

MAX17542G 5V Output Evaluation Kit

Evaluates: MAX17542G in 5V Output-Voltage Application

General Description

The MAX17542G 5V Output EV kit provides a proven design to evaluate the MAX17542G 5V high-efficiency, high-voltage, synchronous step-down DC-DC converter in a TDFN package. The EV kit generates 5V at load currents up to 1A from a 6V to 42V input supply. The EV kit features a 600kHz fixed switching frequency for optimum efficiency and component size. The EV kit features a forced-PWM control scheme that provides constant switching-frequency operation at all load and line conditions.

Features

- Operates from a 6V to 42V Input Supply
- 5V Output Voltage
- 1A Output Current
- 600kHz Switching Frequency
- Enable/UVLO Input
- Resistor-Programmable UVLO Threshold
- Open-Drain $\overline{\text{RESET}}$ Output
- Overcurrent and Overtemperature Protection
- Proven PCB Layout
- Fully Assembled and Tested

Ordering Information appears at end of data sheet.

Quick Start

Recommended Equipment

- MAX17542G 5V Output EV kit
- 6V to 42V, 2A DC input power supply
- Load capable of sinking 1A
- Digital voltmeter (DVM)
- Function generator

Procedure

The EV kit is fully assembled and tested. Follow the steps below to verify the board operation. **Caution: Do not turn on power supply until all connections are completed.**

- 1) Set the power supply at a voltage between 6V and 42V. Disable the power supply.
- 2) Connect the positive terminal of the power supply to the VIN PCB pad and the negative terminal to the nearest PGND PCB pad. Connect the positive terminal of the 1A load to the VOUT PCB pad and the negative terminal to the nearest PGND PCB pad.
- 3) Connect the DVM across the VOUT PCB pad and the nearest PGND PCB pad.
- 4) Turn on the DC power supply.
- 5) Enable the load.
- 6) Verify that the DVM displays 5V.

To turn-on/off the part from EN/UVLO, follow the steps below:

- 1) Connect the power supply to the EV kit and turn on the power supply. Set the power supply at a voltage between 6V and 42V.
- 2) Connect the function generator output to the EN/UVLO test loop.
- 3) EN/UVLO rising threshold is 1.24V and falling threshold is 1.11V. Make sure that the voltage-high and voltage-low levels of the function generator output are greater than 1.24V and less than 1.11V, respectively.
- 4) While powering down the EV kit, first disconnect the function generator output from the EN/UVLO test loop and then turn off the DC power supply.

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Detailed Description of Hardware

The MAX17542G 5V Output EV kit provides a proven design to evaluate the MAX17542G 5V high-efficiency, high-voltage, synchronous step-down DC-DC converter in a TDFN package. The EV kit generates 5V at load currents up to 1A from a 6V to 42V input supply. The EV kit features a 600kHz fixed switching frequency for optimum efficiency and component size. The EV kit features a forced-PWM control scheme that provides constant switching-frequency operation at all load and line conditions.

The EV kit includes an EN/UVLO PCB pad to enable control of the converter output. An additional RESET PCB pad is available for monitoring the open-drain logic output. The VCC PCB pad helps measure the internal LDO voltage.

Soft-Start Input (SS)

The device utilizes an adjustable soft-start function to limit inrush current during startup. The soft-start time is adjusted by the value of C3, the external capacitor from SS to GND. To adjust the soft-start time, determine C3 using the following formula:

$$C3 = 5.55 \times t_{SS}$$

where t_{SS} is the required soft-start time in milliseconds and C3 is in nanofarads.

Regulator Enable/Undervoltage-Lockout Level (EN/UVLO)

The device features an EN/UVLO input. For normal operation, no shunts should be installed across pins 1-2 or 2-3 on jumper JU1. To disable the output, install a shunt across pins 2-3 on JU1 and the EN/UVLO pin is pulled to GND. See [Table 1](#) for JU1 settings.

