

MAX16904 Evaluation Kit

Evaluates: MAX16904

General Description

The MAX16904 evaluation kit (EV kit) provides a proven design to evaluate the MAX16904 2.1MHz high-voltage mini-buck converter in a 16-pin TSSOP package. All components are rated for the automotive temperature range. Various test points are included for evaluation.

The EV kit PCB comes with a MAX16904RAUE50/V+ installed. The EV kit outputs a fixed +5V. The fixed +3.3V output version can also be installed with minimal component changes. Contact the factory for free samples of the pin-compatible MAX16904SAUE50/V+, MAX16904SAUE33/V+, and MAX16904RAUE33/V+ to evaluate these devices.

Features

- Up to +42V Input Supply Range
- Delivers Up to 600mA Output Current
- +5V Output
- 2.1MHz Switching Frequency
- Proven PCB Layout
- Fully Assembled and Tested

Ordering Information

PART	TYPE
MAX16904EVKIT#	EV Kit

#Denotes RoHS compliant.

Component List

DESIGNATION	QTY	DESCRIPTION
C1	1	4.7 μ F \pm 10%, 50V X7R ceramic capacitor (1206) Murata GRM31CR71H475K
C4	1	0.1 μ F \pm 10%, 16V ceramic capacitor (0402) TDK C1005X7R1C104K
C5	1	10 μ F \pm 10%, 25V X7R ceramic capacitor (1210) TDK C3225X7R1E106M
C6	1	2.2 μ F \pm 10%, 16V X7R ceramic capacitor (0805) TDK C2012X7R1C225K
C8	0	Not installed, ceramic capacitor (0603)
D2	1	Green LED (0603)
JU1, JU2	2	3-pin headers
JU3	1	2-pin header

DESIGNATION	QTY	DESCRIPTION
L1	1	4.7 μ H, 2.0A power inductor TDK LTF5022T-4R7N2R0
R1, R2	0	Not installed, resistors (0603)
R4	1	3k Ω \pm 5% resistor (0603)
TP2, TP9, TP10, TP11	4	Black multipurpose test points
TP3, TP4	2	Red multipurpose test points
TP5, TP6	2	Red miniature test points
TP8	0	Not installed, miniature test point
U1	1	2.1MHz mini-buck converter (16 TSSOP-EP) Maxim MAX16904SAUE50/V+
—	3	Shunts
—	1	PCB: MAX16904 EVALUATION KIT

Component Suppliers

SUPPLIER	PHONE	WEBSITE
Murata Electronics North America, Inc.	770-436-1300	www.murata-northamerica.com
TDK Corp.	847-803-6100	www.component.tdk.com

Note: Indicate that you are using the MAX16904 when contacting these component suppliers.

Quick Start

Required Equipment

- MAX16904 EV kit
- +12V, 1A DC power supply (PS1)
- Electronic load or equivalent resistor load
- Two digital multimeters (DMMs)

Procedure

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

- 1) Verify that the jumpers are in their default position, as shown in Table 1.
- 2) Connect the positive terminal of the +12V supply to VSUP (TP3) and the negative terminal to PGND (TP2).
- 3) Set DMM1 to measure voltage and connect the positive terminal to VOUT (TP4). Connect the negative terminal to PGND (TP11).
- 4) Set the power supply to 1A current limit. Turn on the power supply.
- 5) With jumper JU3 shorted, the green LED should light up. DMM1 should display an output voltage of +5V.

Additional Evaluation

- 1) Set DMM2 to measure current and connect the positive terminal to VOUT (TP4). Connect the negative terminal to an electronic load.
- 2) Set the electronic load to 300mA or use an equivalent resistor load. The resistor load is calculated based on +5V output and should be approximately 10Ω. If using a resistor load, make sure it can handle 3W.
- 3) Turn on the power supply and electronic load. DMM2 gives the load current while DMM1 gives the output voltage.
- 4) Increase the load to 600mA and observe the output.

