Evaluation Board Report

12V 0.12W ACDC power supply

Design Specs	Value	Unit
Input Voltage	85-265	VAC
Output Voltage	12	VDC
Output Current	10	mA
Isolation	No	
MPS IC	MP100GN	
Application	• Wall Switches and Dimmers • AC/DC Power Supply for Wireless System, like ZigBee, Z-Wave etc. • Standby Power for General Off-Line Applications	

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Author	Application Engineering Department
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Design Summary

EV100-N-00A evaluation board provides a reference design for a universal offline inductor-less power supply with 12V, 10mA output. It contains the complete specification of the power supply, a detailed circuit diagram, the entire bill of materials required to build the power supply, drawing of the power inductors and transformers, and test data of the most important performance.

DESCRIPTION

The MP100 is a compact, inductor-less, good-efficiency, off-line regulator. It steps down the AC line voltage to an adjustable DC output. It is a simple solution to provide a bias voltage to ICs in off-line applications. Its integrated smart-control system uses AC line power only when necessary, thus minimizing device losses to achieve good efficiency. This device can help system designs meet new standby power specifications.

The MP100 provides various protections, such as over-current protection, short-circuit protection, VD over-voltage protection, VD under-voltage lockout, and thermal shutdown.

The MP100 is available in a SOIC8E package.

FEATURES

- Universal AC Input (85Vac-305Vac)
- Smart Control to Maximize Efficiency
- Adjustable Output Voltage from 1.5V to 15V
- Low Component Count and Cost
- Thermal Shutdown Protection
- Short Circuit Protection
- Provide Power Good Signal
- Excellent EMI Performance

ELECTRICAL SPECIFICATION

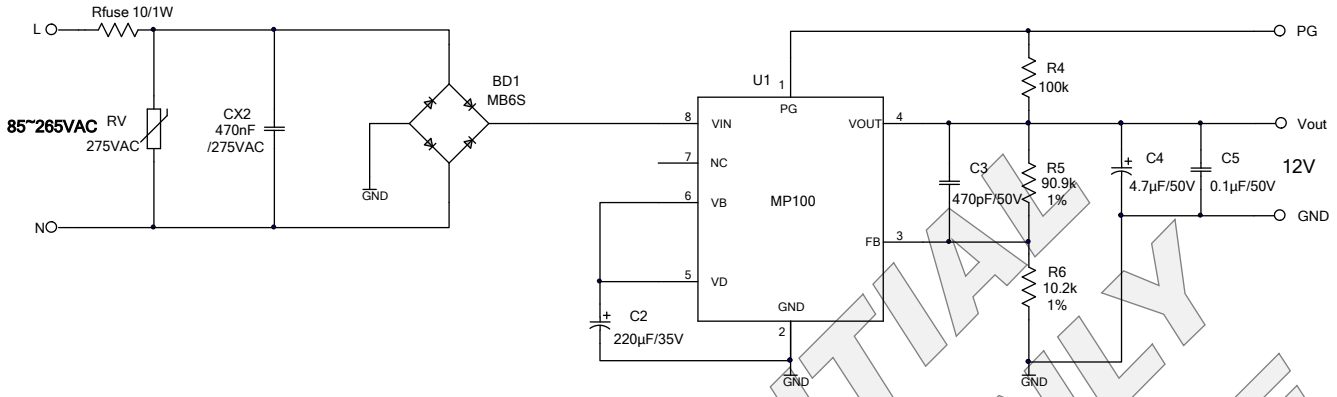
Parameter	Symbol	Value	Units
Supply Voltage	V_{IN}	85-265	VAC
Output Voltage	V_{OUT}	12	V
Output Current	I_{OUT}	10	mA

