EV28200-G-00A

Ultra Low IQ Step-down Regulator Step-Down Switcher Evaluation Board

The Future of Analog IC Technology®

DESCRIPTION

The MP28200 is a monolithic power management unit containing 200mA high efficiency step-down switching. The sub microampere quiescent current provides extremely high efficiency when load current is low down to uA range. With the input range up to 5.5V, the MP28200 is ideal for powering battery-powered devices.

The constant-on-time control scheme provides fast transient response, high light load efficiency as well as the minimum capacitors.

The regulation is tight by integrating an error amplifier to correct the output voltage.

The CTRL pins control the ON/OFF and output voltage selection function.

Fault condition protection includes UVLO, over current protection, and thermal shutdown.

The MP28200 requires a minimum number of readily available standard external components and is available in a small QFN12 (2x2mm) package.

FEATURES

- Ultra Low IQ: 500nA
- Wide 2.0V to 5.5V Operating Input Range
- 7 Selectable Output Voltages
- Up to 200mA Output Current
- 1.5MHz Switching Frequency at CCM Mode
- 100% Duty Cycle in Dropout
- 0.25Ω and 0.25Ω Internal Power MOSFET Switches
- Cycle-by-Cycle Over Current Protection
- Short Circuit Protect with Hiccup Mode
- Over Temperature Protection
- Available in a QFN12-2.0mmx2.0mm Package

APPLICATIONS

- Wearables
- IOT
- Portable Instruments
- Battery-Powered Devices

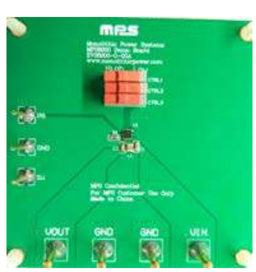
All MPS parts are lead-free, halogen free, and adhere to the RoHS directive. For MPS green status, please visit MPS website under Quality Assurance.

ELECTRICAL SPECIFICATION

Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	2.0 – 5.5	V
Output Voltage	V_{OUT}	Table 1	
Output Current	I_{OUT}	0.2	A

Note: V_{IN}<3.3V may need more input capacitor.