Table 1. Jumper Descriptions (JU1, JU2, JU3)

JUMPER	SHUNT POSITION	DESCRIPTION
JU1	1-2*	Connects EN to VSUP (normal operation).
	2-3	Connects EN to PGND (shutdown).
JU2	1-2*	Connects SYNC to VBIAS to enable forced-PWM mode.
	2-3	Connects SYNC to AGND to enable skip mode under light-load conditions.
	Open	When SYNC is unconnected or when a clock source is present, forced-PWM mode is enabled. SYNC can be used to synchronize with other supplies when a clock source is present.
JU3	1-2*	Powers the green LED from the VBIAS supply.
	Open	Does not power the green LED from the VBIAS supply.

*Default position.

Detailed Description of Hardware

The MAX16904 EV kit provides a proven layout for the MAX16904 2.1MHz synchronous buck regulator. The device accepts input voltages as high as +28V and delivers up to 600mA at +5V. The EV kit can handle an input-supply transient up to +42V. Various test points are included for evaluation.

SYNC

The device can operate in two modes, forced PWM or skip mode. For light-load conditions, skip mode has better efficiency. When SYNC is pulled low, the device operates in skip mode for light loads and PWM mode for larger loads. By applying a high level on SYNC, the device is forced to do PWM even under light-load conditions.

SYNC can also be used to synchronize with other supplies if a clock source is present. The device forces PWM when a clock source is present based on the input clock.

Evaluating the +3.3V Version

The device is available in fixed +5V and +3.3V outputs. The EV kit comes installed with the +5V output version. The +3.3V output part can be swapped with the +5V part on the EV kit and the device functions without changing other components. To optimize efficiency, refer to the MAX16904 IC data sheet.

