EV155-J-00A

Energy Efficient Off-line Regulator EV Board

The Future of Analog IC Technology®

DESCRIPTION

The MP155 is a primary-side regulator that provides accurate constant voltage regulation without the opto-coupler, and supports buck, buck-boost, and flyback topologies. An integrated 500V MOSFET simplifies the structure and reduces costs. These features make it a competitive candidate for off-line low-power applications, such as home appliances and standby power.

The MP155 is a green-mode-operation regulator. Both the peak current and the switching frequency decrease as the load decreases. As a result, it offers excellent efficiency performance at light load, thus improving the overall average efficiency.

The MP155 features various protections such as thermal shutdown (TSD), VCC under-voltage lockout (UVLO), overload protection (OLP), short-circuit protection (SCP), and open loop protection.

The MP155 is available in the TSOT23-5 package.

FEATURES

- Primary-side constant voltage (CV) control, supporting buck, buck-boost and flyback topologies
- Integrated 500V/20Ω MOSFET
- < 100mW No-load power consumption
- Up to 3W output power
- Maximum DCM output current of 130mA
- Maximum CCM output current of 220mA
- Low VCC operating current
- Frequency foldback
- Maximum frequency limit
- Peak current compression
- Internal high-voltage current source
- Internal 350ns leading-edge blanking
- Thermal shutdown (auto restart)
- VCC under-voltage lockout with hysteresis (UVLO)
- Timer-based overload protection.
- Short circuit protection
- Open loop protection

APPLICATIONS

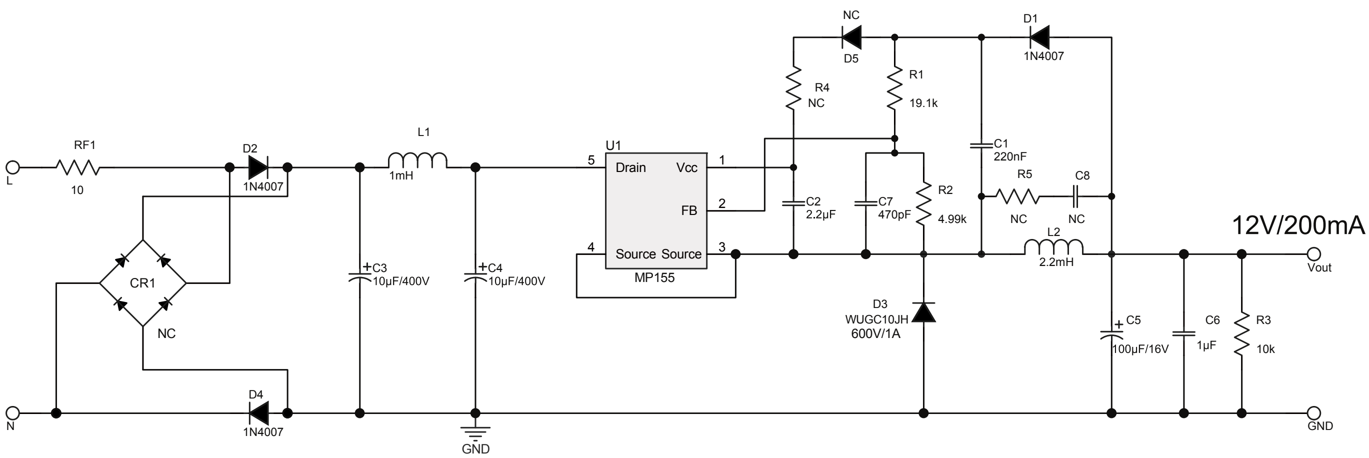
- Home Appliance, white goods and consumer electronics
- Industrial Controls
- Standby Power