EV100-N-00A EVALUATION BOARD

(L x W x H) 33mm x 29mm x 22mm

Board Number	MPS IC Number
EV100-N-00A	MP100GN

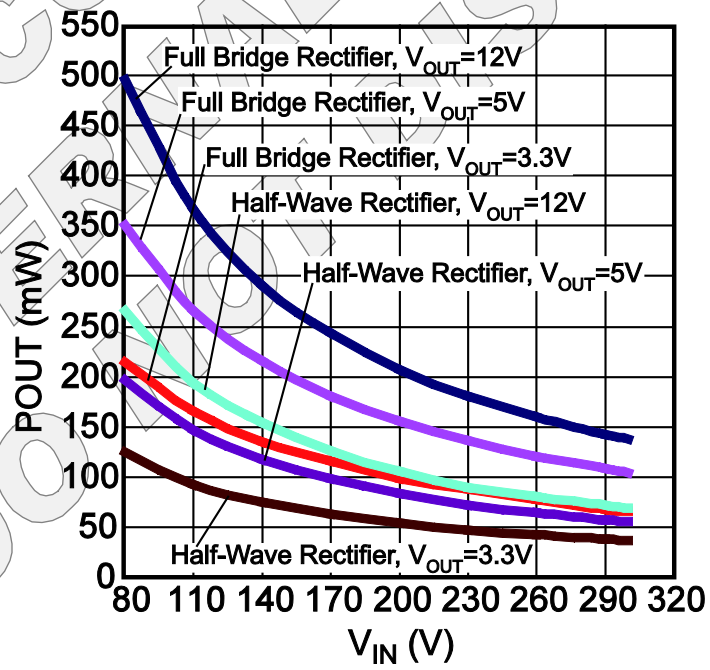
EVALUATION BOARD SCHEMATIC



Vout can be adjusted by choosing the value of R5 and R6, the relationship of them is: Vout=1.235V*(1+R5/R6);
Table below gives the value need to get normally used output voltage:

Vout(V)	R5(kΩ)	R6(kΩ)
1.5	2.21(1%)	10.2(1%)
3.3	16.9(1%)	10.2(1%)
5	30.9(1%)	10.2(1%)
15	121(1%)	10.2(1%)

The maximum output power (P_{OUT}) of MP100 Vs input voltage (V_{IN}) is depicted by following chart for 12V ,5V and 3.3V output applications respectively considering full bridge and half bridge rectifier:



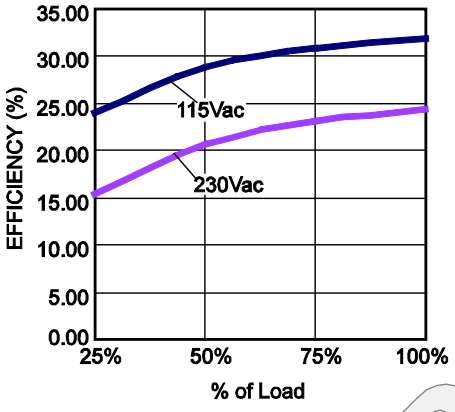
EV100-N-00A BILL OF MATERIAL

Qty	RefDes	Value	Description	Package	Manufacture	Manufacturer_PN
1	BD1	MB6S	Diode;600V;0.5A;	SOIC-4	TaiWan Semiconductor	MB6S
1	C2	220µF	Electrolytic Capacitor; 35V;	DIP	Jianghai	CD110-35V220
1	C3	470pF	Ceramic Capacitor; 50V;C0G;	0603	muRata	GRM1885C1H471JA01
1	C4	4.7µF	Electrolytic Capacitor; 50V;	DIP	Jianghai	CD287-50V4.7
1	C5	0.1µF	Ceramic Capacitor; 50V;X7R;	0603	TDK	C1608X7R1H104K
1	CX2	470nF	Film Capacitor; 275V;10%;	DIP	Kaili	PX474K3ID42L270D9R
1	R4	100kΩ	Film Resistor;5%;	0603	Yageo	RC0603JR-07100KL
1	R5	90.9kΩ	Film Resistor;1%;	0603	Yageo	RC0603FR-0790K9L
1	R6	10.2kΩ	Film Resistor;1%;	0603	Yageo	RC0603FR-0710K2L
1	Rfuse	10Ω	Resistor;5%;1W	DIP	Bangdayuan	10 Ohm/1W
1	RV	275Vac	TVR10431KSY; 430V(1 mA);	DIP	TKS	TVR10431KSY
1	U1	MP100	Offline Regulator	SOIC8E	MPS	MP100GN

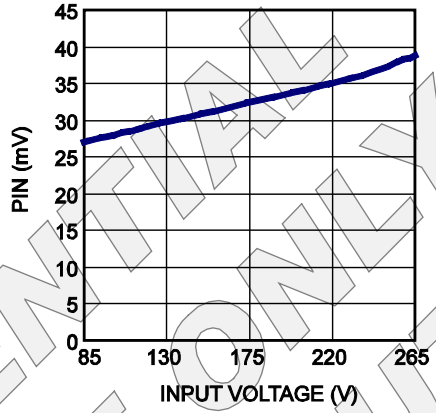
EVB TEST RESULTS

Performance waveforms are tested on the evaluation board.
V_{OUT} = 12V, I_{OUT} = 10mA, T_A = 23ºC, unless otherwise noted.

