EVM3805A-QB-00A

6V, 0.6A Peak Synchronous Step-Down Switcher Evaluation Board

DESCRIPTION

The EVM3805A-QB-00A is used for demonstrating the performance of MPS's MPM3805A a low voltage high switching frequency step-down switcher with built-in power MOSFETs and power inductor. MPM3805A provides up to 0.6A peak highly efficient output with constant-on-time control for fast loop response.

The constant-on-time control (COT) scheme provides fast, transient response loop stabilization. Fault condition protection includes cycle-by-cycle current limiting and thermal shutdown TSD.

The EVM3805A-QB-00A is available in QFN 3.0x2.5x0.9mm package.

ELECTRICAL SPECIFICATION

Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	2.5– 6	V
Output Voltage	V_{OUT}	1.2	V
Output Current	I_{OUT}	0.6	A

FEATURES

- Wide 2.5V to 6V Operating Input Range
- Adjustable output from 0.6V
- 3mm x 2.5mm x 0.9mm QFN Package
- Total Solution Size 6mm x 3.8mm
- Up to 0.6A Peak Output Current
- 100% Duty Cycle in Dropout
- Force CCM Mode
- EN and Power Good for Power Sequencing
- Cycle-by-Cycle Over-Current Protection
- Short Circuit Protection with Hiccup Mode
- Adjustable Output Only Needs 4 External Components - 2 Ceramic Capacitors and FB Divider Resistors

APPLICATIONS

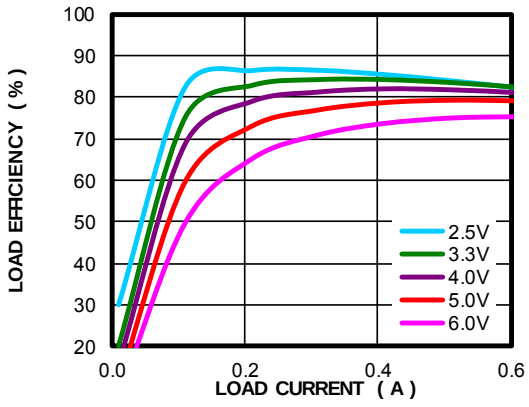
- Automotive ECU
- Low Voltage I/O System Power
- LDO Replacement
- Power for Portable Products
- Telematics
- Space-limited Applications

EVM3805A-QB-00A EVALUATION BOARD

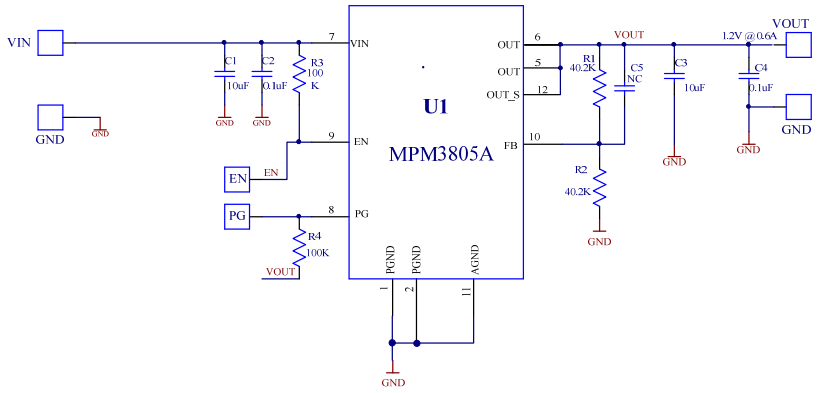
Board Number	MPS IC Number
EVM3805A-QB-00A	MPM3805AGQB

Efficiency vs. Load

V_{OUT}=1.2V



EVALUATION BOARD SCHEMATIC



V_{OUT} (V)	R1 (kΩ)	R2 (kΩ)
1.0	40(1%)	60(1%)
1.2	40(1%)	40(1%)
1.8	60(1%)	30(1%)
2.5	80(1%)	25(1%)
3.3	80(1%)	17.7(1%)

