

DESCRIPTION

EV3910-K-00A Evaluation Board is designed to demonstrate the capabilities of MP3910. MP3910 is a Peak Current Mode PWM controller that can drive an external MOSFET capable of handling >10A current. It can accommodate flyback, boost for isolated and non-isolated applications.

While designed for Flyback applications, the 1A gate driver minimizes the power loss of the external MOSFET while allowing the use of a wide variety of standard threshold devices. Additionally, MP3910 has pulse skipping Mode function that improves the efficiency with light load or no load. It also provides hiccup protection for OLP, OVP and SCP condition.

The MP3910 is available in MSOP10 package.

ELECTRICAL SPECIFICATIONS

| Parameter | Symbol | Value | Units |
|----------------|-----------|-------|-------|
| Input voltage | V_{IN} | 36-72 | V |
| Output voltage | V_{OUT} | 12 | V |
| Output current | I_{OUT} | 2.5 | A |
| Frequency | F_S | 250 | kHz |

FEATURES

- Wide 36V to 72V V_{IN} Range
- 1A 12V MOSFET Gate Driver
- External Soft-Start
- Pulse Skipping Operation with Light Load
- Programmable Switching Frequency (30kHz-to-400kHz)
- Synchronizable from 80kHz-to-400kHz
- Cycle-by-Cycle Current Limit
- Over Load Protection
- Over Voltage Protection
- Short Circuit Protection
- Available in an MSOP10 Package

APPLICATIONS

- Telecom Isolated Power
- Brick Modules
- Off-line Controller
- General Step Up Applications

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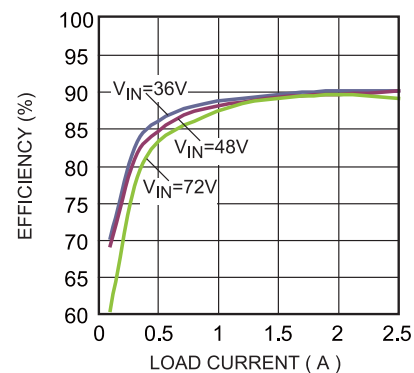
EV3910-K-00A EVALUATION BOARD



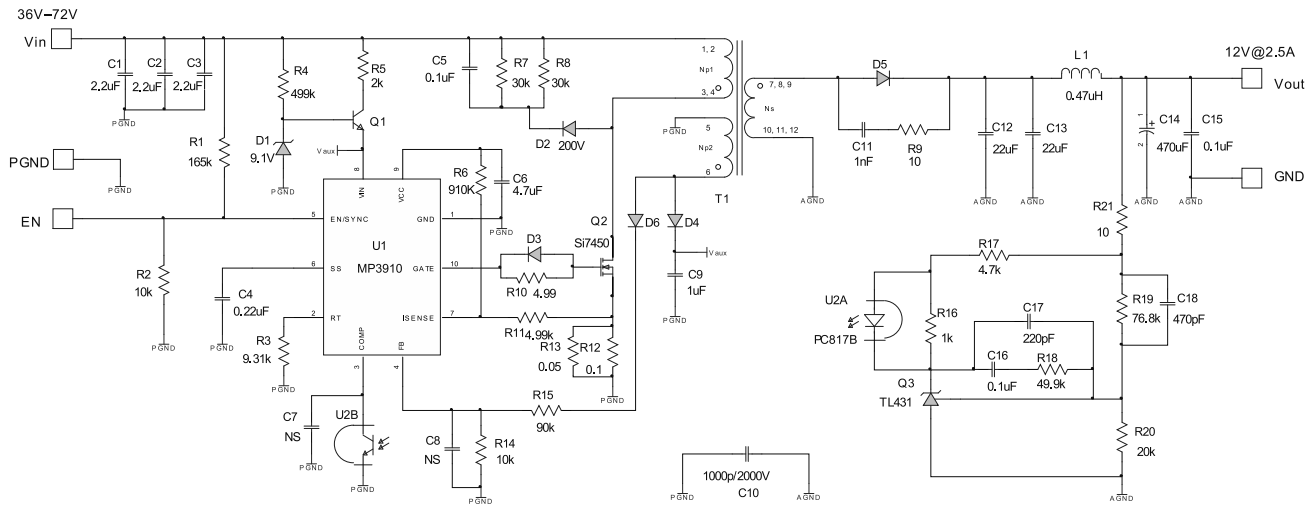
(L x W x H) 3.3" x 1.5" x 0.6"
(8.5cm x 3.8cm x 1.5cm)

| Board Number | MPS IC Number |
|--------------|---------------|
| EV3910-K-00A | MP3910GK |

