

DESCRIPTION

The EV28160-C-00A is an evaluation board for MP28160, which is an integrated Buck-Boost converter in small CSP package. The Buck-Boost converter can operate from an input voltage above, equal to, or below the output voltage. It uses current-mode control with 1.8MHz fixed PWM frequency to optimize stability and transient response. In light load condition, it enter auto PFM/PWM mode to get high light load efficiency. Integrated MOSFETs minimize the solution size while maintaining high efficiency.

Fault protection includes output hiccup current limiting, OVP and thermal shutdown.

The MP28160 is available in a tiny CSP-12 (1.4mmx1.8mm) package.

ELECTRICAL SPECIFICATION

| Parameter | Symbol | Value | Units |
|----------------|--------|-----------|-------|
| Input Voltage | VIN | 2.5 – 5.5 | V |
| Output Voltage | VOUT | 3.3 | V |
| Output Current | IOUT | 0.5 | A |

FEATURES

- 2.5V to 5.5V Input-Voltage Range
- 1.8MHz Switching Frequency for CCM
- 3.3V Fixed Output Voltage
- 500mA Continuous Output Current
- 1ms Soft-start Time
- Auto PFM/PWM Mode
- Output over Voltage Protection
- Hiccup over Current Protection
- 1µA Shutdown Current
- Active Low System EN pin
- Over Temperature Shutdown
- Available in a Wafer Level Chip Scale Packaging: CSP-12(1.4mmx1.8mm)

APPLICATIONS

- USB-C Cable
- Thunderbolt
- Portable Devices

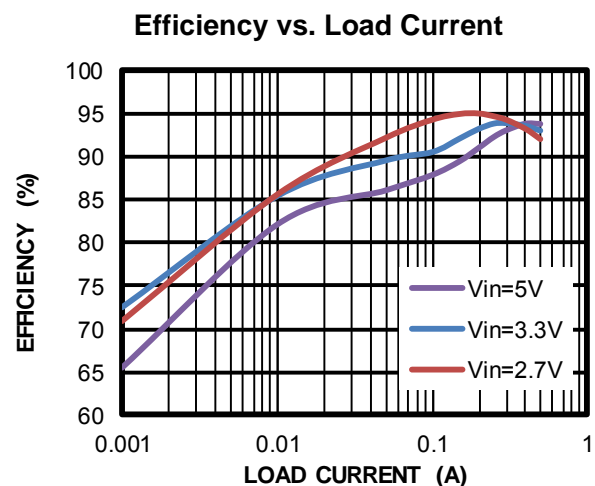
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EV28160-C-00A EVALUATION BOARD