EVM3805A-QB-00A BILL OF MATERIALS

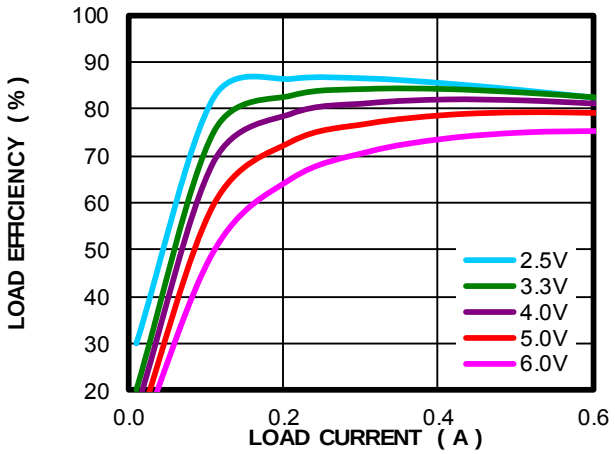
Qty	RefDes	Value	Description	Package	Manufacturer	Manufactuer_P/N
2	C_1, C_3	10uF	Ceramic Capacitor;16V;X5R	0805	muRata	GRM21BR61C106KE15L
2	C_2, C_4	0.1uF	Ceramic Capacitor;16V;X7R	0603	muRata	GRM188R71C104KA01D
1	C_5	NS	Ceramic Capacitor;16V;X7R	0603		
2	R1, R2	40.2k	Film Res.,1%	0603	Any	
2	R3, R4	100k	Film Res.,1%	0603	Any	
1	U1	MPM3805A	COT Buck	QFN3.0*2.5	MPS	MPM3805A-GQB
2	PG, EN	Test Point	TP1mm	Any	HZ	
4	VIN, GND, VOUT, GND	Test Point	2.0 Golden Pin	Any	HZ	

EVB TEST RESULTS

Performance waveforms are tested on the evaluation board. T_A = 25°C, unless otherwise noted.

