EVQ8626-D-00A

High Efficiency, 16V, 6A Synchronous Step-down Converter Evaluation Board

The Future of Analog IC Technology

DESCRIPTION

The EVQ8626-D-00A is an evaluation board for the MPQ8626, a high efficiency, monolithic, synchronous step-down converter.

The EV board can deliver 6A continuous load current over a wide operating input range. High efficiency can be achieved over a wide output current load range.

The MPQ8626 adopts internally compensated constant-on-time (COT) control mode that provides fast transient response and eases loop stabilization.

This EV board can be turned on or off via a remote ON/OFF input (EN) that is referenced to ground. This input is compatible with popular logic devices.

ELECTRICAL SPECIFICATION

Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	8-16	V
Output Voltage	V_{OUT}	1.8	V
Output Current	I_{OUT}	6	A

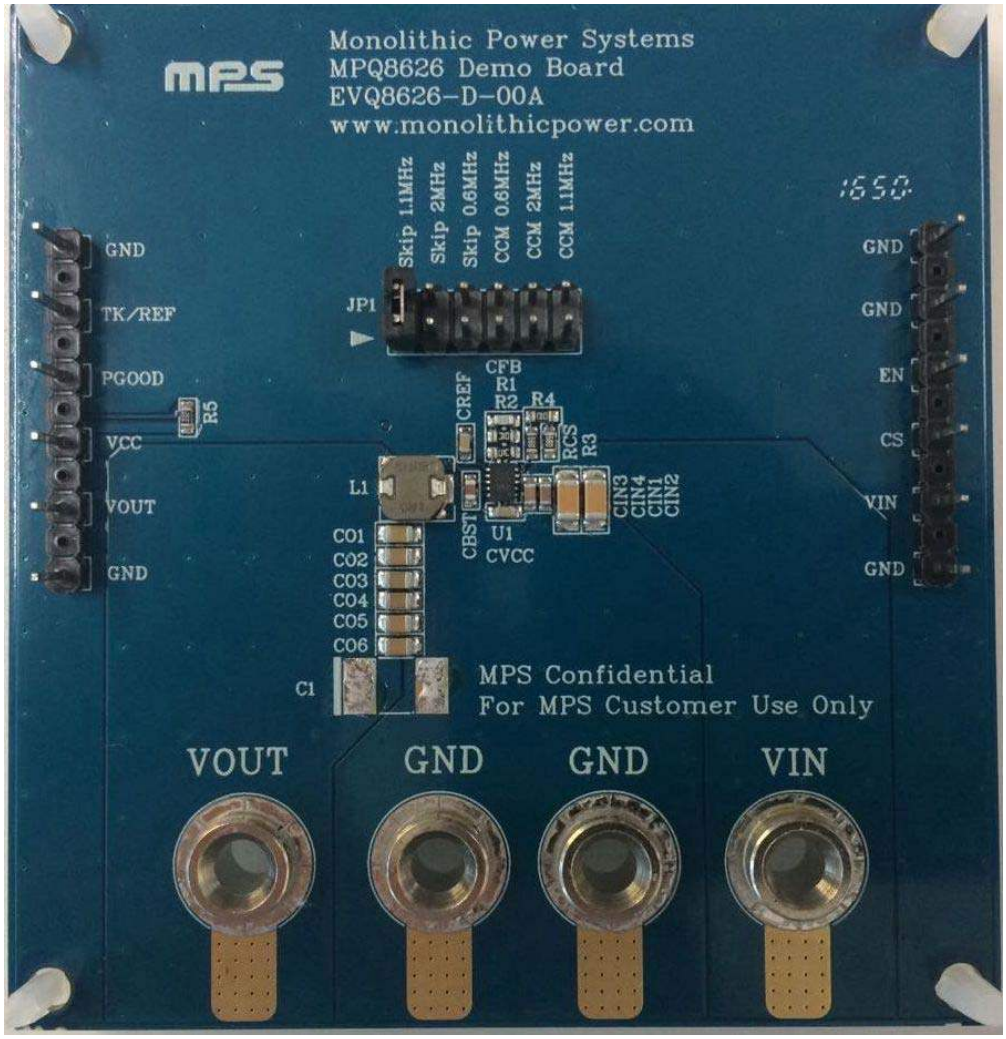
FEATURES

- Wide Input Voltage Range from 2.85V:
  - 2.85V to 16V with External 3.3V VCC Bias
  - 4V to 16V with Internal VCC Bias or External 3.3V Bias
- Programmable Accurate Current Limit Level
- 6A Output Current
- Low R_{DS}(ON) Integrated Power MOSFETs
- Proprietary Switching Loss Reduction Technique
- Adaptive COT for Ultrafast Transient Response
- Stable with Zero-ESR Output Capacitor
- 0.5% Reference Voltage Over 0°C to +70°C Junction Temperature Range
- 1% Reference Voltage Over -40°C to +125°C Junction Temperature Range
- Selectable Pulse-Skip or Forced-CCM Operation
- Excellent Load Regulation
- Output Voltage Tracking
- Output Voltage Discharge
- PGOOD Active Clamped Low Level during Power Failure
- Programmable Soft Start Time from 1ms
- Pre-Bias Start up
- Selectable Switching Frequency of 600kHz, 1100kHz and 2000kHz
- Non-Latch for OCP, OVP, UVP, UVLO and Thermal Shutdown.
- Output Adjustable from 0.6V to 90%*Vin, Up to 5.5V max.
- Available in a QFN2X3 mm Package

APPLICATIONS

- Telecom and Networking Systems
- Server, Cloud-Computing, Storage
- Base Stations
- General Purpose Point-of-Load (PoL)
- 12V Distribution Power Systems
- High-end TV
- Game Consoles and Graphic Cards