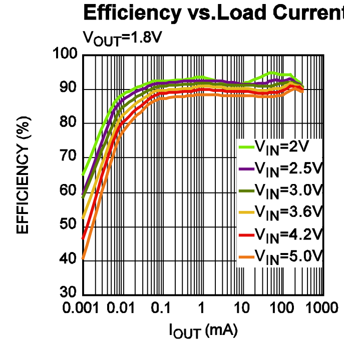
EV28200-G-00A EVALUATION BOARD



(L x W) 6.3cm x 6.3cm

Board Number	MPS IC Number
EV28200-G-00A	MP28200GG

Efficiency vs.Load Current



EVALUATION BOARD SCHEMATIC

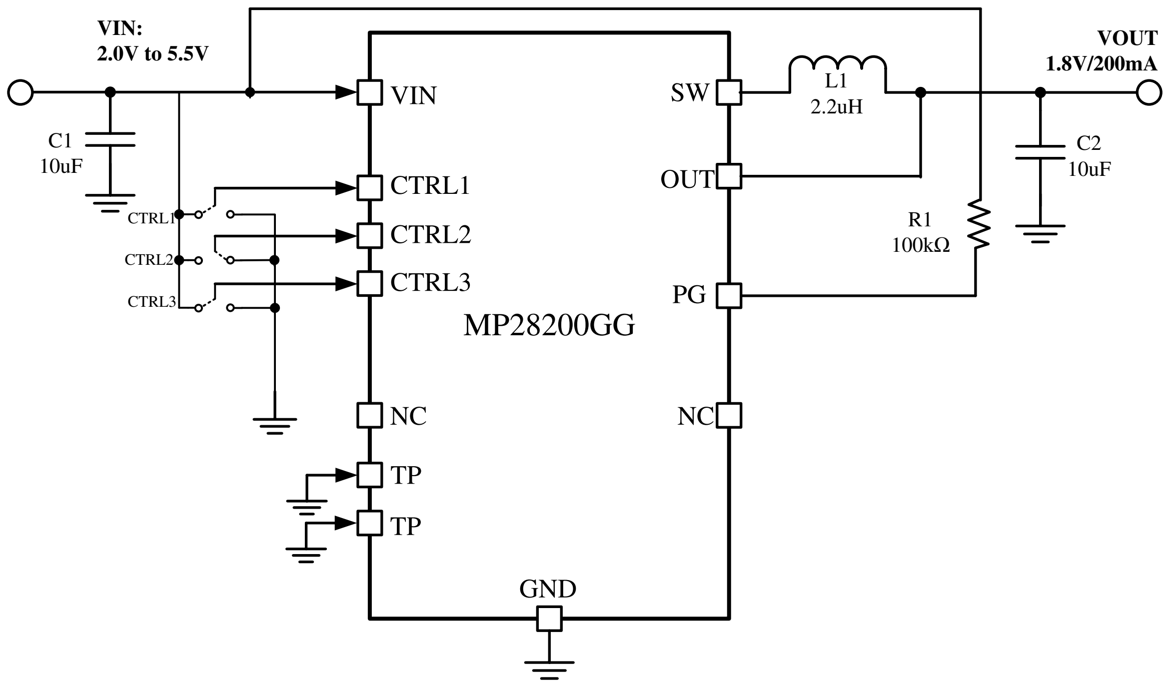


Figure 1. Typical Application Circuit for MP28200GG

Note: V_{IN}<3.3V may need more input capacitor.

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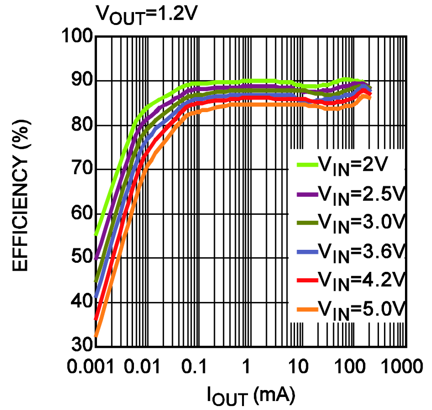
EV28200GG-00A BILL OF MATERIALS

Qty	RefDes	Value	Description	Package	Manufacturer	Manufacturer P/N
2	C1,C2	10μF	Ceramic Cap,6.3V,X5R	0603	muRata	GRM188R60J106ME47D
1	R1	100k	Film Res.1%	0603	ROYALOHM	F1003T5E
1	L1	2.2μH	Inductor, Isate=2.1A, Rdc=144mΩ	2016	muRata	DFE201612P-2R2M
1	U1		Step-down Switcher	QFN12-2x2mm	MPS	MP28200GG
3	CTRL1, CTRL2, CTRL3,				Wurth	450301014042

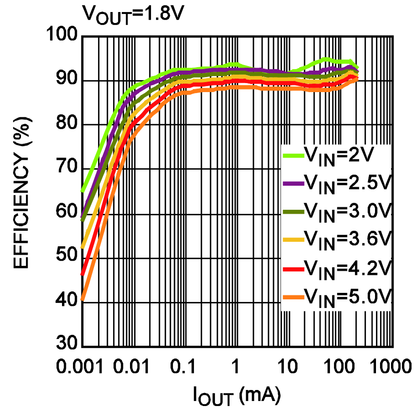
EVB TEST RESULTS

Performance waveforms are tested on the evaluation board.
V_{IN}=3.6V, V_{OUT}=1.8V, L_1=2.2µH, C_{IN}=10µF, C_{OUT}=10µF, T_A = +25°C, unless otherwise noted.