EV155-J-00A EVALUATION BOARD

(L x W x H) 3.4cm x 2.2cm x 1.6cm

Board Number	MPS IC Number
EV155-J-00A	MP155GJ

EVALUATION BOARD SCHEMATIC



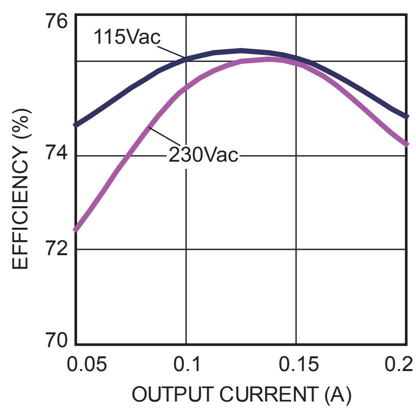
EV155-J-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacture	Part Number
1	C1	220nF	Ceramic Capacitor; 16V;X7R;0603;	0603	muRata	GRM188R71C224KA01
1	C2	2.2µF	Ceramic Capacitor; 10V;X7R;0603	0603	muRata	GRM188R71A225KE15D
2	C3, C4	10µF/400V	Capacitor;400V;20%	DIP	Any	Any
1	C5	100µF/16V	Electrolytic Capacitor; 16V;Electrolytic;DIP	DIP	Jianghai	CD11C-16V100
1	C6	1µF	Ceramic Capacitor; 50V;X7R;0805;	0805	muRata	GRM21BR71H105KA12L
1	C7	470pF	Ceramic Capacitor;50V;COG	0603	TDK	C1608COG1H471J
3	D1, D2, D4	1N4007	Diode;1000V;1A	DO-41	Diodes	1N4007
1	D3	WUGC10JH	Diode;600V;1A	SMA	ZOWIE	WUGC10JH
1	L1	1mH	Inductor;1mH;6; 250mA	DIP	Wurth	7447462102
1	L2	2.2mH	Inductor;2.2mH;4.73; 300mA	DIP	Wurth	7447720222
1	R1	19.1k	Film Resistor;1%	0603	Yageo	RC0603FR-0719K1L
1	R2	4.99k	Film Resistor;1%;	0603	Yageo	RC0603FR-074K99L
1	R3	10k	Resistor;1%	0603	Yageo	RC0603FR-0710KL
1	RF1	10	Fuse Resistor;5%;1W	DIP	Any	10 Ohm/1W
1	U1	MP155GJ	Buck regulator	TSOT23-5	MPS	MP155GJ

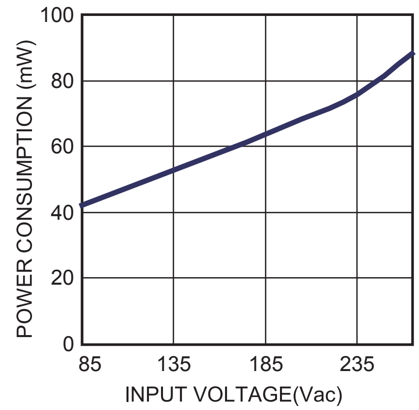
EVB TEST RESULTS

Performance waveforms are tested on the evaluation board.
V_{IN} = 85-265Vac, V_{OUT} = 12V, I_{OUT} = 200mA, T_A = 25ºC, unless otherwise noted.