Efficiency vs. Load Current



EVALUATION BOARD SCHEMATIC



EV3910-K-00A BILL OF MATERIALS

| Qty | Ref | Value | Description | Package | Manufacturer | Part Number |
|-----|-----------|---------------|-------------------------------|--------------|--------------|---------------------|
| 3 | C1,C2, C3 | 2.2uF | Ceramic Cap. 100V X7R | 1210 | muRata | GRM32ER72A225KA352 |
| 1 | C4 | 0.22uF | Ceramic Cap. 50V X7R | 0603 | muRata | GRM188R71H224KA93D |
| 1 | C5 | 0.1uF | Ceramic Cap. 100V X7R | 0805 | muRata | GRM21BR72A104KAC4 L |
| 1 | C6 | 4.7uF | Ceramic Cap. 16V X7R | 0805 | muRata | GRM21BR71C475KA73L |
| 2 | C7,C8 | NS | | | | |
| 1 | C9 | 1uF | Ceramic Cap. 16V X7R | 0805 | muRata | GRM188R71C105KA12D |
| 1 | C10 | 1nF | Ceramic Cap. 2000V X7R | 1808 | muRata | GR442QR73D102KW01L |
| 1 | C11 | 1nF | Ceramic Cap. 50V X7R | 0603 | muRata | GRM188R71H102KA01D |
| 2 | C12,C13 | 22uF | Ceramic Cap. 25V X5R | 1210 | muRata | GRM32ER61E226ME15 |
| 1 | C14 | 470uF | 25V Electrolytic | DIP | Rubycon | 470uF/25V |
| 2 | C15,C16 | 0.1uF | Ceramic Cap. 50V X7R | 0603 | muRata | GRM188R71H104KA93D |
| 1 | C17 | 220pF | Ceramic Cap. 50V X7R | 0603 | muRata | GRM188R71H221KA01D |
| 1 | C18 | 470pF | Ceramic Cap. 50V X7R | 0603 | muRata | GRM188R71H471KA01D |
| 1 | R1 | 165k | Film Resistor 1% | 0603 | Yageo | RC0603FR-07165KL |
| 2 | R2,R14 | 10k | Film Resistor 1% | 0603 | Yageo | RC0603FR-0710KL |
| 1 | R3 | 9.31k | Film Resistor 1% | 0603 | Yageo | RC0603FR-079K31L |
| 1 | R4 | 499k | Film Resistor 5% | 0603 | Yageo | RC0603JR-07499KL |
| 1 | R5 | 2k | Film Resistor 5% | 0603 | Yageo | RC0603JR-072KL |
| 1 | R6 | 910k | Film Resistor 5% | 0603 | Yageo | RC0603JR-07910KL |
| 2 | R7,R8 | 30k | Film Resistor 5% | 0805 | Yageo | RC0805JR-0730KL |
| 2 | R9,R21 | 10R | Film Resistor 5% | 0603 | Yageo | RC0603JR-0710RL |
| 1 | R10 | 4.99R | Film Resistor 5% | 0603 | Yageo | RC0603JR-074R99L |
| 1 | R11 | 4.99k | Film Resistor 5% | 0603 | Yageo | RC0603JR-074K99L |
| 1 | R12 | 50mΩ | Strip Resistor 1% | 1206 | CYNTEC | RL1632H-R050-FN |
| 1 | R13 | 100mΩ | Strip Resistor 1% | 1206 | CYNTEC | RL1632H-R100-FN |
| 1 | R15 | 90k | Film Resistor 1% | 0603 | Yageo | RC0603FR-0790KL |
| 1 | R16 | 1k | Film Resistor 1% | 0603 | Yageo | RC0603FR-071KL |
| 1 | R17 | 4.7k | Film Resistor 5% | 0603 | Yageo | RC0603JR-074K7L |
| 1 | R18 | 49.9k | Film Resistor 5% | 0603 | Yageo | RC0603JR-0749K9L |
| 1 | R19 | 76.8k | Film Resistor 1% | 0603 | Yageo | RC0603FR-0776K8L |
| 1 | R20 | 20k | Film Resistor 1% | 0603 | Yageo | RC0603FR-0720KL |
| 1 | D1 | 9.1V | Diode Zener 9.1V | SOD-123 | Diodes Inc | BZT52C9V1 |
| 1 | D2 | BAV21 | Switching Diode 200V 200mW | SOD-123 | Diodes Inc | BAV21W-7-F |
| 3 | D3,D4,D6 | 1N4148 | Switching Diode 75V 250mW | SOD-323 | Diodes Inc | 1N4148WS-7 |
| 1 | D5 | SBR8U6 OP5 | Switching Diode 60V 8A | POWERDI 5 | Diodes Inc | SBR8U60P5 |

