EV5087-G-00B

5.5V, 7A Low R_{DSON} Load Switch with Current Monitoring

The Future of Analog IC Technology

DESCRIPTION

The EV5087-G-00B is an evaluation board for the MP5087, a low R_{DSON} load switch with current monitoring

The MP5087 is a load switch, designed to provide 7A load protection covering 0.5V to 5.5V voltage range. With low R_{DSON} in tiny package, the MP5087 provides very high efficiency and space-saving solution for notebook, tablet and other portable applications.

The MP5087 is equipped with the very accurate current monitoring function. The gain of the current monitor can be scaled to different applications. With the soft start function, the MP5087 can avoid inrush current during circuit start-up. The MP5087 also provides other features, like power good, output discharge function, and fast short-circuit response time.

The EV board can deliver a continuous 7A load current over 0.8V to 5.5V operating input range.

ELECTRICAL SPECIFICATION

Parameter	Symbol	Value	Units
Input Voltage(1)	V_{IN}	0.8-5.5	V
Vcc Voltage	V_{CC}	3-5.5	V
Output Current	I_{OUT}	7	A

Note:

1) For specifications of lower voltage, please contact factory.

FEATURES

- Output Current Monitoring Accurate as High as 3%
- Wide V_{IN} Range: 0.5V to 5.5V
- <1uA Shutdown Current
- Integrated 10mΩ Low R_{DSON} FET
- Typical 7A Load Current Range
- Push-pull PG Indicator
- Adjustable Start Up Slew Rate
- Output Discharge Function
- <200ns Short-Circuit Response Protection
- Thermal Protection
- Small 2mmx2mm QFN Package

APPLICATIONS

- Notebook and Tablet Computers
- Portable Devices
- Solid State Drives
- Handheld Devices

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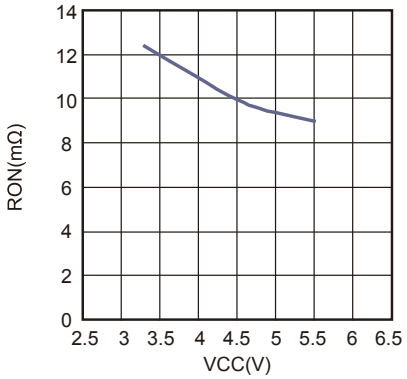
EV5087-G-00B EVALUATION BOARD



(L × W × H) 6.4cm × 6.4cm × 1.3cm

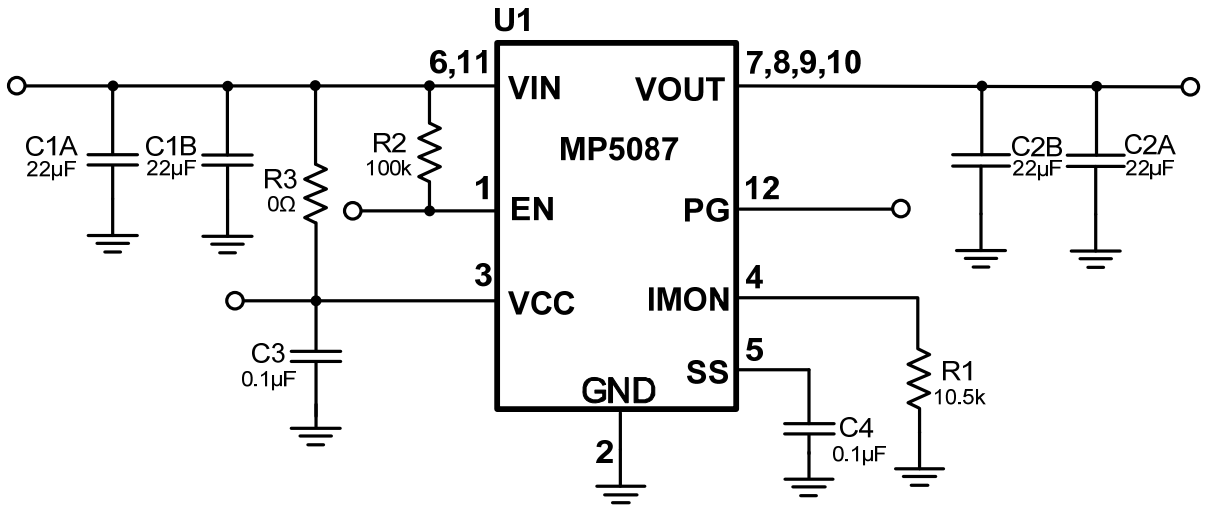
Board Number	MPS IC Number
EV5087-G-00B	MP5087GG