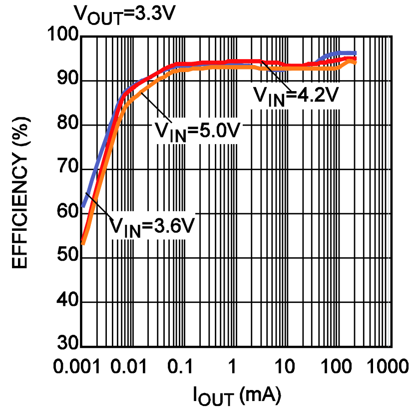
Efficiency vs.Load Current



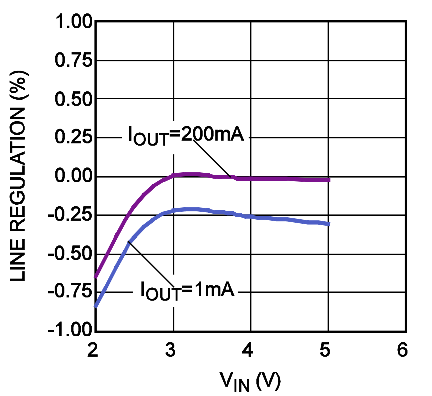
Efficiency vs.Load Current



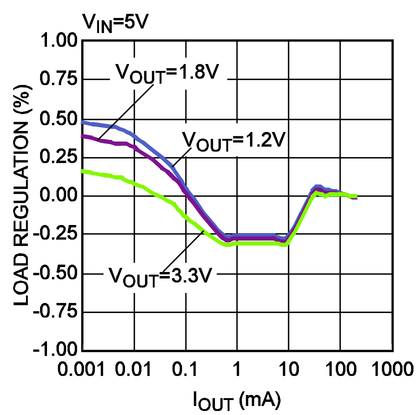
Efficiency vs.Load Current



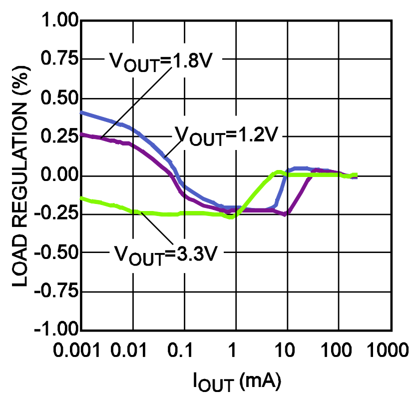
Line Regulation vs. Load Current



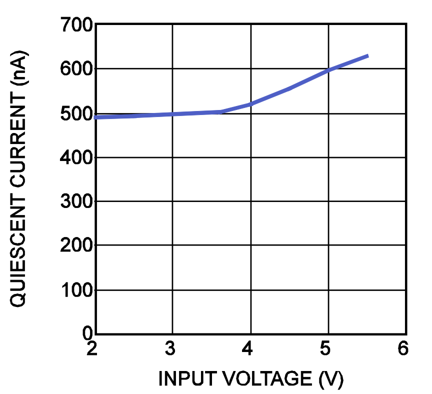
Load Regulation vs. Load Current



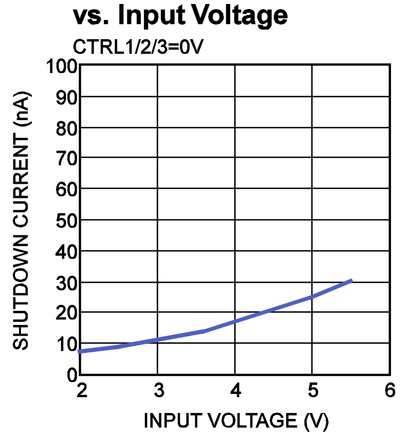
Load Regulation vs. Load Current



Buck Quiescent Current vs. Input Voltage



