EV2349-G-00A

24V, 6.5A,Low I_Q Step-Down Converter Evaluation Board

DESCRIPTION

The EV2349-G-00A is an evaluation board for MP2349, a fully integrated high frequency synchronous rectified step-down switch mode converter. It offers super compact solution to achieve 6.5A continuous output current and 7.5A peak output current over a wide input supply range.

The MP2349 operates at high efficiency over a wide output current load rang based on MPS proprietary switching loss reduction tech and internal Low Ron Power MOSFETs. Adaptive Constant-On-Time (COT) control mode provides fast transient response and eases loop stabilization. The DC auto tune loop combined with the remote differential sense provides good load and line regulation.

Full protection features include OCP, OVP, UVP and thermal shut down.

The converter requires minimum number of external components and is available in QFN-11 (2mmx2mm) package.

ELECTRICAL SPECIFICATION (1)

Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	8 to 24	V
Output Voltage	V_{OUT}	3.3	V
Continuous Output Current	I_{OUT}	6.5	A
Peak Output Current	I_{OUT}	7.5	A

Notes:

1) For different Input/output voltage specs and different output capacitor/inductor may need change the application circuit parameters.

FEATURES

- Wide 4.5V to 24V Operating Input Range
- 105μA low quiescent Current
- 6.5A Continuous Output Current
- 7.5A Peak Output Current
- Adaptive COT for Fast transient
- DC Auto Tune Loop and Remote Differential sense
- Low R_{DS}(ON) Internal Power MOSFETs
- Proprietary Switching Loss Reduction Technique
- Forced PWM, Auto PFM/PWM and Ultra-sonic Mode Selectable
- Fixed 700kHz Switching Frequency
- Stable with POSCAP and Ceramic Cap
- Internal Soft Start
- Output Discharge
- OCP, OVP, UVP and Thermal Shutdown with Auto Retry
- QFN-11(2mm x 2mm) Package

APPLICATIONS

- Security Cameras
- Portable Device, XDSL Device
- Digital Set-Top Boxes
- Flat-Panel Television and Monitors
- General Purposes

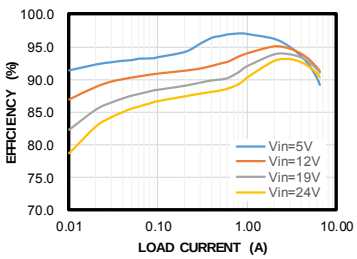
EV2349-G-00A EVALUATION BOARD

(L x W) 64mm x 64mm

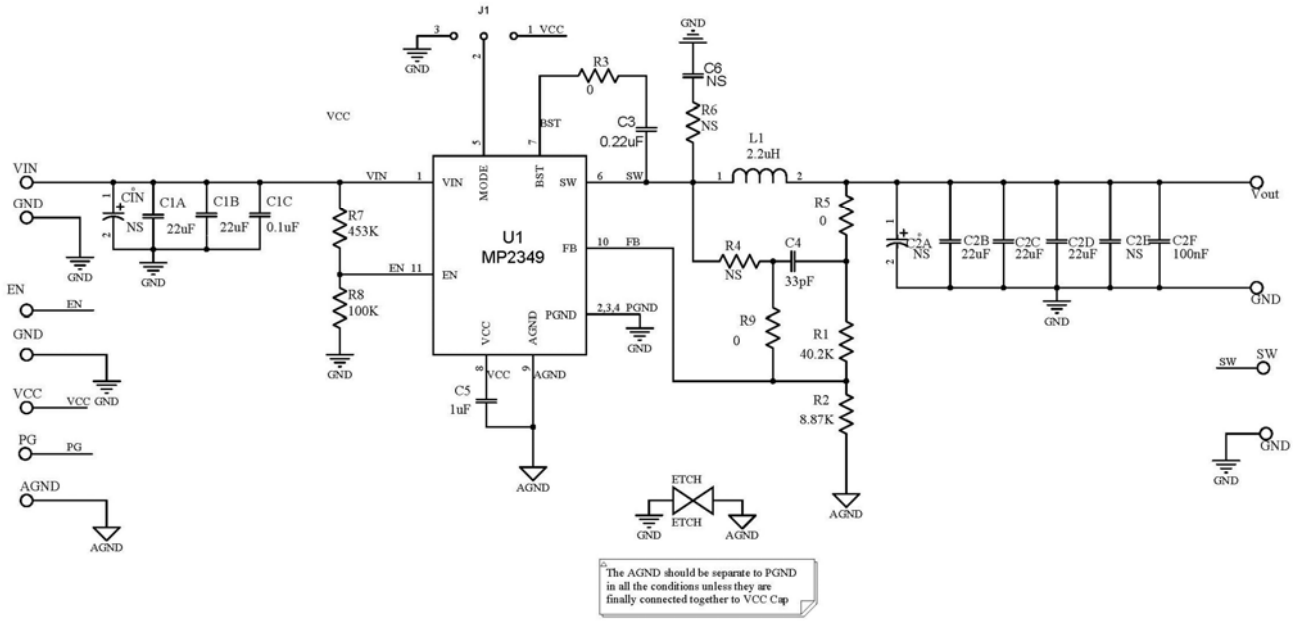
Board Number	MPS IC Number
EV2349-G-00A	MP2349GG

Efficiency

V_{OUT}=3.3V,L=2.2μH,DCR=12mΩ, PFM WITHOUT USM



EVALUATION BOARD SCHEMATIC (2)



Notes:

2) EN resistor divider sets the VIN rising threshold to 7.5V. For 5V input application, change R7 to 200K.