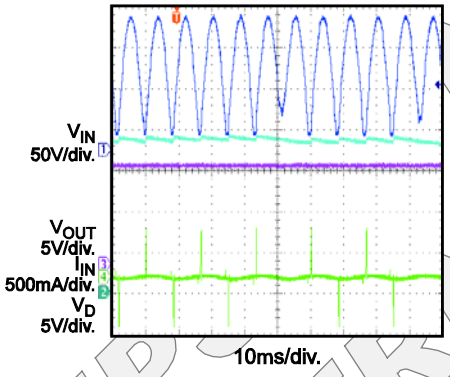
Efficiency vs. Load



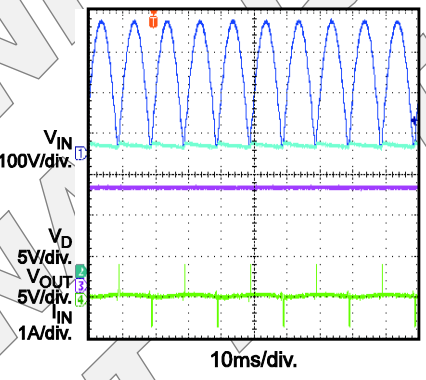
No Load Power vs. Input Voltage



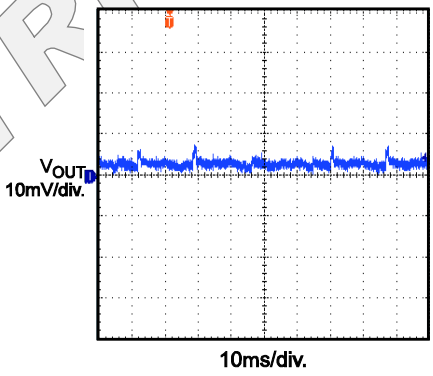
Steady State
V_{IN} = 115Vac, 12V/10mA



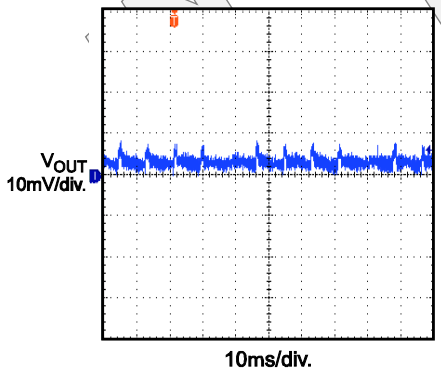
Steady State
V_{IN} = 230Vac, 12V/10mA



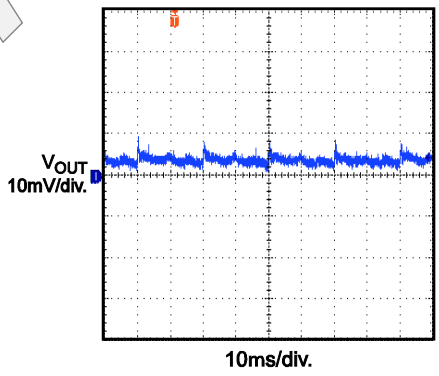
Output Voltage Ripple
V_{IN} = 115Vac, 12V/0mA



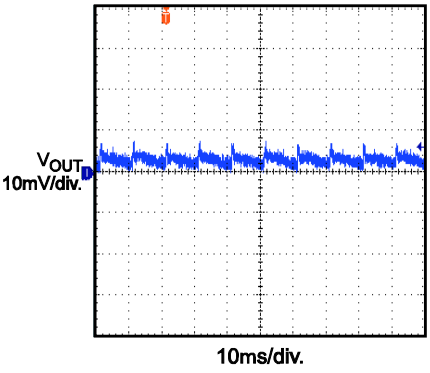
Output Voltage Ripple
V_{IN} = 115Vac, 12V/10mA