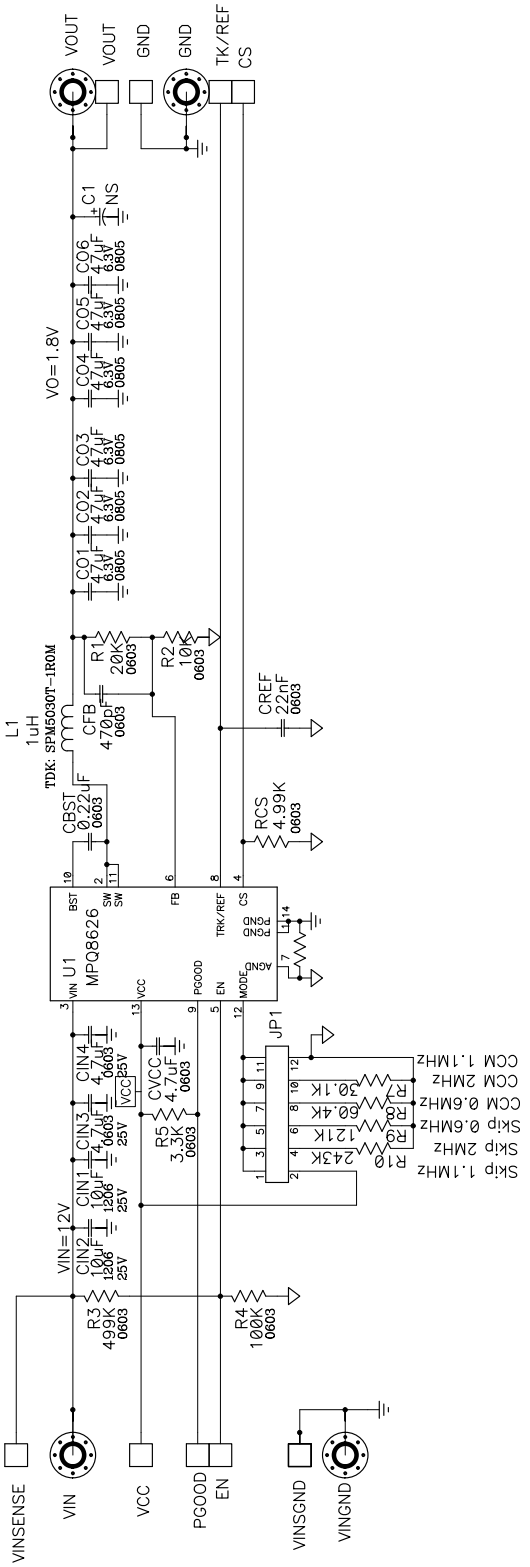
EVQ8626-D-00A EVALUATION BOARD



(L x W) 81 mm x 78mm)

Board Number	MPS IC Number
EVQ8626-D-00A	MPQ8626GD

EVALUATION BOARD SCHEMATIC



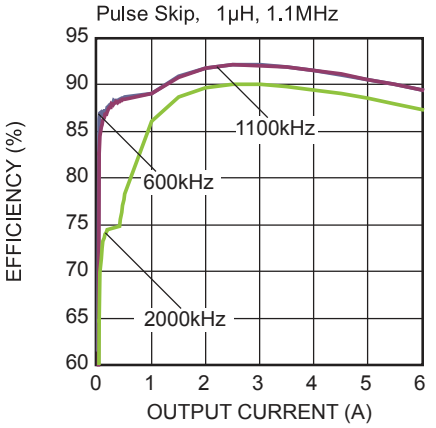
EVQ8626-D-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Part Number
0	C1	NS		Pos-cap/D2		
1	CBST	0.22µF	CAP CER 0.22µF 25V 10% X7R 0603	CAP0603	Generic	
1	CFB	470pF	CAP, 50V, 10%, X7R	CAP0603	Generic	
2	CIN1, CIN2	10µF/25V	Capacitor, 25V, X7R, 10%	CAP1206	Generic	
2	CIN3, CIN4	4.7µF/25V	CAP CER 4.7uF 25V 10% X6S 0603	CAP0603	Generic	
6	CO1, CO2, CO3, CO4, CO5, CO6	47µF	CAP, 6.3V, X5R, 20%	CAP0805	Murata or Generic	GRM21BR60J476ME15L
1	CREF	22nF	CAP CER 22nF 25V 10% X7R 0603	CAP0603	Generic	