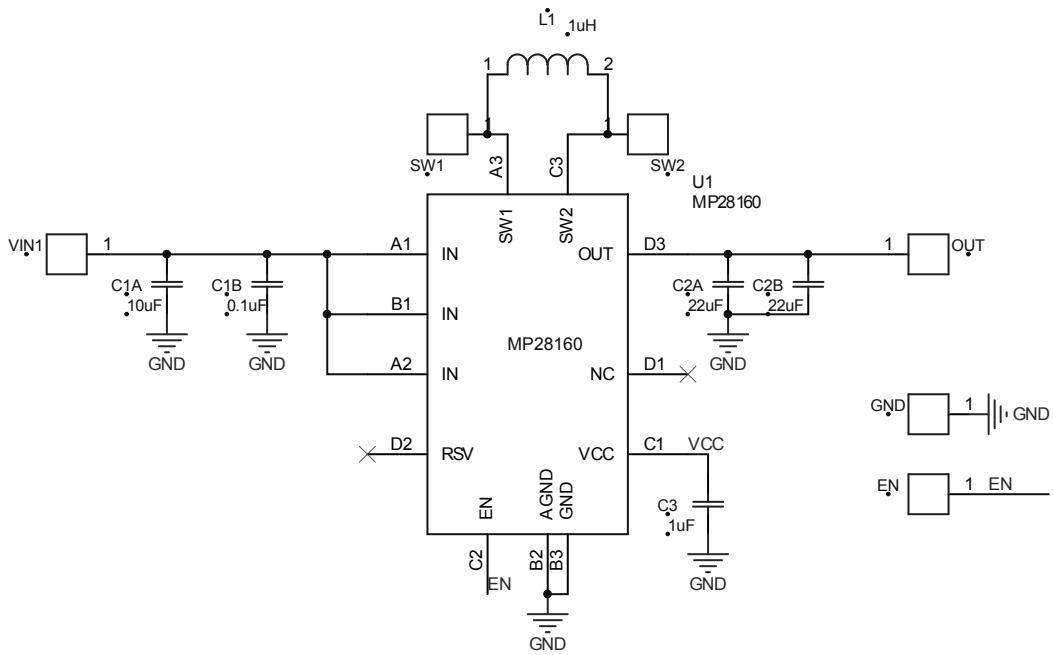


**Total solution size
(L x W) 6.9mm x 7.2mm**

| Board Number | MPS IC Number |
|---------------|---------------|
| EV28160-C-00A | MP28160GC |



EVALUATION BOARD SCHEMATIC



EV28160-C-00A BILL OF MATERIALS

| RefDes | Value | Description | Package | Manufacturer | Manufacturer_P/N |
|----------------------------------|-------------|------------------------------------|---------|--------------|-----------------------|
| C1A, | 10 μ F | Ceramic Cap.,6.3V,X5R | 0402 | Murata | GRM155R60J106ME44D |
| C1B | 0.1 μ F | Ceramic Cap.,16V,X5R | 0402 | Murata | GRM155R61C104KA88J |
| C2A, C2B | 22 μ F | Ceramic Cap.,6.3V,X6S | 0603 | Murata | GRT188C80J226ME13D |
| C3 | 1 μ F | Ceramic Cap.,10V,X5R | 0402 | WE | 885012105012 |
| L1 | 1 μ H | 1 μ H inductor | SMT | Murata | DFE252012P-1R0M=P2 |
| U1 | MP28160 | CSP-12, buck-boost DC-DC converter | CSP-12 | MPS | MP28160GC |
| GNDSENSE, STATUS, SEL,SW1,SW2,EN | 1PIN | 1Pin single row straight Header | DIP | WE | 61300111121 |
| GND*3,VIN1,VIN2, OUT,OR_OUT | ϕ 2.0 | ϕ 2.0 copper pin | DIP | N/A | ϕ 2.0 copper pin |

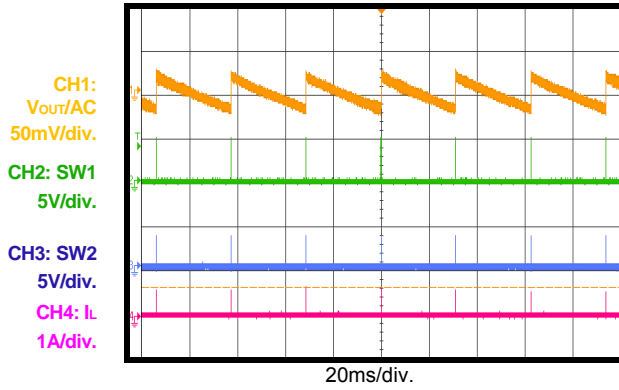
EVB TEST RESULTS

Performance curves and waveforms are tested on the evaluation board.

$V_{IN} = 5V$, $V_{OUT} = 3.3V$, $L = 1\mu H$, $T_A = 25^\circ C$, unless otherwise noted.

