EV8765-Q-00A

24V, High Current Synchronous Step-down Converter Evaluation Board

The Future of Analog IC Technology

DESCRIPTION

The EV8765-Q-00A is an evaluation board for the MP8765GQ, a high efficiency monolithic synchronous step-down converter.

The Evaluation Board can deliver 6A continuous load current from a 5V to 24V input with excellent load and line regulation.

Constant-On-Time (COT) control mode provides fast transient response and eases loop stabilization.

The Evaluation Board can be turned on or shut down via a remote ON/OFF input that is reference to ground. This input is compatible with popular logic devices.

ELECTRICAL SPECIFICATION

Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	5 – 24	V
Output Voltage	V_{OUT}	1.05	V
Output Current	I_{OUT}	6	A
Switching Frequency	f_{SW}	500	kHz

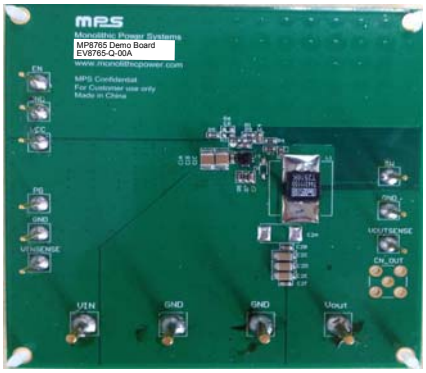
FEATURES

- Wide 5V to 24V Operating Input Range
- 6A Continous Output Current
- PFM/PWM Mode Selectable
- Low R_{DS}(ON) Internal Power MOSFETs
- Proprietary Switching Loss Reduction Technique
- 1% Reference Voltage
- Internal Soft Start
- Output Discharge
- 500kHz Switching Frequency
- OCP, OVP, UVP Protection and Thermal Shutdown
- Available in a QFN3x3 package

APPLICATIONS

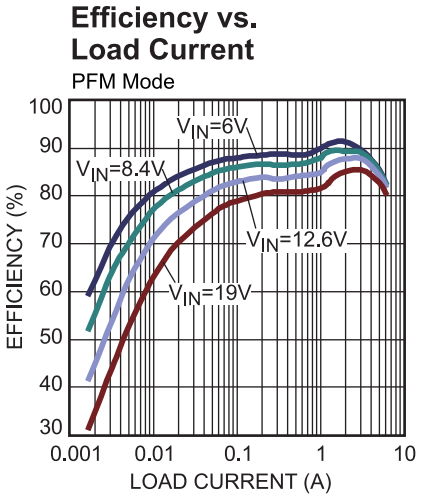
- Laptop Computer
- Tablet PC
- Networking Systems
- Personal Video Recorders
- Flat Panel Television and Monitors
- Distributed Power Systems