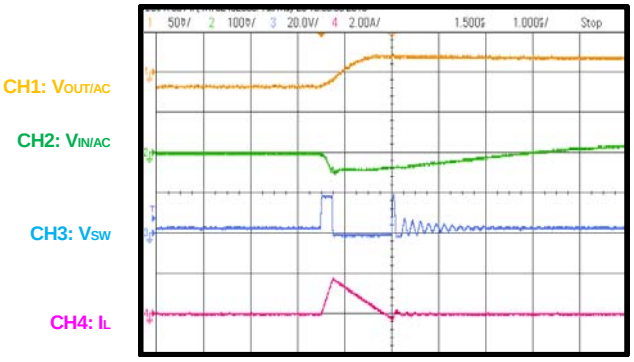
EV2349-G-00A BILL OF MATERIALS

Qty	Des	Value	Description	Package	Manufacture	Manufacture_PN
2	C1A, C1B	22μF	Ceramic Capacitor;25V;X5R;	1206	muRata	GRM31CR61E226KE15L
1	C1C	0.1μF	Ceramic Capacitor;25V;X7R;	0603	muRata	GRM188R71E104KA01D
3	C2B, C2C, C2D	22μF	Ceramic Capacitor;16V;X5R;	0805	muRata	GRM21BR61C226ME44L
0	CIN,C2A, C2E,C2F, C6	NS				
1	C3	0.22μF	Ceramic Capacitor;16V;X7R	0603	muRata	GRM188R71C224KA01D
1	C4	33pF	Ceramic Cap.,50V,C0G	0603	muRata	GRM1885C1H330JA01D
1	C5	1μF	Ceramic Capacitor;16V;X7R	0603	muRata	GRM188R71C105KE15D
1	R1	40.2k	Film Res,1%	0603	Yageo	RC0603FR-0740K2L
1	R2	8.87k	Film Res,1%	0603	Yageo	RC0603FR-078K87L
3	R3,R5,R9,	0R	Film Res,1%	0603	Yageo	RC0603FR-070RL
0	R4,R6	NS				
1	R8	100k	Film Res,1%	0603	Yageo	RC0603FR-07100KL
1	R7	453k	Film Res,1%	0603	Yageo	RC0603FR-07453KL
1	L1	2.2μH	Inductor, RDC=12mΩ Isat=14A	SMD	Wurth	74437349022
1	U1	MP2349	Synchronous Step-Down Converter	QFN2*2	MPS	MP2349GG

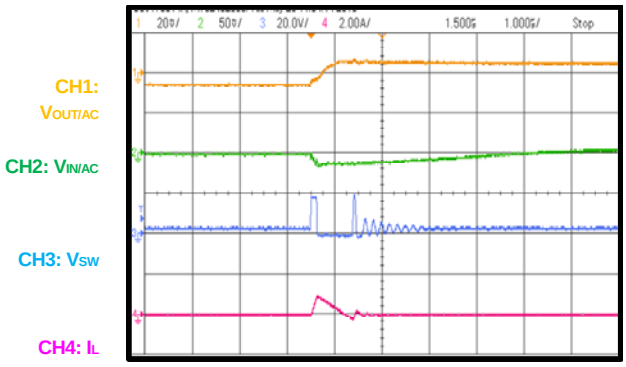
EVB TEST RESULTS

V_{IN} =19V, V_{OUT} =3.3V, L = 2.2µH, T_A = +25°C, PFM without USM, unless otherwise noted.

