MAX16962R Evaluation Kit
Evaluates: MAX16962R

General Description

The MAX16962R evaluation kit (EV kit) is a fully assembled and tested circuit board that evaluates the MAX16962R high-efficiency synchronous PWM step-down converter with integrated high-side and low-side switches. The EV kit output is configured to 3.3V and delivers up to 4A output current. The EV kit circuit operates at the IC's internally set 2.2MHz switching frequency.

The EV kit is designed to operate from a single DC power supply that provides 3.5V to 5.5V and up to 4A for normal operation. However, the IC has a 2.7V to 5.5V input voltage range. The EV kit, shipped with a MAX16962RATEA/V+ in a 16-pin TQFN package with exposed pad, provides enhanced thermal dissipation.

Features

- **3.5V to 5.5V Input Voltage Range (EV Kit)**
- **3.3V at 4A Output**
- **Fixed 2.2MHz Switching Frequency**
- **Configurable Forced-PWM and Skip-Mode Operation**
- **External Synchronization**
- **Power-Good Output (PG1)**
- **Overcurrent and Thermal-Shutdown Protection**
- **Proven PCB Layout**
- **Fully Assembled and Tested**

Ordering Information appears at end of data sheet.

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.

19-6756; Rev 0; 7/13

Quick Start

Required Equipment

- MAX16962R EV kit
- 5.5V adjustable, 5A power supply
- Electronic load capable of sinking up to 4A
- Two digital voltmeters

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 shunts are installed on jumpers JU1 (output enabled) and JU2 (forced-PWM mode).
2) Connect the power-supply positive and ground terminals to the VSUP and PGND banana jacks, respectively.
3) Connect the positive and negative terminal of the electronic load to the VOUT and PGND banana jacks, respectively.
4) Connect a voltmeter across the VOUT and PGND PCB pads.
5) Connect a voltmeter across the PG1 and GND PCB pads.
6) Turn on the power supply.
7) Set the power-supply voltage to 5V.
8) Enable the electronic load and set it to 4A
9) Verify that the voltmeter connected to VOUT measures approximately 3.3V.
10) Verify that the voltmeter connected to PG1 measures approximately 5V.

Detailed Description of Hardware

The MAX16962R EV kit is a fully assembled and tested circuit board that contains all the components necessary to evaluate the performance of the MAX16962R high-efficiency, synchronous PWM step-down converter with integrated high-side and low-side switches. The IC is available in a 16-pin TQFN package and features an exposed pad for thermal dissipation.

The EV kit circuit uses a step-down converter IC to implement a step-down synchronous DC-DC converter circuit with a fixed 2.2MHz switching frequency. The EV kit output is configured to 3.3V and delivers up to 4A output current. The IC's on-board low R_{DSON} switches help minimize efficiency losses at heavy loads and reduce critical/parasitic inductances, resulting in a very small compact layout. The EV kit circuit is designed to operate from a single DC power supply that provides 3.5V to 5.5V and up to 4A of current.

The EV kit converter circuit is configured to 3.3V using resistors R6 and R7. The EV kit can be configured to operate in forced fixed-frequency PWM mode or low-quiescent current skip mode using jumper JU2. Ferrite bead L2 and capacitor C9 are available for preventing oscillation at the circuit input when interfacing long cables from the power supply to the EV kit's VSUP and PGND PCB pads.

The circuit includes a SYNC PCB pad that can be used to synchronize the IC to frequencies operating in the 1.7MHz to 2.5MHz range. The EV kit also provides a PG1 PCB pad for monitoring the power-good output and a PWM PCB pad for driving the PWM input.

Configuring the Output Voltage (V_{OUT})

The EV kit converter is configured to 3.3V using resistors R6 and R7. The EV kit's output voltage (V_{OUT}) can be reconfigured in the range of 0.8V to 3.6V by replacing resistors R6 and R7. Use the following equation to reconfigure the output voltage to the desired value:

$$R7 = R6 \times \left(\frac{V_{OUT}}{0.8} - 1 \right)$$

where V_{OUT} is the desired output voltage in volts and R6 is typically less than 100kΩ.

