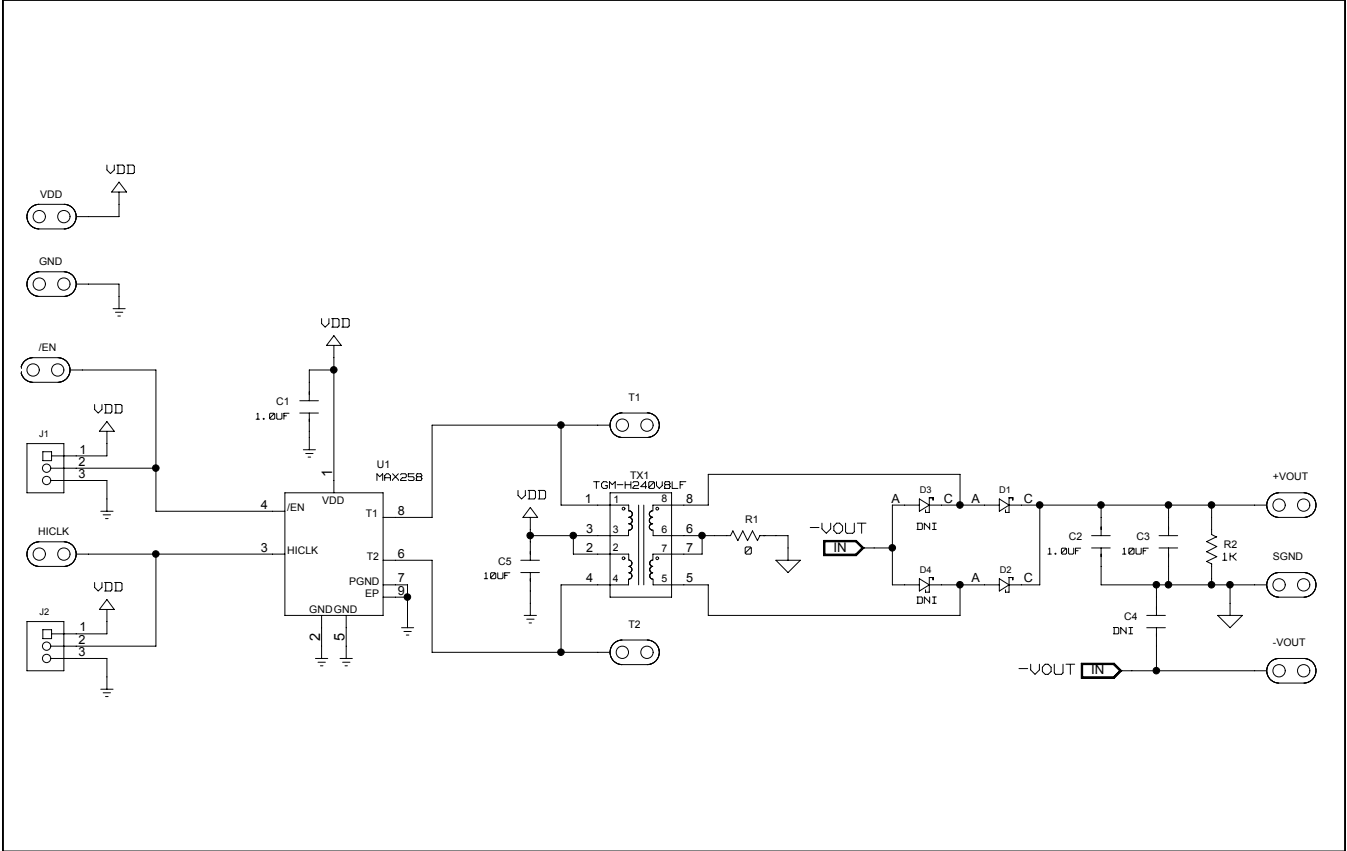


Figure 1. MAX258 EV Kit Schematic

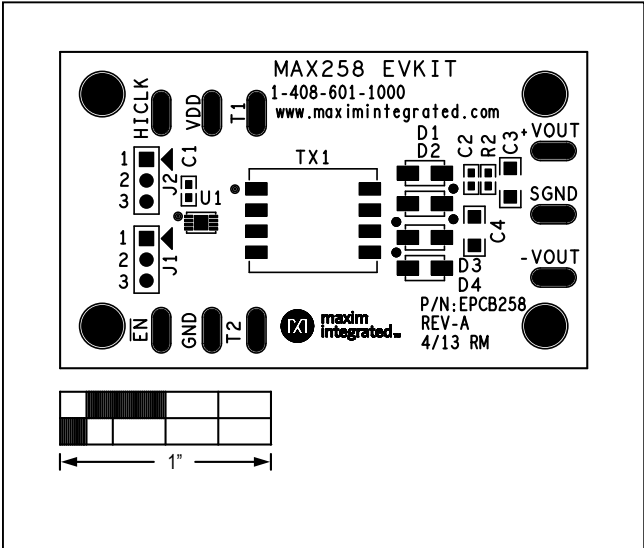


Figure 2. MAX258 EV Kit Component Placement Guide—Component Side

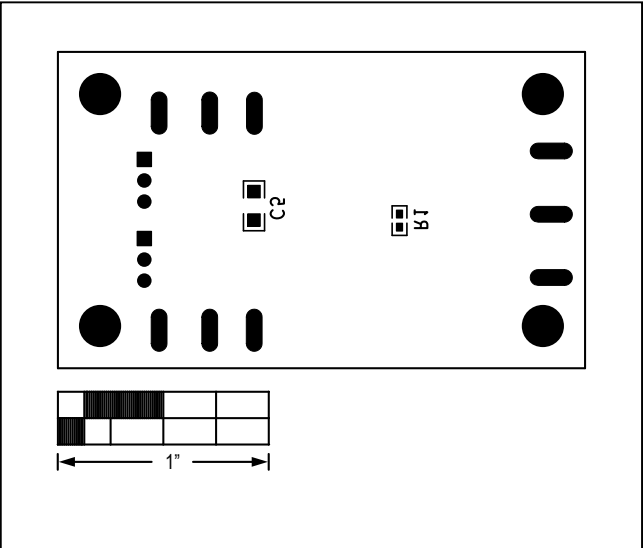


Figure 3. MAX258 EV Kit Component Placement Guide—Solder Side

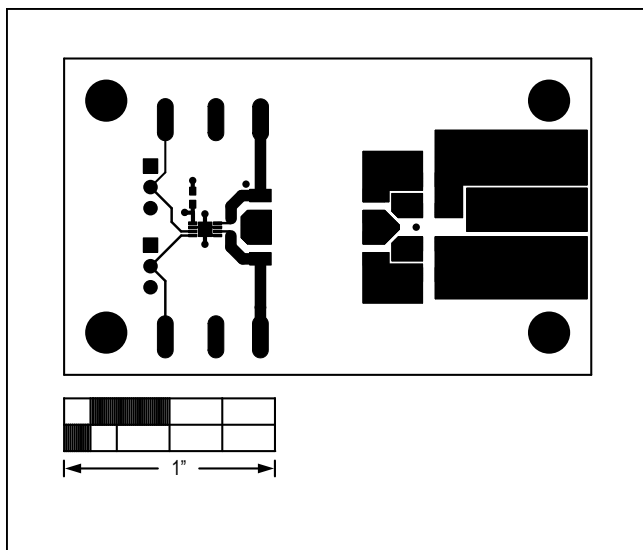


Figure 4. MAX258 EV Kit PCB Layout—Component Side

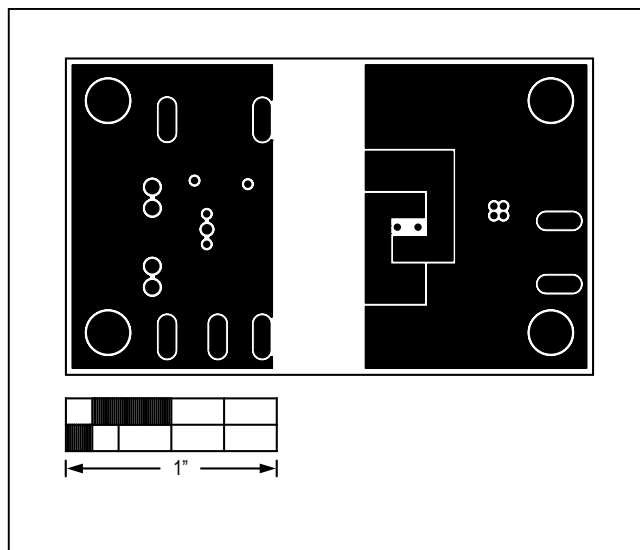