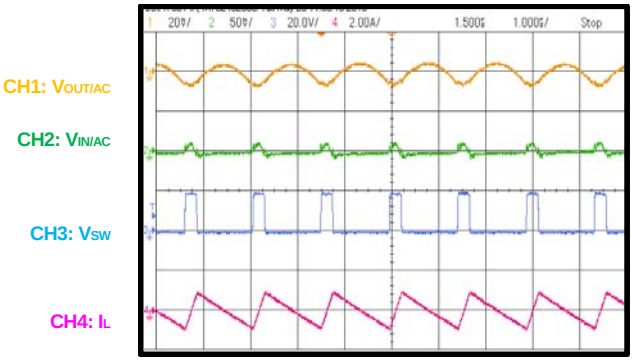
Input/Output Ripple
I_{OUT}=0A, PFM without USM



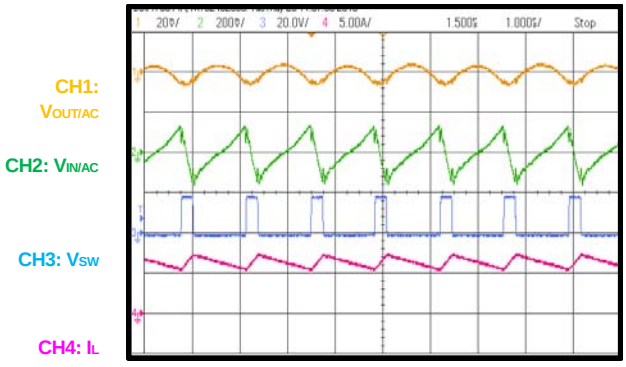
Input/Output Ripple
I_{OUT}=0A, USM



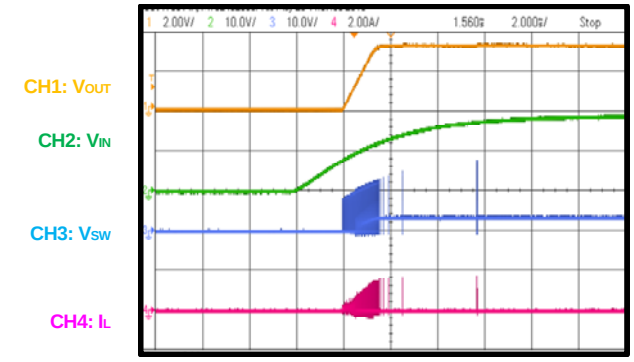
Input/Output Ripple
I_{OUT}=0A, Force CCM



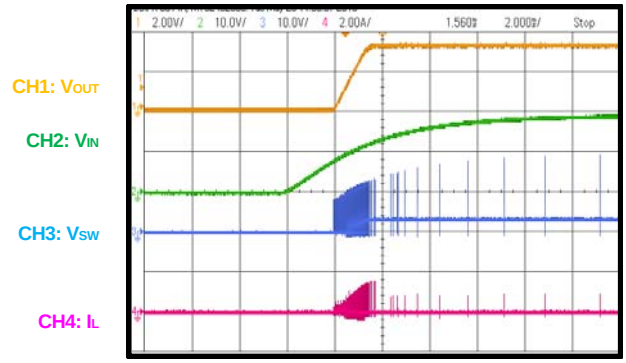
Input/Output Ripple
I_{OUT}=6.5A



Startup through Input Voltage
I_{OUT}=0A, PFM without USM



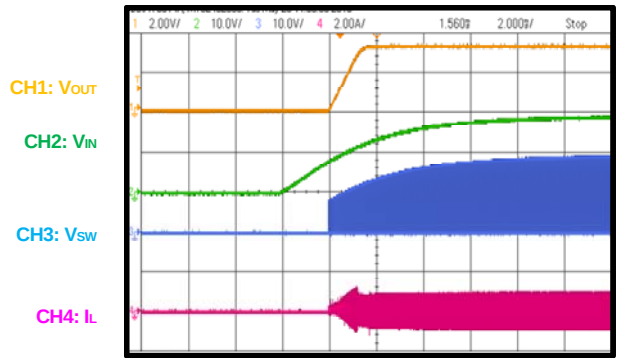
Startup through Input Voltage
I_{OUT}=0A, USM



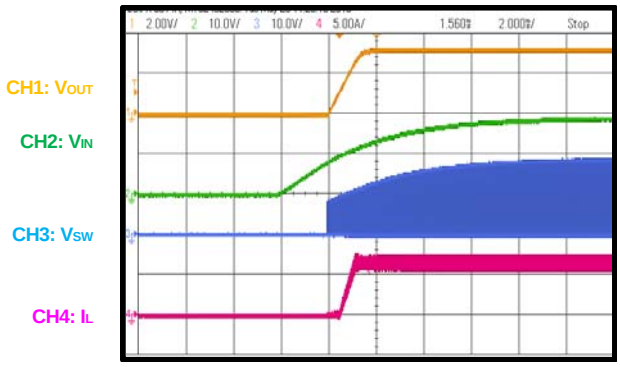
EVB TEST RESULTS *(continued)*

V_{IN} =19V, V_{OUT} =3.3V, L = 2.2µH, T_A = +25°C, PFM without USM, unless otherwise noted.