Rds_on vs.Vcc



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EVALUATION BOARD SCHEMATIC



EV5087-G-00B BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer P/N
1	R1	10.5kΩ	Film Res,1%	0603	ROYAL	RL0603FR-0710K5L
1	R2	100kΩ	Film Res,1%	0603	ROYAL	RL0603FR-07100KL
1	R3	0Ω	Film Res,1%	0603	ROYAL	RC0603FR-070RL
4	C1A,C1B, C2A,C2B	22µF	Ceramic Cap,10V,X5R	0805	muRata	GRM21BR61A226ME51L
2	C3,C4	0.1µF	Ceramic Cap,16V,X7R	0603	muRata	GRM188R71C104KA01D
1	U1	MP5087	7A Load Switch	QFN 2mmx2mm	MPS	MP5087GG

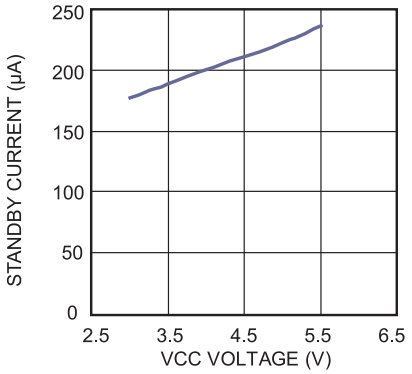
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EVB TEST RESULTS

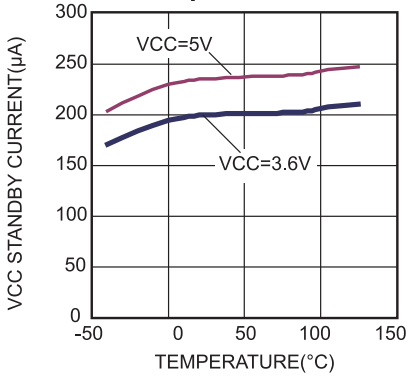
Performance waveforms are tested on the evaluation board.

V_{IN} = 3.6V, V_{CC} = 3.6V, EN=2.5V, R_{IMON} = 10.5k, T_A = 25°C, unless otherwise noted.

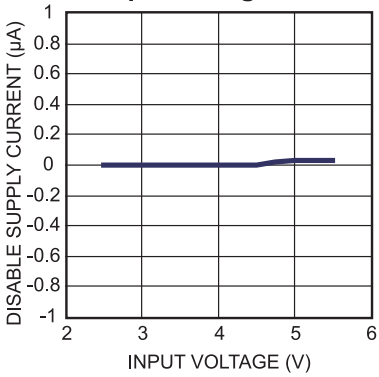
Vcc Standby Current vs. Vcc



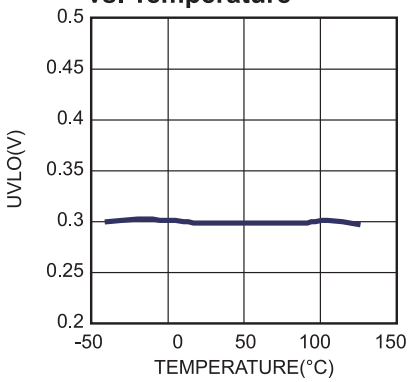
Vcc Standby Current vs. Temperature



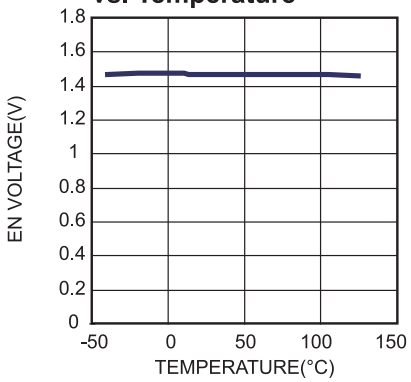
Disabled Supply Current vs. Input Voltage



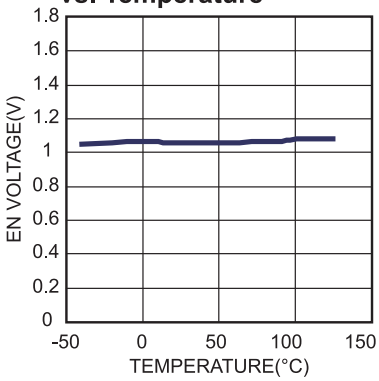
VIN UVLO Rising Threshold vs. Temperature