Setting the Undervoltage-Lockout Level

The device offers an adjustable input undervoltage-lockout level. Set the voltage at which the device turns on with a resistive voltage-divider connected from VIN to GND (see [Figure 1](#)). Connect the center node of the divider to EN/UVLO.

Choose R1 to be 3.3MΩ and then calculate R2 as follows:

$$R2 = \frac{R1 \times 1.218}{(V_{INU} - 1.218)}$$

where V_{INU} is the voltage at which the device is required to turn on. Ensure that V_{INU} is higher than $0.8 \times V_{OUT}$.

Adjusting the Output Voltage

The device offers an adjustable output voltage. Set the output voltage with a resistive voltage-divider connected from the positive terminal of the output capacitor (V_{OUT}) to GND (see schematic attached to this PDF). Connect the center node of the voltage-divider to FB.

To choose the values of R4 and R5, select the parallel combination of R4 and R5, with R_P less than 15kΩ. Once R_P is selected, calculate R4 as follows:

$$R4 = \frac{R_P \times V_{OUT}}{0.9}$$

Calculate R5 as follows:

$$R5 = \frac{R4 \times 0.9}{(V_{OUT} - 0.9)}$$

Table 1. Regulator Enable (EN/UVLO) Jumper JU1 Settings

| SHUNT POSITION | EV/UVLO PIN | MAX17542G 5V OUTPUT |
|----------------|------------------------------------------------------------|----------------------------------------------------------------|
| Not installed* | Connected to the center node of resistor-divider R1 and R2 | Enabled, UVLO level set through the R1 and R2 resistor-divider |
| 2-3 | Connected to GND | Disabled |

*Default position.