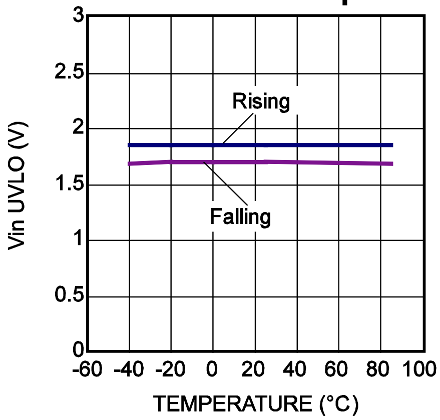
Buck Shutdown Current vs. Input Voltage



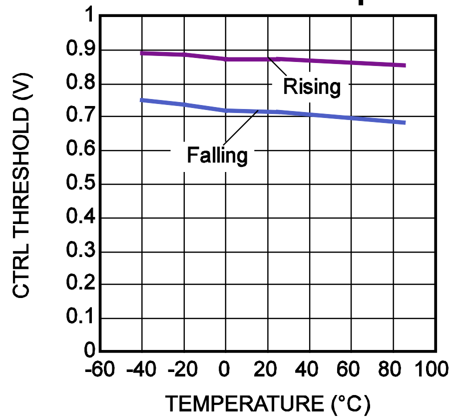
EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.
V_{IN}=3.6V, V_{OUT}=1.8V, L_1=2.2µH, C_{IN}=10µF, C_{OUT}=10µF, T_A = +25°C, unless otherwise noted.

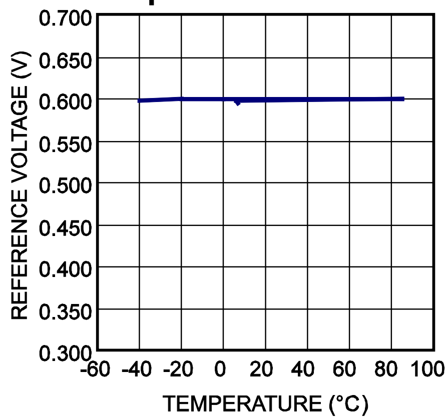
Buck VIN UVLO Rising Threshold vs. Temperature



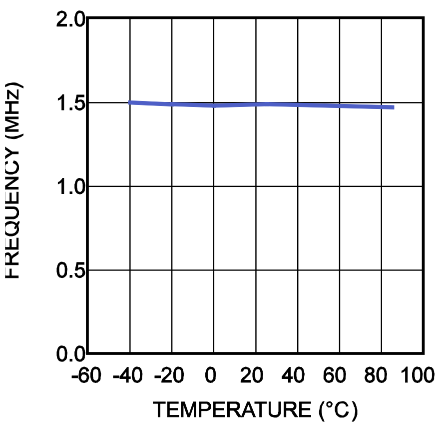
CTRL Rising and Falling Threshold vs. Temperature