EV8765-Q-00A EVALUATION BOARD

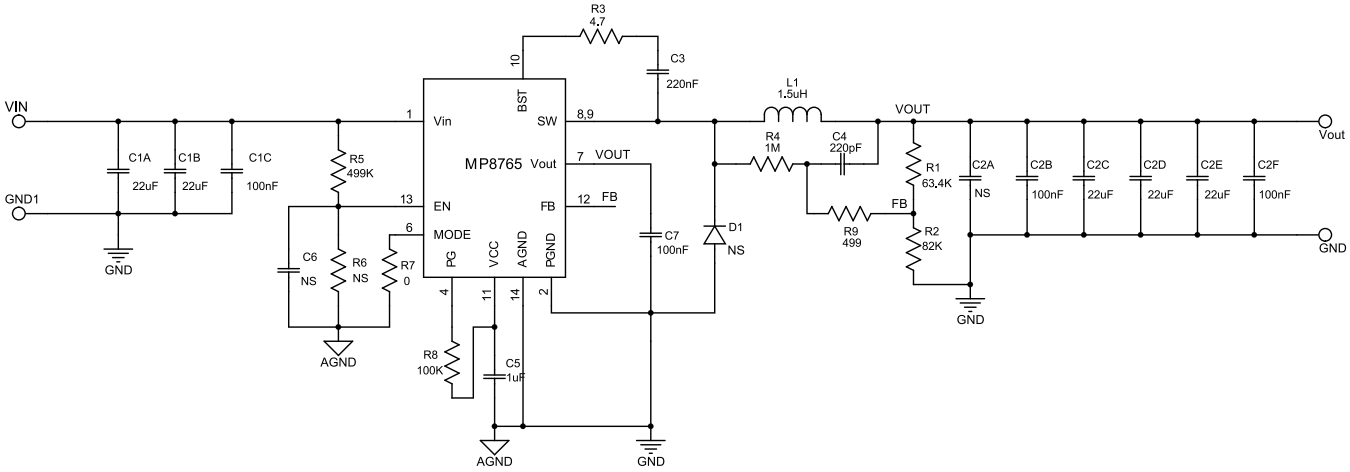


(L × W × H) 8.55cm × 8.55cm × 1.6cm

Board Number	MPS IC Number
EV8765-Q-00A	MP8765GQ



EVALUATION BOARD SCHEMATIC



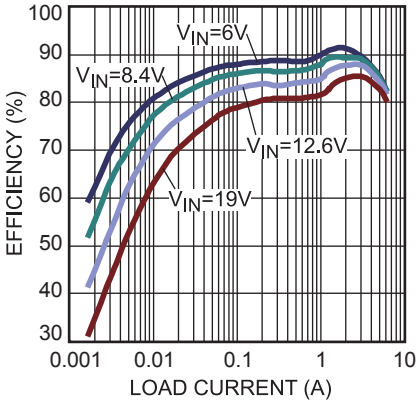
EV8765-Q-00A BILL OF MATERIALS

Qty.	Ref	Value	Description	Package	Manufacture	Manufacture_PN
2	C1A, C1B	22µF	Ceramic Capacitor; 25V;X5R;1210;	1210	muRata	GRM32ER61E226KE15L
1	C1C	100nF	Ceramic Capacitor; 50V;X7R;0603;	0603	muRata	GRM188R71H104KA93D
0	C2A	NS		POSCAP		
3	C2B, C2F, C7	100nF	Ceramic Capacitor; 16V;X7R;0603;	0603	muRata	GRM188R71C104KA01D
3	C2C, C2D, C2E	22µF	Ceramic Capacitor; 6.3V;X5R;1206	1206	muRata	GRM31CR60J226KE19
1	C3	220nF	Ceramic Capacitor; 16V;X7R;0603;	0603	muRata	GRM188R71C224KA01
1	C4	220pF	Ceramic Capacitor; 50V;X7R;0603;	0603	muRata	GRM188R71H221KA01D
1	C5	1µF	Ceramic Capacitor; 6.3V;X5R;0603	0603	muRata	GRM188R60J105KA01D
0	C6	NS		0603		
0	CN_OUT	NS	Connector			
0	D1	NS				
1	L1	1.5µH	Inductor;1.5µH;6.6mΩ; 14A	SMD	Wurth	744311150
1	R1	63.4k	Film Resistor;1%;	0603	Yageo	RC0603FR-0763K4L
1	R2	82k	Film Resistor;1%	0603	Yageo	RC0603FR-0782KL
1	R3	4.7	Film Resistor;5%;	0603	Yageo	RC0603JR-074R7L
1	R4	1M	Film Resistor;5%	0603	Any	
1	R5	499k	Film Resistor;1%;	0603	Yageo	RC0603FR-07499KL
0	R6	NS		0603		
1	R7	0	Film Resistor;5%	0603	Any	
1	R8	100k	Film Resistor;1%;	0603	Yageo	RC0603FR-07100KL
1	R9	499	Film Resistor;1%;	0603	Yageo	RC0603FR-07499RL
1	U1		Step down converter	QFN 3×3	MPS	MP8765GQ

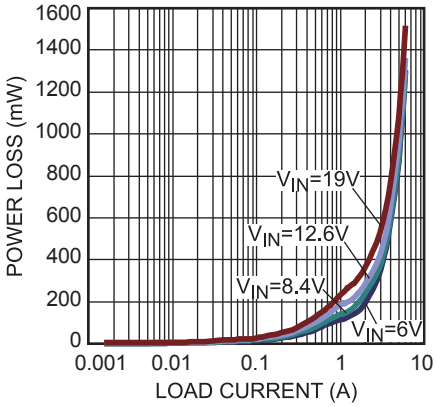
EVB TEST RESULTS

Performance waveforms are tested on the EV8765-Q-00A.
V_{IN} = 12V, V_{OUT} = 1.05V, L = 1.5µH, PFM mode, T_A = 25°C, unless otherwise noted.