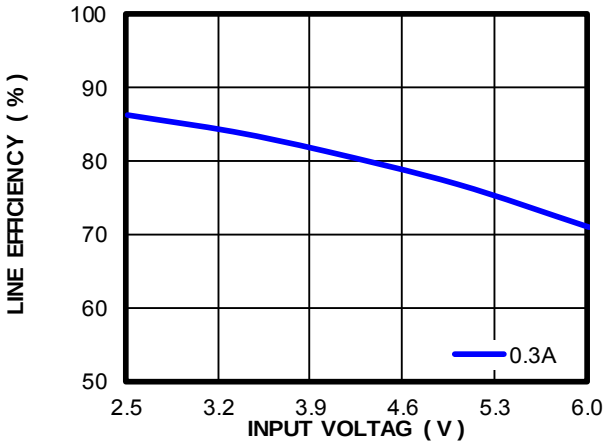
Efficiency vs. Load

V_{OUT}=1.2V



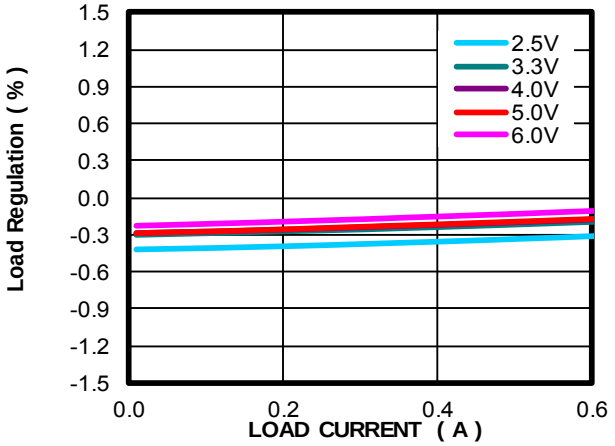
Efficiency vs. Input

V_{OUT}=1.2V



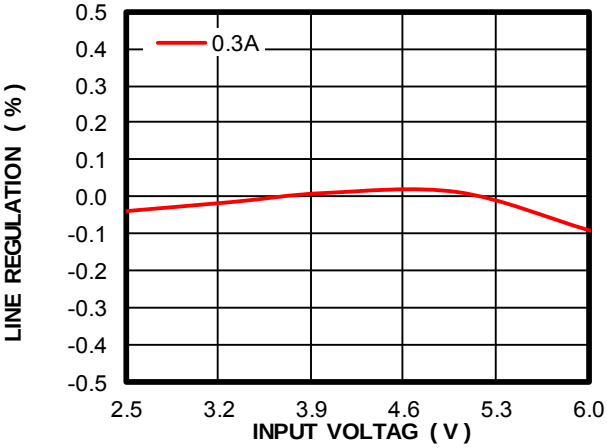
Load regulation

V_{OUT}=1.2V



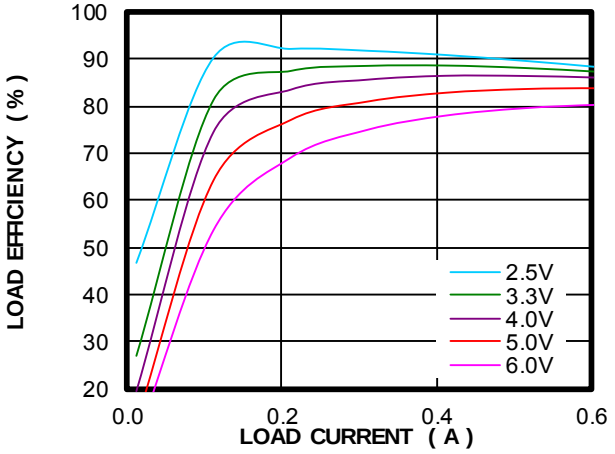
Line Regulation

V_{OUT}=1.2V



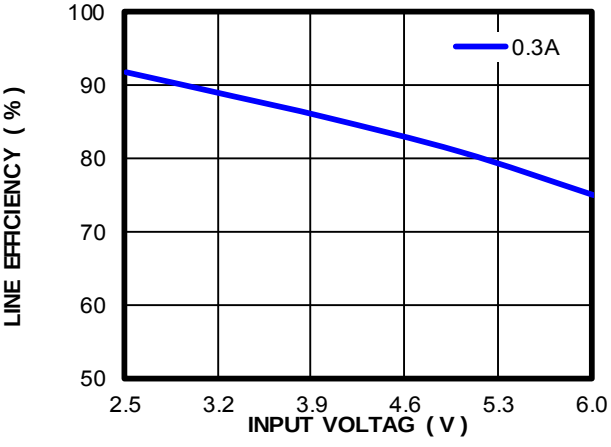
Efficiency vs. Load

V_{OUT}=1.8V



Efficiency vs. Input

V_{OUT}=1.8V

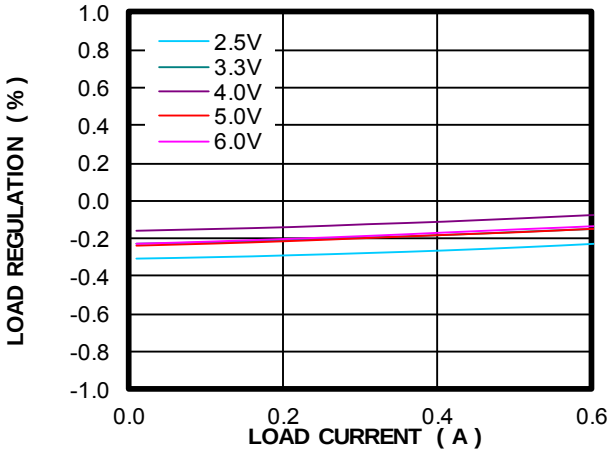


EVB TEST RESULTS

Performance waveforms are tested on the evaluation board. T_A = 25°C, unless otherwise noted.

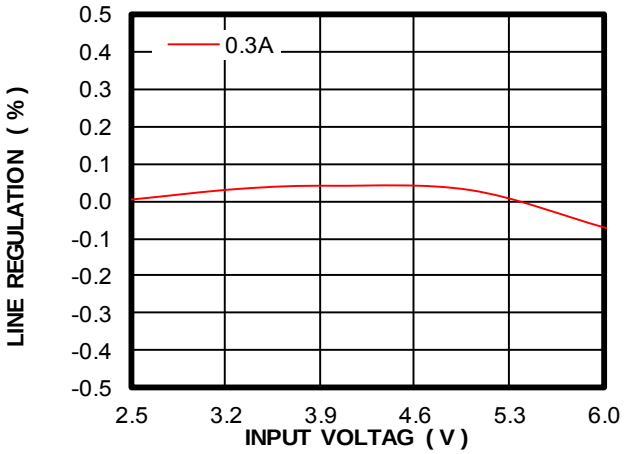
Load regulation

V_{OUT}=1.8V

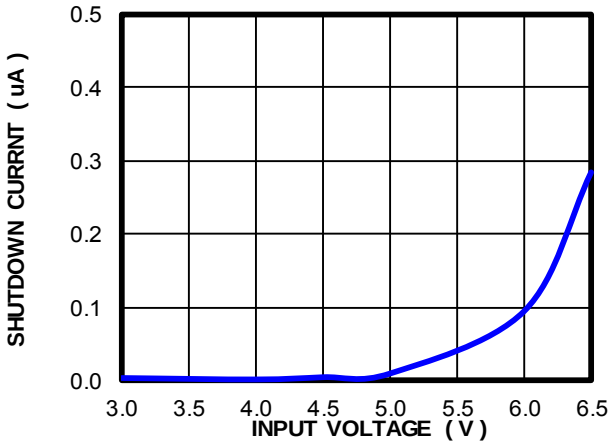


Line Regulation

V_{OUT}=1.8V



Shut Down Current vs. VIN

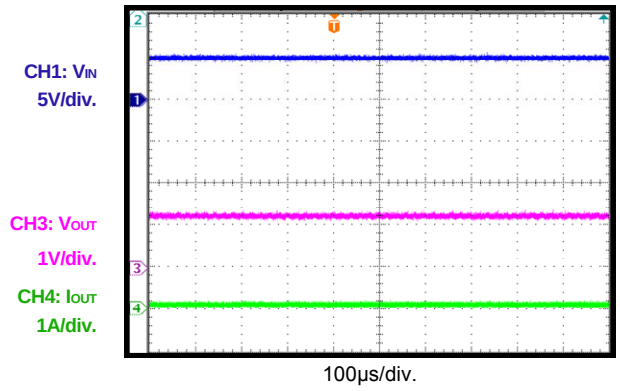


EVB TEST RESULTS

Performance waveforms are tested on the evaluation board. T_A = 25°C, unless otherwise noted.