EV Kit Performance Report

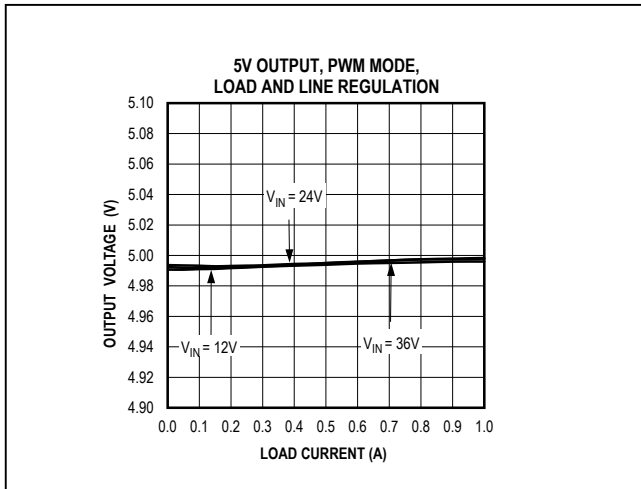


Figure 1. MAX17542G 5V Output Load and Line Regulation

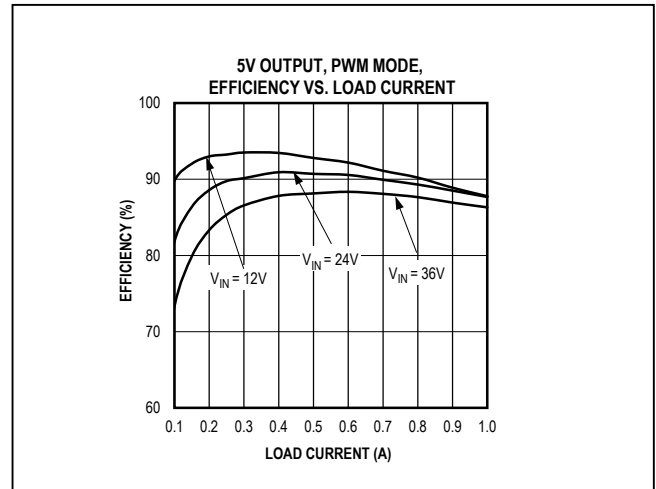


Figure 2. MAX17542G 5V Output Efficiency

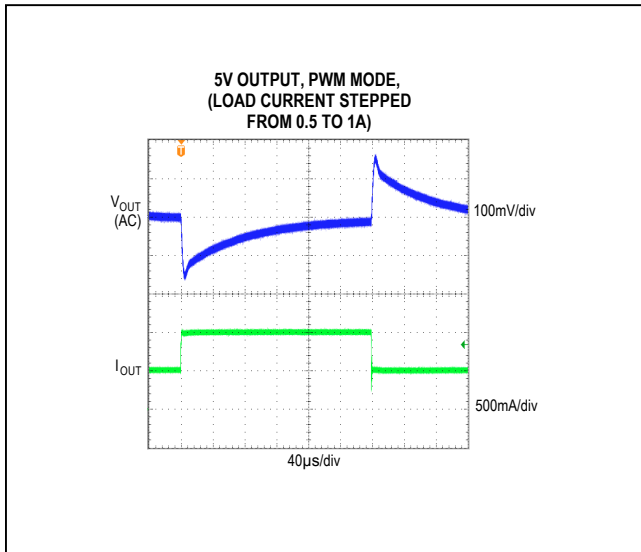


Figure 3. MAX17542G 5V Output 500mA to 1A Load Transient

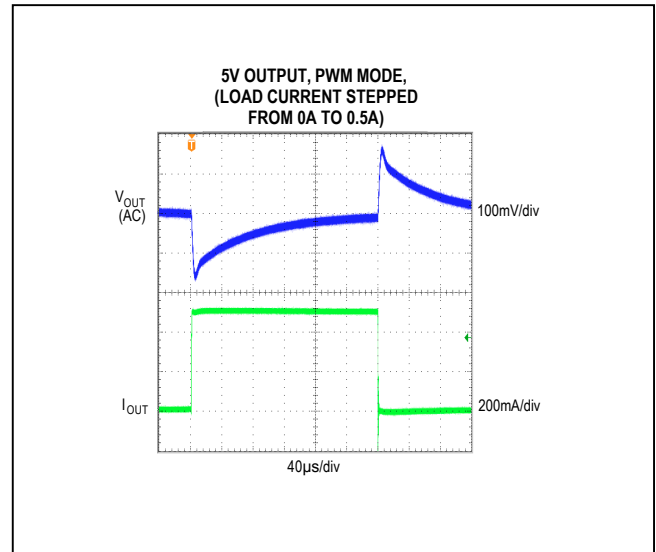


Figure 4. MAX17542G 5V Output No-Load to 500mA Load Transient

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EV Kit Performance Report (continued)

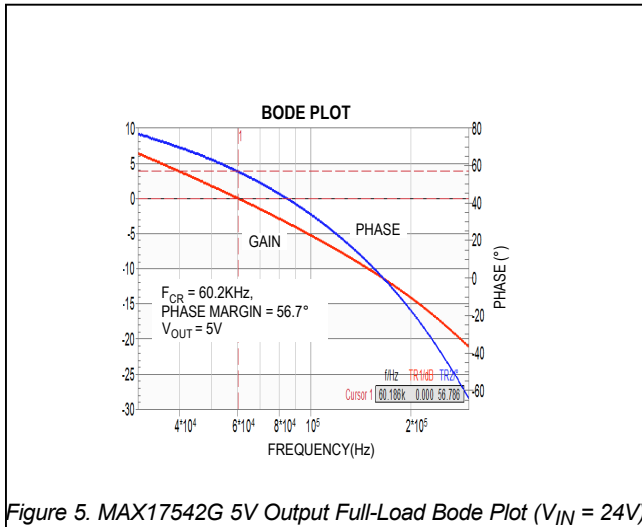


Figure 5. MAX17542G 5V Output Full-Load Bode Plot ($V_{IN} = 24\text{V}$)