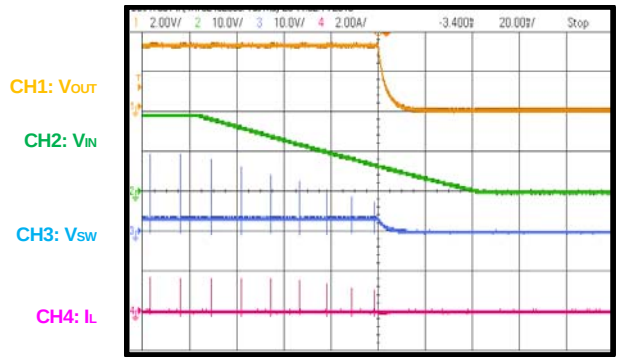
Startup through Input Voltage
I_{OUT}=0A, Force CCM



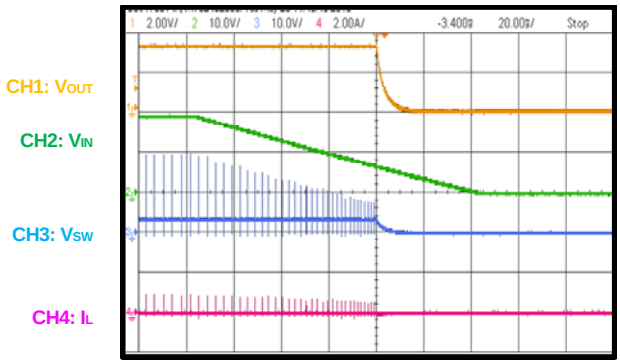
Startup through Input Voltage
I_{OUT}=6.5A



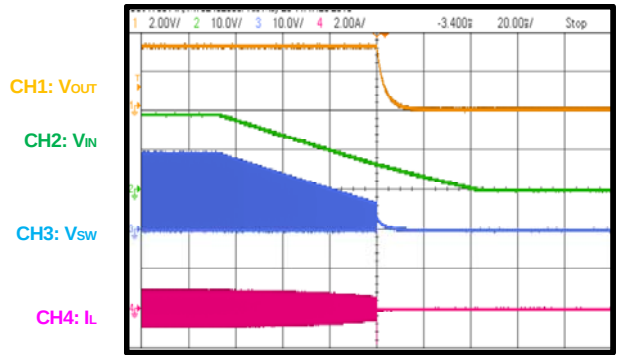
Shutdown through Input Voltage
I_{OUT}=0A, PFM without USM



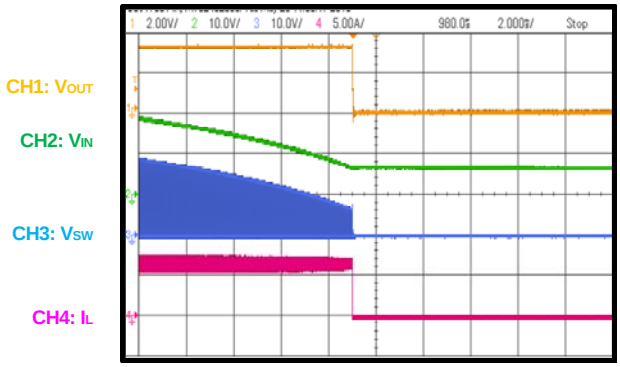
Shutdown through Input Voltage
I_{OUT}=0A, USM



Shutdown through Input Voltage
I_{OUT}=0A, Force CCM



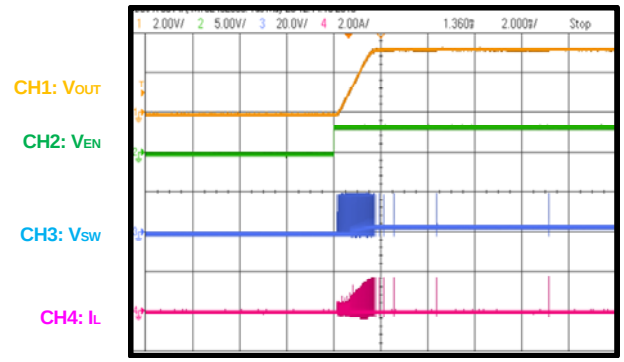
Shutdown through Input Voltage
I_{OUT}=6.5A



EVB TEST RESULTS *(continued)*

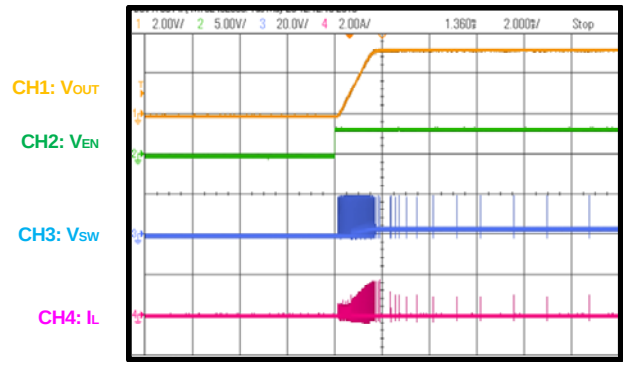
V_{IN} =19V, V_{OUT} =3.3V, L = 2.2µH, T_A = +25°C, PFM without USM, unless otherwise noted.

