

## DESCRIPTION

The EV157-S-00A Evaluation Board is designed to demonstrate the capabilities of MP157GS. MP157 is a primary side regulator providing accurate constant voltage (CV) regulation without the Opto-coupler. It supports Buck, Buck-Boost, Boost and Flyback topologies.

The EV157-S-00A Evaluation Board is designed as Buck application. The EV157-S-00A typically drives a 4.2W with a 12V<sub>TYP</sub>, 350mA load from 85VAC to 265VAC, at 50Hz.

The EV157-S-00A has excellent efficiency and meets EN55022 conducted EMI requirements. It has multiple protections, including open-circuit protection, short-circuit protection, over load protection and over-temperature protection, etc.

MP157GS is available in the SOIC8 packages.

## ELECTRICAL SPECIFICATION

Parameter	Symbol	Value	Units
Input Voltage	V <sub>IN</sub>	85 to 265	VAC
Output Voltage	V <sub>OUT</sub>	12	V
Output Current	I <sub>out</sub>	350	mA
Output Power	P <sub>out</sub>	4.2W	W
Average Efficiency	η	>75.00	%

## FEATURES

- Primary side constant voltage (CV) control
- Integrated 500V/10Ω MOSFET
- < 100mW No-load power consumption
- Up to 6W output power
- Maximum discontinuous conduction mode (DCM) output current less than 225mA, maximum continuous conduction mode (CCM) output current less than 360mA
- Low V<sub>CC</sub> Operating Current
- Frequency Foldback
- Limited maximum frequency
- Peak Current Compression
- Internal High Voltage Current Source
- Internal 400ns Leading Edge Blanking
- Thermal Shutdown (auto restart)
- V<sub>CC</sub> Under Voltage Lockout with Hysteresis (UVLO)
- Timer based Over Load Protection
- Short Circuit Protection
- Open Loop Protection

## APPLICATIONS

- Home Appliances, White Goods and Consumer Electronics
- Industrial Controls
- Standby Power

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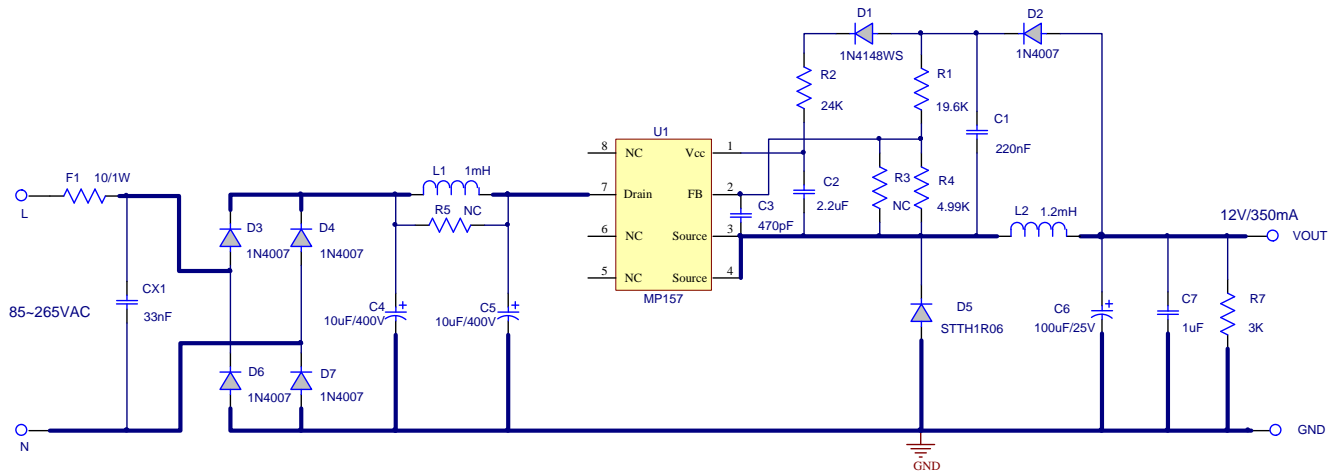
### EV157-S-00A EVALUATION BOARD