Efficiency

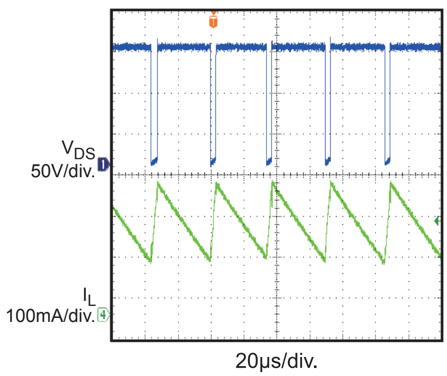


No Load Consumption



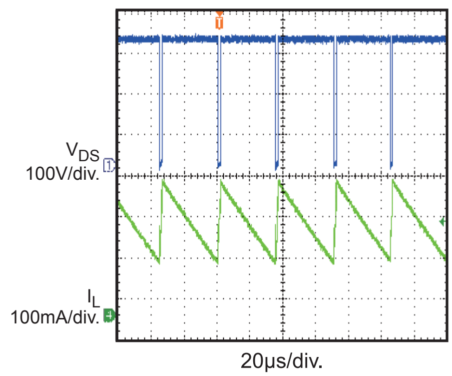
Normal Operation

V_{IN} = 115Vac, Full Load



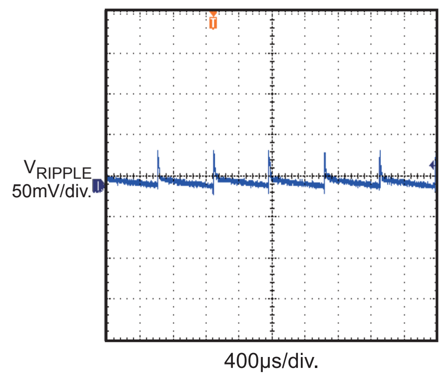
Normal Operation

V_{IN} = 230Vac, Full Load



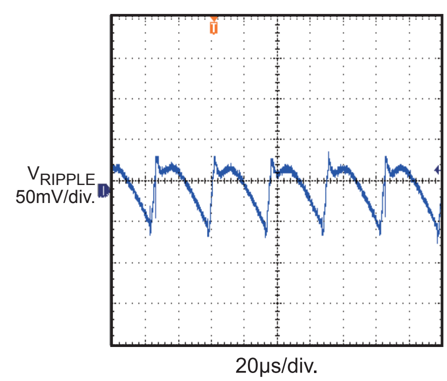
Output Ripple

V_{IN} = 115Vac, No Load



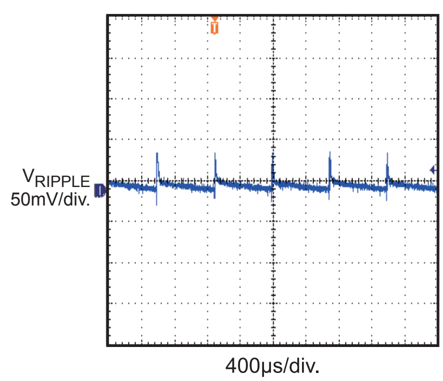
Output Ripple

V_{IN} = 115Vac, Full Load



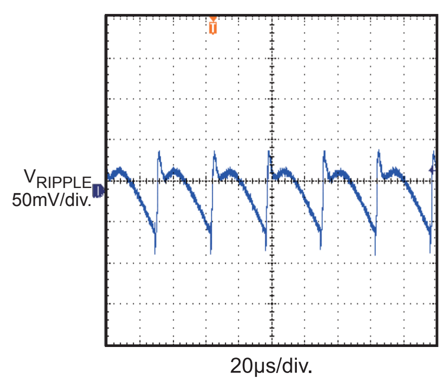
Output Ripple

V_{IN} = 230Vac, No Load



Output Ripple

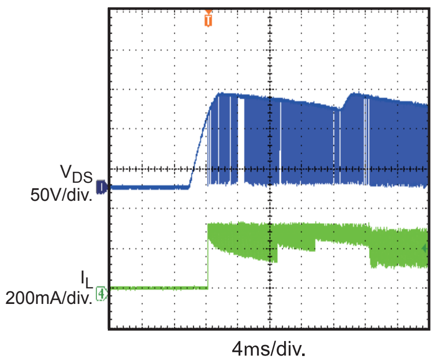
V_{IN} = 230Vac, Full Load



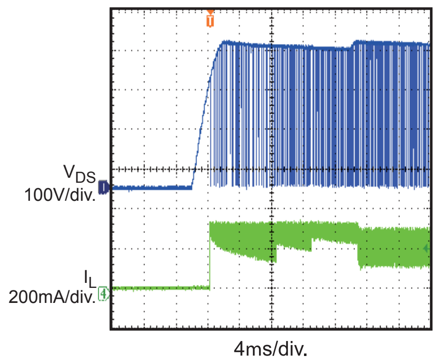
EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.
V_{IN} = 85-265Vac, V_{OUT} = 12V, I_{OUT} = 200mA, T_A = 25ºC, unless otherwise noted.