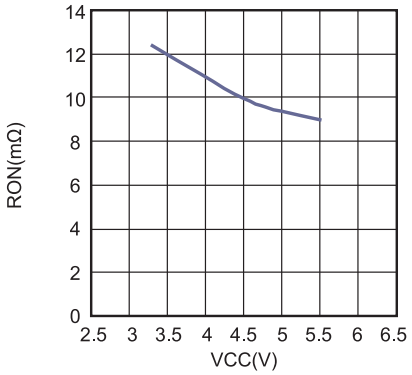
EN Rising Threshold vs. Temperature



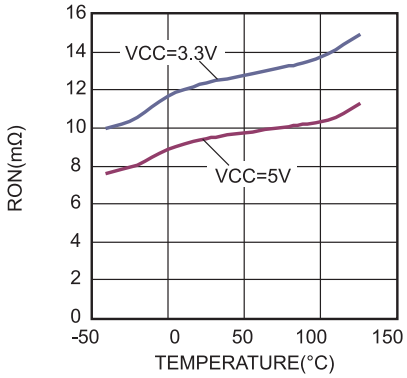
EN Falling Threshold vs. Temperature



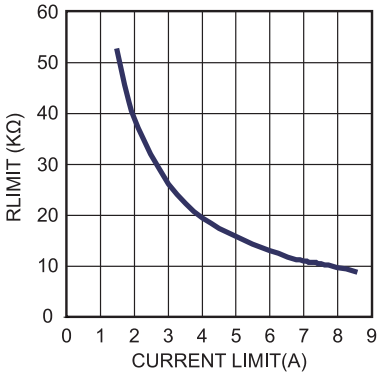
Rds_on vs.Vcc



Rds_on vs. Temperature



Current Limit vs. Rlimit



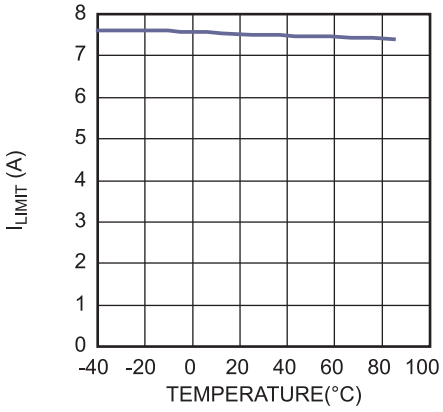
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EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.

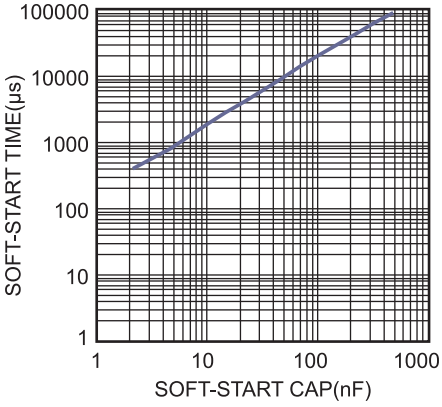
V_{IN} = 3.6V, V_{CC} = 3.6V, EN=2.5V, R_{IMON} = 10.5k, T_A = 25°C, unless otherwise noted.