( L x W x H ) 4.5cm x 2.5cm x 1.7cm

Board Number	MPS IC Number
EV157-S-00A	MP157GS

### EVALUATION BOARD SCHEMATIC



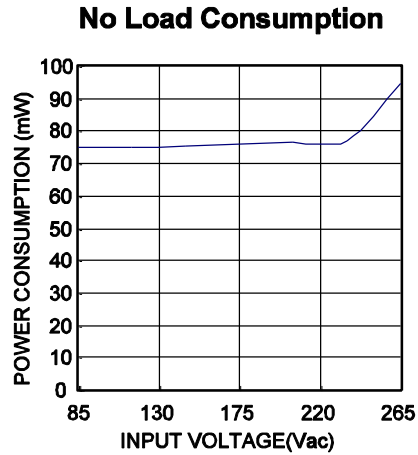
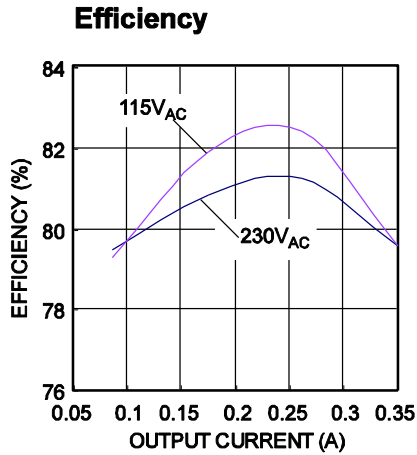
**EV157-S-00A BILL OF MATERIALS**

Qty	Ref	Value	Description	Package	Manufacture	Manufacture_PN
1	C1	220nF	Ceramic Capacitor;16V;X7R;0603;	0603	muRata	GRM188R71C224KA01D
1	C2	2.2μF	Ceramic Capacitor;10V;X7R;0603;	0603	muRata	GRM188R71A225KE15D
1	C3	470pF	Ceramic Capacitor;50V;X7R;0603;	0603	muRata	GRM188R71H471KA01D
2	C4, C5	10μF/400V	Electrolytic Capacitor;400V;20%	DIP	Any	Any
1	C6	100μF/35V	Electrolytic Capacitor;35V;Electrolytic	DIP	Jianghai	CD287-35V100
1	C7	1μF	Ceramic Capacitor;16V;X7R;0603;	0603	muRata	GRM188R71C105KA12D
1	CX1	33nF	Capacitor;275V;10%	DIP	Carli	PX333K3IB29L270D9R
1	D1	1N4148WS	Diode;75V;0.15A;	SOD-323	Diodes	1N4148WS-7-F
5	D2, D3, D4, D6, D7	1N4007	Diode;1000V;1A	DO-41	Diodes	1N4007
1	D5	STTH1R06	Diode;600V;1A	DO-41	ST	STTH1R06
1	F1	10/1W	Resistor;5%;1W	DIP	Yageo	FKN1WSJT-52-10R
1	L1	1mH	Inductor;1000uH;8 Ohm;0.1A	DIP	Any	Any
1	L2	1.2mH	Inductor;1.2mH;1.8Ω;400 mA	DIP	Yimei	DR9X12P2M1.2-00
1	R1	19.6k	Film Resistor;1%;	0603	Yageo	RC0603FR-0719K6L
1	R2	24k	Film Resistor;1%;	0603	Yageo	RC0603FR-0724KL
1	R4	4.99k	Film Resistor;1%;	0603	Yageo	RC0603FR-074K99L
1	R7	3k	Film Resistor;1%	1206	Yageo	RC1206FR-073KL
1	U1	MP157GS	Primary side regulator	SOIC8	MPS	MP157GS

## EVB TEST RESULTS

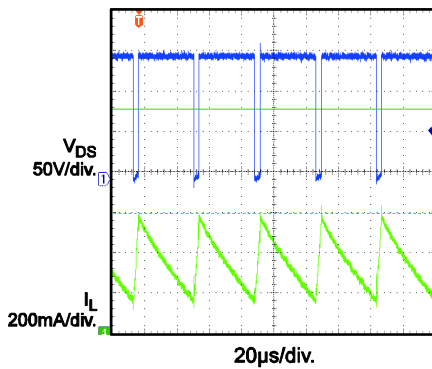
Performance waveforms are tested on the evaluation board.