The external feedback resistive divider must be frequency compensated for proper operation. Place a capacitor across each resistor in the resistive-divider network. Use the following equation to determine the value of the capacitors:

$$C8 = C7\left(\frac{R6}{R7}\right), \text{ where } C7 = 100pF$$

Reconfiguring the EV kit circuit for a new output voltage may require replacing inductor L1 and capacitors C1–C4. To select new values for inductor L1 and capacitors C1–C4, refer to the *Inductor Selection*, *Output Capacitor*, and *Input Capacitor* sections in the MAX16962 IC data sheet.

Enable Control (JU1)

Jumper JU1 configures the EV kit output for turn-on/turn-off control. Install a shunt to enable the output. Remove the shunt to disable the EV kit output. VOUT can also be enabled by applying an external signal greater than 1.95V (typ) at the EN1 and GND PCB pads. See Table 1 for proper JU1 configuration.

Switching Mode of Operation (JU2)

Jumper JU2 configures the EV kit for forced-PWM, or skip-mode operation. In PWM mode, the converter switches at a constant frequency with variable on-time. In skip mode, the converter's switching frequency is load dependent until the output load reaches a certain threshold. Install a shunt to operate the EV kit in forced-PWM mode. Remove the shunt to operate in skip mode. See Table 2 for proper JU2 configuration. Use the PWM PCB pad for monitoring the logic voltage at the PWM pin.

Power-Good Output (PG1)

The EV kit provides a PCB pad to monitor the status of the power-good PG1 output. The PG1 output can be used as a system reset signal during power-up. PG1 is high after V_{OUT} rises 10% above its programmed output voltage. PG1 is pulled up to PSUP using resistor R4. The PG1 output is pulled low when the V_{OUT} drops below 92% (typ) of its nominal set voltage or rises 10% above its nominal set voltage.

Synchronization Input (SYNC)

The EV kit's SYNC PCB pad can be used to synchronize the IC with an external digital clock in the 1.75MHz to 2.5MHz range. When SYNC is driven with an external digital clock, the IC synchronizes to the rising edge of the external clock.

The digital square-wave clock source must provide the following signal qualities:

Output voltage:

- Logic-low = 0 to 0.4V
- Logic-high = 1.8V to PSUP

To use external synchronization, connect the external square-wave clock to the SYNC and GND PCB pads.

Table 1. Enable Control (JU1)

SHUNT POSITION	EN1 PIN	VOUT
Installed	Connected to PSUP	Enabled
Not installed	Connected to ground through R1	Disabled or external source applied at EN1 and GND PCB pads

Table 2. Mode of Operation (JU2)

SHUNT POSITION	PWM PIN	SWITCHING MODE
Installed	Connected to PSUP	Forced PWM
Not installed	Connected to GND through R2	Skip

Component List

DESIGNATION	QTY	DESCRIPTION
C1, C2	2	10µF ±10%, 10V X7R ceramic capacitors (1206) Murata GRM31CR71A106K
C3, C4	2	47µF ±10%, 6.3V X7R ceramic capacitors (1210) Murata GRM32ER70J476K
C5	1	1µF ±10%, 10V X7R ceramic capacitor (0603) Murata GRM188R71A105K
C6	0	Not installed, ceramic capacitor (1206)
C7	1	100pF ±5%, 50V C0G ceramic capacitor (0603) Murata GRM1885C1H101J
C8	1	33pF ±5%, 50V C0G ceramic capacitor (0603) Murata GRM1885C1H330J
C9	1	100µF ±20%, 6.3V POS capacitor (3.5mm x 2.8mm) SANYO 6TPG100M
GND	1	Small black test point
JU1, JU2	2	2-pin headers
L1	1	1µH, 3.5A inductor Coilcraft XAL4020-102
L2	0	Not installed, ferrite bead—short (PC trace) (0805)
PG1, SYNC	2	Small red test points
PGND (x2), VOUT, VSUP	4	Uninsulated banana jacks
R1	1	100kΩ ±5% resistor (0603)
R2, R4, R5	3	20kΩ ±5% resistors (0603)
R3	1	10Ω ±5% resistor (0603)
R6	1	30.1kΩ ±1% resistor (0603)
R7	1	95.3kΩ ±1% resistor (0603)
U1	1	2.2MHz low-voltage step-down converter (16 TQFN-EP) Maxim MAX16962RATEA/V+
—	2	Shunts (JU1, JU2)
—	1	PCB: MAX19692 EVKIT