Efficiency vs. Load Current



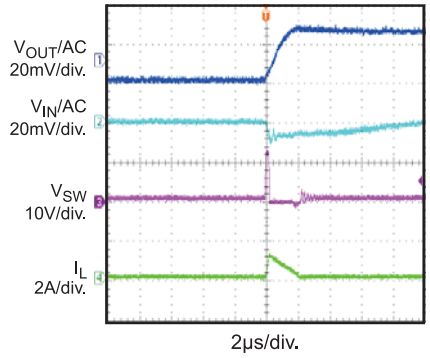
Power Loss vs. Load Current



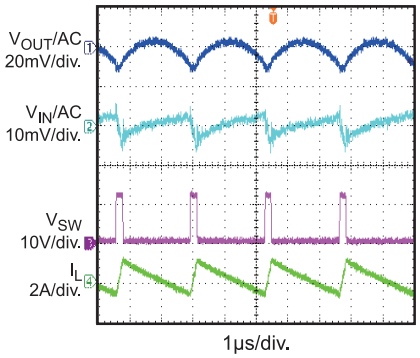
EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the EV8765-Q-00A.
V_{IN}=12V, V_{OUT} =1.05V, L=1.5µH, PFM mode, T_J=+25°C, unless otherwise noted.

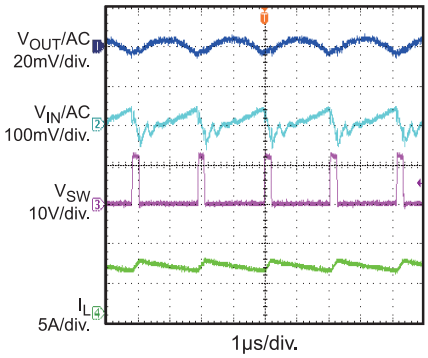
Input/Output Voltage Ripple
I_{OUT} = 0A



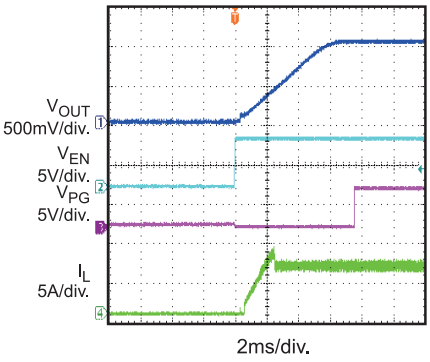
Input/Output Voltage Ripple
I_{OUT} = 0A, PWM Mode



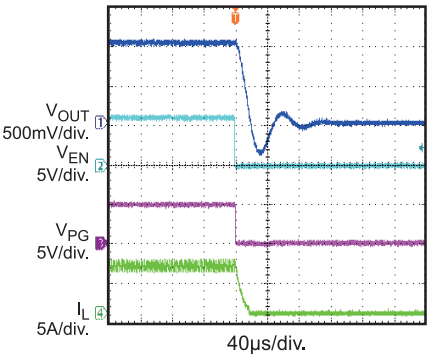
Input/Output Voltage Ripple
I_{OUT} = 6A



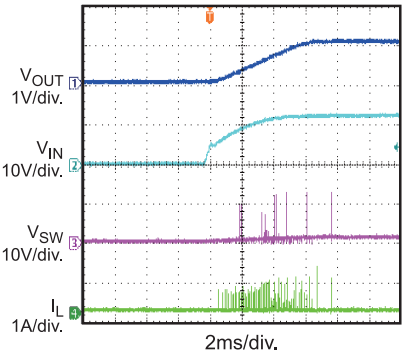
Power Good Through EN Start-Up
I_{OUT} = 6A



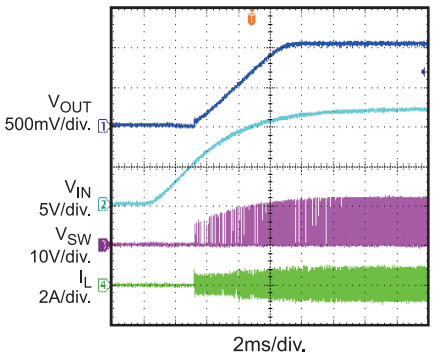
Power Good Through EN Shutdown
I_{OUT} = 6A