I_{LIMIT} vs. Temperature

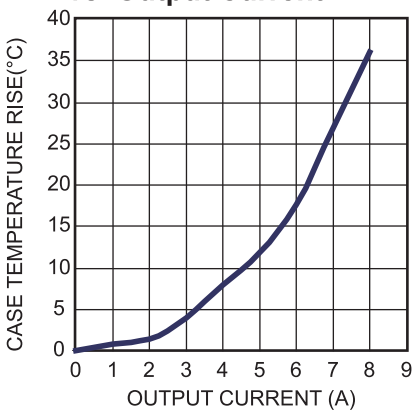


Soft-Start vs.Cap

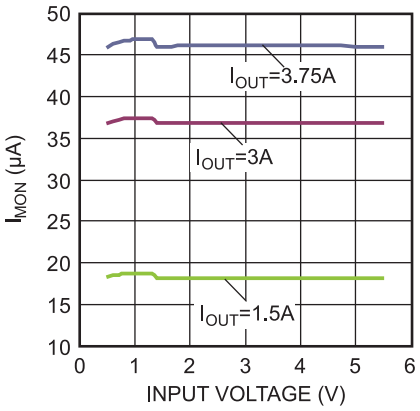
V_{IN}=5V, V_{CC}=3.6V



Case Temperature Rise vs. Output Current

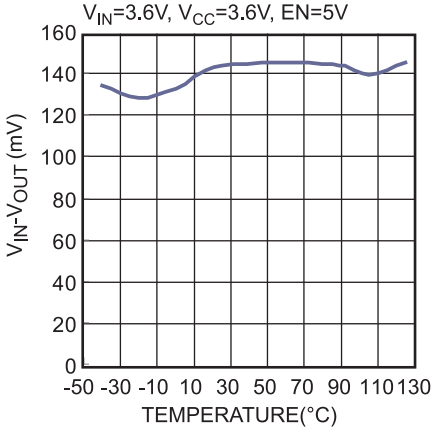


I_{MON} vs. V_{IN}



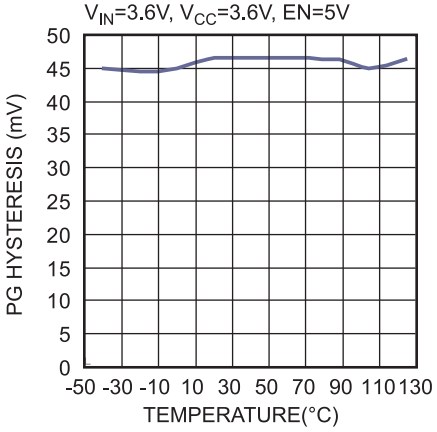
PG Rising Threshold vs. Temperature

V_{IN}=3.6V, V_{CC}=3.6V, EN=5V



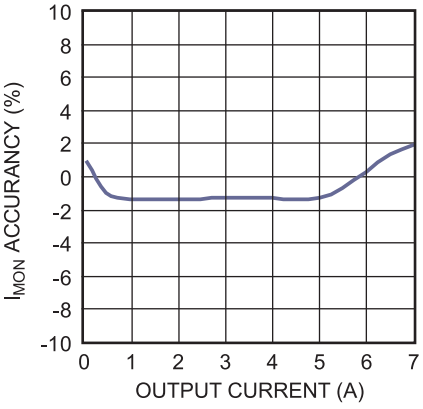
PG Hysteresis vs. Temperature

V_{IN}=3.6V, V_{CC}=3.6V, EN=5V

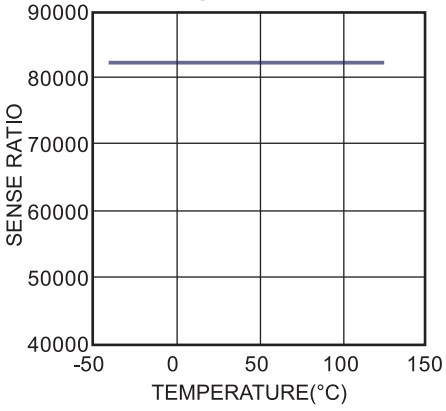


I_{MON} Accurancy vs. I_{OUT}

V_{IN}=5V, V_{CC}=5V, EN=5V



Sense Ratio vs. Temperature



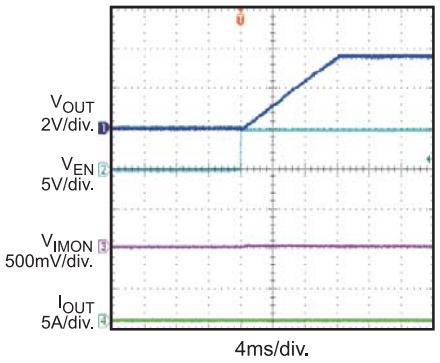
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EVB TEST RESULTS *(continued)*