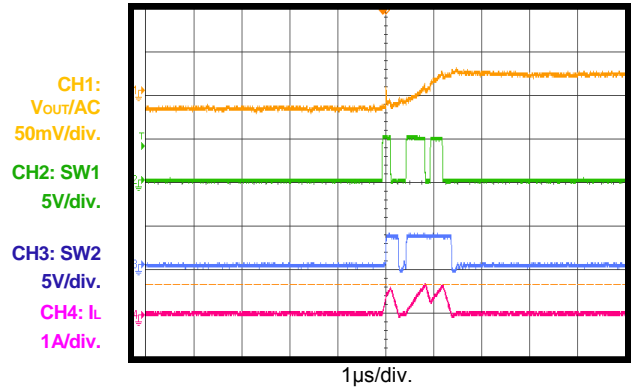
Output Ripple

$V_{IN}=5V$, $V_{OUT}=3.3V$, $I_{OUT}=0A$



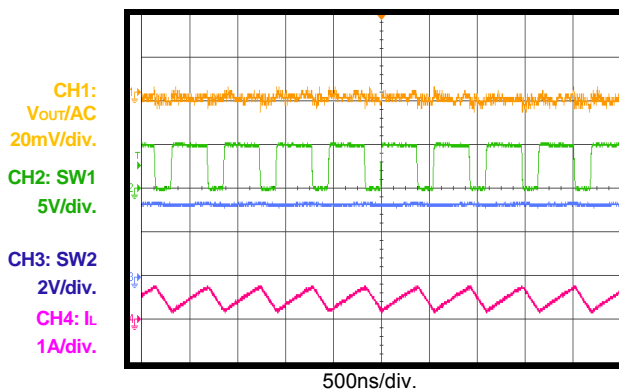
Output Ripple

$V_{IN}=5V$, $V_{OUT}=3.3V$, $I_{OUT}=0A$



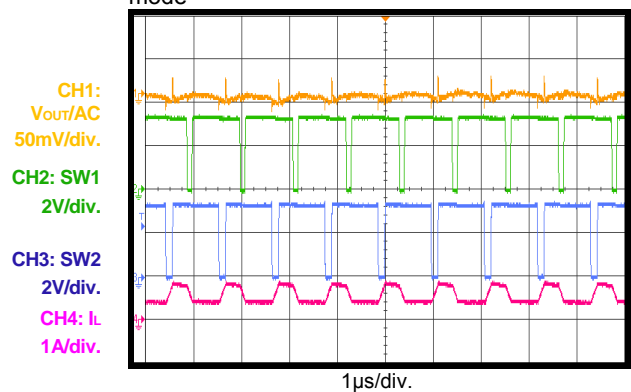
Output Ripple

$V_{IN}=5V$, $V_{OUT}=3.3V$, $I_{OUT}=0.5A$



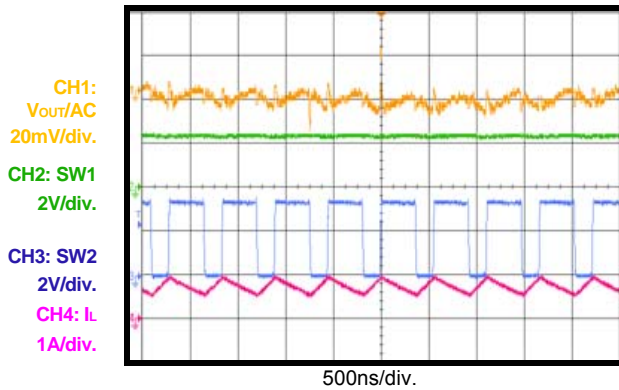
Output Ripple

$V_{IN}=3.3V$, $V_{OUT}=3.3V$, $I_{OUT}=0.5A$, Buck-boost mode



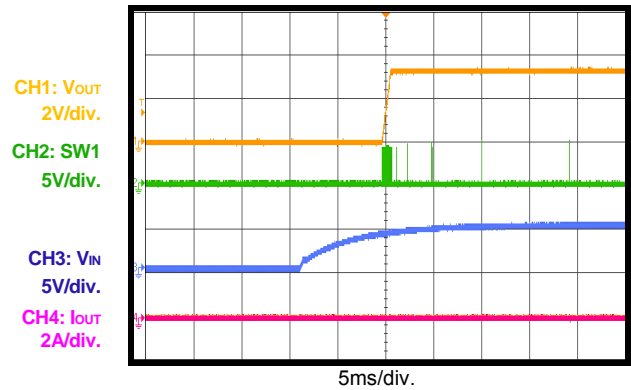