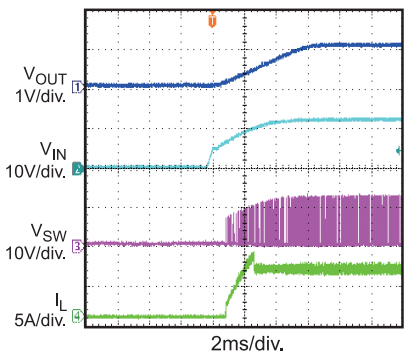
Start-Up Through V_{IN}
I_{OUT} = 0A



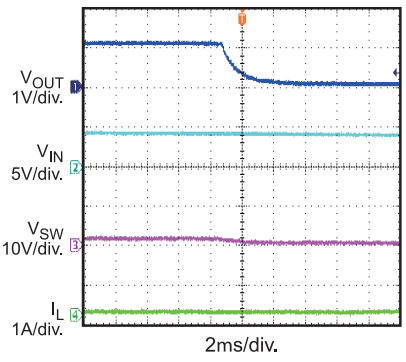
Start-Up Through V_{IN}
I_{OUT} = 0A, PWM Mode



Start-Up Through V_{IN}
I_{OUT} = 6A



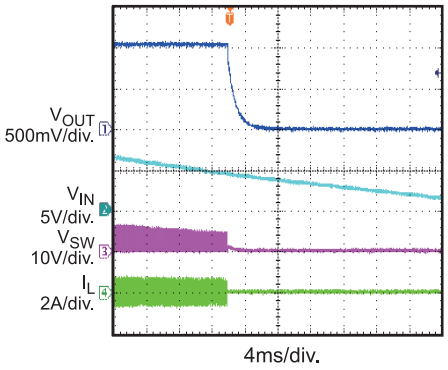
Shutdown Through V_{IN}
I_{OUT} = 0A



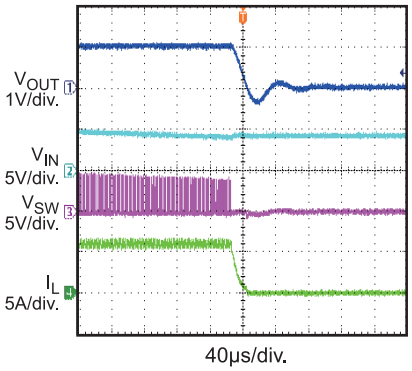
EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the EV8765-Q-00A.
V_{IN}=12V, V_{OUT} =1.05V, L=1.5µH, PFM Mode, T_J=+25°C, unless otherwise noted.

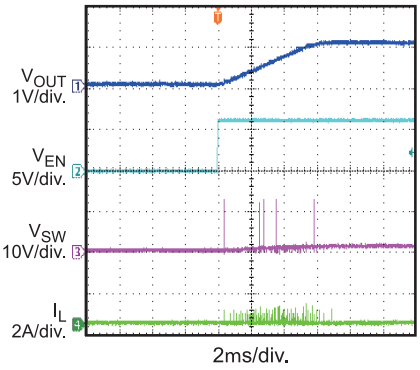
Shutdown Through V_{IN}
I_{OUT} = 0A, PWM Mode