$V_{IN} = 85\text{--}265\text{VAC}$ ,  $V_{OUT} = 12\text{V}$ ,  $I_{OUT} = 350\text{mA}$ ,  $T_A = 25^\circ\text{C}$ , unless otherwise noted.



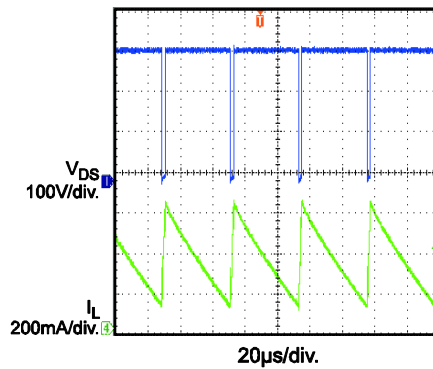
**Normal Operation**

$V_{IN} = 115\text{VAC}$ , Full Load



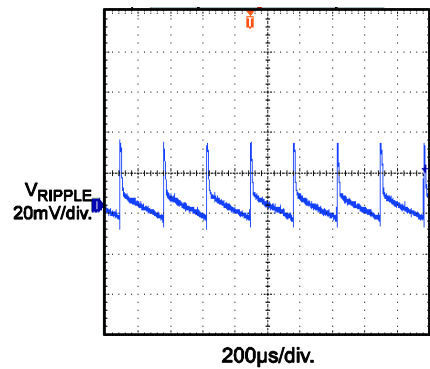
**Normal Operation**

$V_{IN} = 230\text{VAC}$ , Full Load



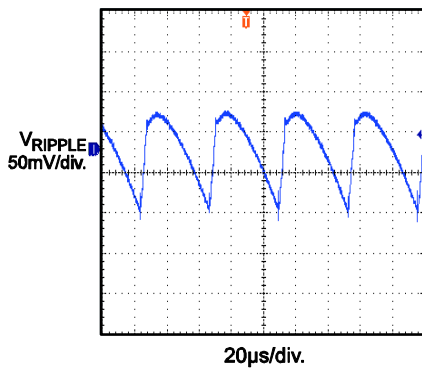
**Output Ripple**

$V_{IN} = 115\text{VAC}$ , No Load



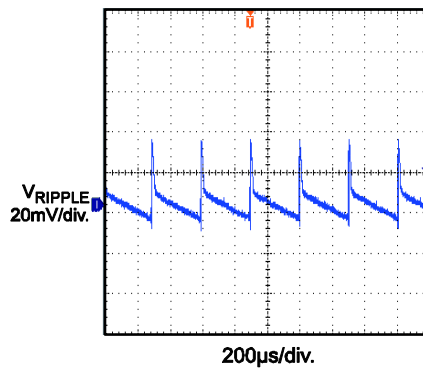
**Output Ripple**

$V_{IN} = 115\text{VAC}$ , Full Load



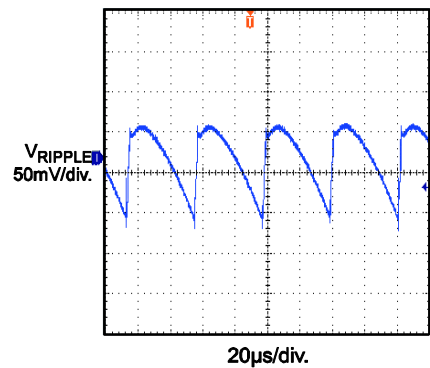