Output Voltage Ripple
V_{IN} = 230Vac, 12V/0mA



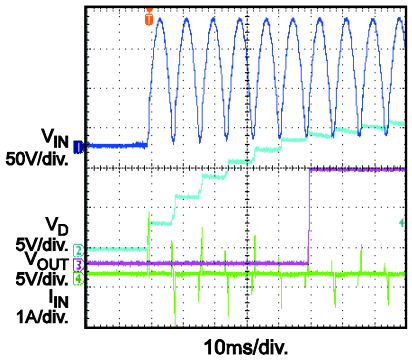
Output Voltage Ripple
V_{IN} = 230Vac, 12V/10mA



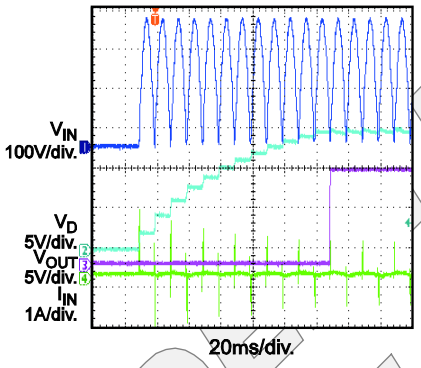
EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.
V_{OUT} = 12V,I_{OUT} = 10mA, T_A = 23ºC, unless otherwise noted.

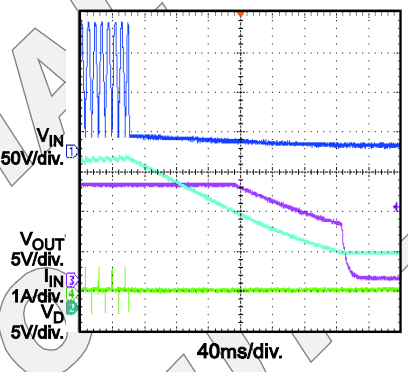
Input Power Start Up
V_{IN} = 115Vac, 12V/10mA



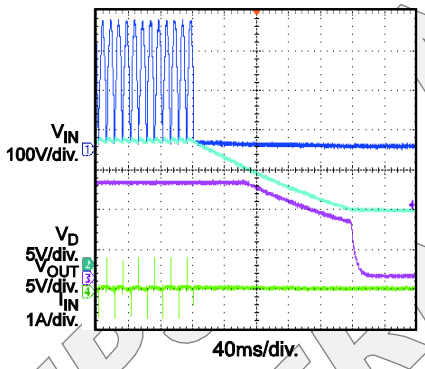
Input Power Start Up
V_{IN} = 230Vac, 12V/10mA



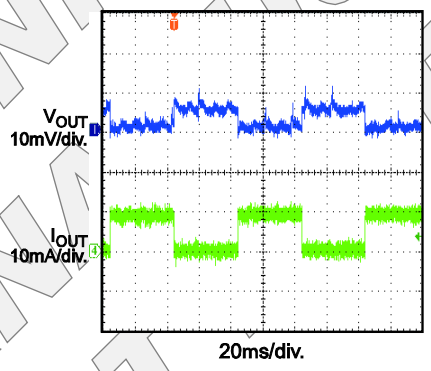
Input Power Shut Down
V_{IN} = 115Vac, 12V/10mA



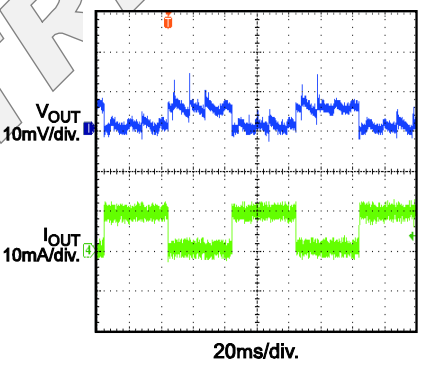
Input Power Shut Down
V_{IN} = 230Vac, 12V/10mA



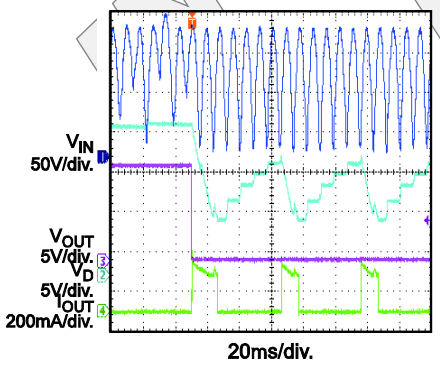
Load Transient
V_{IN} = 115Vac, I_{OUT} = 0 to 10mA