Output Ripple

$V_{IN}=2.5V$, $V_{OUT}=3.3V$, $I_{OUT}=0.5A$, Boost mode



Power Start-Up

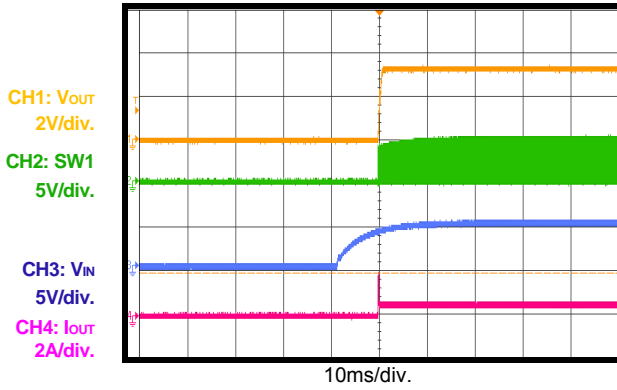
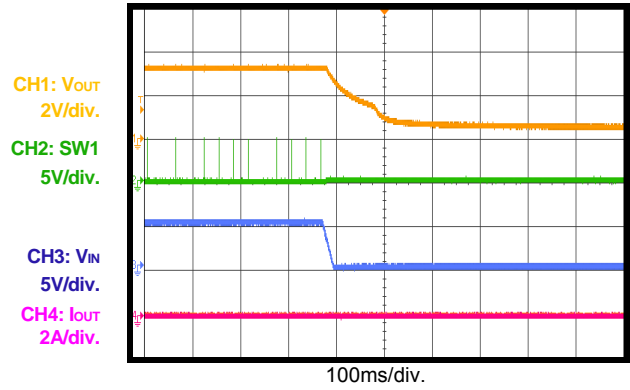
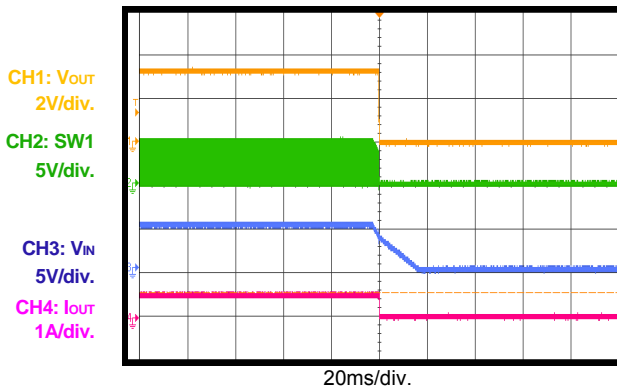
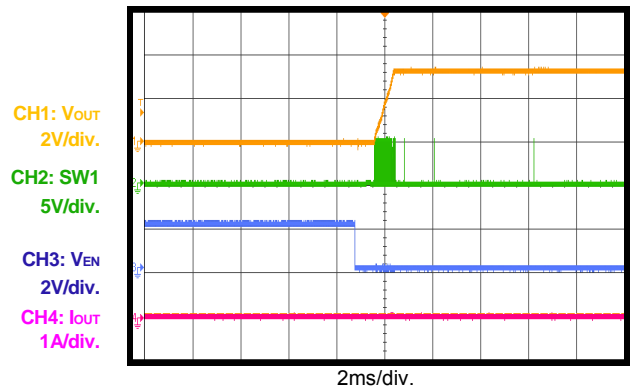
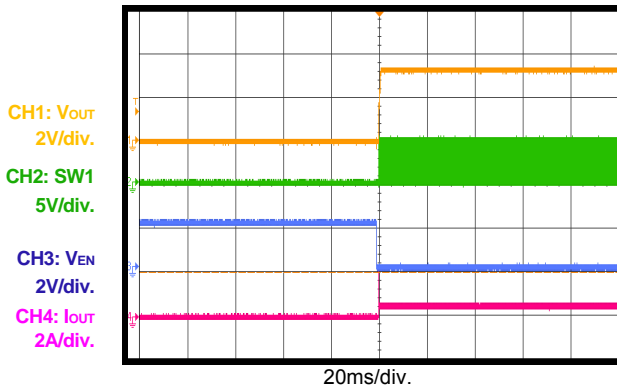
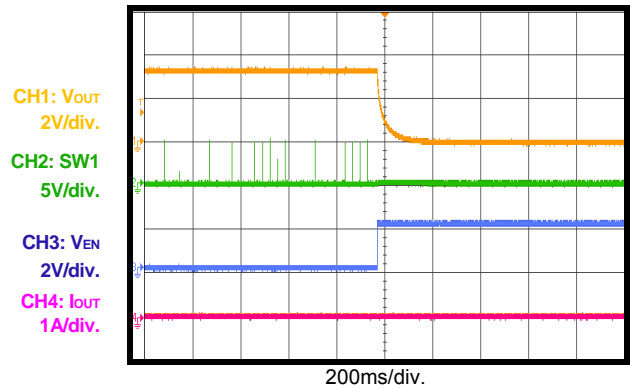
$V_{IN}=5V$, $V_{OUT}=3.3V$, $I_{OUT}=0A$



EVB TEST RESULTS (continued)

Performance curves and waveforms are tested on the evaluation board.