Reference Voltage vs. Temperature

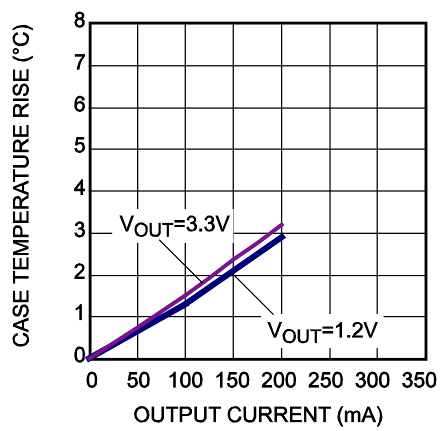


Frequency vs. Temperature



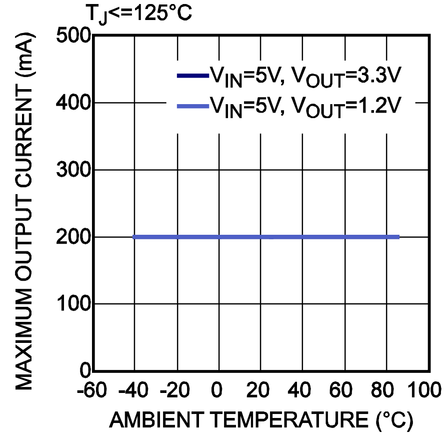
T_{RISING} vs. Output Current

V_{IN}=5V



Output Current Derating vs. Ambient Temperature

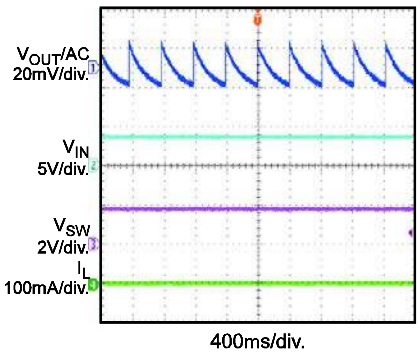
T_J<=125°C



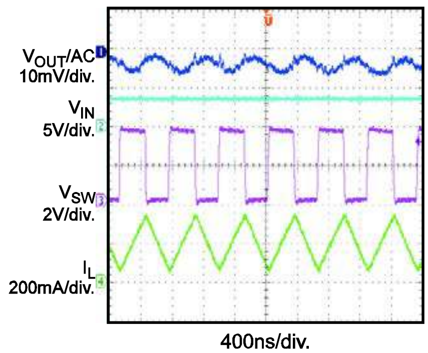
EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.
V_{IN}=3.6V, V_{OUT}=1.8V, L_1=2.2µH, C_{IN}=10µF, C_{OUT}=10µF, T_A = +25°C, unless otherwise noted.

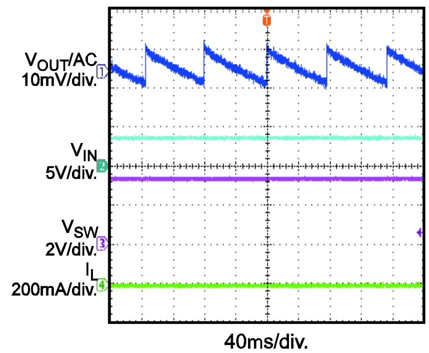
Steady State
I_{OUT} = 0A



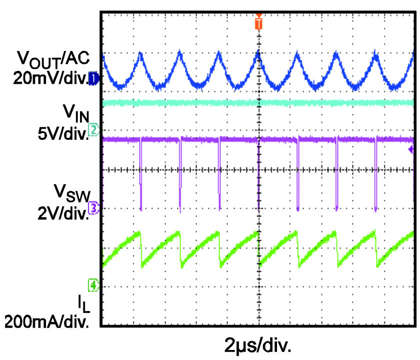
Steady State
I_{OUT} = 0.2A



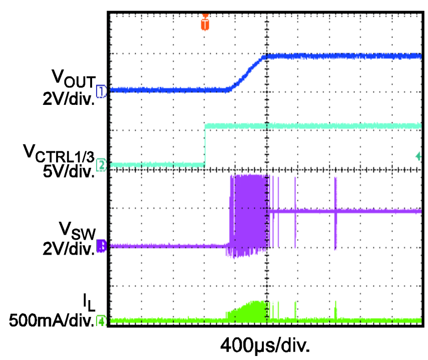
Steady State
V_{OUT} = 3.3V, I_{OUT} = 0A



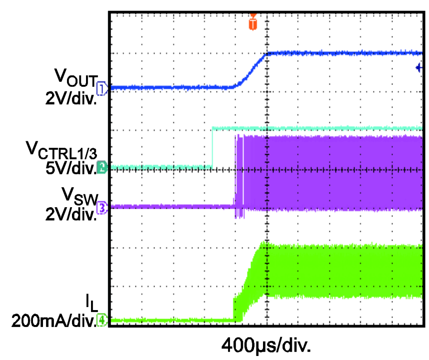
Steady State
V_{OUT} = 3.3V, I_{OUT} = 0.2A