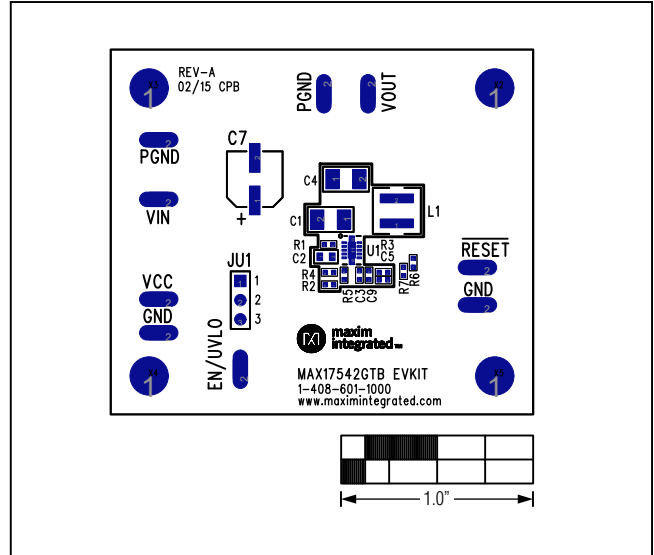


Figure 6. MAX17542G 5V Output EV Kit Component Placement Guide—Component Side

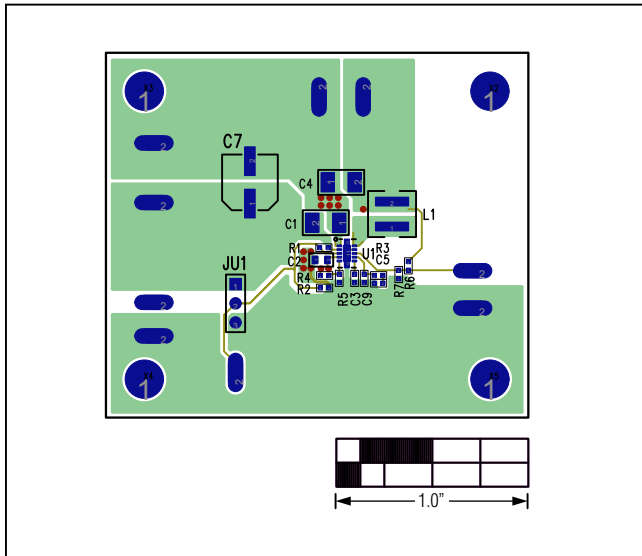


Figure 7. MAX17542G 5V Output EV Kit PCB Layout—Component Side

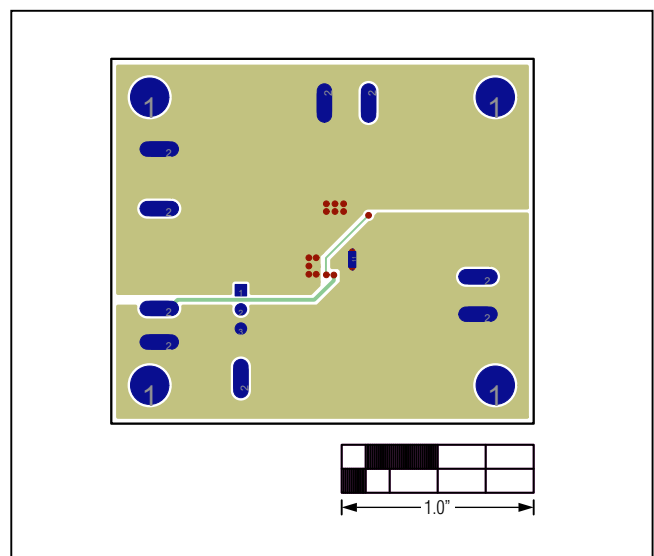


Figure 8. MAX17542G 5V Output EV Kit PCB Layout—Solder Side

EV Kit Performance Report (continued)