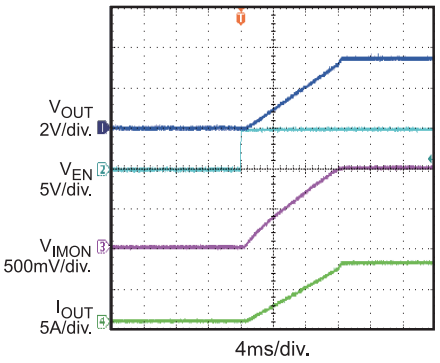
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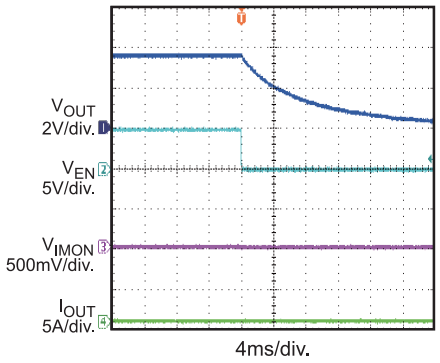
Enable Startup
V_{IN} =3.6V, V_{CC}=3.6V, No Load



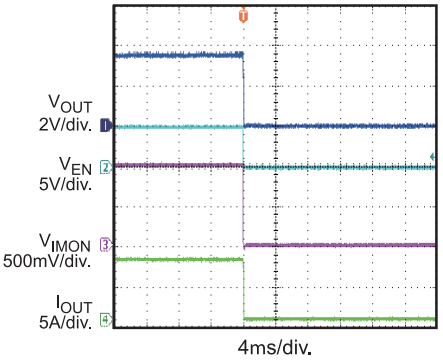
Enable Startup
V_{IN} =3.6V, V_{CC}=3.6V, 7A Load



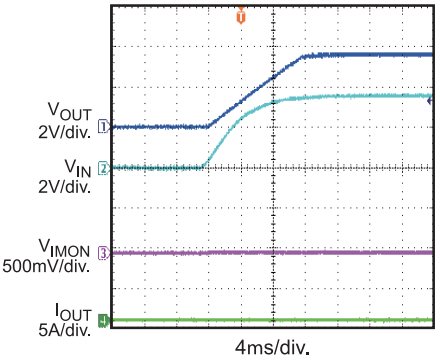
Enable Shutdown
V_{IN} =3.6V, V_{CC}=3.6V, No Load



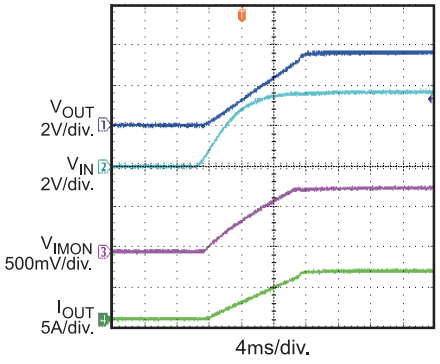
Enable Shutdown
V_{IN} =3.6V, V_{CC}=3.6V, 7A Load



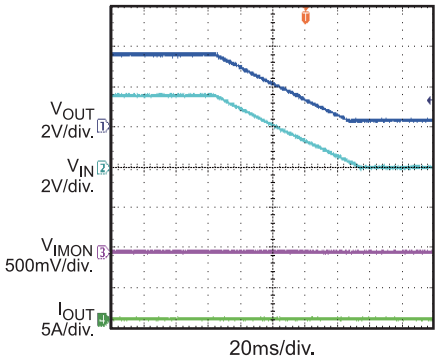
Power Up
V_{IN} =3.6V, V_{CC}=3.6V, No Load



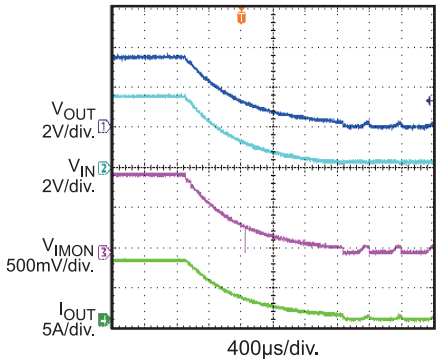
Power Up
V_{IN} =3.6V, V_{CC}=3.6V, 7A Load



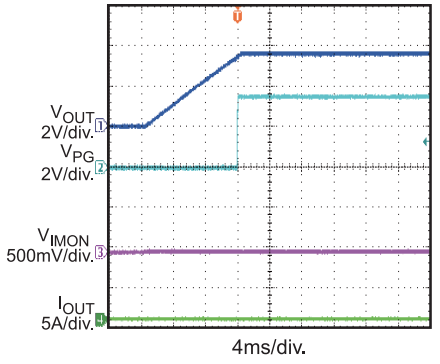
Power Down
V_{IN} =3.6V, V_{CC}=3.6V, No Load