**Output Ripple**

$V_{IN} = 230\text{VAC}$ , No Load



**Output Ripple**

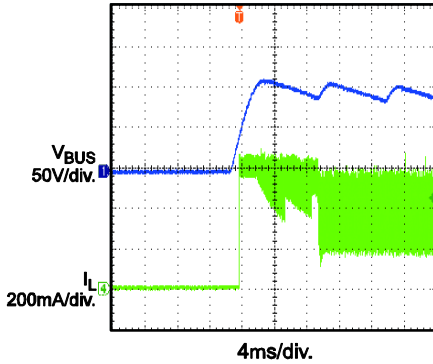
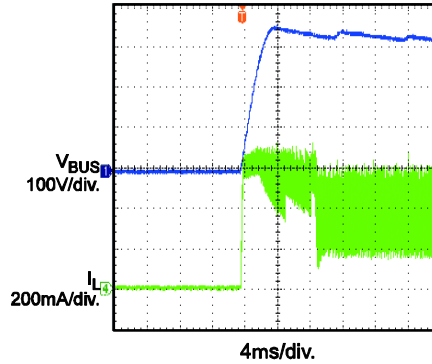
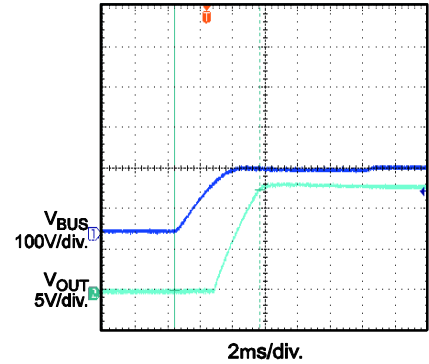
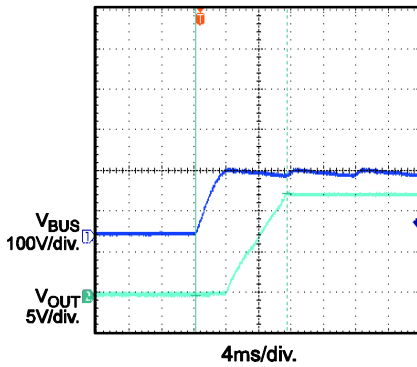
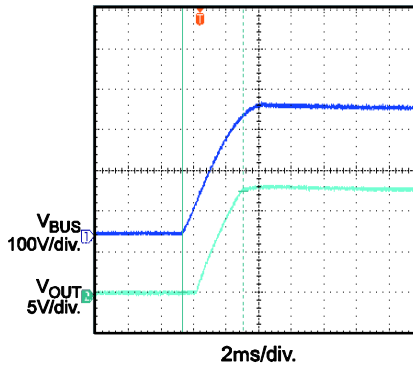
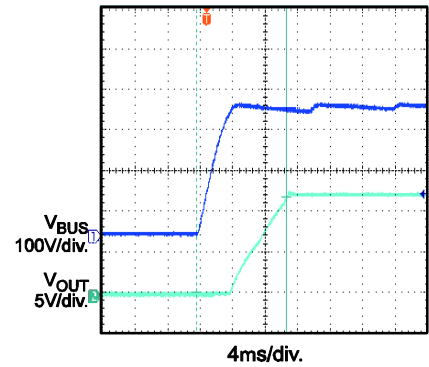
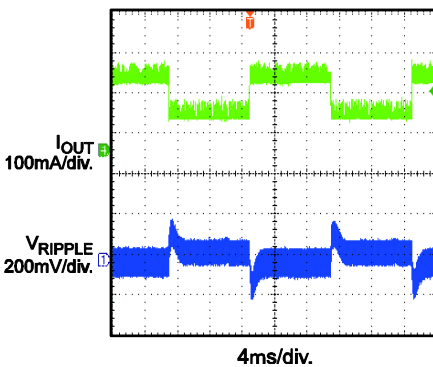
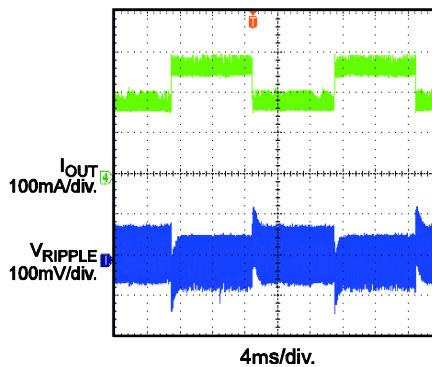
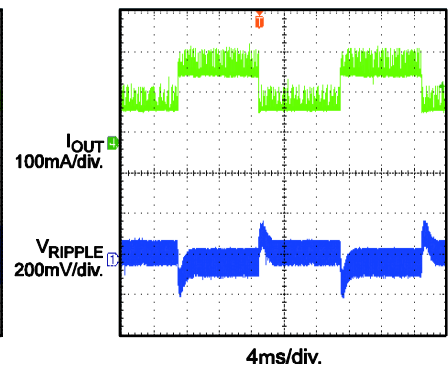
$V_{IN} = 230\text{VAC}$ , Full Load



**EVB TEST RESULTS** *(continued)*

Performance waveforms are tested on the evaluation board.

