EV5036A-J-00A

5V, 0.4A-5A Current Limit Switch with Over Voltage Clamp

DESCRIPTION

The EV5036A-J-00A Evaluation Board is designed to demonstrate the capabilities of MPS' MP5036A, a protection device designed to protect circuitry on the output from transients on input. It also protects input from undesired shorts and transients coming from the output. MP5036A is a small R_{ON}, low quiescent current, current limited switch.

At startup, the inrush current is limited by limiting the slew rate at the output. The slew rate is controlled by a capacitor at the DV/DT pin.

The maximum load at the output is current limited. The magnitude of the current limit is controlled by an external resistor from ILIMIT to GND. There is a fixed 2.5A current limit when floating ILIMIT pin.

The output voltage is limited by the output over voltage protection (OVP) function.

The MP5036A is available in a space-saving 8 pin-TSOT23-6 package.

ELECTRICAL SPECIFICATION

Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	5	V
Output Current	I_{OUT}	3	A

FEATURES

- Wide 2.9V to 5.5V Continued Operating Input Range
- 26V Absolute Maximum Transient Input Voltage
- Fixed 5.75V Over Voltage Clamp Threshold
- Fast Output OVP Response
- Integrated 43mΩ Power FET
- Adjustable Current-Limit or Fixed Current Limit when floating ILIMIT pin
- Soft Start Time Programmable through DV/DT pin
- Fast Response for Hard Short Protection
- OCP Hiccup Protection
- Thermal Shutdown and Auto Retry
- Available in TSOT23-6 Package

APPLICATIONS

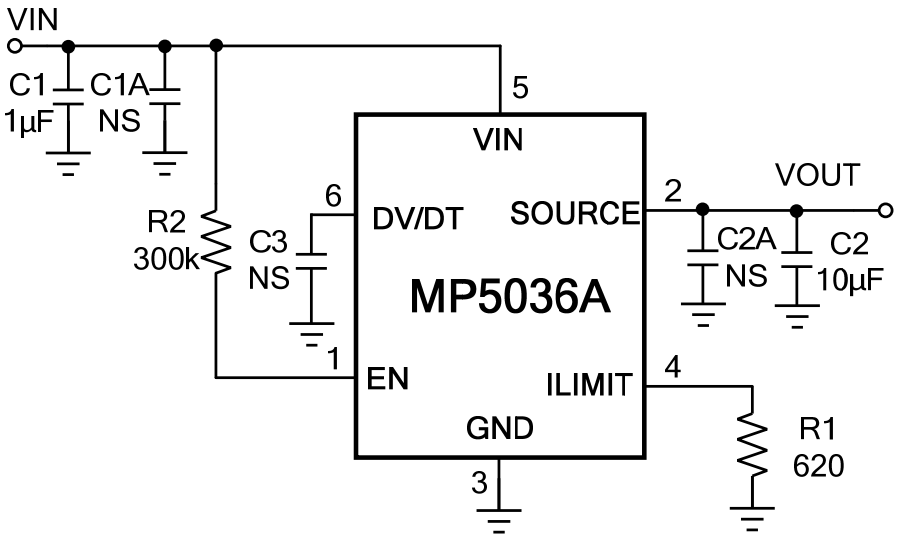
- HDD, SSD
- Hot Swap
- Wireless Modem Data Cards
- PC Cards
- USB Power Distribution
- USB Protection
- USB3.1 Power Delivery