Startup through Enable
I_{OUT}=0A, PFM without USM

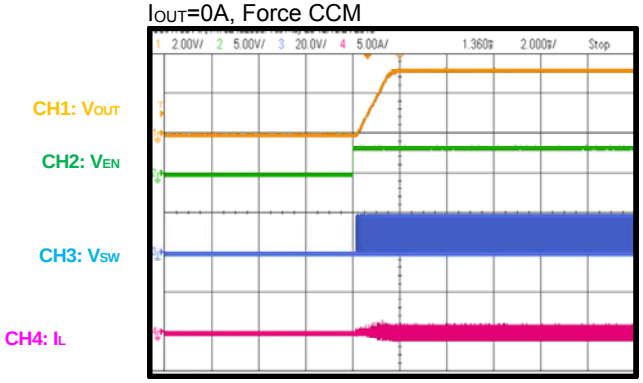


100µs/div.

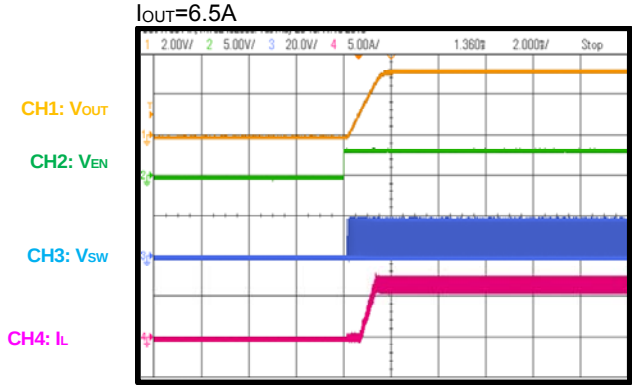
Startup through Enable
I_{OUT}=0A, USM



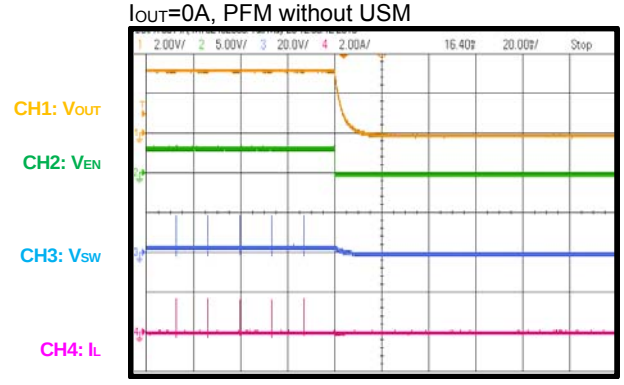
Startup through Enable
I_{OUT}=0A, Force CCM



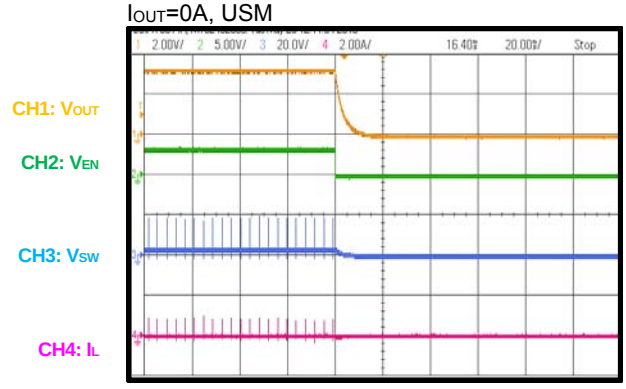
Startup through Enable
I_{OUT}=6.5A



Shutdown through Enable
I_{OUT}=0A, PFM without USM



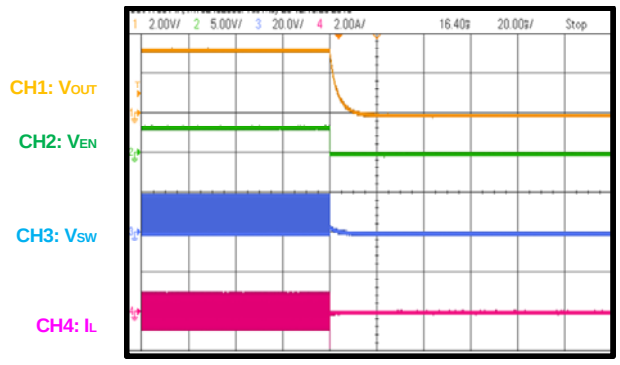
Shutdown through Enable
I_{OUT}=0A, USM



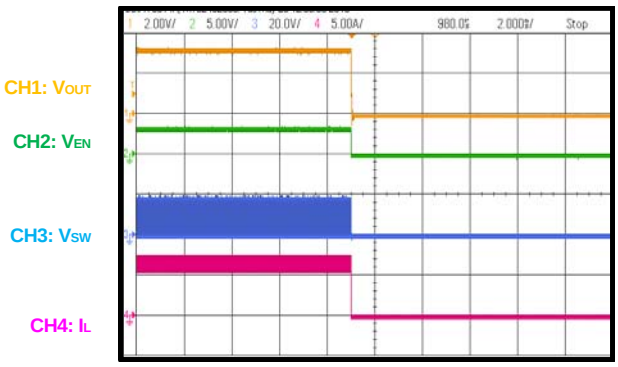
EVB TEST RESULTS *(continued)*

V_{IN} =19V, V_{OUT} =3.3V, L = 2.2µH, T_A = +25°C, PFM without USM, unless otherwise noted.