**EP = Exposed pad.*

Component Suppliers

SUPPLIER	PHONE	WEBSITE
Coilcraft, Inc.	847-639-6400	www.coilcraft.com
Murata Americas	770-436-1300	www.murataamericas.com
SANYO Electric Co., Ltd.	619-661-6835	www.sanyo.com

Note: *Indicate that you are using the MAX16962R when contacting these component suppliers.*

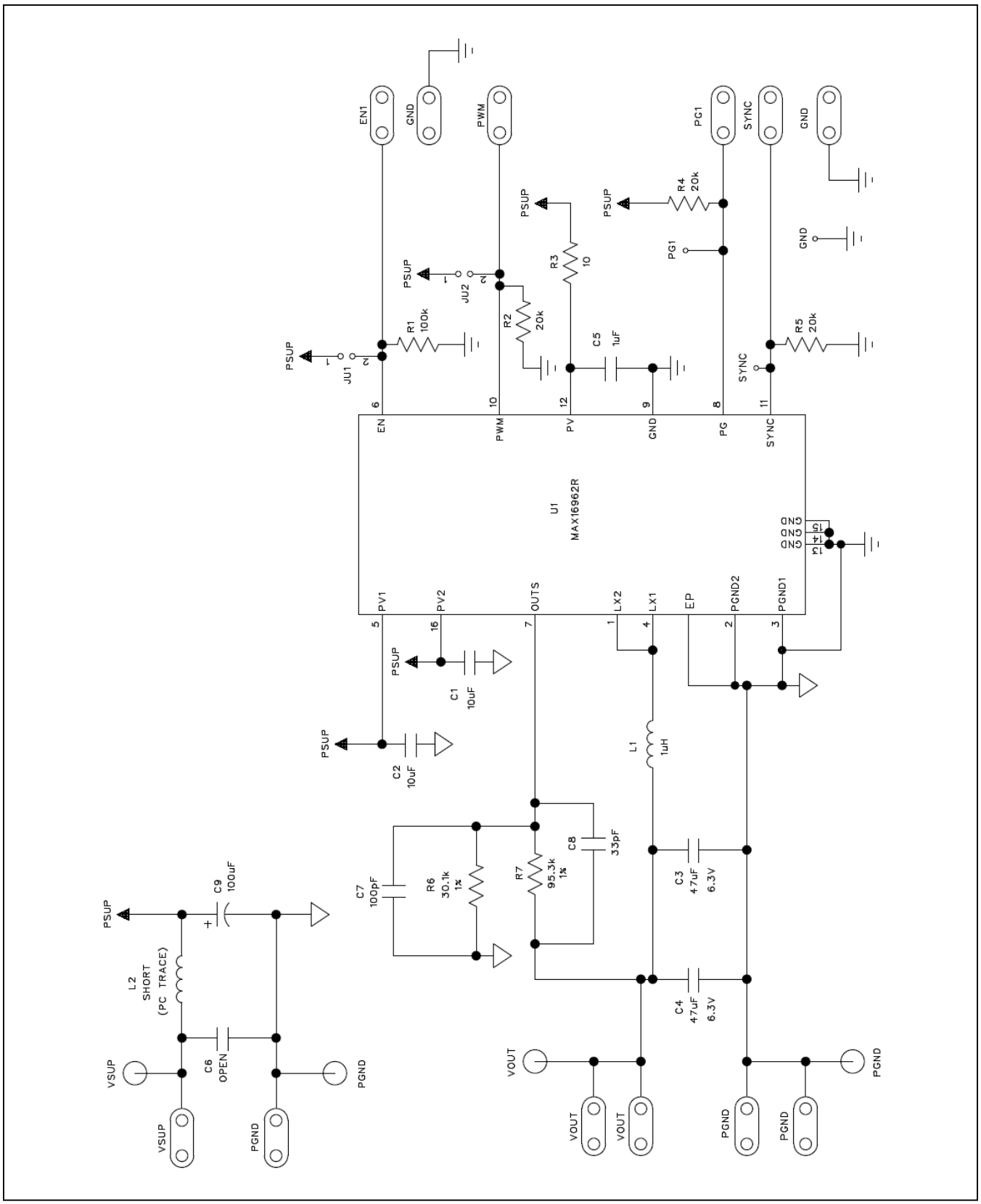