EV5036A-J-00A EVALUATION BOARD

(L × W × H) 54mm x 46mm x 6.4mm

Board Number	MPS IC Number
EV5036A-J-00A	MP5036AGJ

EVALUATION BOARD SCHEMATIC



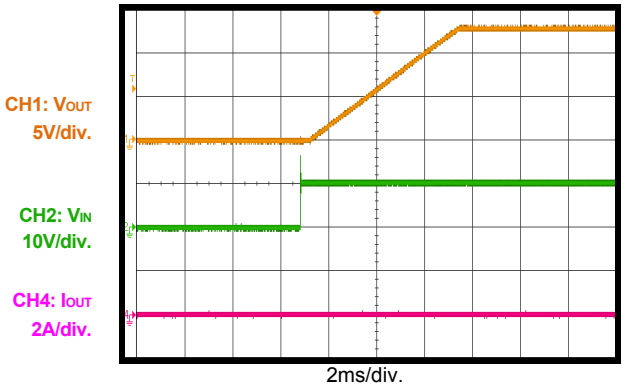
EV5036A-J-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Part Number
1	C1	1µF	Ceramic Cap.,25V,X7R	0805	Murata	GRM21BR71E105KA99L
1	C2	10µF	Ceramic Cap.,25V,X5R	0805	Murata	GRM21BR61E106KA73L
0	C1A, C2A, C3	NS				
1	R1	620Ω	Thick Film Res., 1%	0603	Yageo	RC0603FR-07620RL
1	R2	300kΩ	Thick Film Res., 1%	0603	Yageo	RC0603FR-07300KL
1	U1	MP5036AGJ	Current limit switch	TSOT23-6	MPS	MP5036AGJ

EVB TEST RESULTS

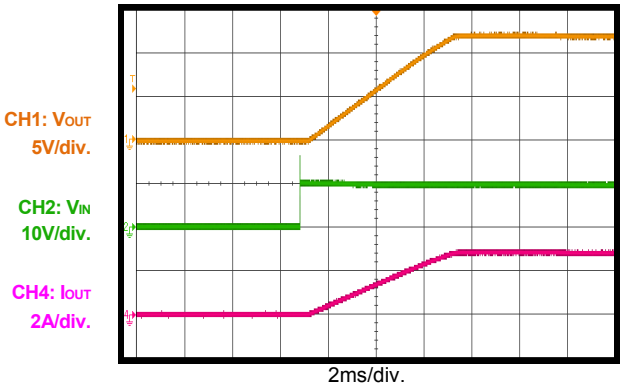
V_{IN}=5V, V_{EN}=5V, R_{LIMIT}=620Ω, DV/DT float, C_{OUT}=10μF, T_A=25°C, unless otherwise noted.

Start-Up through Input Voltage
I_{OUT}=0A



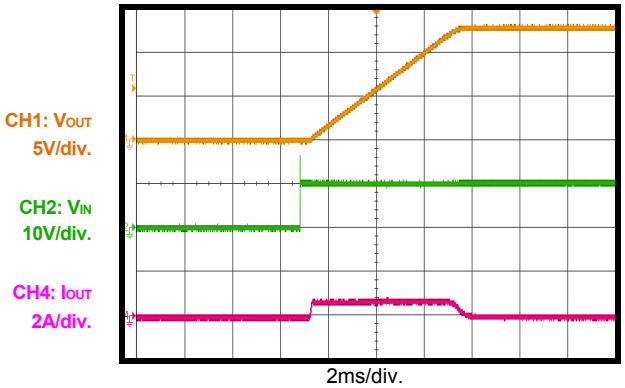
2ms/div.

Start-Up through Input Voltage
I_{OUT}=3A



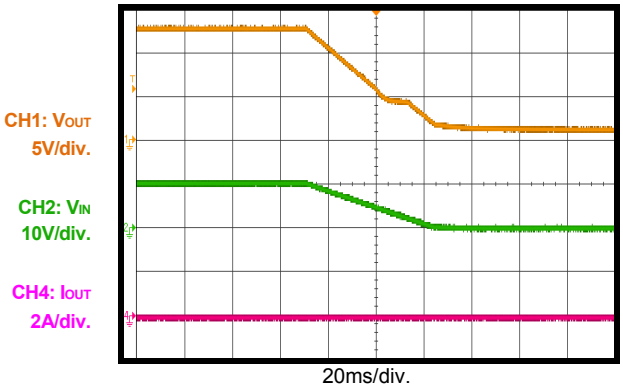
2ms/div.

Start-Up through Input Voltage
I_{OUT}=0A, C_{OUT}=1000μF



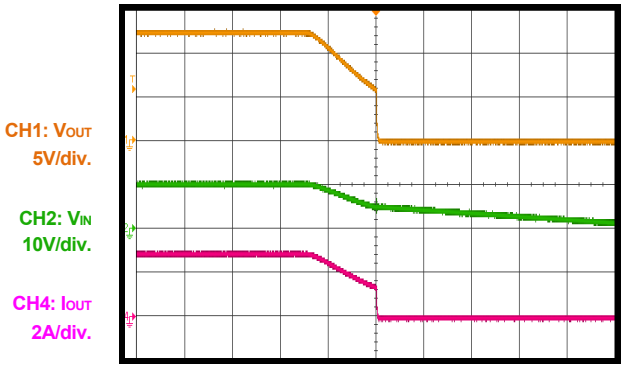
2ms/div.