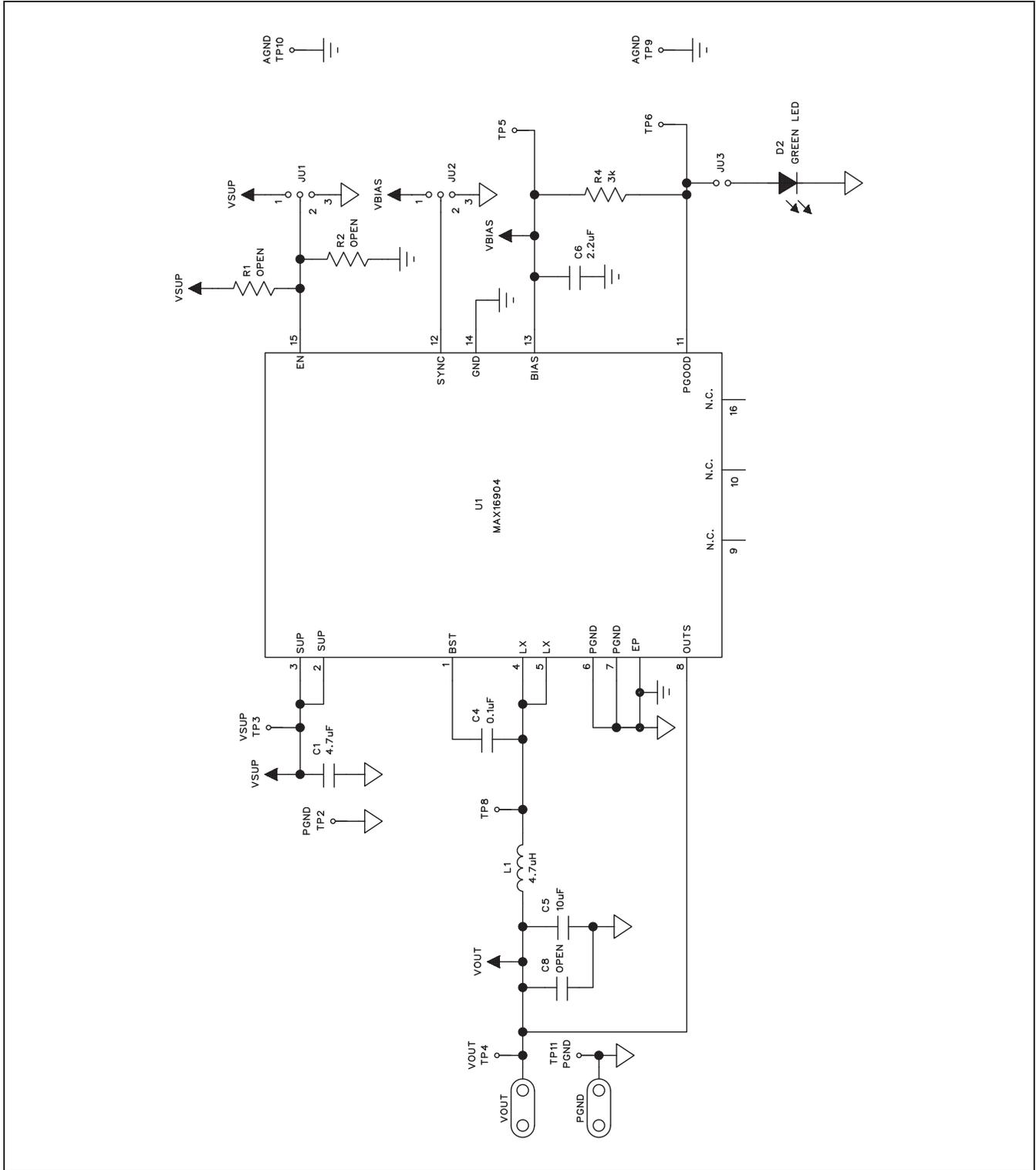


Figure 1. MAX16904 EV Kit Schematic

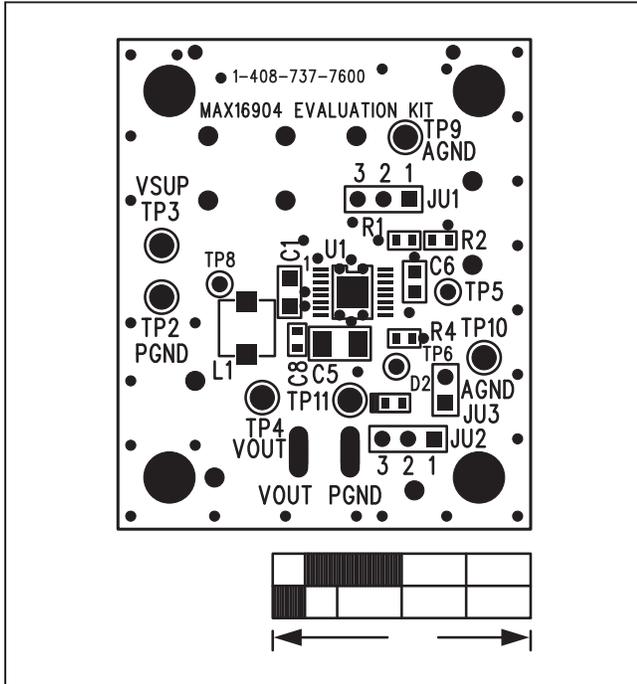


Figure 2. MAX16904 EV Kit Component Placement Guide—Component Side

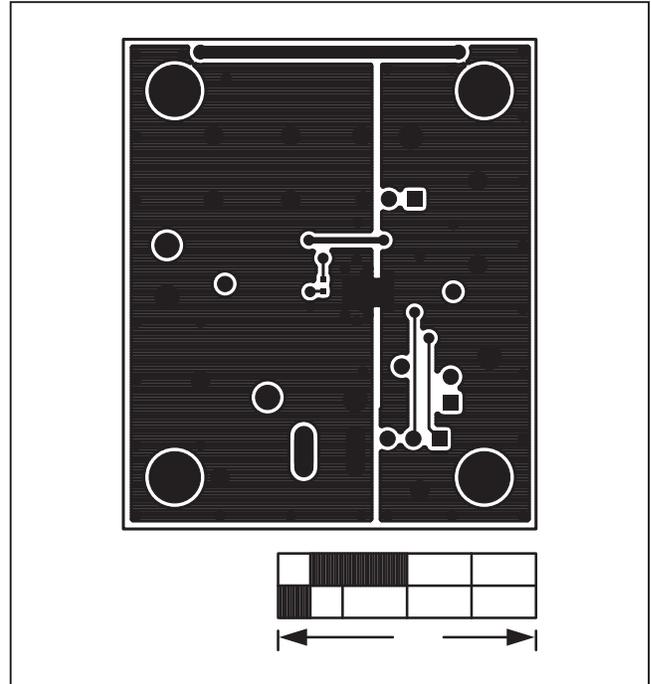


Figure 4. MAX16904 EV Kit PCB Layout—Solder Side

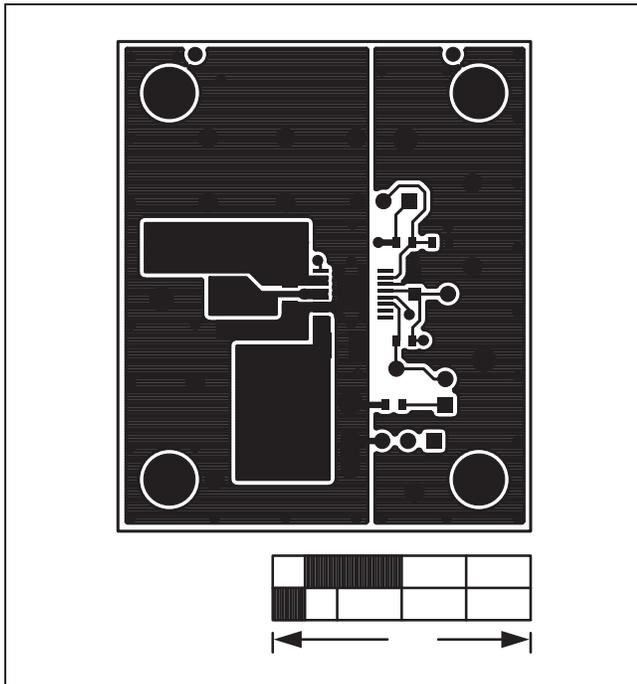