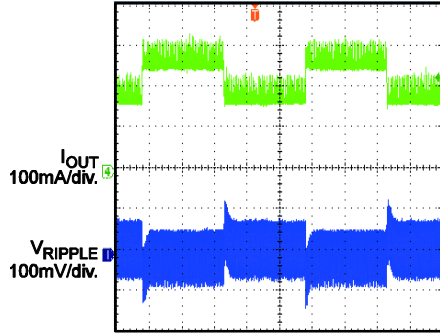
 $V_{IN} = 85\text{--}265\text{VAC}$ ,  $V_{OUT} = 12\text{V}$ ,  $I_{OUT} = 350\text{mA}$ ,  $T_A = 25^\circ\text{C}$ , unless otherwise noted.

**Soft Start**
 $V_{IN} = 85\text{VAC}$ 

**Soft Start**
 $V_{IN} = 265\text{VAC}$ 

**Turn-on Delay**
 $V_{IN} = 115\text{VAC}$ , No Load

**Turn-on Delay**
 $V_{IN} = 115\text{VAC}$ , Full Load

**Turn-on Delay**
 $V_{IN} = 230\text{VAC}$ , No Load

**Turn-on Delay**
 $V_{IN} = 230\text{VAC}$ , Full Load

**Load Transient**
 $V_{IN} = 115\text{VAC}$ ,  
25% Load to 50% Load

**Load Transient**
 $V_{IN} = 230\text{VAC}$ ,  
25% Load to 50% Load

**Load Transient**
 $V_{IN} = 115\text{VAC}$ ,  
50% Load to 75% Load


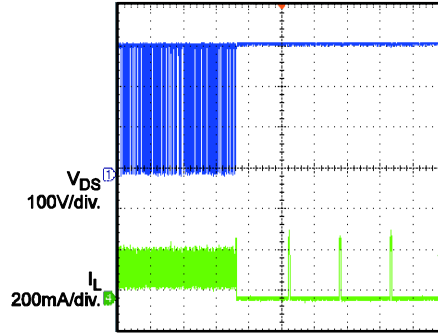
**EVB TEST RESULTS** *(continued)*

Performance waveforms are tested on the evaluation board.

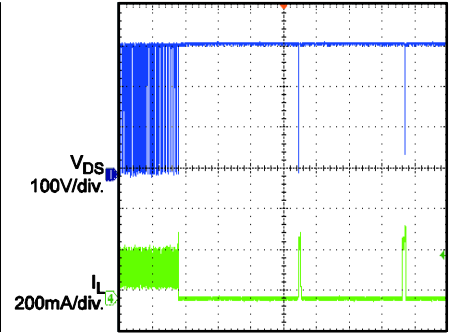
 $V_{IN} = 85\sim 265VAC$ ,  $V_{OUT} = 12V$ ,  $I_{OUT} = 350mA$ ,  $T_A = 25^\circ C$ , unless otherwise noted.

**Load Transient**
 $V_{IN} = 230VAC$ ,  
50% Load to 75% Load


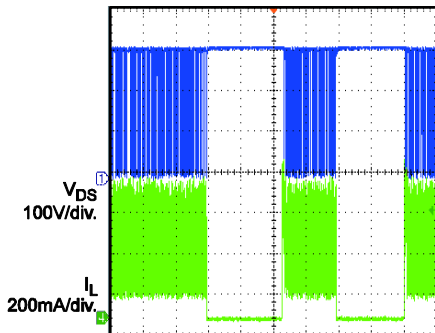
4ms/div.

**OLP Protection**
 $V_{IN} = 230VAC$ 


100ms/div.