Figure 1. MAX16962R EV Kit Schematic

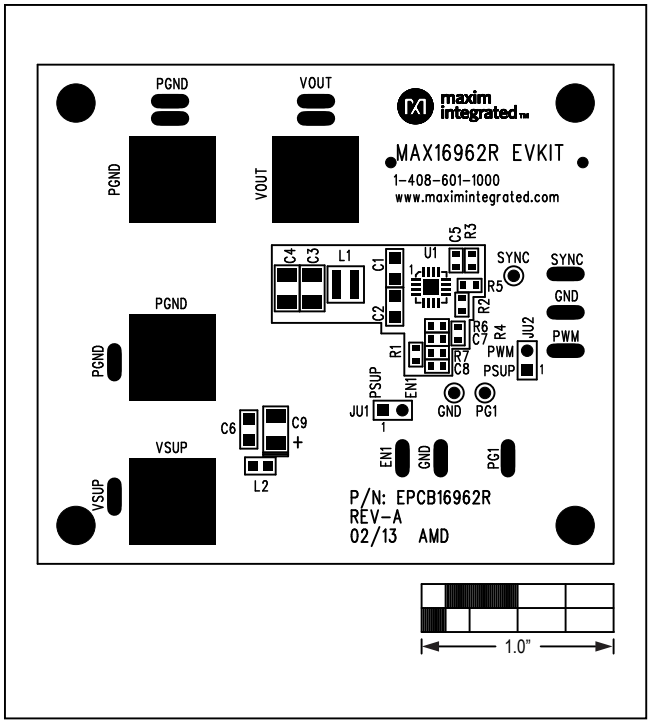

Figure 2. MAX16962R EV Kit Component Placement Guide—Component Side

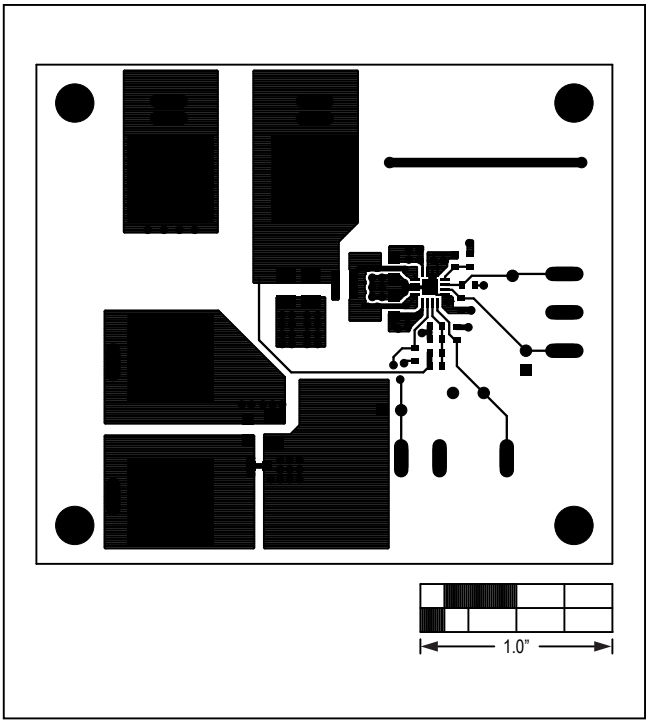

Figure 3. MAX16962R EV Kit PCB Layout—Component Side

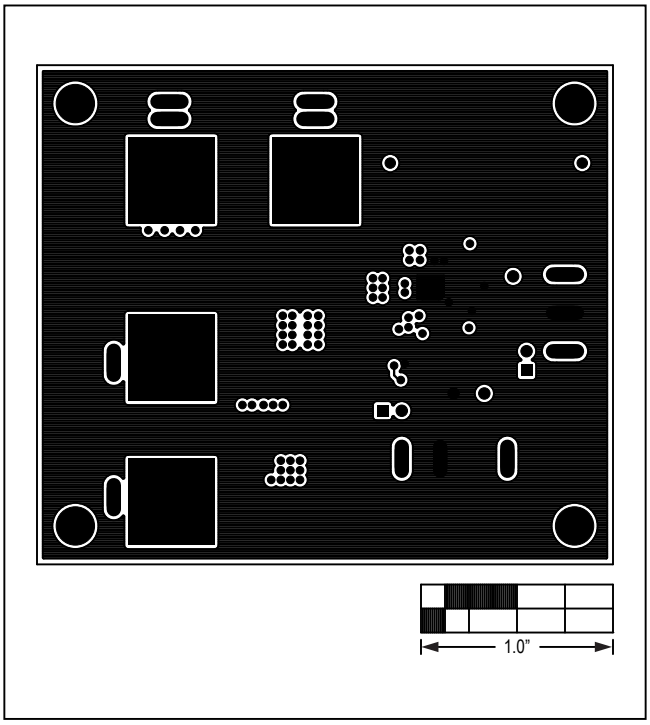

Figure 4. MAX16962R EV Kit PCB Layout—PGND Layer 2

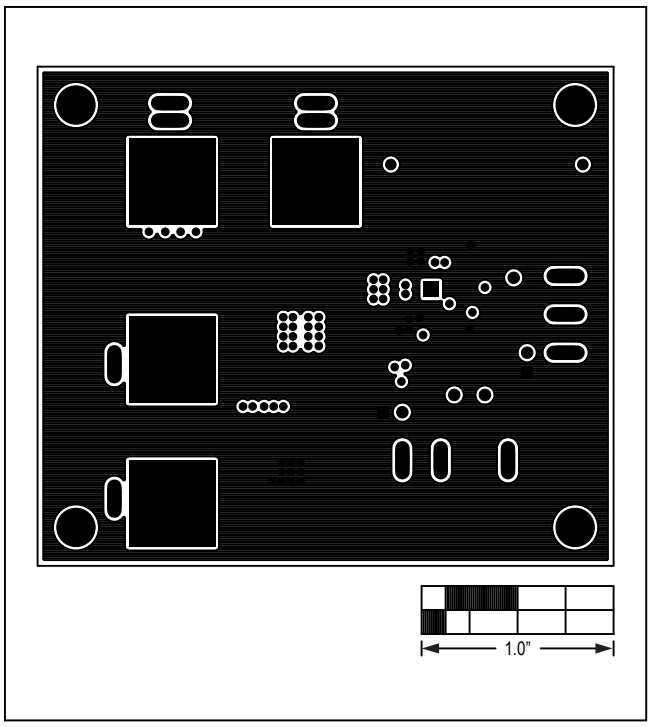