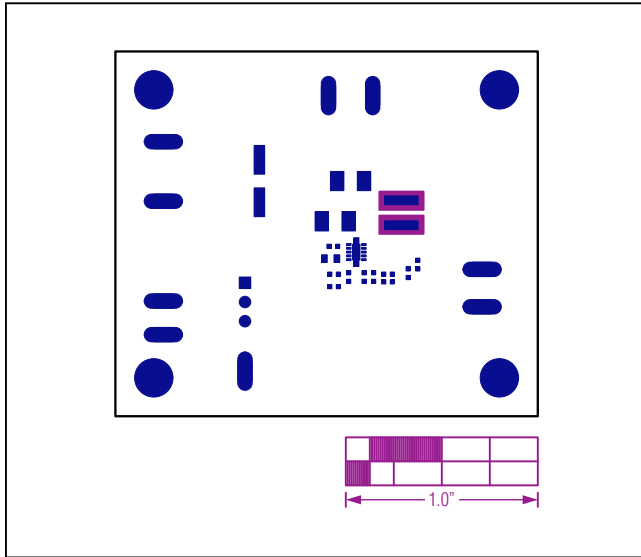


Figure 9. MAX17542G 5V Output EV Kit Component Placement Guide—Top Solder Mask

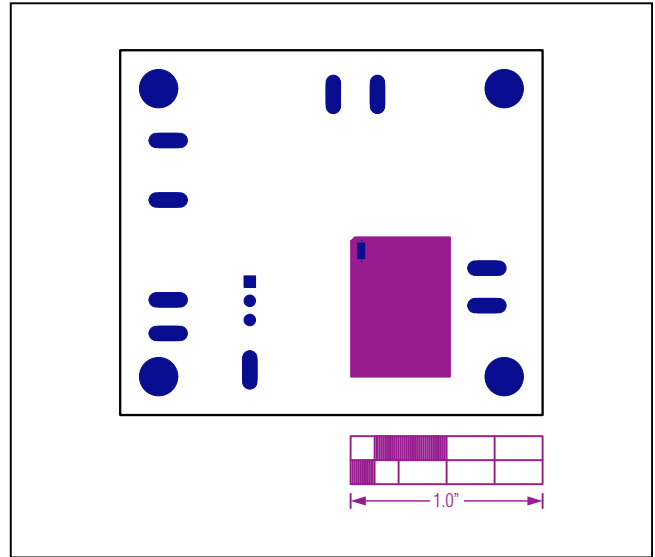


Figure 10. MAX17542G 5V Output EV Kit Component Placement Guide—Bottom Solder Mask

Component Suppliers

| SUPPLIER | WEBSITE |
|-----------------|-------------------|
| Coilcraft, Inc. | www.coilcraft.com |
| Murata Americas | www.murata.com |
| Panasonic Corp. | www.panasonic.com |
| TDK Corp. | ww.tdk.com |

Note: Indicate that you are using the MAX17542G when contacting these component suppliers.

Component Information and Schematic

See the following links for component information and schematic:

- [MAX17542G 5V EV BOM](#)
- [MAX17542G 5V EV Schematic](#)

Ordering Information

| PART | TYPE |
|-------------------|--------|
| MAX17542GTBEVKIT# | EV Kit |

#Denotes RoHS compliant.