EV3910-K-00A BILL OF MATERIALS (continued)

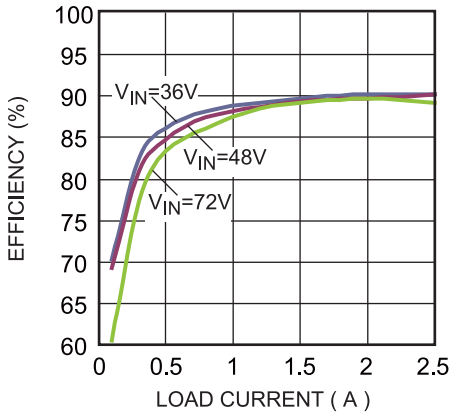
| Qty | Ref | Value | Description | Package | Manufacturer | Part Number |
|-----|-----|-------------|----------------------------|-------------------|--------------|-----------------|
| 1 | Q1 | MMBTA06 | NPN, 80V, 500mA | SOT-23 | Fairchild | MMBTA06FSDKR-ND |
| 1 | Q2 | SI7450 | N-CH MOSFET 200V 5.3A | PowerPA K SO-8 | Vishay | Si7450 |
| 1 | Q3 | TL431 | REG VLT ADJ 2.5V | SOT-23-3 | Zetex Inc | TL431 |
| 1 | U1 | MP3910GK | DC-DC Controller | MSOP10 | MPS | MP3910GK |
| 1 | U2 | PC817B | Photocoupler | SMD | SHARP | PC817B |
| 1 | T1 | Transformer | POWER STAGE TRANSFORMER | SMD | Würth | 7491194912 |
| 1 | L1 | 0.47uH | IR=6.8A,Isat=14.5A | SMD | Würth | 744 373 240 047 |

EVB TEST RESULTS

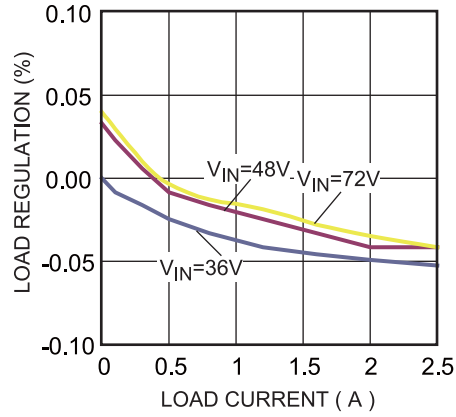
Performance waveforms are tested on the evaluation board.

$V_{IN}=48V$, $V_{OUT}=12V$, $I_{OUT}=2.5A$, $T_A=25^{\circ}C$, unless otherwise noted.