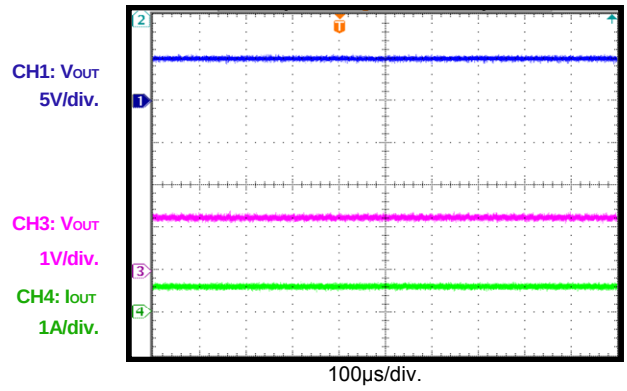
Steady State

V_{IN}=5V, V_{OUT}=1.2V, I_{OUT}=0.1A



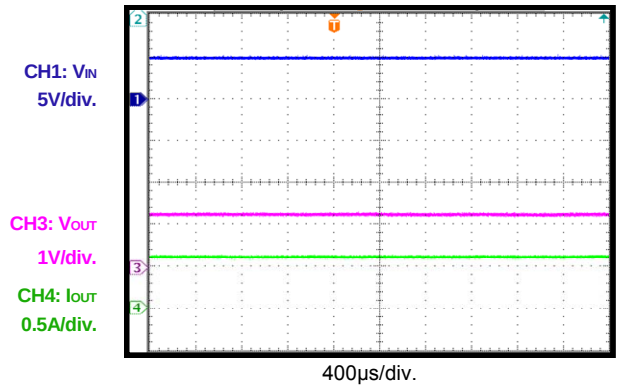
Steady State

V_{IN}=5V, V_{OUT}=1.2V, I_{OUT}=0.6A



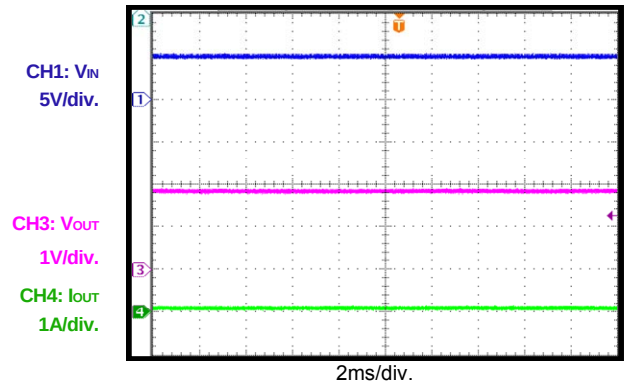
Steady State

V_{IN}=5V, V_{OUT}=1.8V, I_{OUT}=0.6A



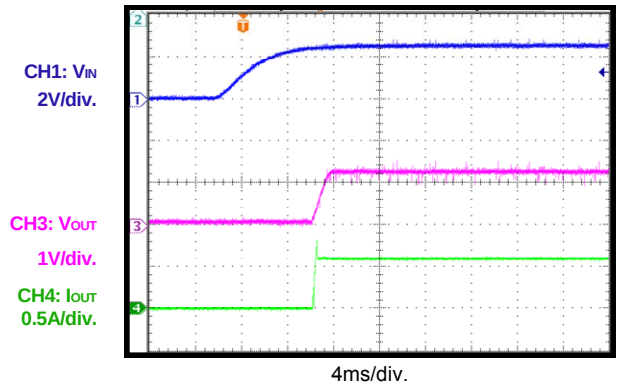
Steady State

V_{IN}=5V, V_{OUT}=1.8V, I_{OUT}=0.1A



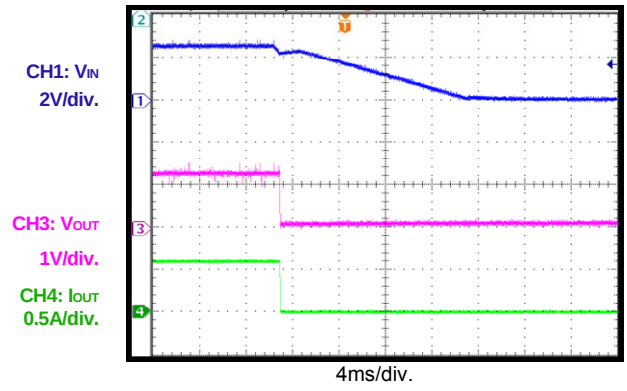
Power Up

V_{IN}=2.5V, V_{OUT}=1.2V, I_{OUT}=0.6A



Power Down

V_{IN}=2.5V, V_{OUT}=1.2V, I_{OUT}=0.6A

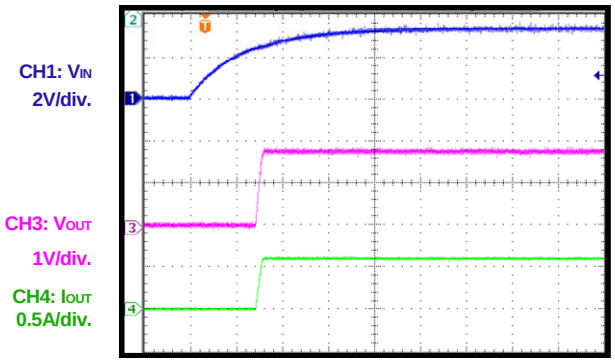


EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board. T_A = 25°C, unless otherwise noted.