Power Down
V_{IN} =3.6V, V_{CC}=3.6V, 7A Load



Power Good (EN Start Up)
V_{IN} =3.6V, V_{CC}=3.6V, No Load



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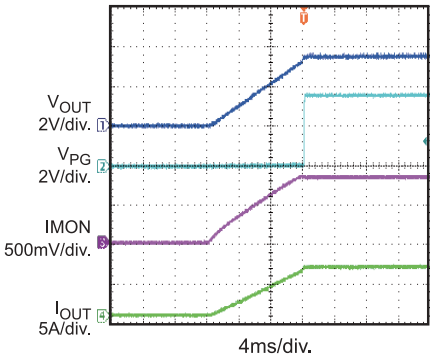
EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.

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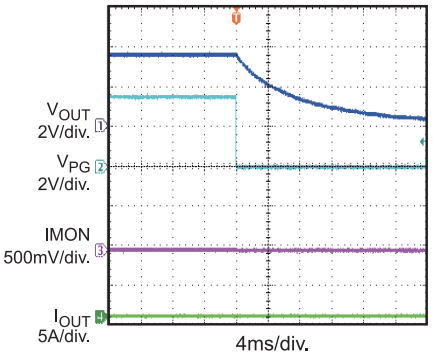
Power Good (EN Start Up)

V_{IN} =3.6V, V_{CC}=3.6V, 7A Load



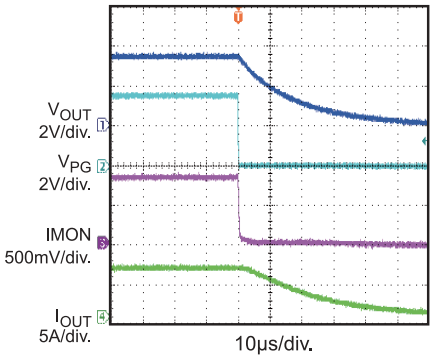
Power Good(EN Shutdown)

V_{IN} =3.6V, V_{CC}=3.6V, No Load



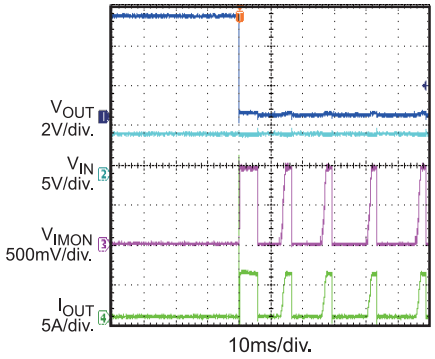
Power Good(EN Shutdown)

V_{IN} =3.6V, V_{CC}=3.6V, 7A Load



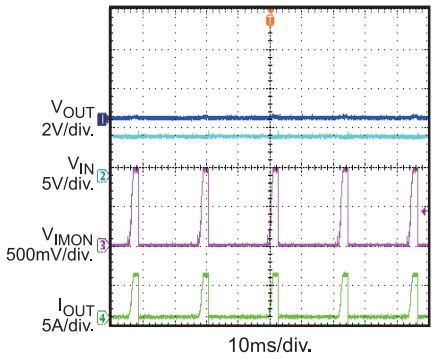
SCP Enter

V_{IN} =5V, V_{CC}=3.3V



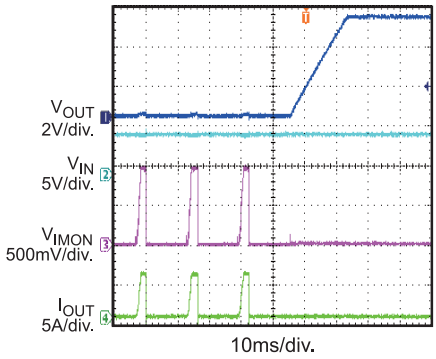
SCP Steady State

V_{IN} =5V, V_{CC}=3.3V



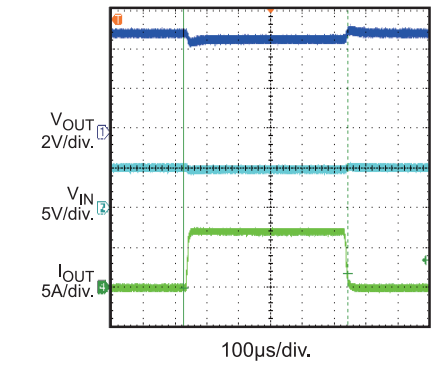
SCP Recover

V_{IN} =5V, V_{CC}=3.3V



Load Transient Response

V_{IN}=5V, V_{CC}=3.3V, I_{OUT}=0A->7A



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PRINTED CIRCUIT BOARD LAYOUT