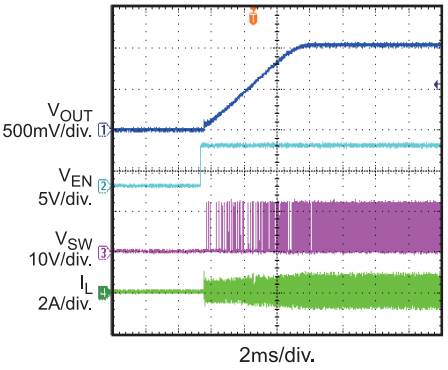
Shutdown Through V_{IN}
I_{OUT} = 6A



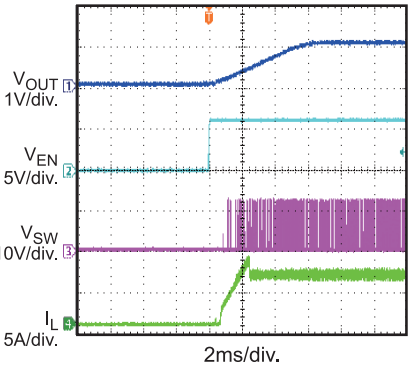
Start Up through EN
I_{OUT} = 0A



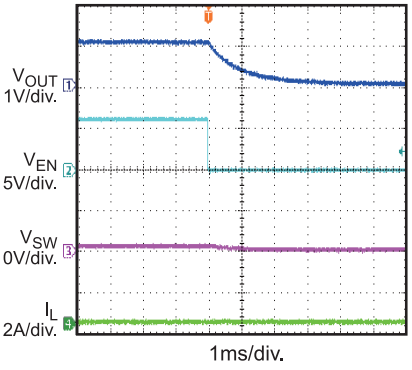
Start Up through EN
I_{OUT} = 0A, PWM Mode



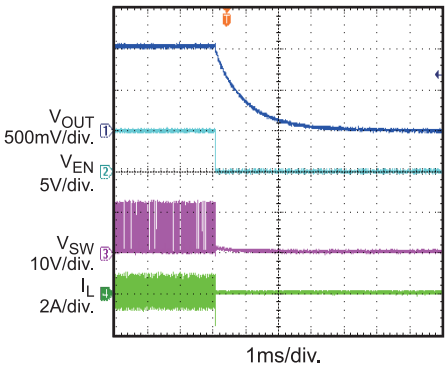
Start Up Through EN
I_{OUT} = 6A



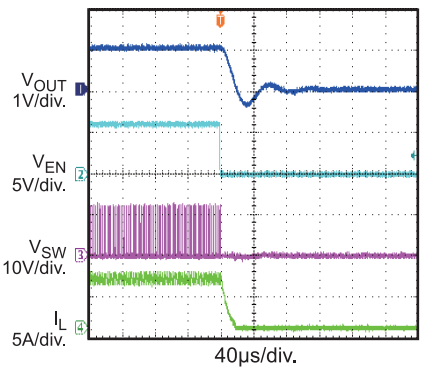
Shutdown Through EN
I_{OUT} = 0A



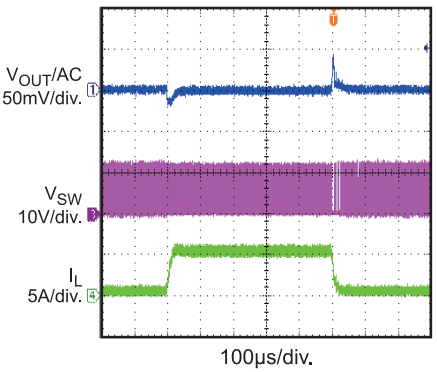
Shutdown Through EN
I_{OUT} = 0A, PWM Mode



Shutdown Through EN
I_{OUT} = 6A



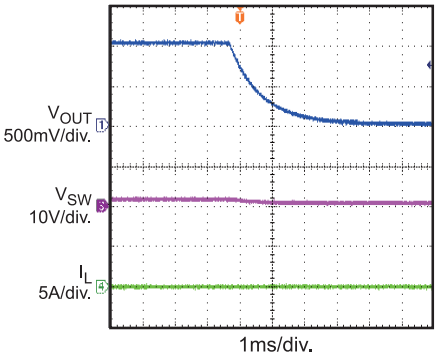
Transient
I_{OUT} = 0.6A-5.4A@2.5A/µs,
f_{SW}=500kHz, C_{OUT}=3x22µF



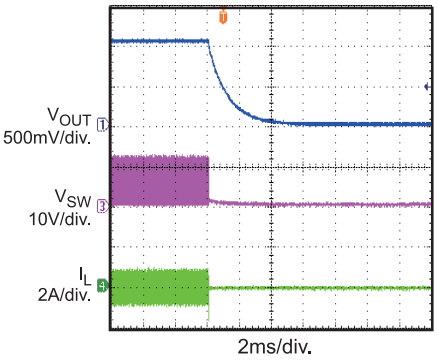
EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the EV8765-Q-00A.
V_{IN}=12V, V_{OUT} =1.05V, L=1.5µH, PFM Mode, T_J=+25°C, unless otherwise noted.