Figure 3. MAX16904 EV Kit PCB Layout—Component Side

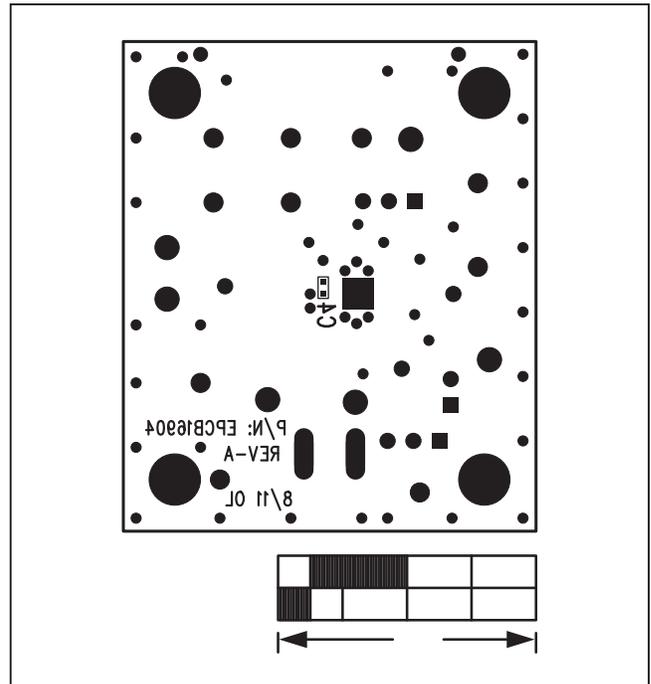


Figure 5. MAX16904 EV Kit Component Placement Guide—Solder Side

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	11/11	Initial release	—
1	5/20	Updated <i>Component List</i>	1

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