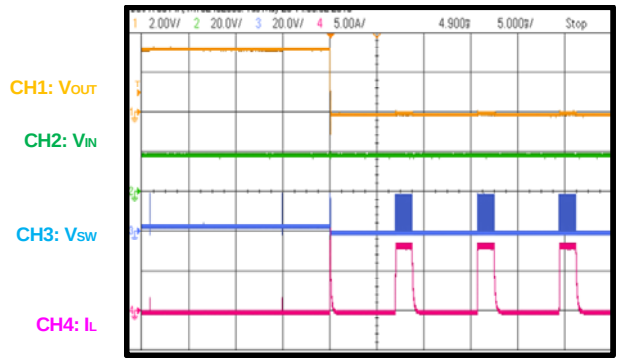
Shutdown through Enable
I_{OUT}=0A, Force CCM



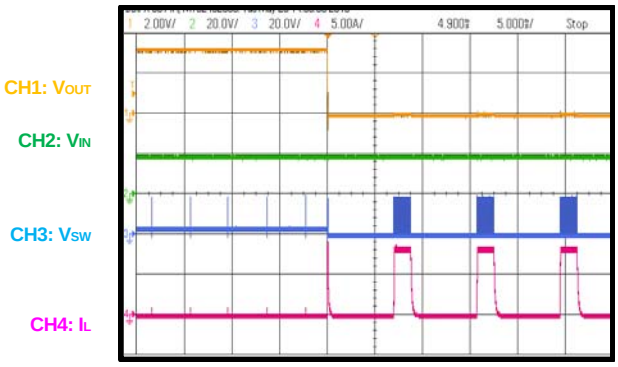
Shutdown through Enable
I_{OUT}=6.5A



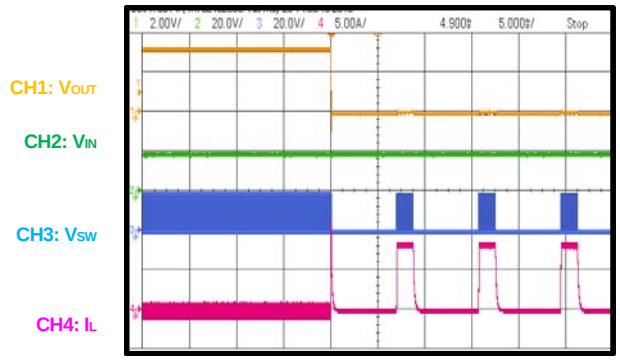
Short Circuit Protection Entry
I_{OUT}=0A, PFM without USM



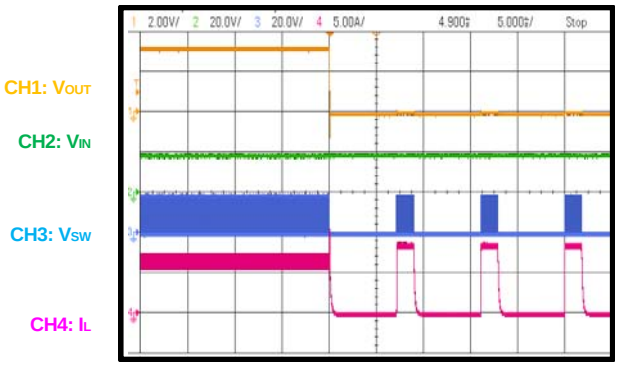
Short Circuit Protection Entry
I_{OUT}=0A, USM



Short Circuit Protection Entry
I_{OUT}=0A, Force CCM



Short Circuit Protection Entry
I_{OUT}=6.5A

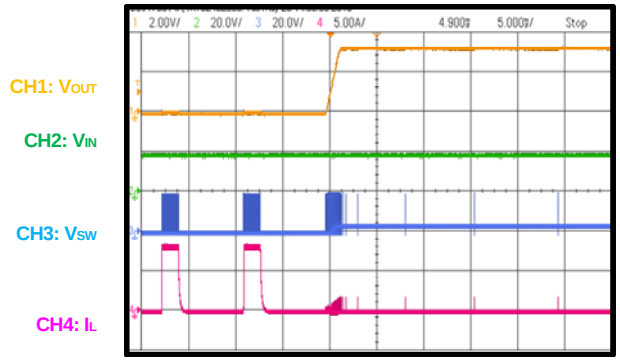


EVB TEST RESULTS *(continued)*

V_{IN} =19V, V_{OUT} =3.3V, L = 2.2µH, T_A = +25°C, PFM without USM, unless otherwise noted.