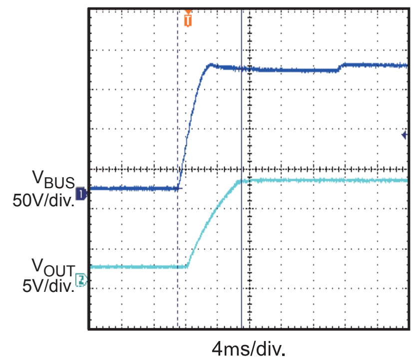
Soft Start
V_{IN} = 85Vac



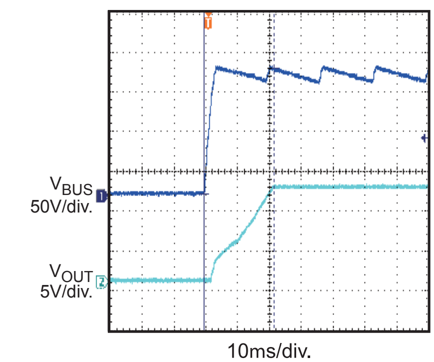
Soft Start
V_{IN} = 265Vac



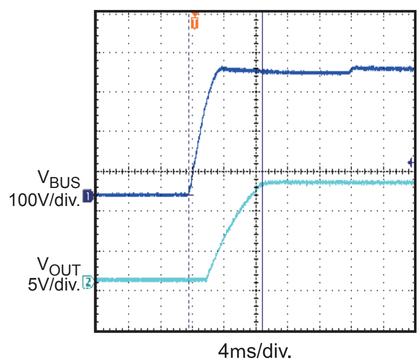
Turn-on Delay
V_{IN} = 115Vac, No Load



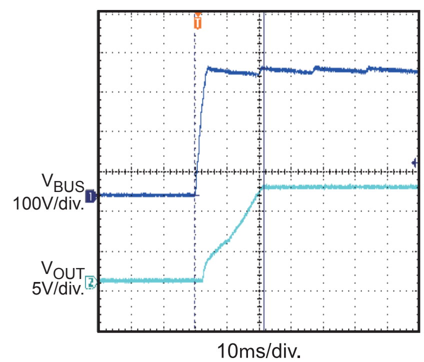
Turn-on Delay
V_{IN} = 115Vac, Full Load



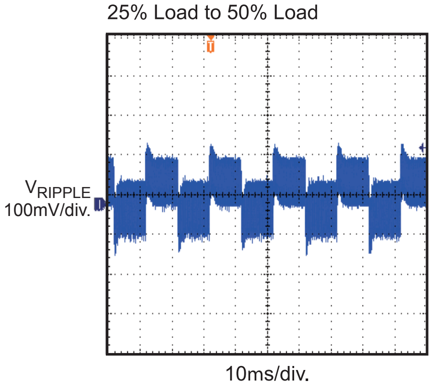
Turn-on Delay
V_{IN} = 230Vac, No Load



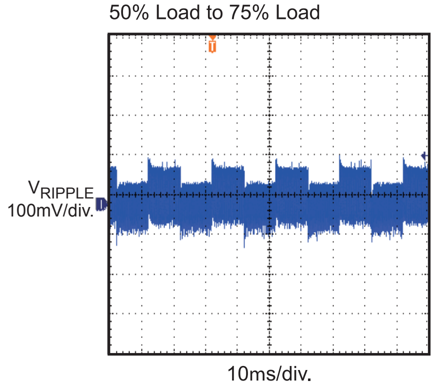
Turn-on Delay
V_{IN} = 230Vac, Full Load



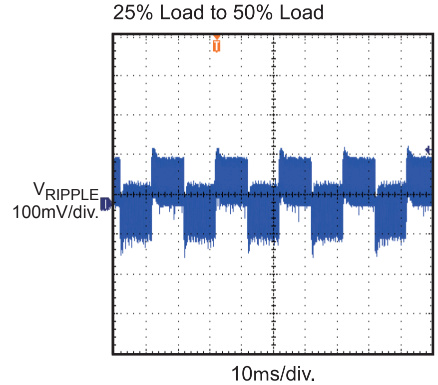
Load Transient
V_{IN} = 115Vac,
25% Load to 50% Load



Load Transient
V_{IN} = 115Vac,
50% Load to 75% Load



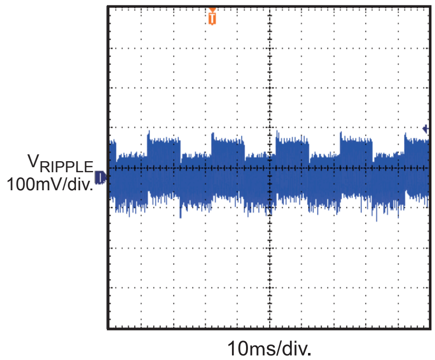
Load Transient
V_{IN} = 230Vac,
25% Load to 50% Load



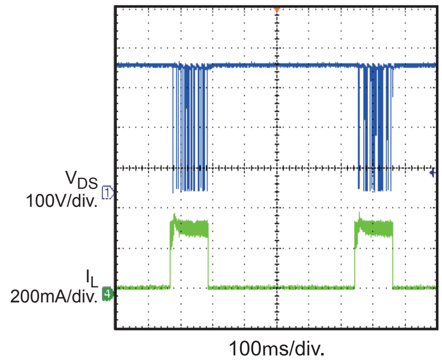
EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.
V_{IN} = 85-265VAC, V_{OUT} = 12V, I_{OUT} = 200mA, T_A = 25ºC, unless otherwise noted.