1	CVCC	4.7µF	CAP CER 4.7µF 6.3v 10% X7R 0603	CAP0603	Generic	
1	L1	1µH	Inductor	7x7mm	TDK or Others	SPM5030T-1R0M
1	R1	20k	Film Res., 1%	0603	Generic	
1	R2	10k	Film Res., 1%	0603	Generic	
1	R3	499k	Film Res., 1%	0603	Generic	
1	R4	100k	Film Res., 1%	0603	Generic	
1	R5	3.3k	Film Res., 1%	0603	Generic	
1	R7	30.1k	Film Res., 1%	0603	Generic	
1	R8	60.4k	Film Res., 1%	0603	Generic	
1	R9	121k	Film Res., 1%	0603	Generic	
1	R10	243k	Film Res., 1%	0603	Generic	
1	RCS	4.99k	Film Res., 1%	0603	Generic	
1	U1	MQ8626GD	16V/6A Step Down Convert	QFN14-2X3mm	MPS	MPQ8626GD

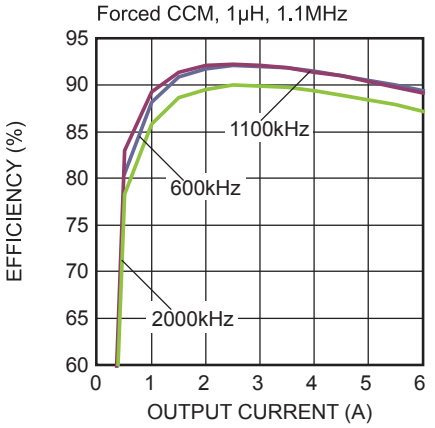
EVB TEST RESULTS

Performance waveforms are tested on the EVQ8626-D-00A evaluation board.
V_{IN} = 12V, V_{OUT} = 1.8V, L = 1µH, T_A = +25ºC, unless otherwise noted.