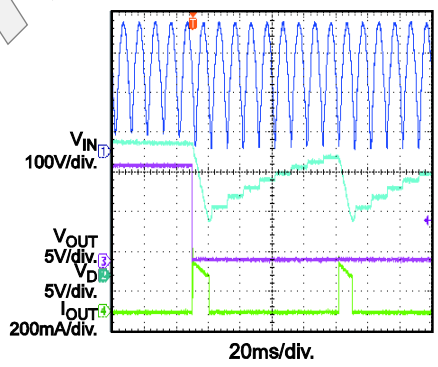
Load Transient
V_{IN} = 230Vac, I_{OUT} = 0 to 10mA



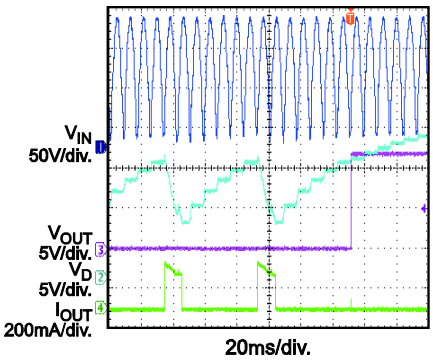
Short Circuit Protection Entry
V_{IN} = 115Vac



Short Circuit Protection Entry
V_{IN} = 230Vac



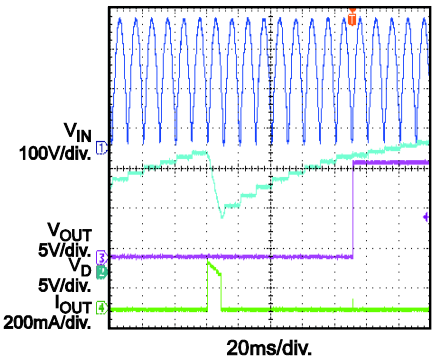
Short Circuit Protection Recovery
V_{IN} = 115Vac



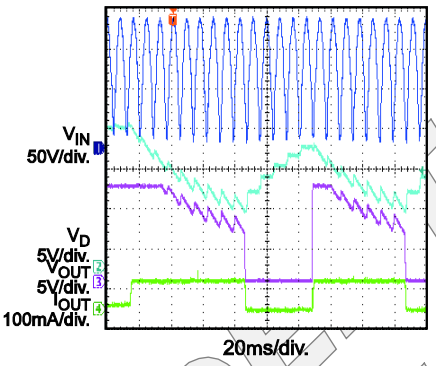
EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.
V_{OUT} = 12V,I_{OUT} = 10mA, T_A = 23ºC, unless otherwise noted.

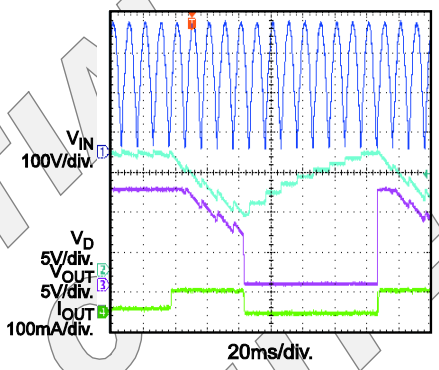
Short Circuit Prtection Recovery
V_{IN} = 230Vac



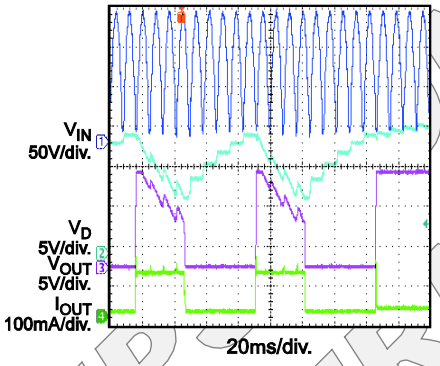
Over Current Protection Entry
V_{IN} = 115Vac