Revision History

| REVISION NUMBER | REVISION DATE | DESCRIPTION | PAGES CHANGED |
|-----------------|---------------|-----------------|---------------|
| 0 | 6/15 | 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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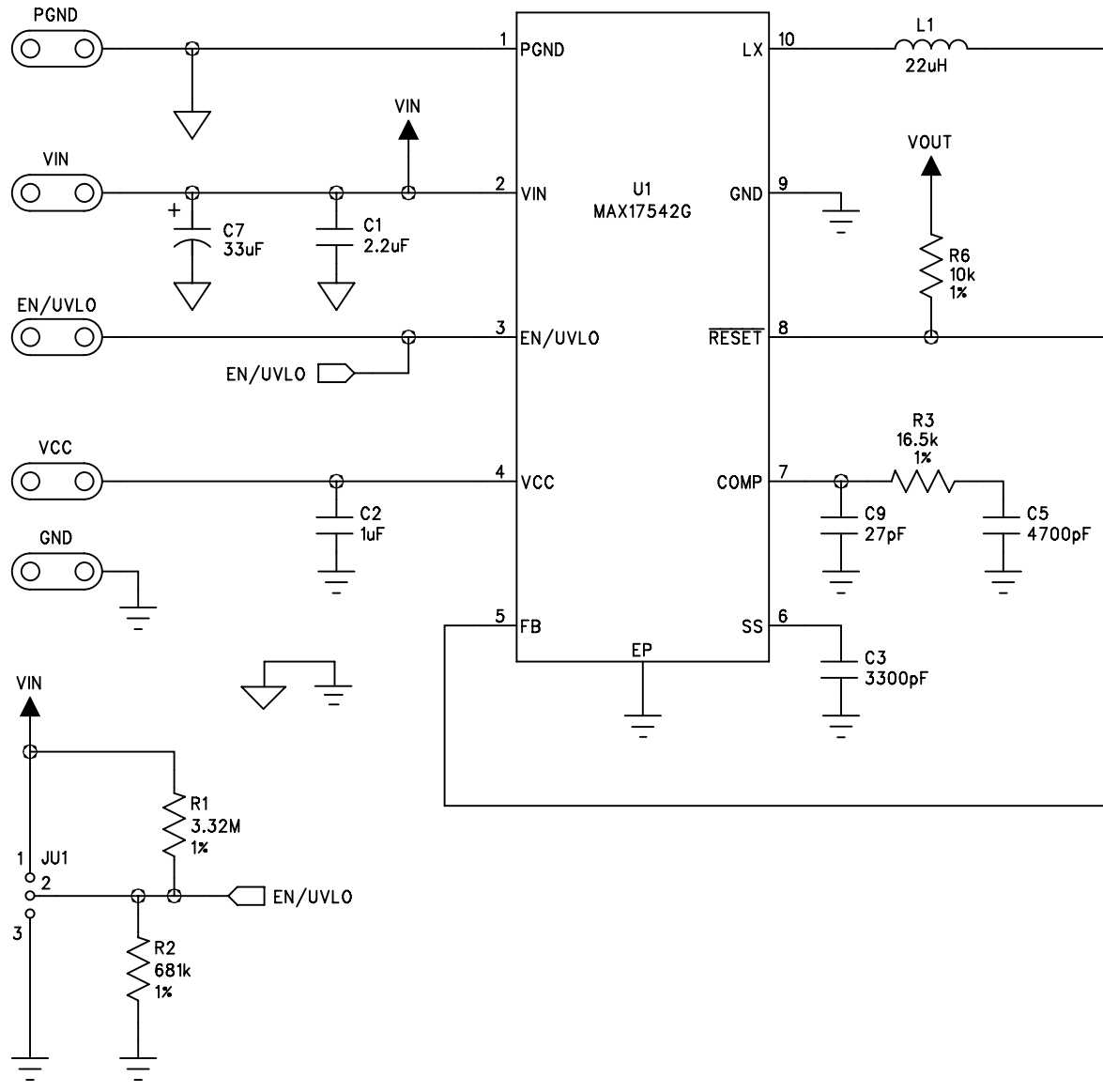
3

D

C

B

A



| | | |
|-----------|--------------------------------------------------|----------|
| 11 | 681k ohm ±1%, resistor (0402) | 1 |
| 12 | 16.5k ohm ±1%, resistor (0402) | 1 |
| 13 | 82.5k ohm ±1%, resistor (0402) | 1 |
| 14 | 18.2k ohm ±1%, resistor (0402) | 1 |
| 15 | 10k ohm ±1%, resistor (0402) | 1 |
| 16 | Not installed, OPEN (0402) | 0 |
| 17 | Buck Converter (10TDFN 3mmx2mm) MAX17542GATB+ | 1 |
| 18 | Shunt | 1 |



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