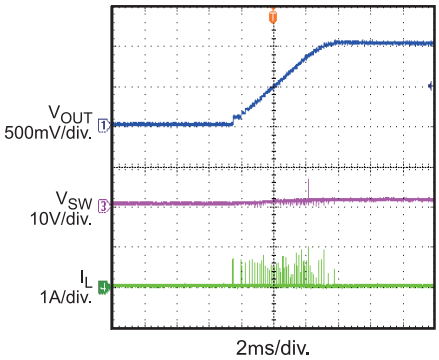
Thermal Shutdown
I_{OUT}=0A



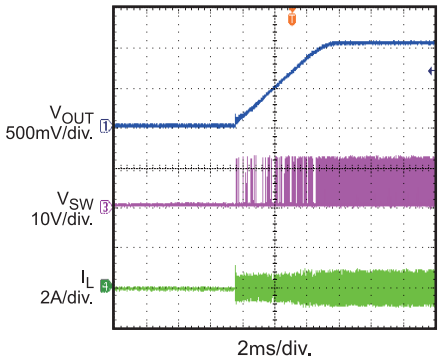
Thermal Shutdown
I_{OUT}=0A, PWM Mode



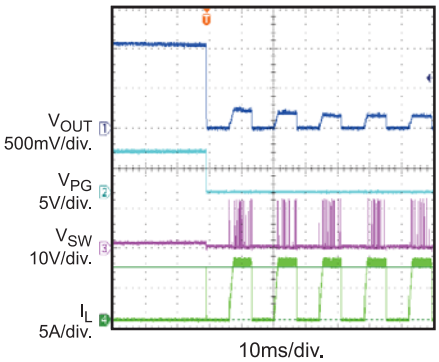
Thermal Recovery
I_{OUT}=0A



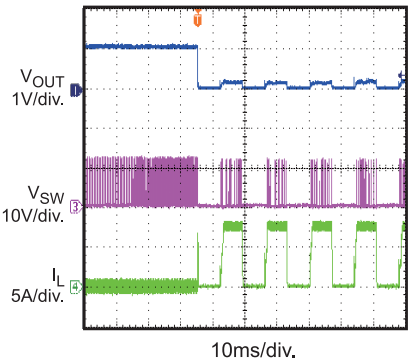
Thermal Recovery
I_{OUT}=0A, PWM Mode



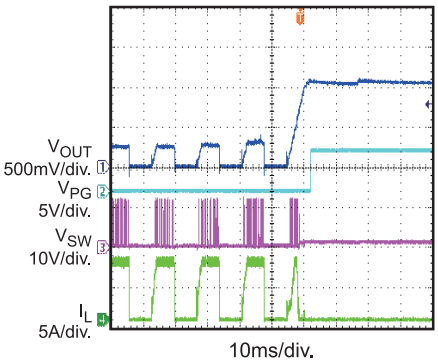
Short Circuit Entry
I_{OUT} = 0A



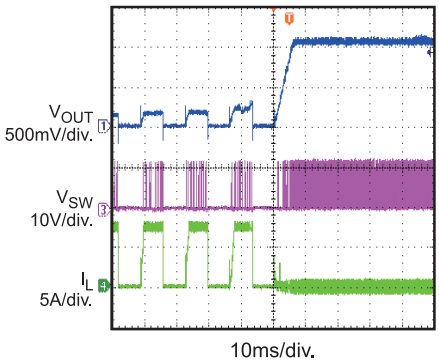
Short Circuit Entry
I_{OUT}=0A, PWM Mode