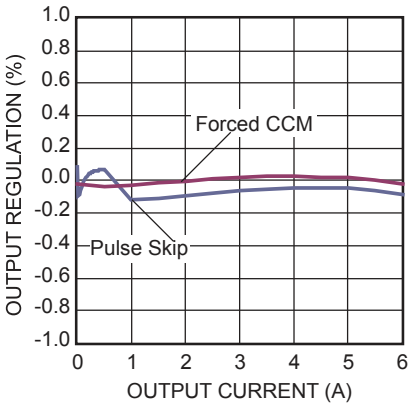
Efficiency (12V to 1.8V)



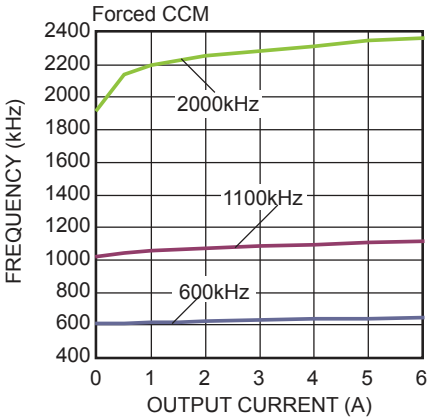
Efficiency (12V to 1.8V)



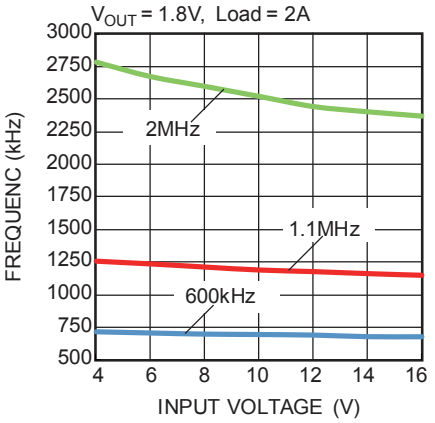
Load Regulation



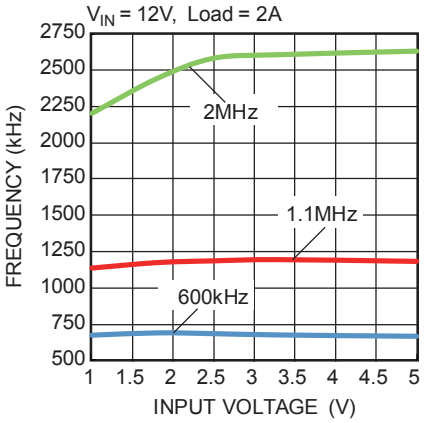
Switching Frequency vs. Output Current



Switching Frequency vs. Input Voltage



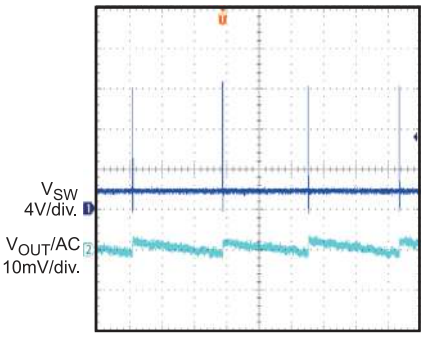
Switching Frequency vs. Output Voltage



EVB TEST RESULTS *(continued)*

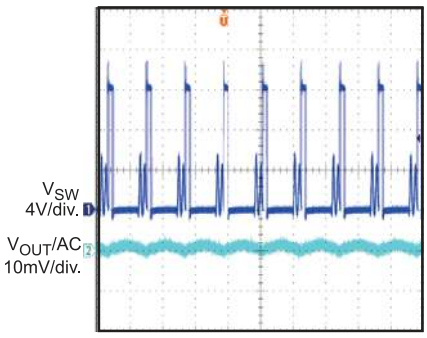
Performance waveforms are tested on the EVQ8626-D-00A evaluation board.
V_{IN} = 12V, V_{OUT} = 1.8V, L = 1µH, T_A = +25ºC, unless otherwise noted.