Shutdown through Input Voltage
I_{OUT}=0A



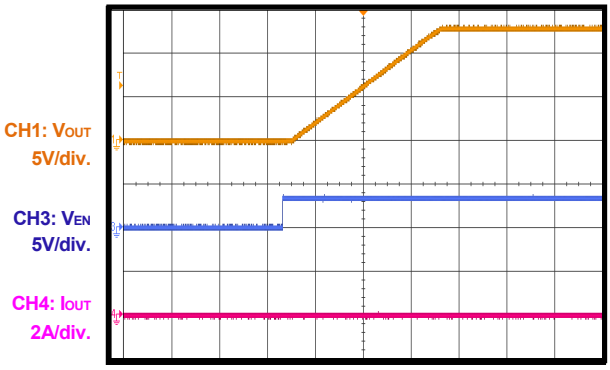
20ms/div.

Shutdown through Input Voltage
I_{OUT}=3A



2ms/div.

Start-Up through Enable
I_{OUT}=0A



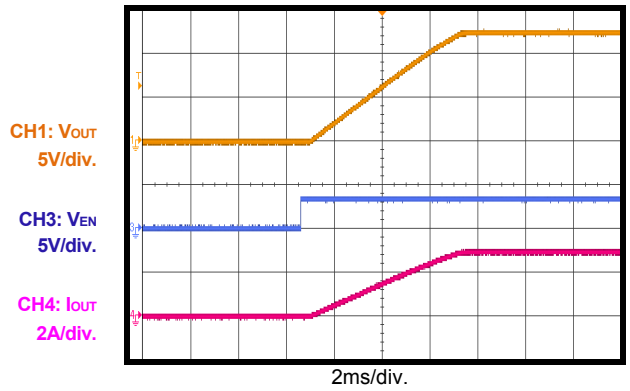
2ms/div.

EVB TEST RESULTS *(continued)*

V_{IN}=5V, V_{EN}=5V, R_{LIMIT}=620Ω, DV/DT float, C_{OUT}=10µF, T_A=25°C, unless otherwise noted.