**SCP Protection**
 $V_{IN} = 230VAC$ 


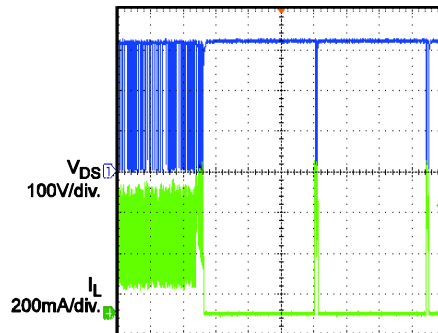
100ms/div.

**Thermal Down**


100ms/div.

**Open Loop**

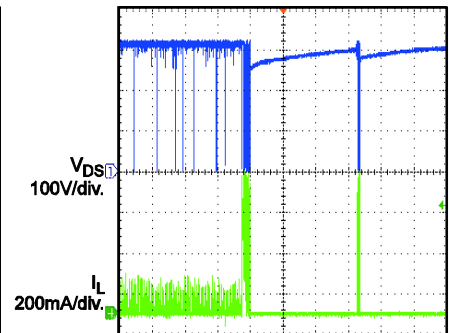
Full Load



100ms/div.

**Open Loop**

No Load

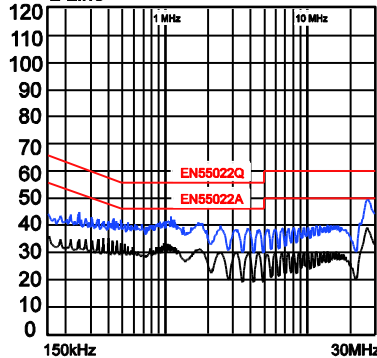


100ms/div.

**Conducted EMI**

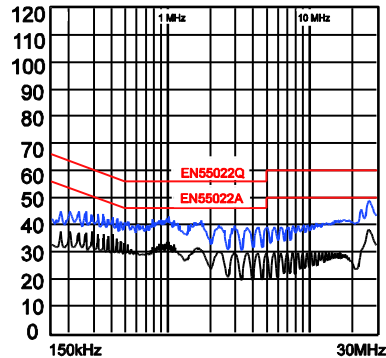
 Two-Wire Input,  $V_{IN} = 230VAC$ 

L Line


**Conducted EMI**

 Two-Wire Input,  $V_{IN} = 230VAC$ 

N Line



## SURGE PERFORMANCE

The circuit pass the 1000V surge.

Surge Level (V)	Input Voltage (VAC)	Injection Location	Injection Phase(o)	Number of Surges	Test Result
1000	220	L-N	0	5	PASS
1000	220	L-N	90	5	PASS
1000	220	L-N	180	5	PASS
1000	220	L-N	270	5	PASS
-1000	220	L-N	0	5	PASS
-1000	220	L-N	90	5	PASS
-1000	220	L-N	180	5	PASS
-1000	220	L-N	270	5	PASS

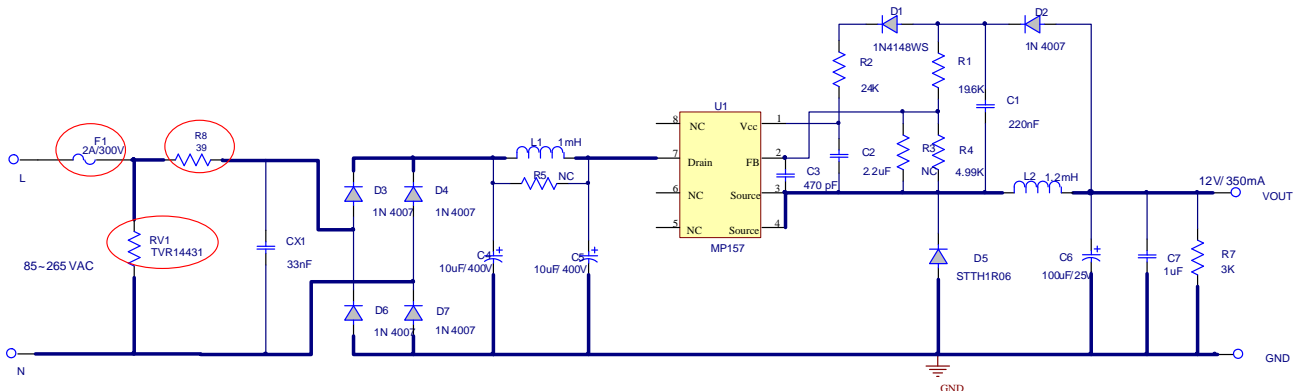
With the input capacitors C4 (10 $\mu$ F) and C5 (10 $\mu$ F), the board can pass 1000V surge test. Table 1 shows the capacitance required under normal condition for different surge voltage.