Steady State
I_{OUT}= 0A, Pulse Skip



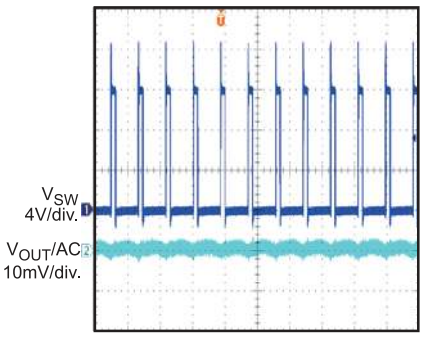
100µs/div.

Steady State
I_{OUT} = 0.5A, Pulse Skip



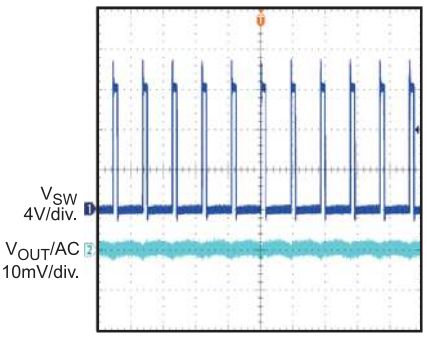
1µs/div.

Steady State
I_{OUT} = 6A, Pulse Skip



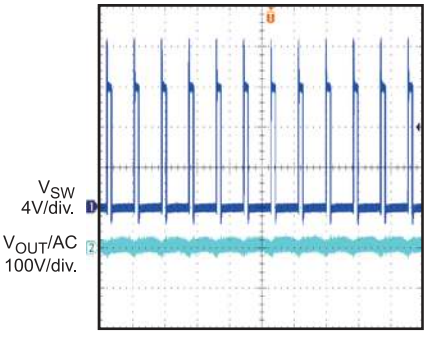
1µs/div.