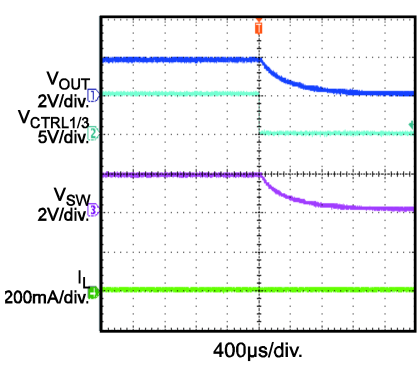
CTRL On
I_{OUT} = 0A



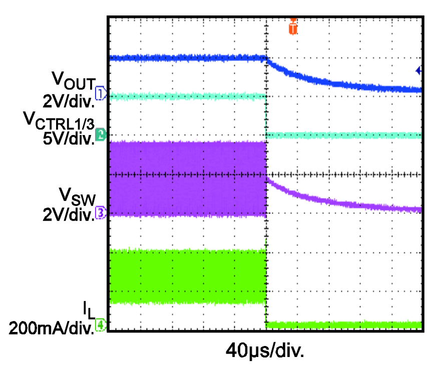
CTRL On
I_{OUT} = 0.2A



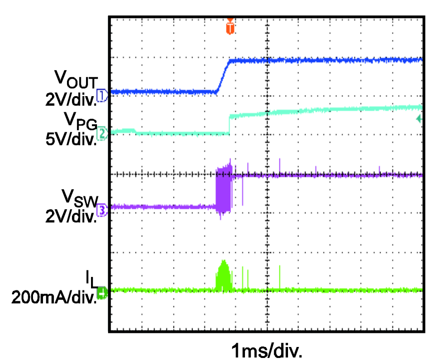
CTRL Off
I_{OUT} = 0A



CTRL Off
I_{OUT} = 0.2A



PG On
I_{OUT} = 0A



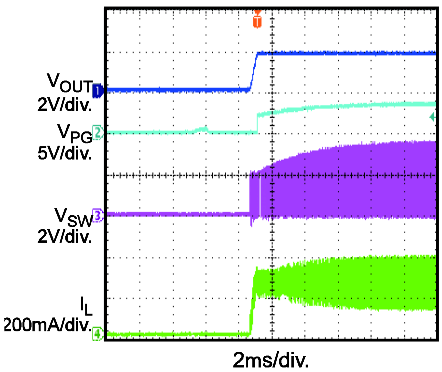
EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.

V_{IN}=3.6V, V_{OUT}=1.8V, L_1=2.2µH, C_{IN}=10µF, C_{OUT}=10µF, T_A = +25°C, unless otherwise noted.