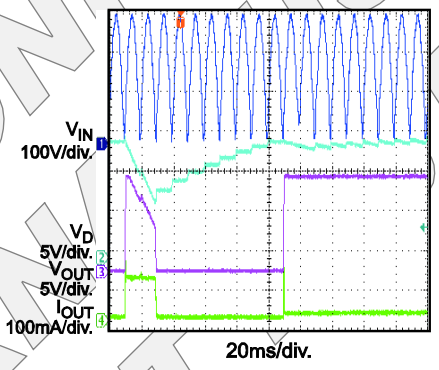
Over Current Protection Entry
V_{IN} = 230Vac



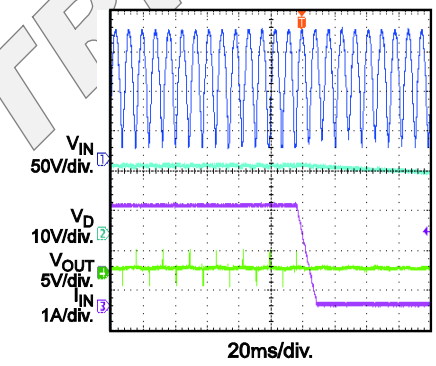
Over Current Protection Recovery
V_{IN} = 115Vac



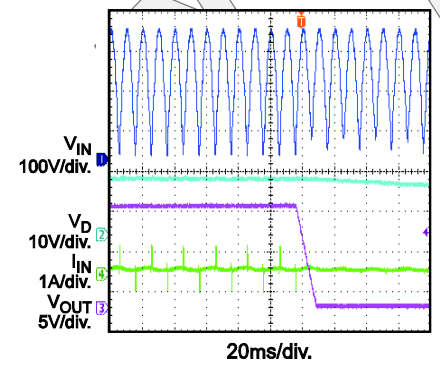
Over Current Protection Recovery
V_{IN} = 230Vac