Steady State
I_{OUT} = 0A, Forced CCM



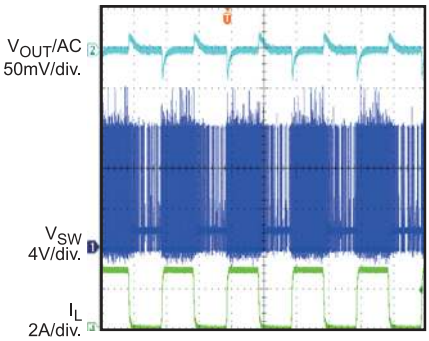
1µs/div

Steady State
I_{OUT} = 6A, Forced CCM



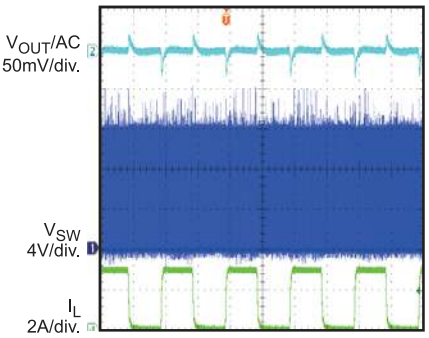
1µs/div

Load Transient
I_{OUT} = 0A-3A, Pulse Skip



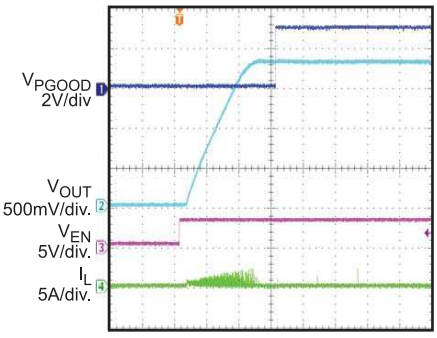
200µs/div

Load Transient
I_{OUT} = 0A-3A, Forced CCM



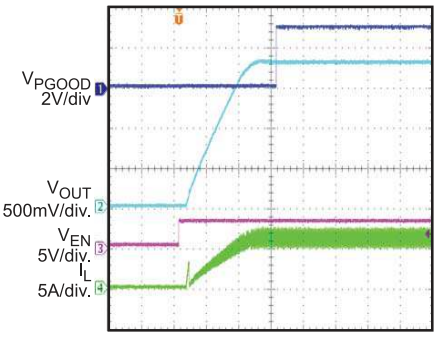
200µs/div

Power Up through EN
I_{OUT}= 0A, Pulse Skip



1ms/div

Power Up through EN
I_{OUT}= 6A, Pulse Skip

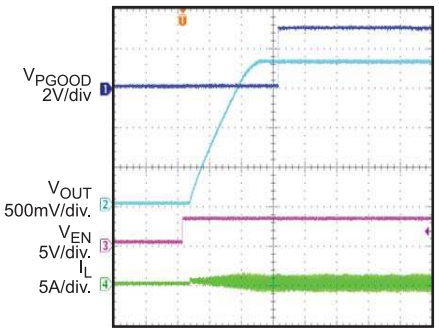


1ms/div

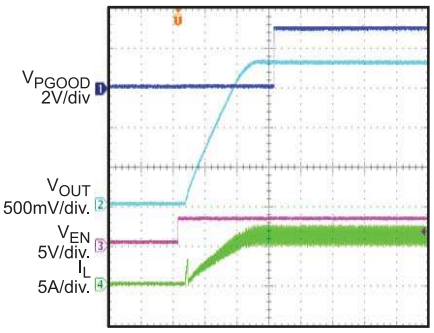
EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the EVQ8626-D-00A evaluation board.
V_{IN} = 12V, V_{OUT} = 1.8V, L = 1µH, T_A = +25ºC, unless otherwise noted.

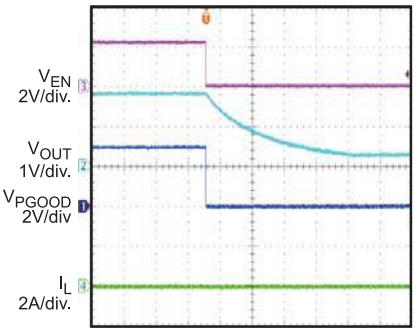
Power Up through EN
I_{OUT} = 0A, Forced CCM



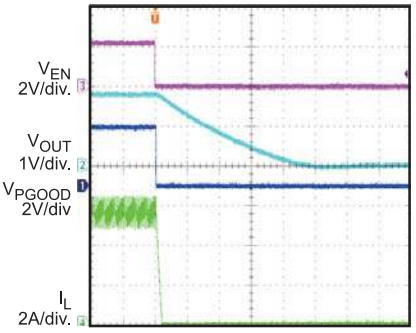
Power Up through EN
I_{OUT} = 6A, Forced CCM



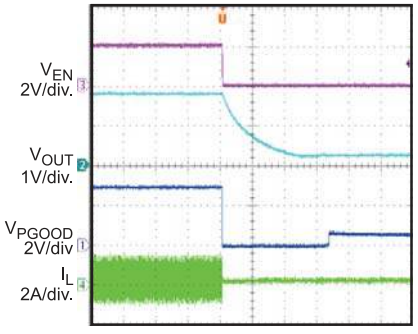
Power Down through EN
I_{OUT} = 0A, Pulse Skip



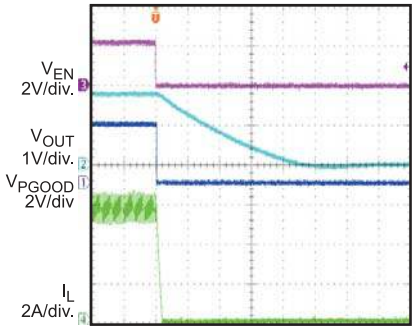
Power Down through EN
I_{OUT} = 6A, Pulse Skip