Power Up

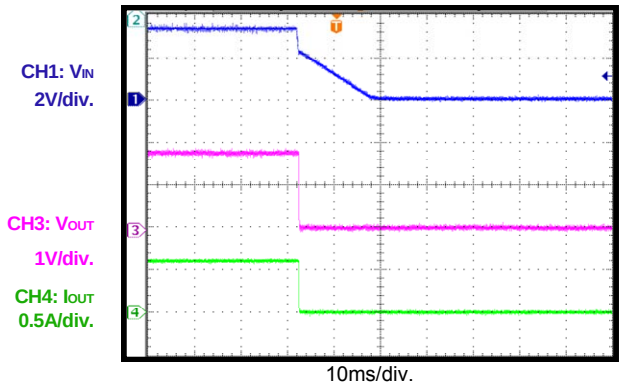
V_{IN}=3.3V, V_{OUT}=1.8V, I_{OUT}=0.6A



10ms/div.

Power Down

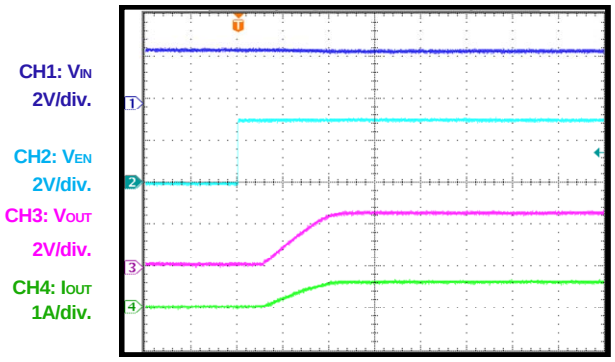
V_{IN}=3.3V, V_{OUT}=1.8V, I_{OUT}=0.6A



10ms/div.

Enable On

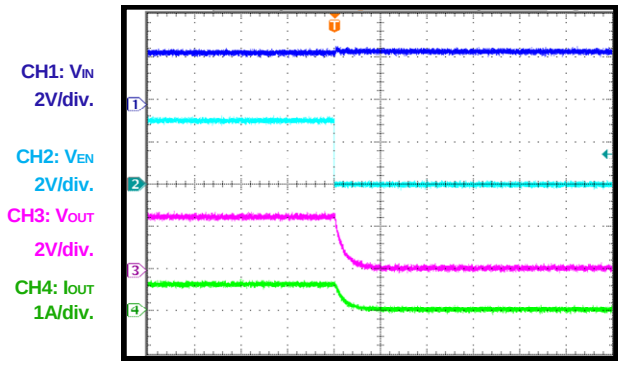
V_{IN}=2.5V, V_{OUT}=1.2V, I_{OUT}=0.6A



1ms/div.

Enable Off

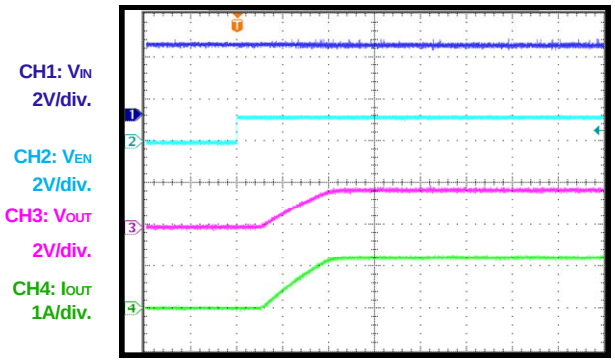
V_{IN}=2.5V, V_{OUT}=1.2V, I_{OUT}=0.6A



100µs/div.

Enable On

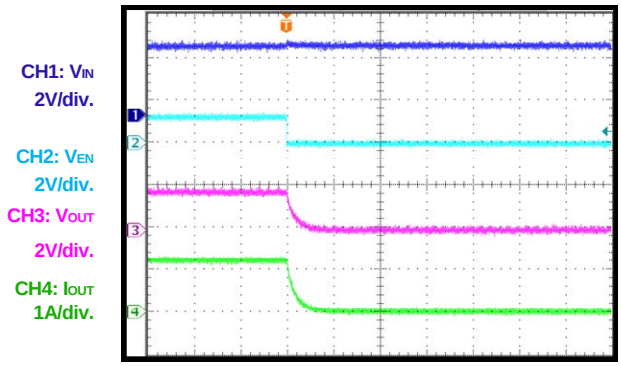
V_{IN}=3.3V, V_{OUT}=1.8V, I_{OUT}=0.6A



1ms/div.