Figure 5. MAX16962R EV Kit PCB Layout—SGND Layer 3

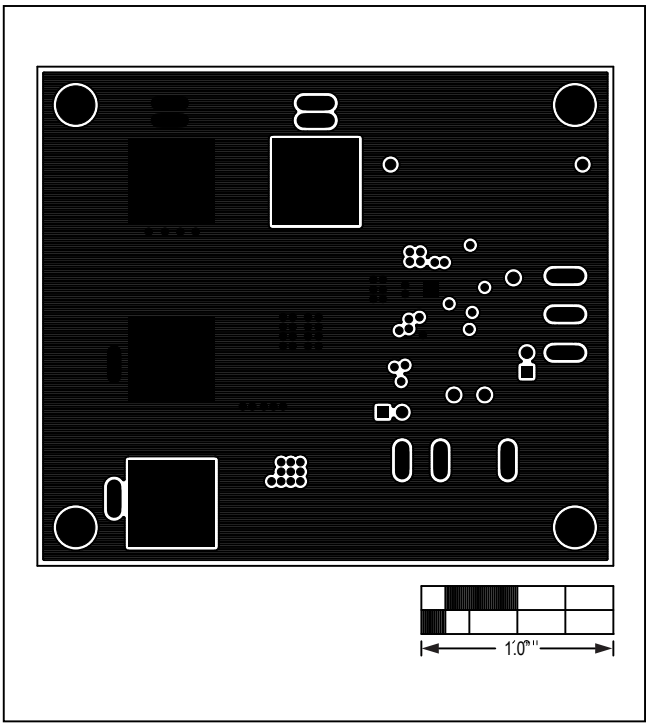

Figure 6. MAX16962R EV Kit PCB Layout—Solder Side

Ordering Information

PART	TYPE
MAX16962REVKIT#	EV Kit

#Denotes RoHS compliant.

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	7/13	Initial release	—

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