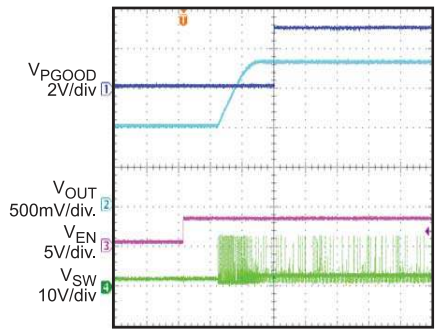
Power Down through EN
I_{OUT} = 0A, Forced CCM



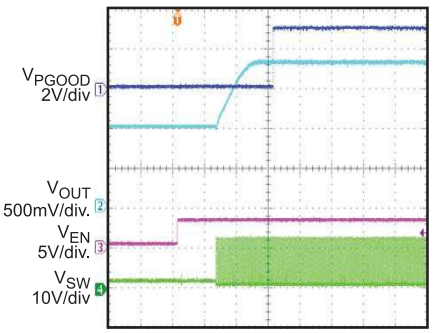
Power Down through EN
I_{OUT} = 6A, Forced CCM



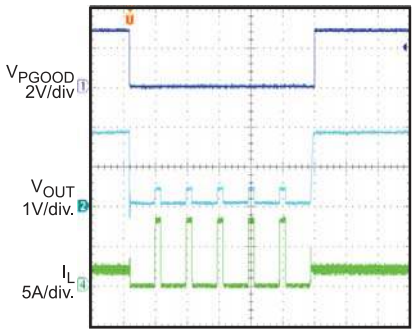
Pre-bias Start-Up
Pulse Skip



Pre-bias Start-Up
Forced CCM



Over-Current Protection

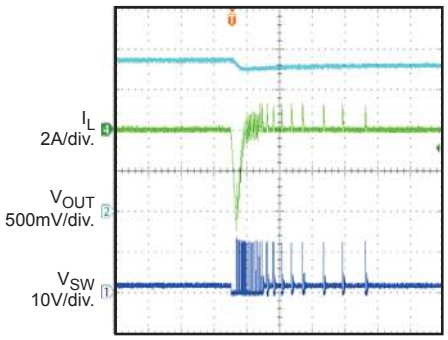


EVB TEST RESULTS *(continued)*

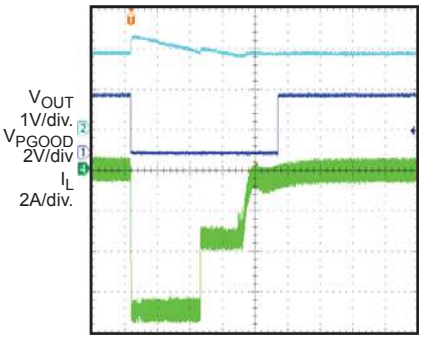
Performance waveforms are tested on the EVQ8626-D-00A evaluation board.
V_{IN} = 12V, V_{OUT} = 1.8V, L = 1µH, T_A = +25ºC, unless otherwise noted.