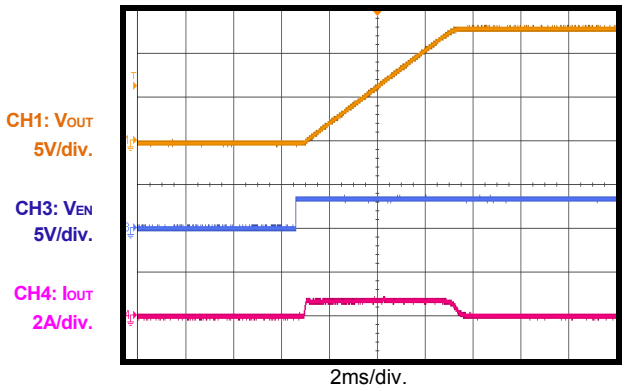
Start-Up through Enable

I_{OUT}=3A



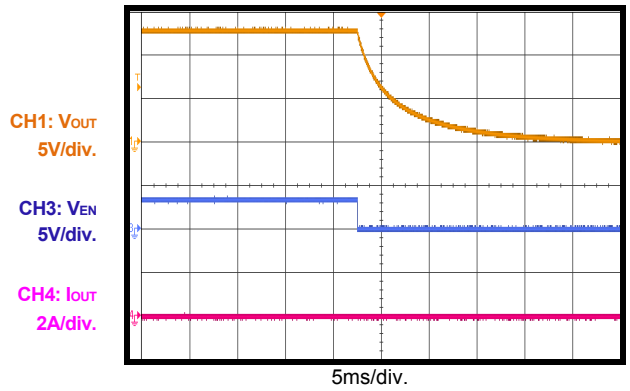
Start-Up through Enable

I_{OUT}=0A, C_{OUT}=1000µF



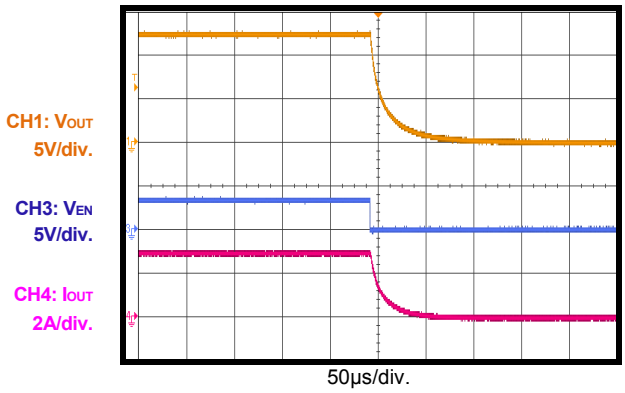
Shutdown through Enable

I_{OUT}=0A



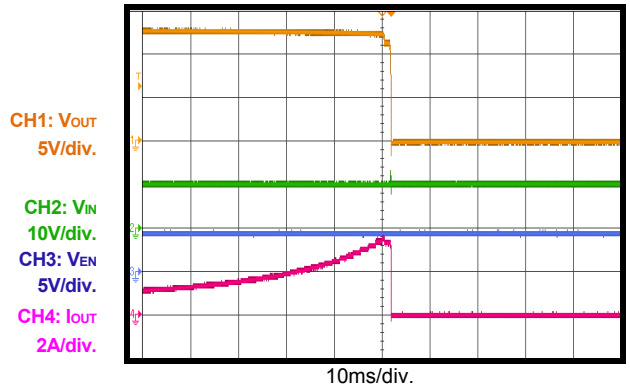
Shutdown through Enable

I_{OUT}=3A

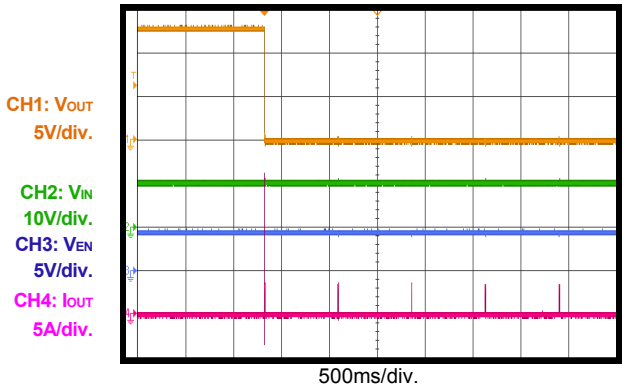


Current Limit

Increase I_{OUT} slowly



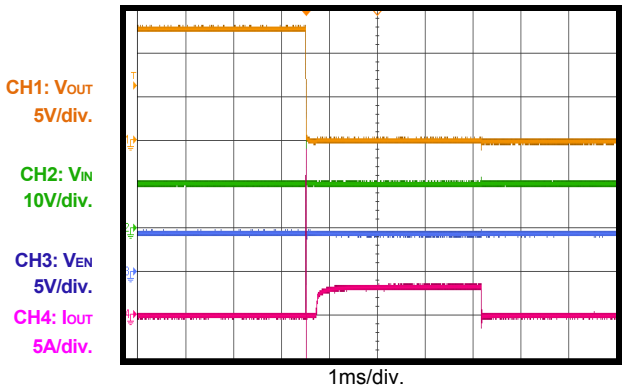
Short Circuit during Normal Operation and Hiccup



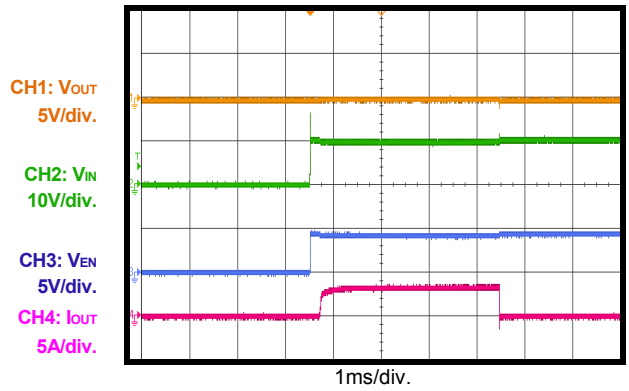
EVB TEST RESULTS *(continued)*

V_{IN}=5V, V_{EN}=5V, R_{LIMIT}=620Ω, DV/DT float, C_{OUT}=10μF, T_A=25°C, unless otherwise noted.