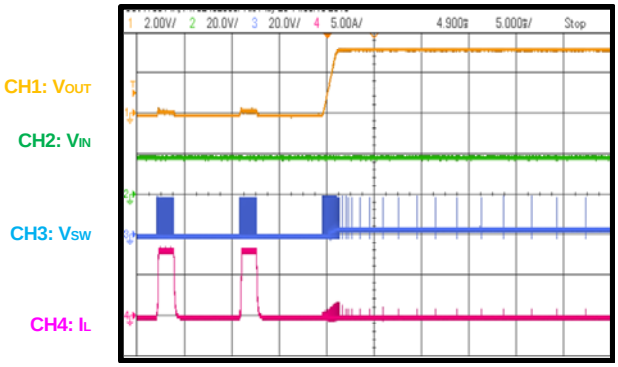
Short Circuit Protection Recovery

I_{OUT}=0A, PFM without USM



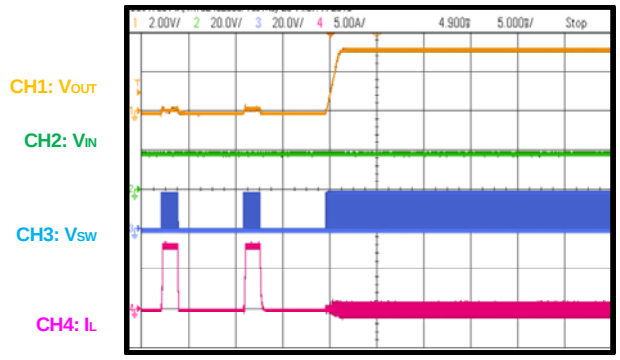
Short Circuit Protection Recovery

I_{OUT}=0A, USM



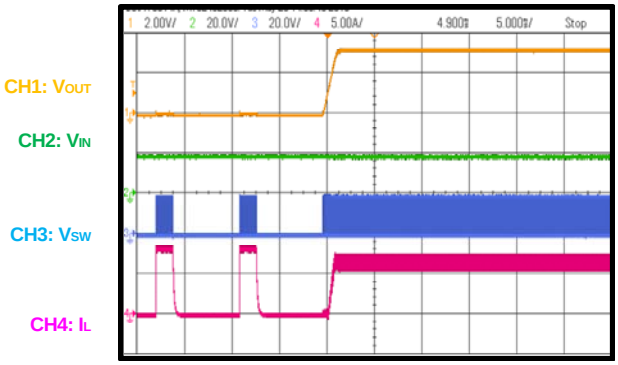
Short Circuit Protection Recovery

I_{OUT}=0A, Force CCM



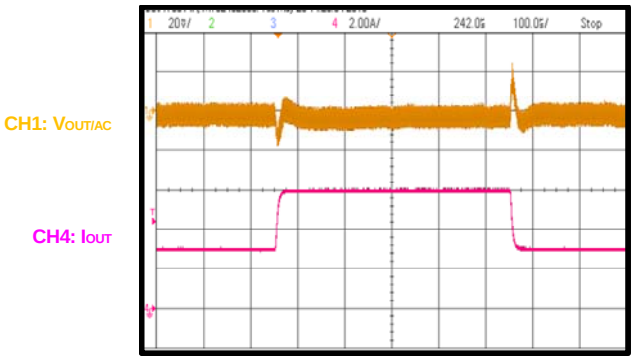
Short Circuit Protection Recovery

I_{OUT}=6.5A



Load Transient

I_{OUT}=3A to 6A



PRINTED CIRCUIT BOARD LAYOUT

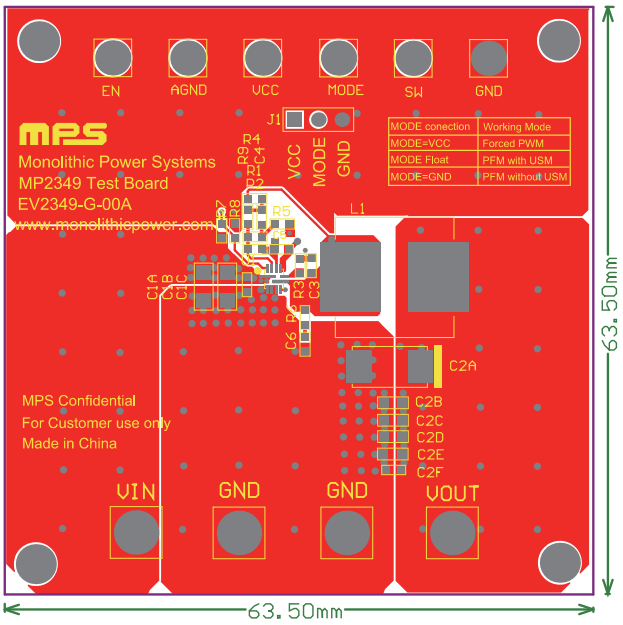


Figure 1—Top Layer and Silk

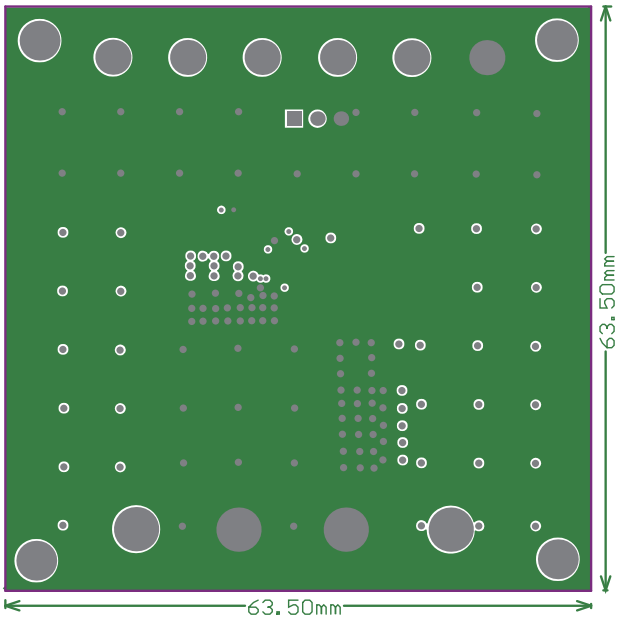


Figure 2—Inner Layer 1

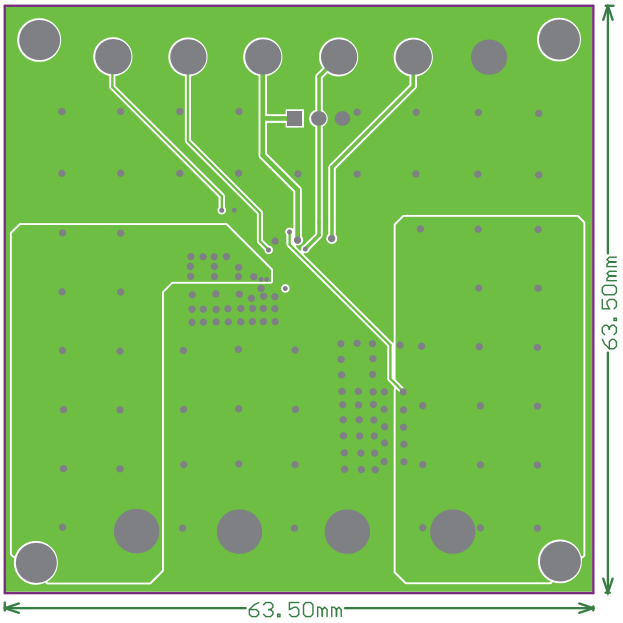