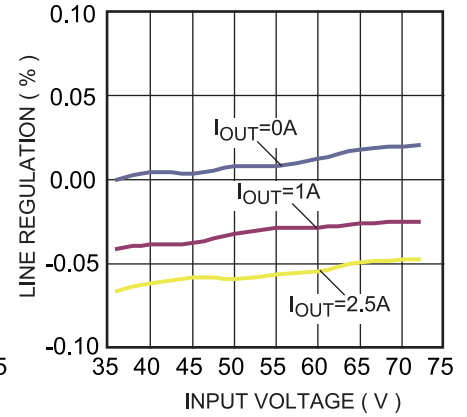
Efficiency vs. Load Current



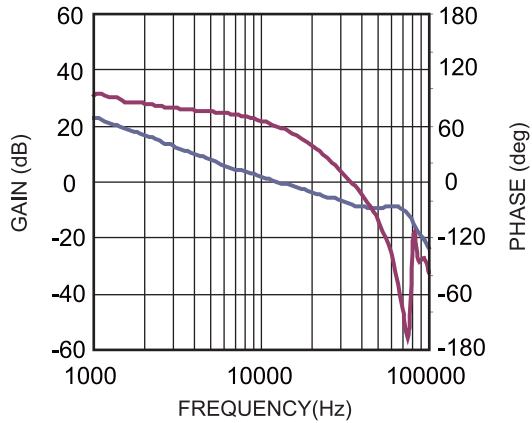
Load Regulation vs. Load Current



Line Regulation vs. Input Voltage

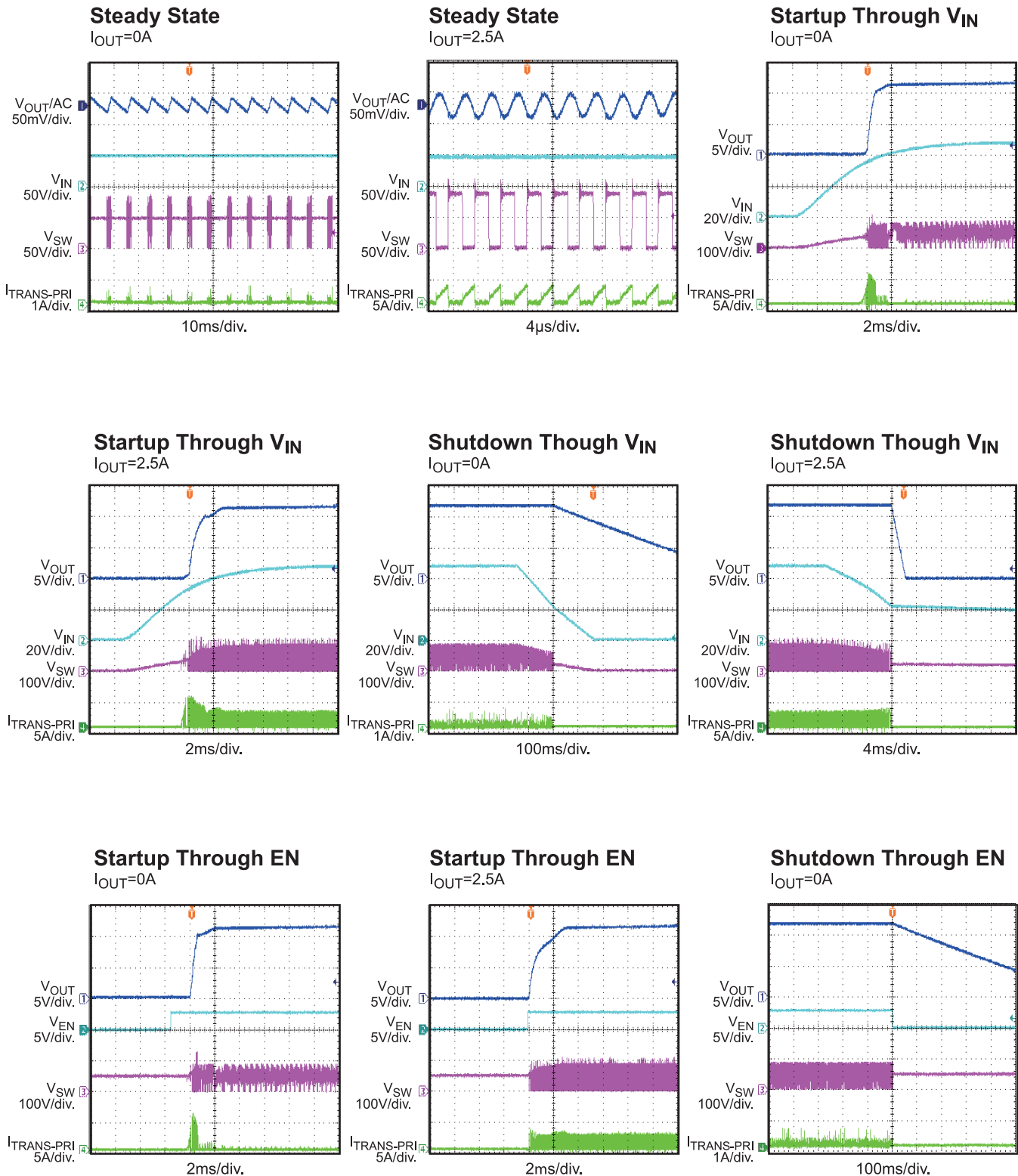


Gain and Phase vs. Frequency



EVB TEST RESULTS (continued)

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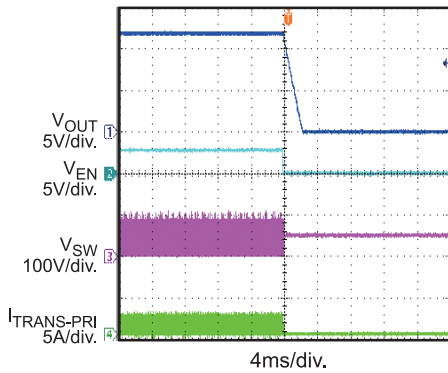
EVB TEST RESULTS *(continued)*

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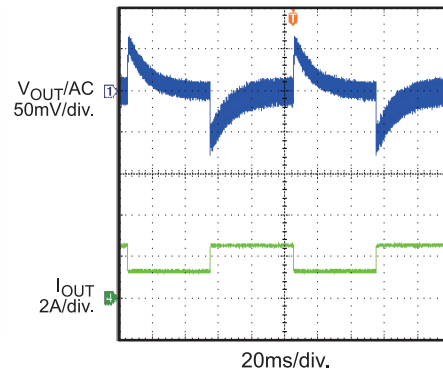
Shutdown Through EN