OSM Operation

Pulse Skip Mode



Over-Voltage Protection



PRINTED CIRCUIT BOARD LAYOUT

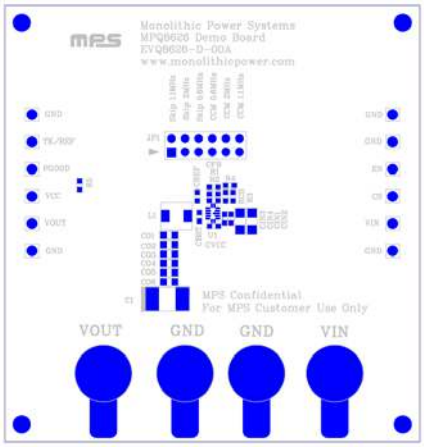


Figure 1—Top Silk Layer

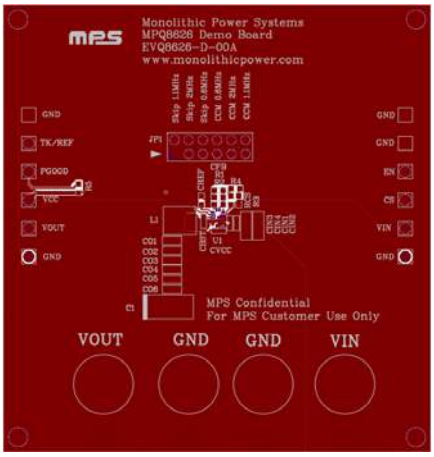


Figure 2—Top Layer

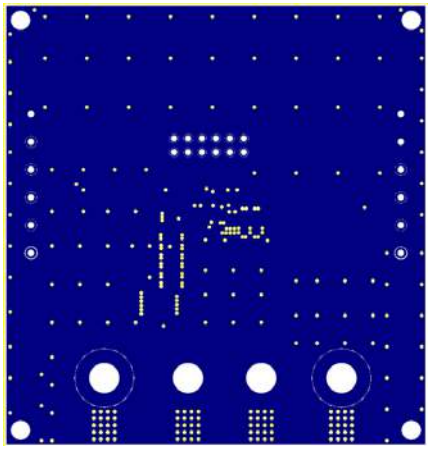


Figure 3—Inner Layer 1

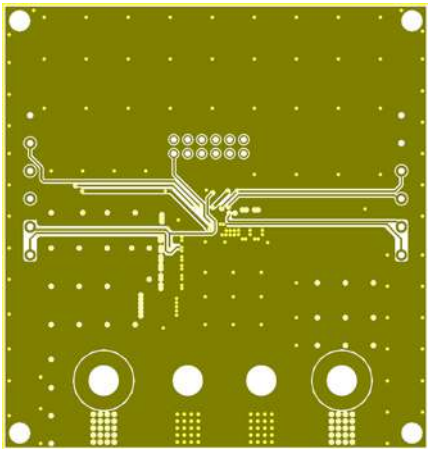


Figure 4— Inner Layer 2

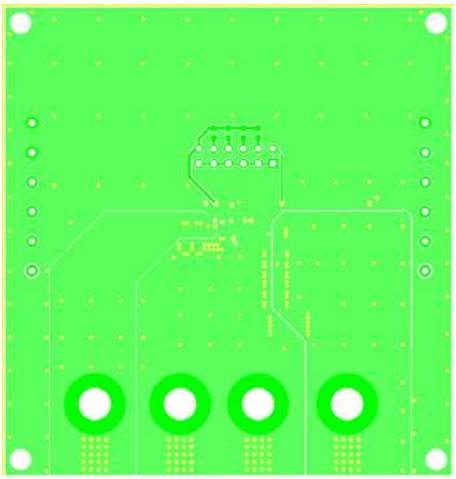


Figure 5—Bottom Layer

QUICK START GUIDE

The input voltage of the EV board can range from 8V to 16V. The minimum 8V input voltage is limited by the EN signal, which is derived from VIN through a resistor divider (R3 and R4). Lower input voltage (as low as 2.85V with external 3.3V VCC bias) can be set by fine tuning the resistor divider values, or by over-driving the EN with an external control signal. The following is the procedure to turn on the EV board.

1. Connect the positive and negative terminals of the load to the VOUT and GND pins, respectively.
2. Preset the power supply output voltage between 8V and 16V, 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. Make sure the power supply has current limit high enough to supply the power.
4. Turn the power supply on. The EVQ8626-D-00A 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 0.8V to turn it off.
6. Use R1 and R2 to set the output voltage with VFB = 0.6 V. Follow the Application Information section in the device datasheet to select the proper values of R1, R2, inductor and output capacitor values when output voltage is changed.
7. The JP1 jumper can be used to select the operating frequency (600kHz, 1100kHz or 2000kHz) and light load operation mode (Pulse Skip or CCM).