Enable Off

V_{IN}=3.3V, V_{OUT}=1.8V, I_{OUT}=0.6A



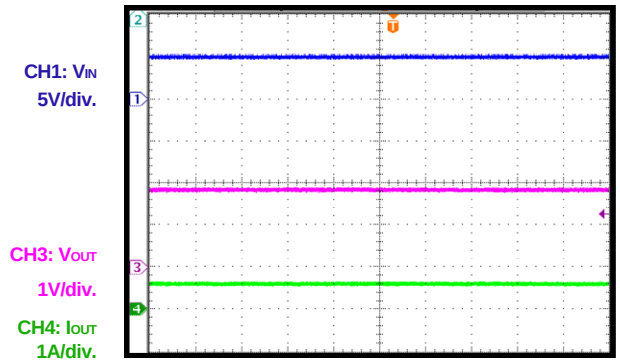
200µs/div.

EVB TEST RESULTS *(continued)*

T_A = 25°C, unless otherwise noted.

Steady State

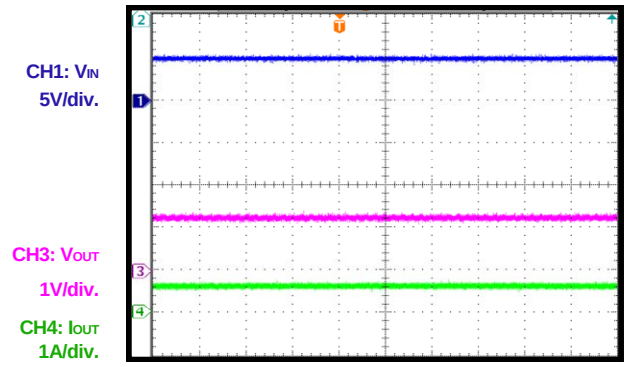
V_{IN}=5V, V_{OUT}=1.8V, I_{OUT}=0.6A



2ms/div.

Steady State

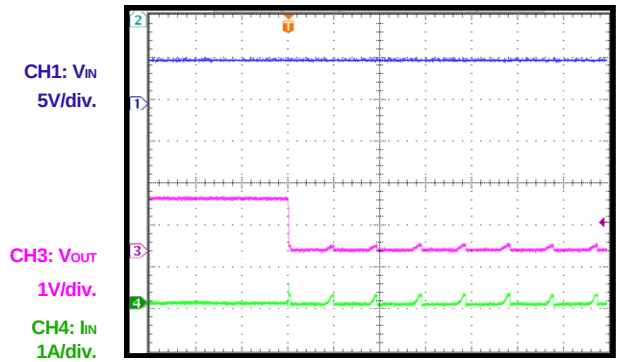
V_{IN}=5V, V_{OUT}=1.2V, I_{OUT}=0.6A



100µs/div.

Short Circuit

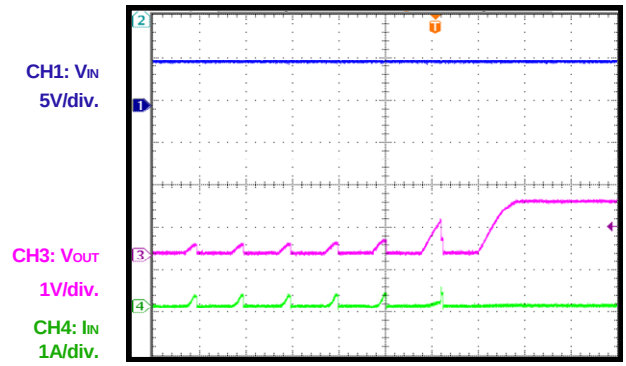
V_{IN}=5V, V_{OUT}=1.2V



2ms/div.

Short Circuit Recovery

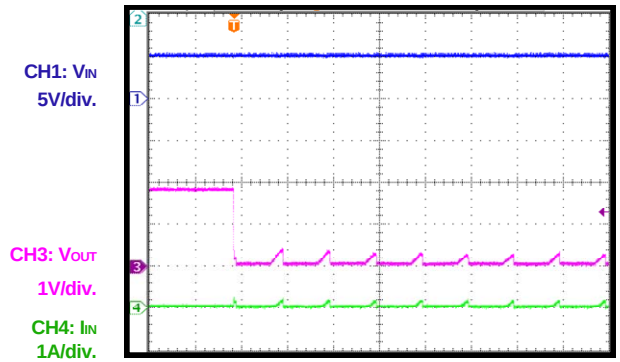
V_{IN}=5V, V_{OUT}=1.2V



2ms/div.