$I_{OUT}=2.5A$



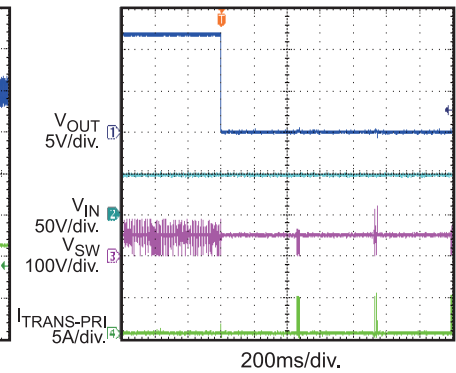
Load Transient

$I_{OUT}=1.25A \rightarrow 2.5A$. $I_{RAMP}=25mA/\mu s$



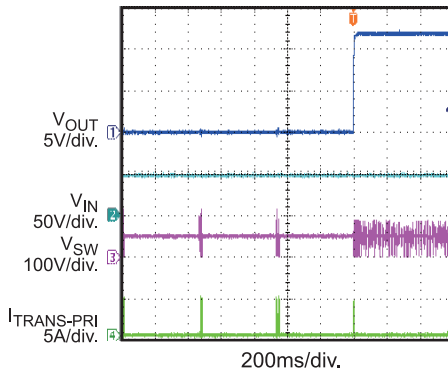
SCP Entry

$I_{OUT}=0A \rightarrow$ Short



SCP Recovery

$I_{OUT}=\text{Short} \rightarrow 0A$



PRINTED CIRCUIT BOARD LAYOUT

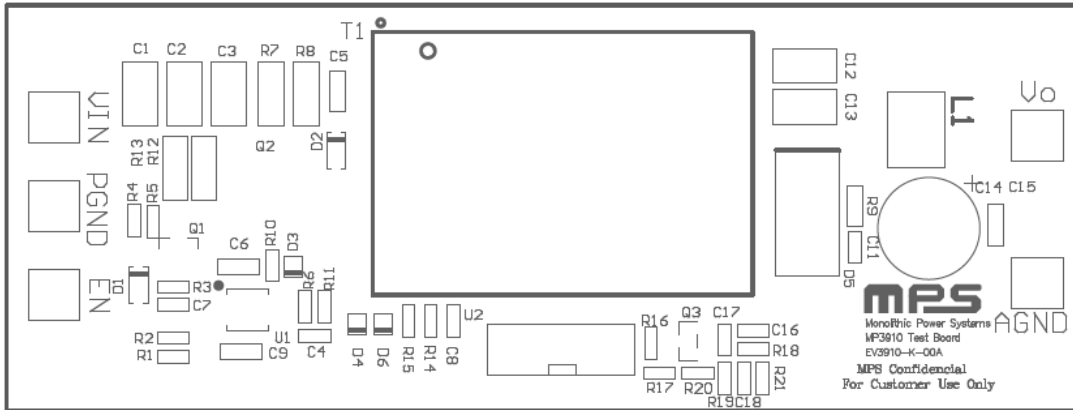


Figure 1: Top Silk Layer

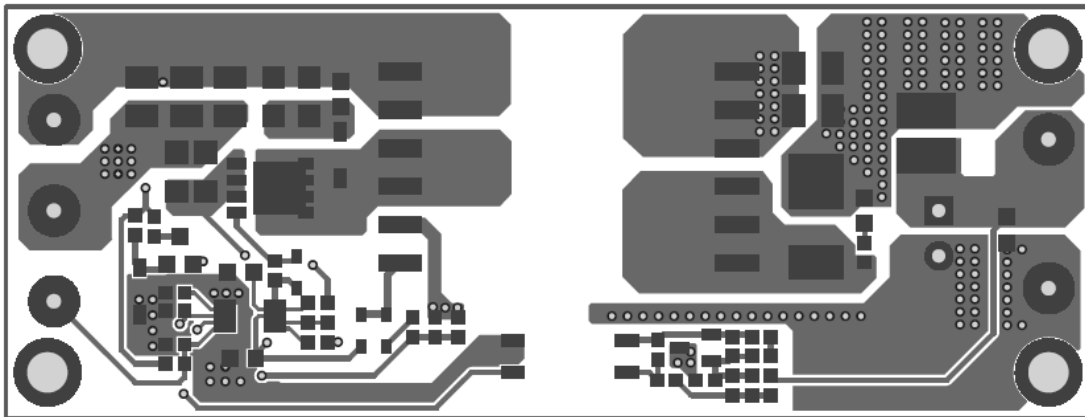


Figure 2: Top Layer

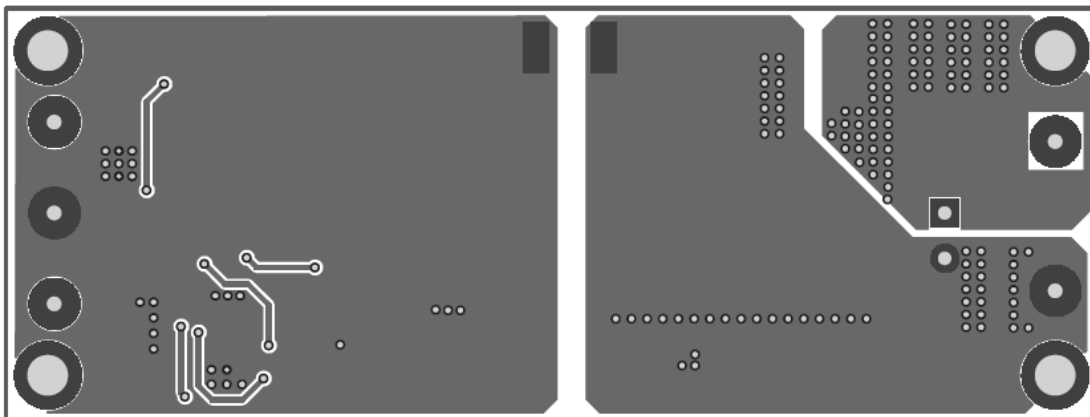


Figure 3: Bottom Layer

QUICK START GUIDE

1. Connect the positive and negative terminals of the load to the VOUT and GND pins respectively.
2. Preset the power supply output between 36V and 72V, and then turn off the power supply.
3. Connect the positive and negative terminals of the power supply output to the VIN and GND pins, respectively.
4. Turn the power supply on. The EV3910-K-00A will automatically startup.
5. To use the Enable function, apply a digital input to the EN pin. Drive EN higher than 2V to turn on the regulator or less than 1V to turn it off.

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