Figure 6. MAX258 EV Kit PCB Layout—PWR

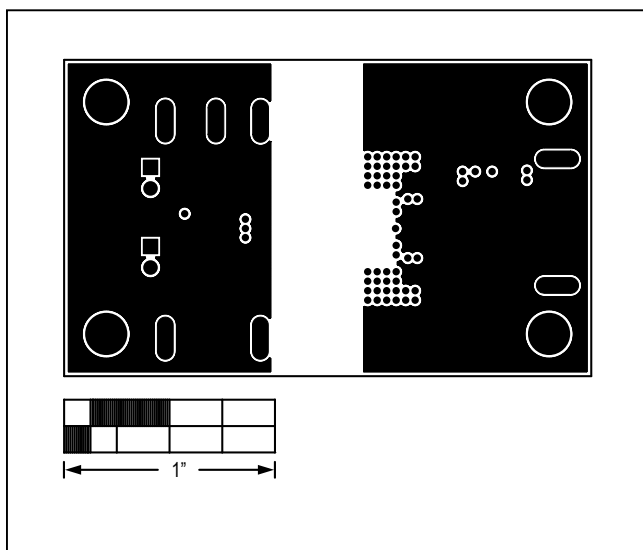


Figure 5. MAX258 EV Kit PCB Layout—GND

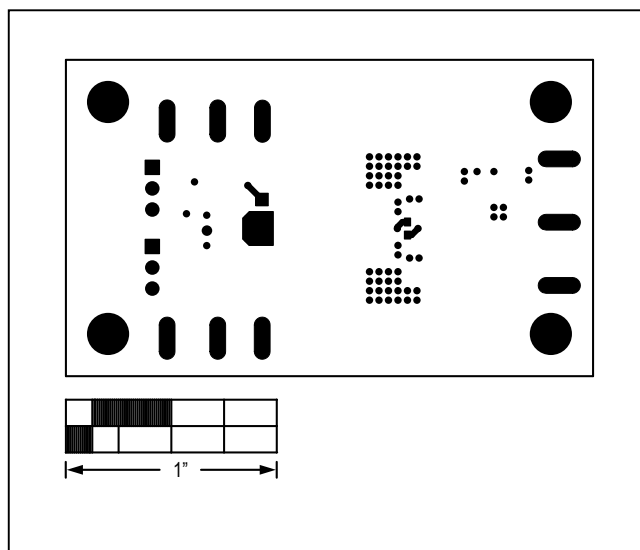


Figure 7. MAX258 EV Kit PCB Layout—Solder Side

Ordering Information

PART	TYPE
MAX258EVKIT#	EV Kit

#Denotes RoHS compliant.

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	5/13	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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