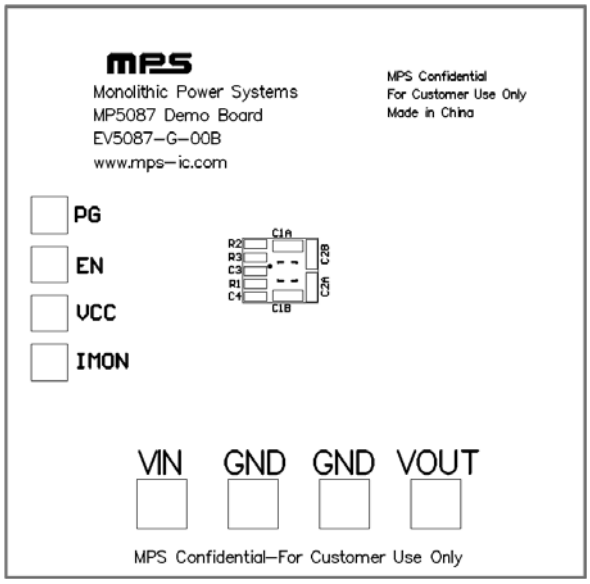


Figure1: Top Layer Silkscreen

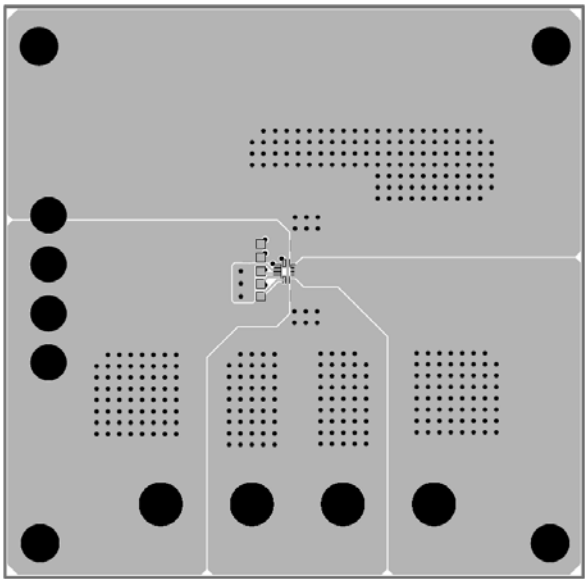


Figure2: Top Layer

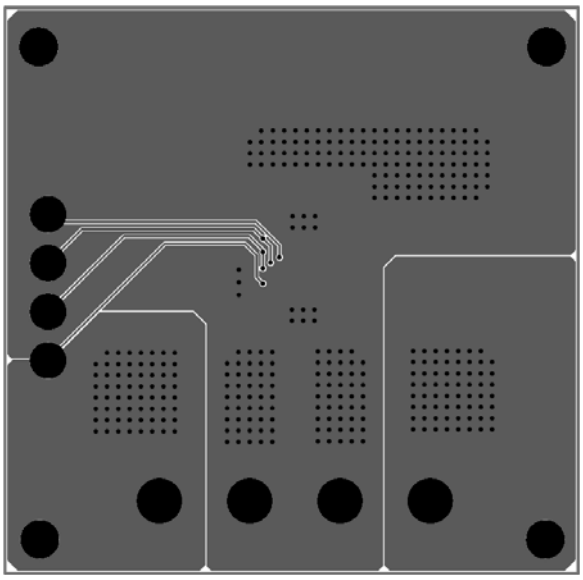


Figure3: Bottom Layer

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QUICK START GUIDE

1. Connect the positive and negative terminals of the load to the V_{OUT} and GND pins, respectively.
2. Preset the power supply output between 0.8V and 5.5V, and then turn off the power supply.
3. Connect the positive and negative terminals of the power supply output to the V_{IN} and GND pins, respectively.
4. Turn the power supply on. The MP5087 will automatically startup.
5. To use the Enable function, apply a digital input to the EN pin. Drive EN higher than 1.5V to turn on the regulator or less than 1.3V to turn it off.
6. Use R1 to set the output current limit. C4 to set the SS time, Follow the Application Information section in the device datasheet to select appropriate R1, C4.

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