Short Circuit Entry

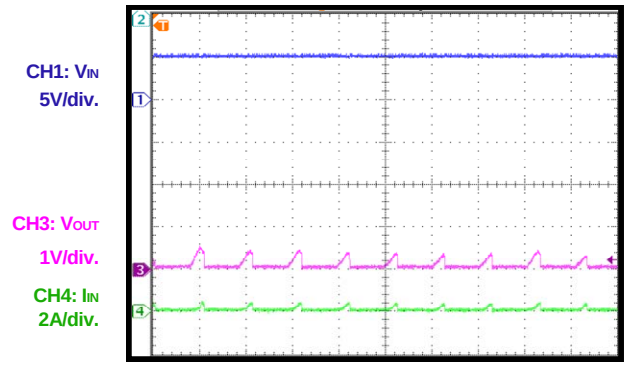
V_{IN}=5V, V_{OUT}=1.8V



2ms/div.

Short Circuit

V_{IN}=5V, V_{OUT}=1.8V



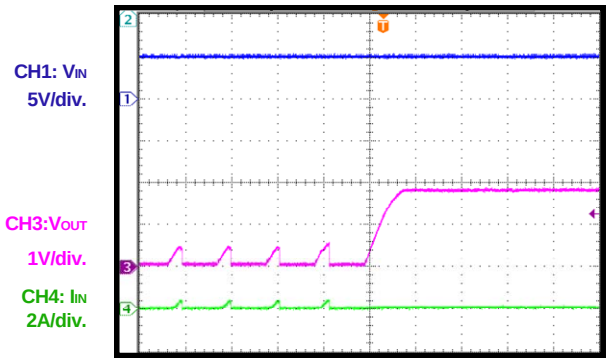
2ms/div.

EVB TEST RESULTS *(continued)*

T_A = 25°C, unless otherwise noted.

Short Circuit Recovery

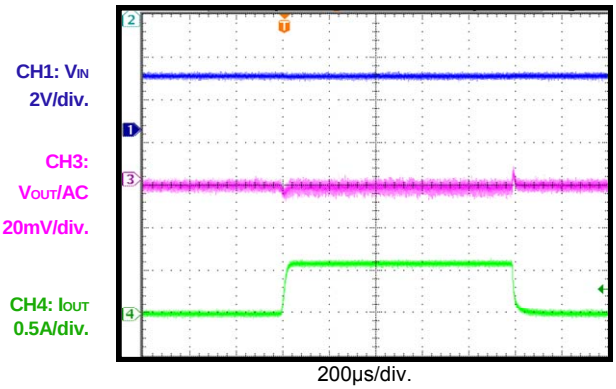
V_{IN}=5V, V_{OUT}=1.2V



2ms/div.

Transient Response

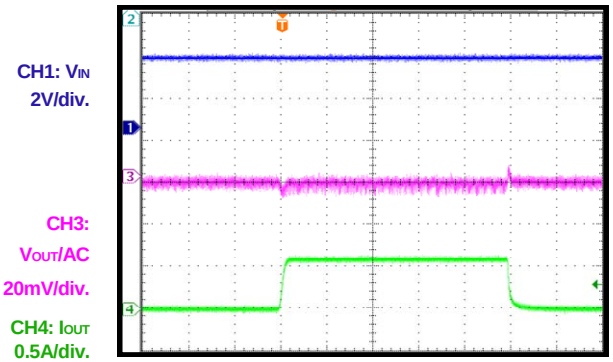
V_{IN}=2.5V, V_{OUT}=1.2V, I_{OUT}=0A-0.6A, 0.25A/us



200µs/div.

Transient Response

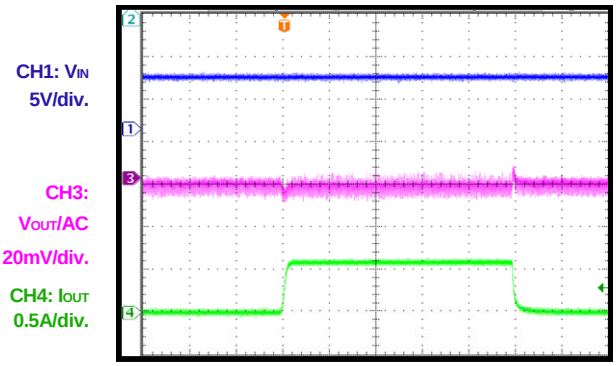
V_{IN}=3.3V, V_{OUT}=1.2V, I_{OUT}=0A-0.6A, 0.25A/us



200µs/div.

Transient Response

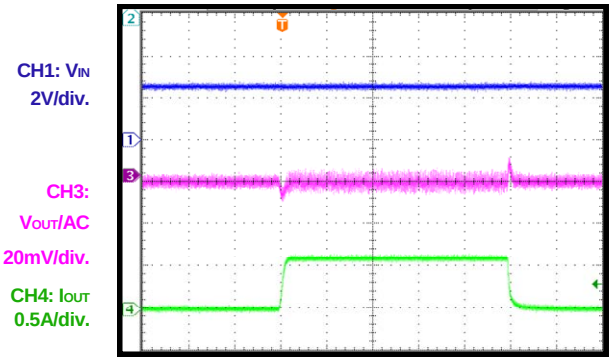
V_{IN}=6V, V_{OUT}=1.2V, I_{OUT}=0A-0.6A, 0.25A/us



200µs/div.