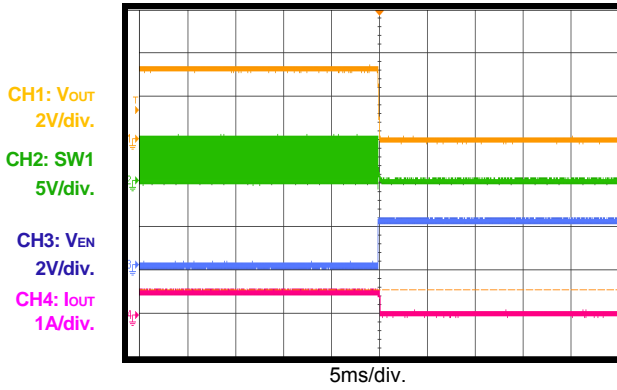
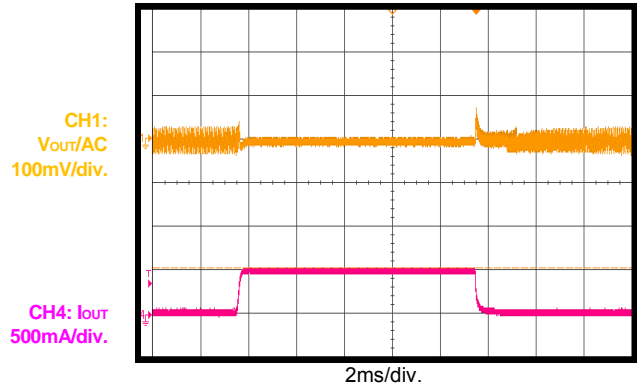
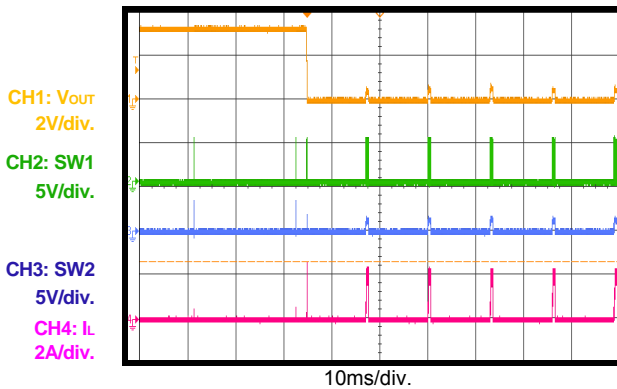
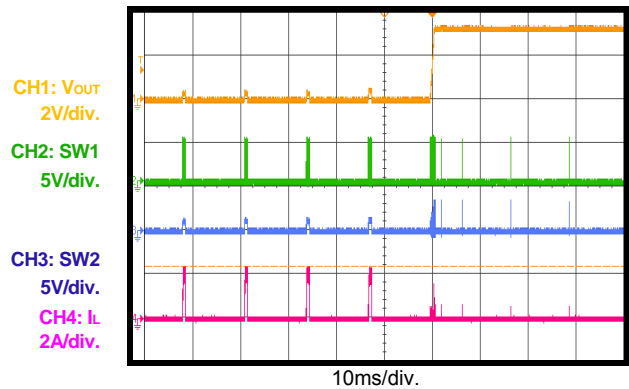
 $V_{IN} = 5V$, $V_{OUT} = 3.3V$, $L = 1\mu H$, $T_A = 25^\circ C$, unless otherwise noted.

Power Start-Up
 $V_{IN}=5V$, $V_{OUT}=3.3V$, $I_{OUT}=0.5A$

Power Shutdown
 $V_{IN}=5V$, $V_{OUT}=3.3V$, $I_{OUT}=0A$

Power Shutdown
 $V_{IN}=5V$, $V_{OUT}=3.3V$, $I_{OUT}=0.5A$

EN Start-Up
 $V_{IN}=5V$, $V_{OUT}=3.3V$, $I_{OUT}=0A$

EN Start-Up
 $V_{IN}=5V$, $V_{OUT}=3.3V$, $I_{OUT}=0.5A$

EN Shutdown
 $V_{IN}=5V$, $V_{OUT}=3.3V$, $I_{OUT}=0A$


EVB TEST RESULTS (continued)

Performance curves and waveforms are tested on the evaluation board.

 $V_{IN} = 5V$, $V_{OUT} = 3.3V$, $L = 1\mu H$, $T_A = 25^\circ C$, unless otherwise noted.