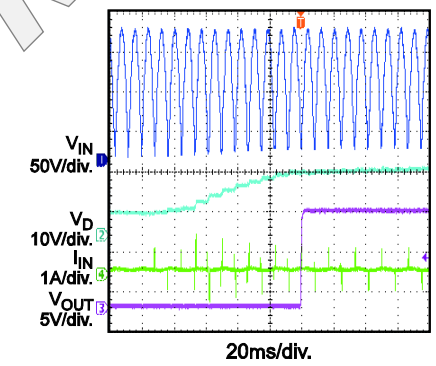
Thernal Shut Down
V_{IN} = 115Vac



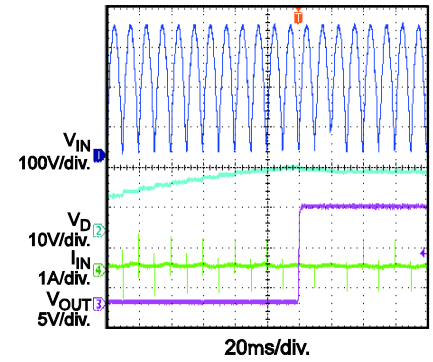
Thernal Shut Down
V_{IN} = 230Vac



Thernal Recovery
V_{IN} = 115Vac



Thernal Recovery
V_{IN} = 230Vac



PRINTED CIRCUIT BOARD LAYOUT

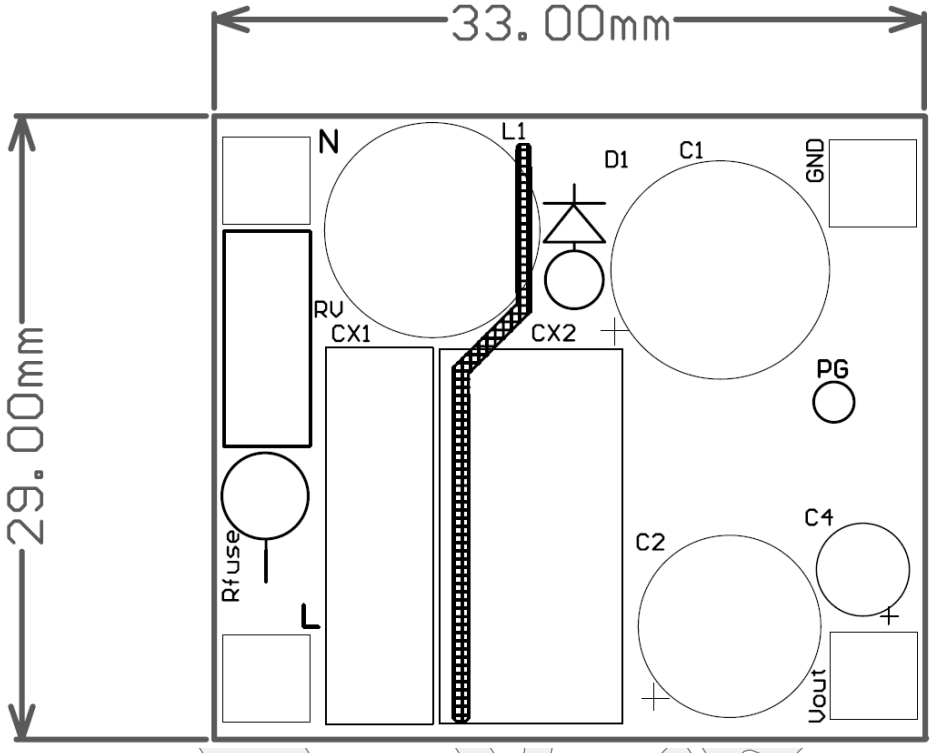


Figure 1 — Top Silk Layer

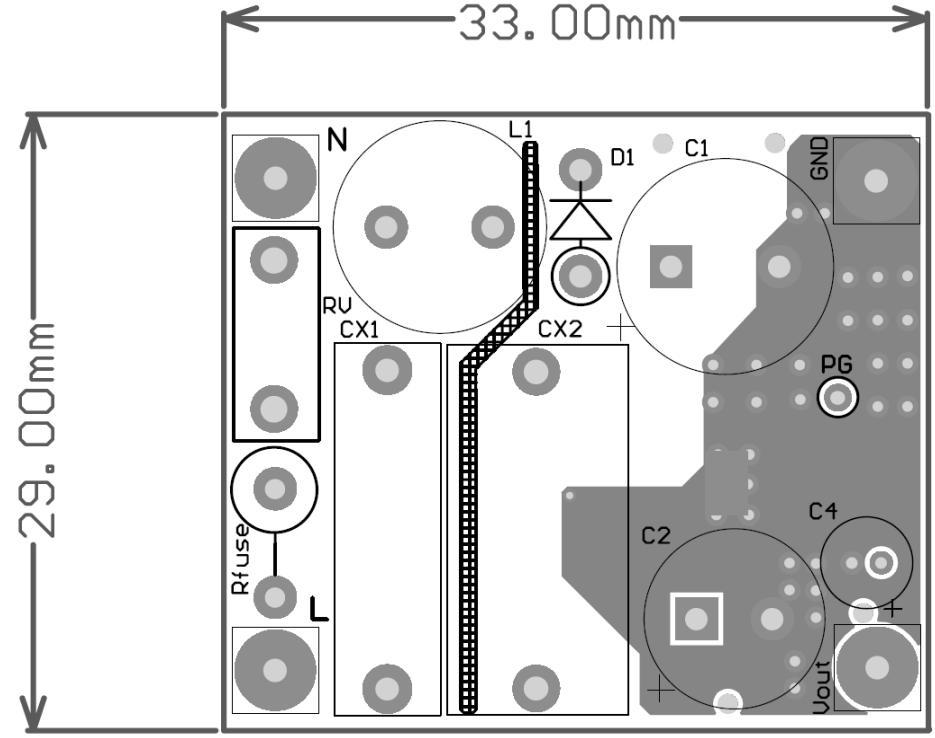


Figure 2 — Top Layer

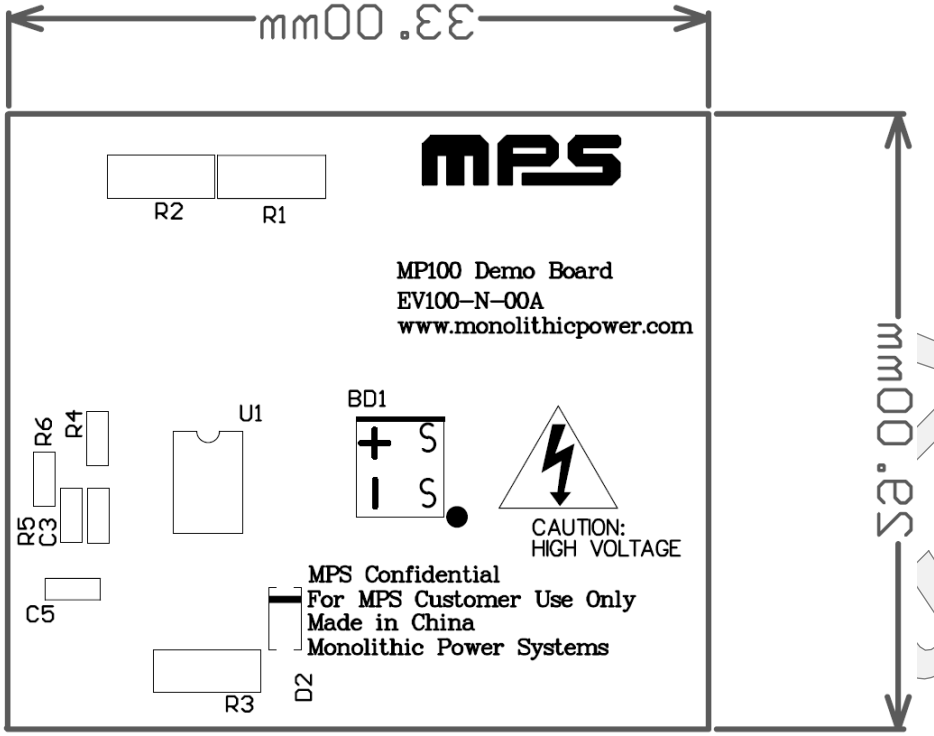


Figure 3 — Bottom Silk

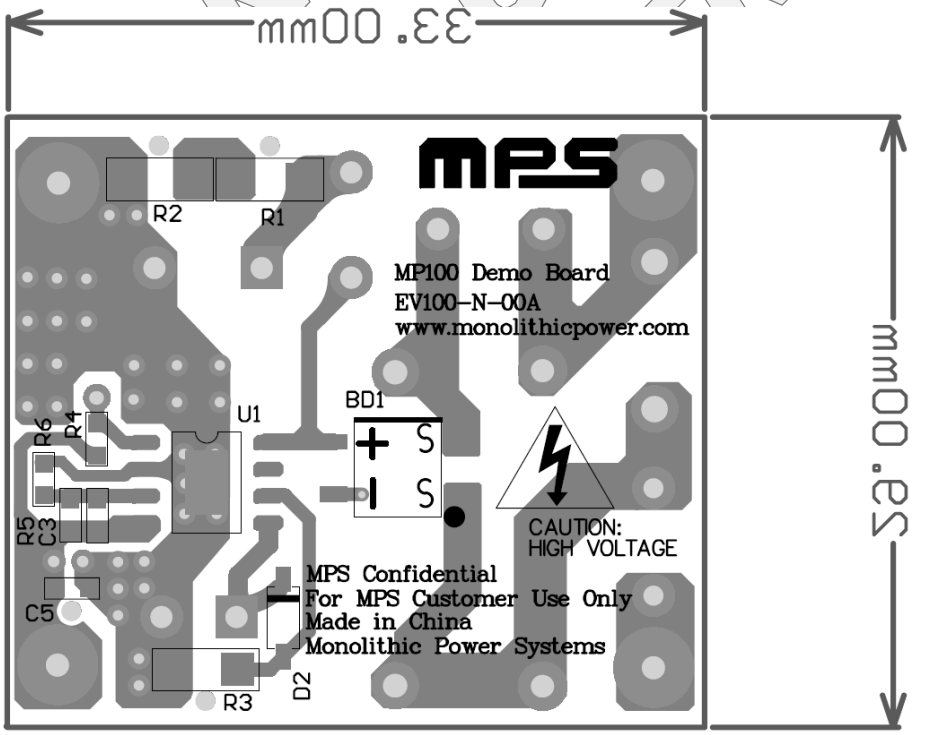


Figure 4 — Bottom Layer

QUICK START GUIDE

1. Preset Power Supply to 85V ≤ V_{IN} ≤ 265V.
2. Turn Power Supply off.
3. Connect the Line and Neutral terminals of the power supply output to L and N ports.
4. Connect Load to Vout and GND ports.
5. Turn Power Supply on after making connections.

Contact Information

To request this evaluation board, please refer to your local sales offices which can be found from:

http://www.monolithicpower.com/Company/Contact-Us

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