Transient Response

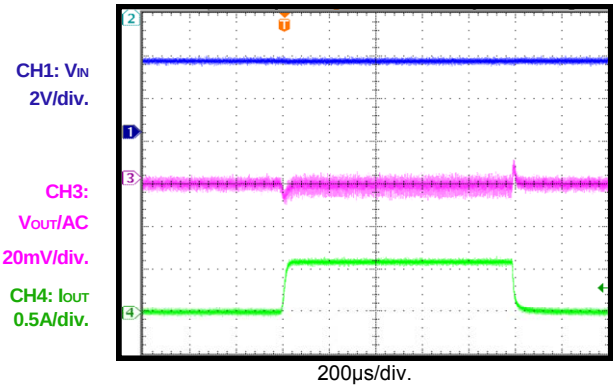
V_{IN}=2.5V, V_{OUT}=1.8V, I_{OUT}=0A-0.6A, 0.25A/us



200µs/div.

Transient Response

V_{IN}=3.3V, V_{OUT}=1.8V, I_{OUT}=0A-0.6A, 0.25A/us



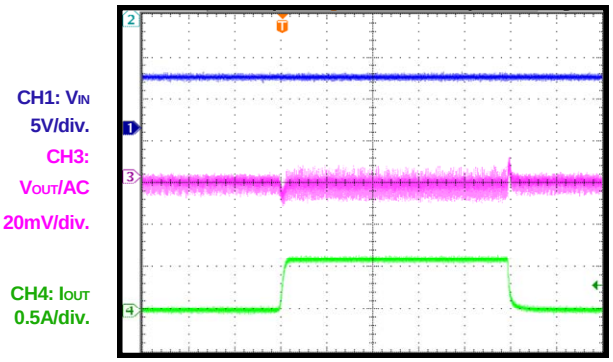
200µs/div.

EVB TEST RESULTS *(continued)*

T_A = 25°C, unless otherwise noted.

Transient Response

V_{IN}=6V, V_{OUT}=1.8V, I_{OUT}=0A-0.6A, 0.25A/us



PRINTED CIRCUIT BOARD LAYER

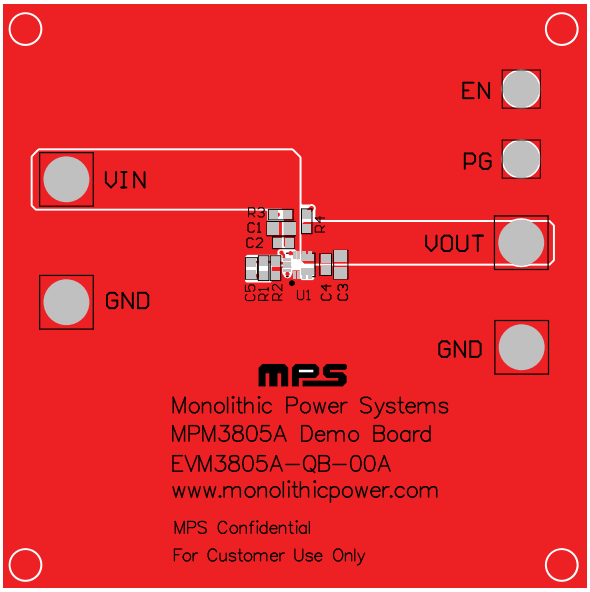


Figure 1: Top Silk Layer

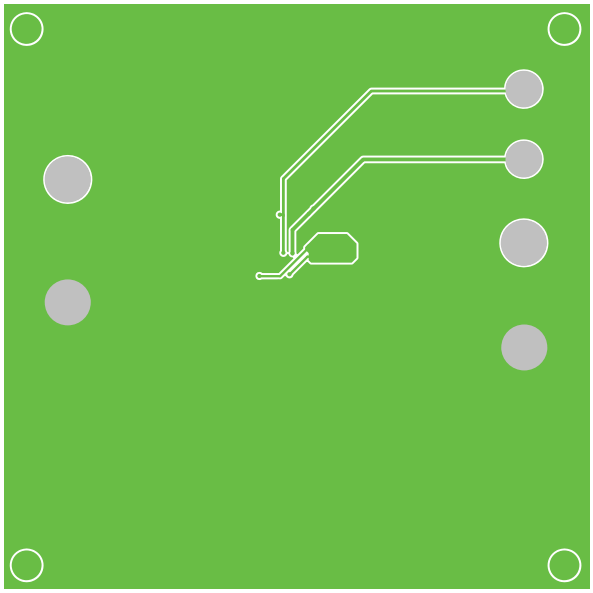


Figure 2: Bottom Layer