EN Shutdown
 $V_{IN}=5V$, $V_{OUT}=3.3V$, $I_{OUT}=0.5A$

Load Transient
 $V_{IN}=5V$, $V_{OUT}=3.3V$, $I_{OUT}=0A-0.5A$, $200mA/\mu s$

SCP Entry
 $V_{IN}=5V$, $V_{OUT}=3.3V$, short output to GND.

SCP Recovery
 $V_{IN}=5V$, $V_{OUT}=3.3V$, short output to GND


PRINTED CIRCUIT BOARD LAYOUT

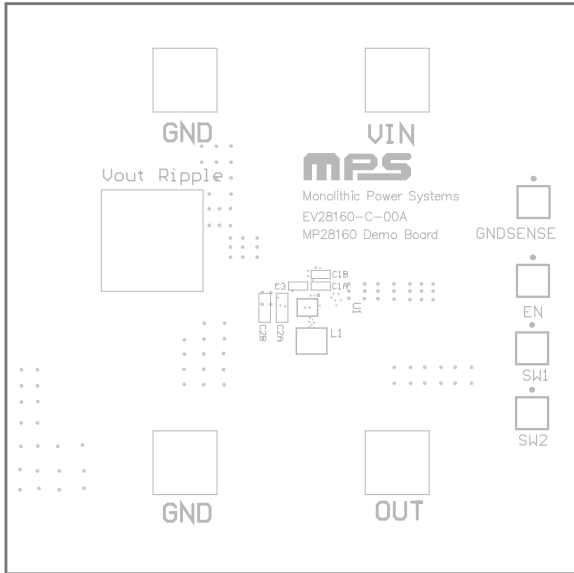


Figure 1—Top Silk Layer

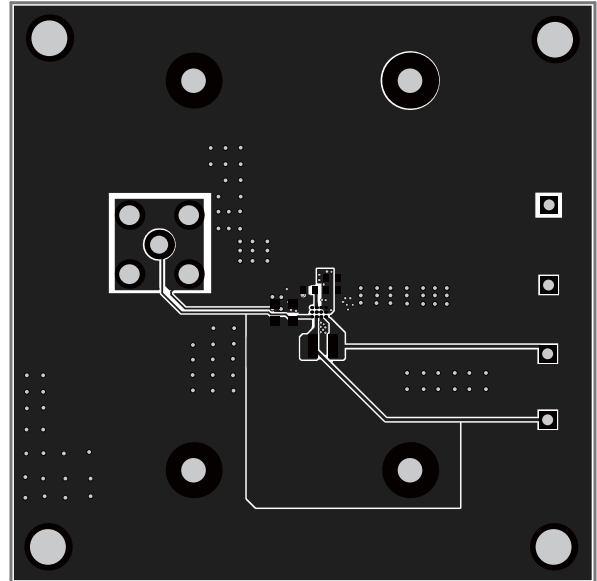


Figure 2—Top Layer

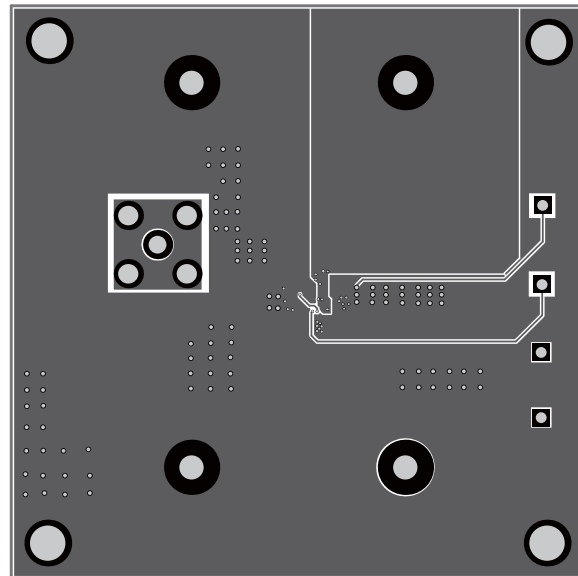


Figure 3—Bottom Layer

QUICK START GUIDE

1. Preset Power Supply between 2.5V and 5.5V.
2. Turn Power Supply off.
3. Connect Power Supply terminals to:
 - a. Positive (+): VIN
 - b. Negative (-): GND
4. Connect Load to:
 - a. Positive (+): VOUT
 - b. Negative (-): GND
5. Turn Power Supply on after making connections. The board will automatically start up.

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