Figure 3—Inner Layer 2

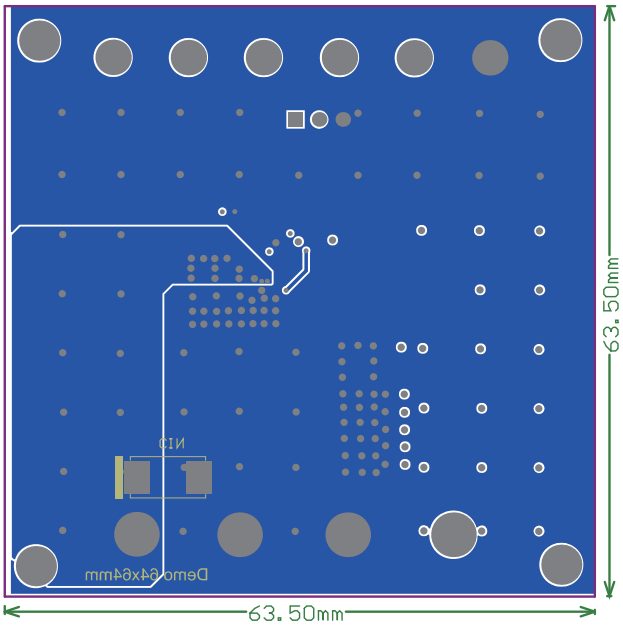


Figure 4—Bottom Layer and Silk

QUICK START GUIDE

1. Preset the input power supply output between 8V and 24V.
2. Turn off the input power supply.
3. Connect the positive and negative terminals of the load to the VOUT and GND pins, respectively.
4. Connect the positive and negative terminals of the input power supply output to the VIN and GND pins, respectively.
5. Turn input 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 1.4V to turn on the regulator, or less than 0.4V to turn it off. Do not make the EN voltage over 4.5V.