Short Circuit Entry during Normal Operation

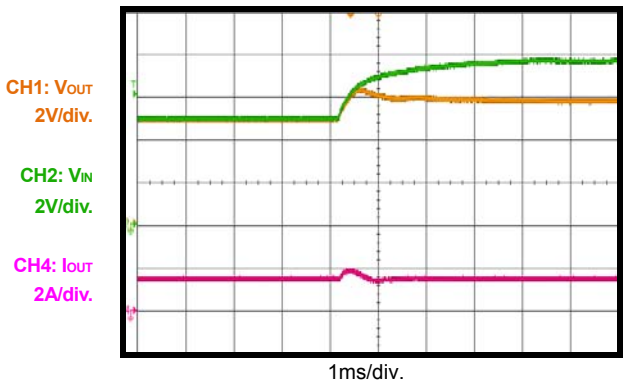


Short Circuit before Input Voltage Start-Up



Output Over Voltage Protection

V_{IN}=5V to 8V, I_{OUT}=1.5A



PRINTED CIRCUIT BOARD LAYOUT

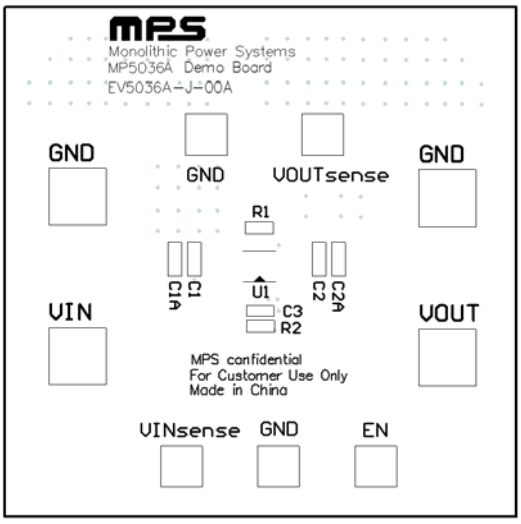


Figure 1: Top Silk Layer

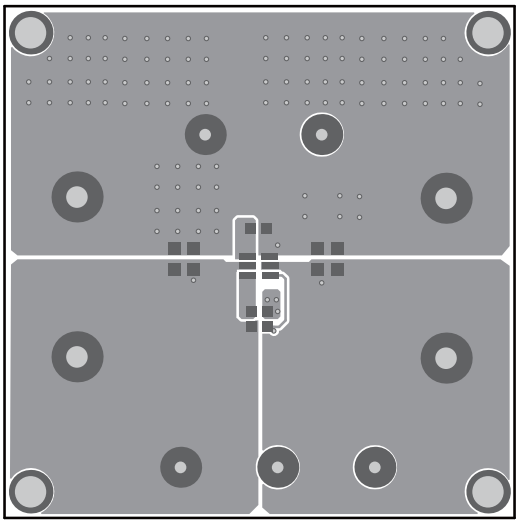


Figure 2: Top Layer

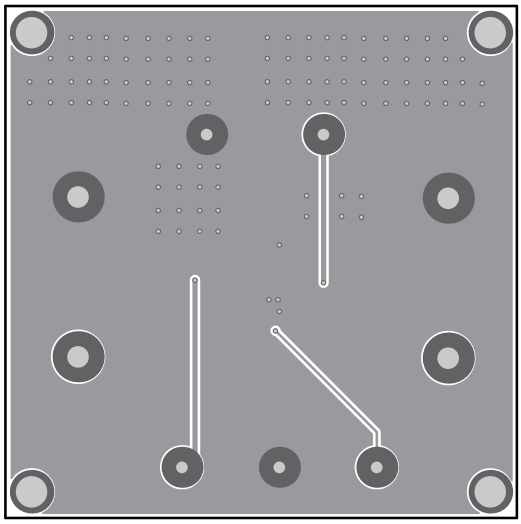


Figure 3: Bottom Layer

QUICK START GUIDE

1. Preset V_{IN1} Power Supply to 5V.
2. Turn Power Supply off.
3. Connect Power Supply terminals to:
    a. Positive (+): V_{IN}
    b. Negative (–): GND
4. Connect Load to:
    a. Positive (+): V_{OUT}
    b. Negative (–): GND
5. Turn Power Supply on after making connections. The board will automatically start up.
6. To use the Enable function, apply a digital input to the EN pin. Drive EN higher than 2.2V to turn on the regulator, or less than 1.5V to turn it off.