Short Circuit Recovery
I_{OUT} = 0A



Short Circuit Recovery
I_{OUT}=0A, PWM Mode



PRINTED CIRCUIT BOARD LAYOUT

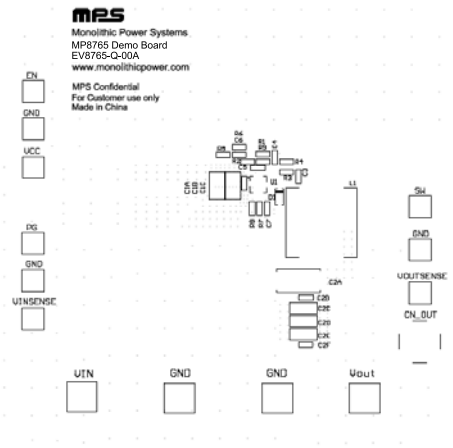


Figure 1: Top Silk Layer

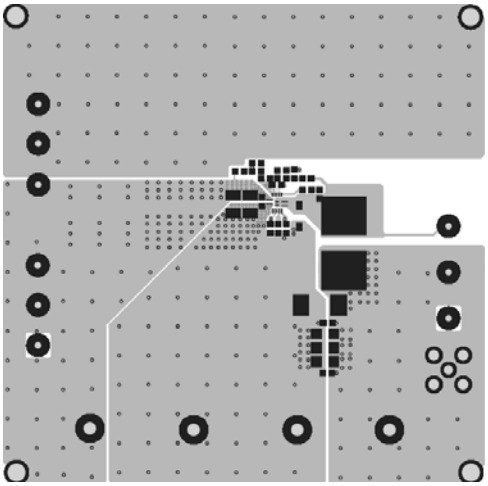


Figure 2: Top Layer

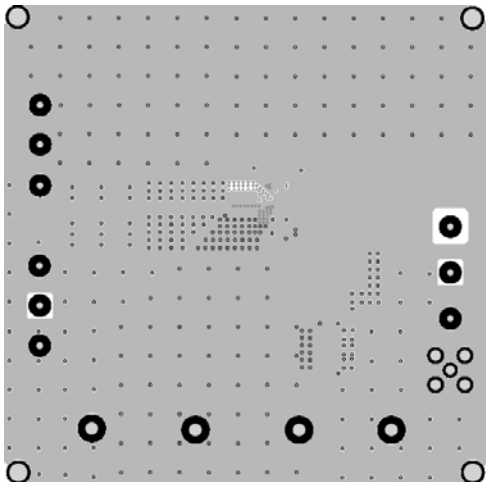


Figure 3: Inner Layer1

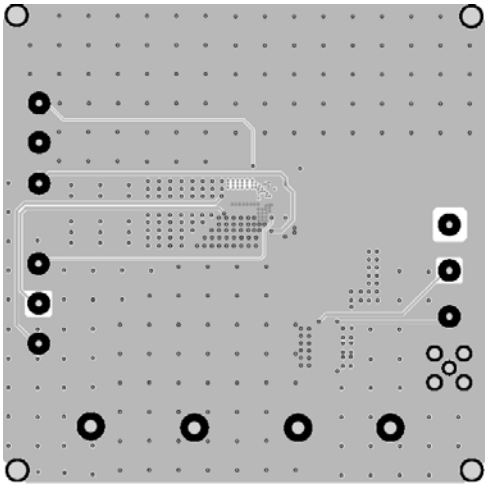


Figure 4: Inner Layer2

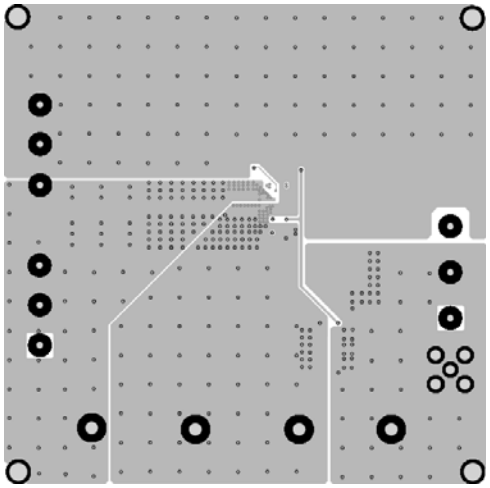


Figure 5: Bottom Layer

QUICK START GUIDE

1. Connect the positive and negative terminals of the load to the VOUT and GND pins respectively.
2. Preset the output of power supply between 5V and 24V, 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:
4. Turn the power supply on. The MP8765GQ will automatically start up.
5. To use the Enable function, apply a digital input to the EN pin. Drive EN higher than 2V to turn on the regulator or less than 0.4V to turn it off.
6. Connect MODE pin to GND (R7=0) to set part work at auto PFM/FWM mode. Float MODE pin (R7=NS) or connect it to VCC can set part work at force PWM mode.
7. Use R1 and R2 to set the output voltage within VFB=0.604V. Follow the Application information section in the device datasheet to select the proper value of R1, R2, inductor and output capacitor values when output voltage is changed.
8. If low ripple at light loads is needed, then use 2.0H L1. But with the larger L1, the transient response peak to peak value will become larger too.