**Table 1 — Recommended Capacitor Values**

Surge Voltage	500V	1000V	2000V
C1	3.3 $\mu$ F	10 $\mu$ F	Shown in Fig
C2	3.3 $\mu$ F	10 $\mu$ F	

The board can pass 2kV surge test by using the circuit below.

- 1) Change the fuse resistor F1 (10ohm/1W) to SS-5-2A
- 2) Add a MOV RV1 (TVR14431)
- 3) Add a resistor R8 (39 $\Omega$ )





PRINTED CIRCUIT BOARD LAYOUT

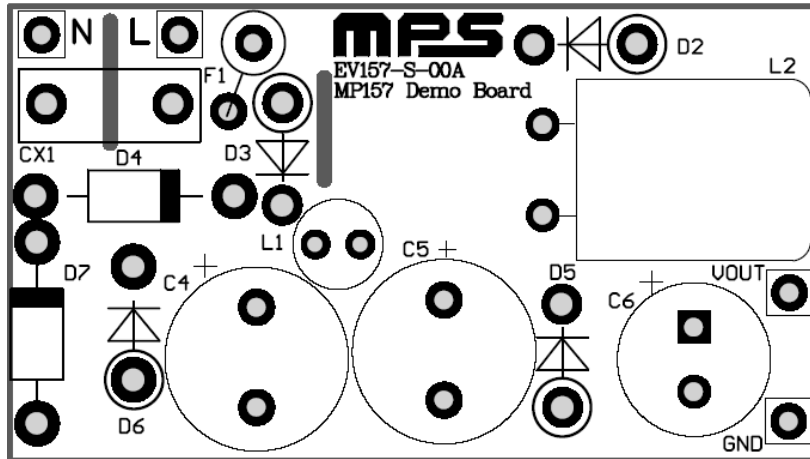


Figure 1 — Top Silk Layer

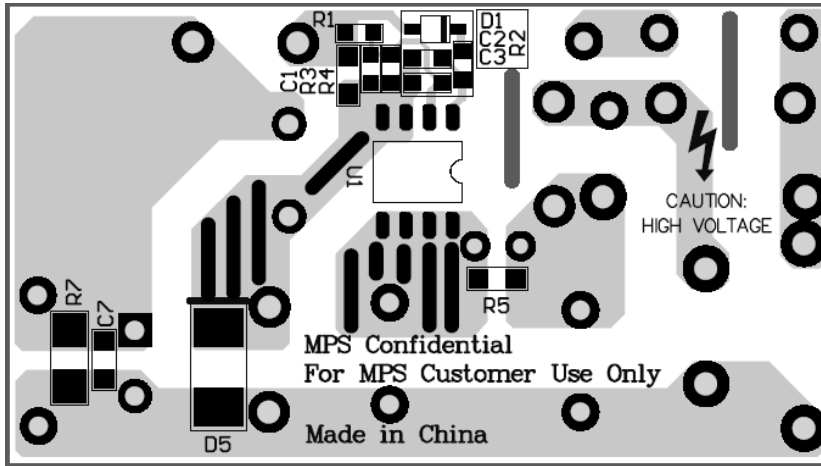


Figure 2 — Bottom Layer

## QUICK START GUIDE

1. Preset Power Supply to  $85\text{VAC} \leq V_{\text{IN}} \leq 265\text{VAC}$ .
2. Turn Power Supply off.
3. Connect the Line and Neutral terminals of the power supply output to L and N port.
4. Connect the positive terminal of the load to “+” port, and connect the negative terminal of the load to “-” port.
5. Turn Power Supply on after making connections.

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