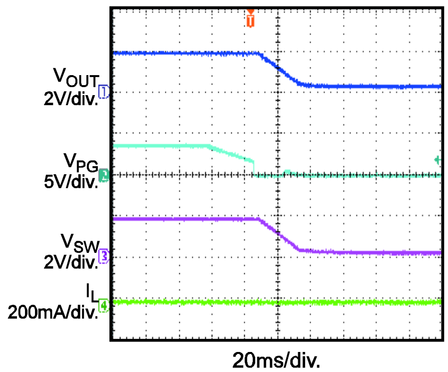
PG On

I_{OUT} = 0.2A



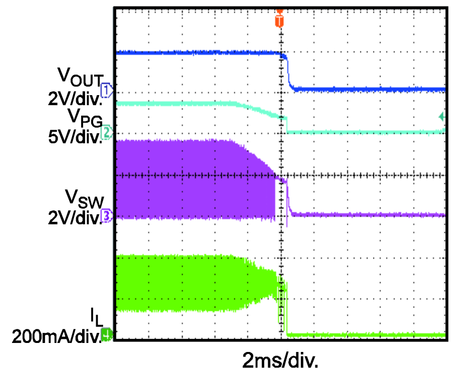
PG Off

I_{OUT} = 0A



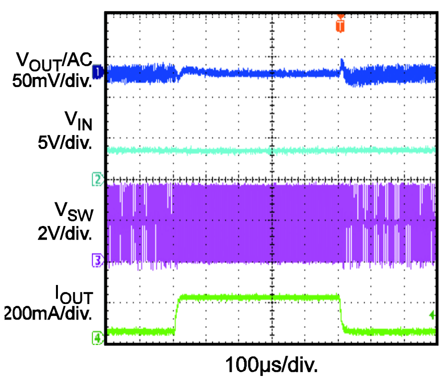
PG Off

I_{OUT} = 0.2A



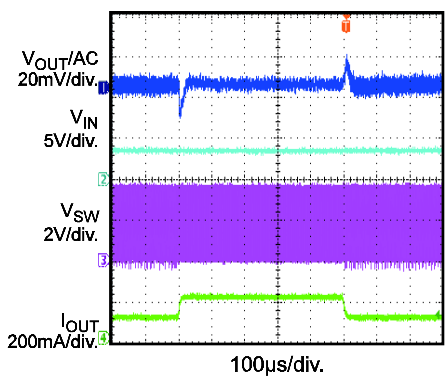
Load Transient

I_{OUT} = 30-200mA, 0.25A/µs

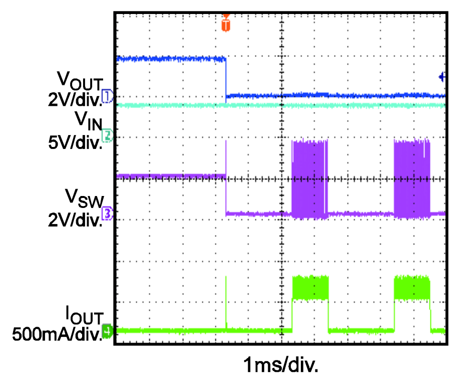


Load Transient

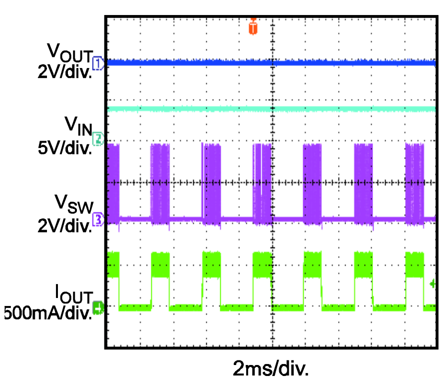
I_{OUT} = 100-200mA, 0.25A/µs



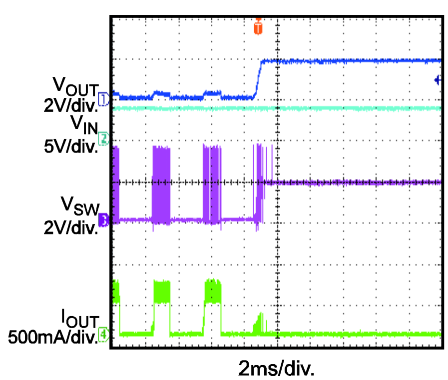
Short-Circuit Entry



Short-Circuit Steady



Short-Circuit Recovery



PRINTED CIRCUIT BOARD LAYOUT

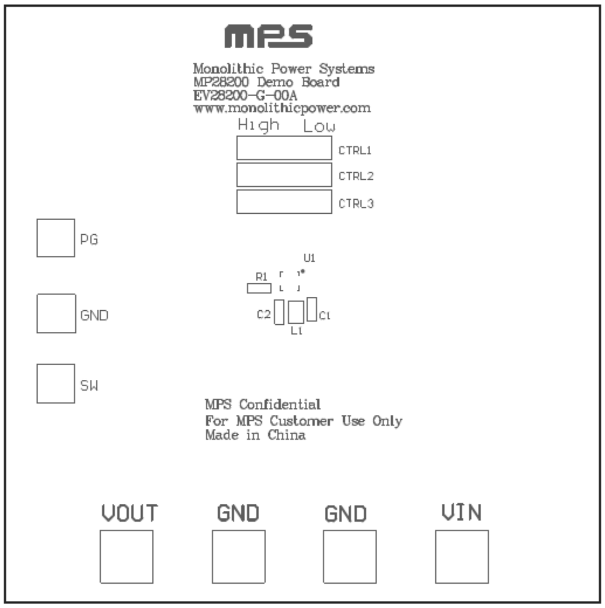


Figure 2—Top Silk Layer

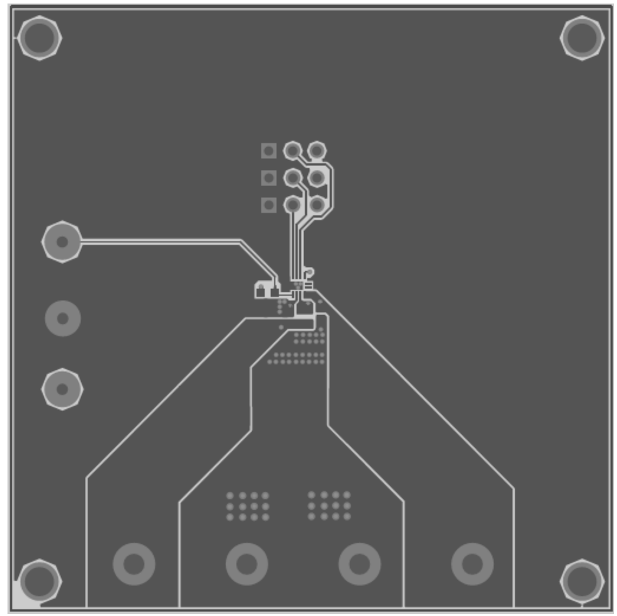


Figure 3—Top Layer

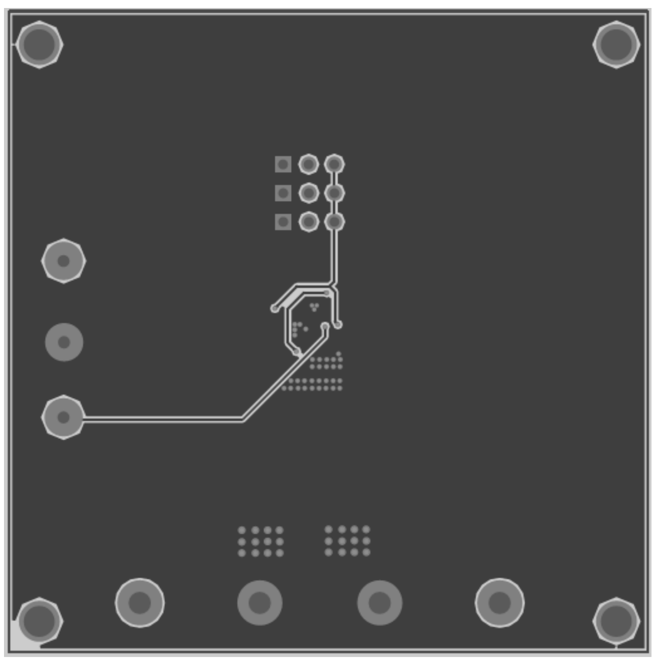


Figure 4—Bottom Layer

QUICK START GUIDE

The output voltage of this board is set by Table1. When switcher turns to high, relative CTRL pin connects to Vin; when switcher turns to low, CTRL pin connects to GND.

1. Connect the positive and negative terminals of the load to the VOUT and GND pins, respectively.
2. Preset the power supply output between 2.0V and 5.5V, 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.Ton on the power supply.
4. According to Table1, turn on relative switchers(CTRL) to test voltage. The board will automatically start up.
5. Swith to different ouput voltage only need move relative switcher directly.

Table 1 CTRL vs. Output Voltages

CTRL3	CTRL2	CTRL1	OUT1
0	0	0	Disabled
0	0	1	0.8V
0	1	0	1.0V
0	1	1	1.2V
1	0	0	1.5V
1	0	1	1.8V
1	1	0	2.5V
1	1	1	3.3V