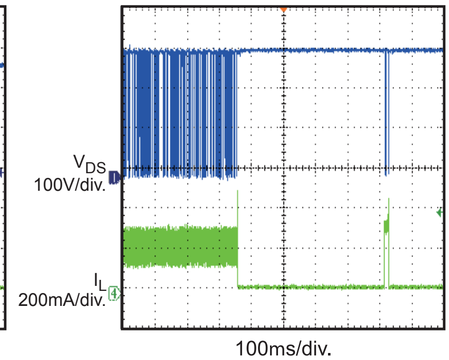
Load Transient
V_{IN} = 230Vac,
50% Load to 75% Load



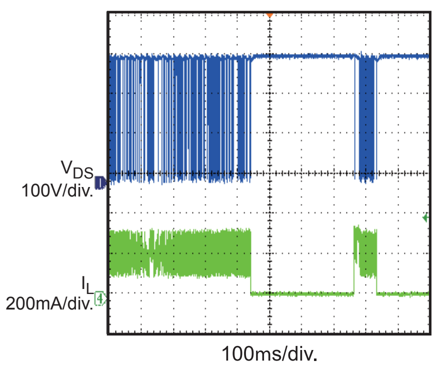
OLP Protection
V_{IN} = 230Vac



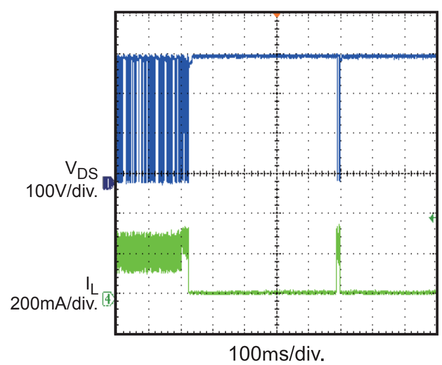
SCP Protection
V_{IN} = 230Vac



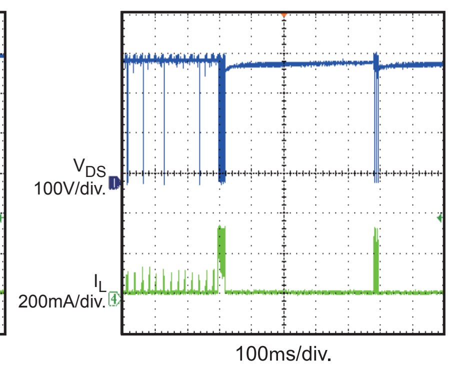
Thermal Down



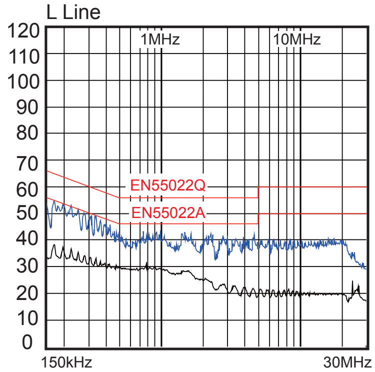
Open Loop
Full Load



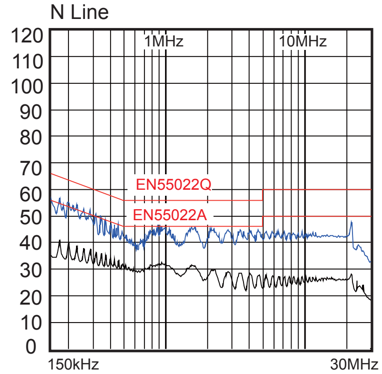
Open Loop
No Load



Conducted EMI
Two-wire input, V_{IN} =230VAC
L Line



Conducted EMI
Two-wire input, V_{IN} =230VAC
N Line



SURGE PERFORMANCE

With the input capacitors C3 (10µF) and C4 (10µF), the board can pass 1kV 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
C3	1µF	10µF	22µF
C4	1µF	4.7µF	10µF

PRINTED CIRCUIT BOARD LAYOUT

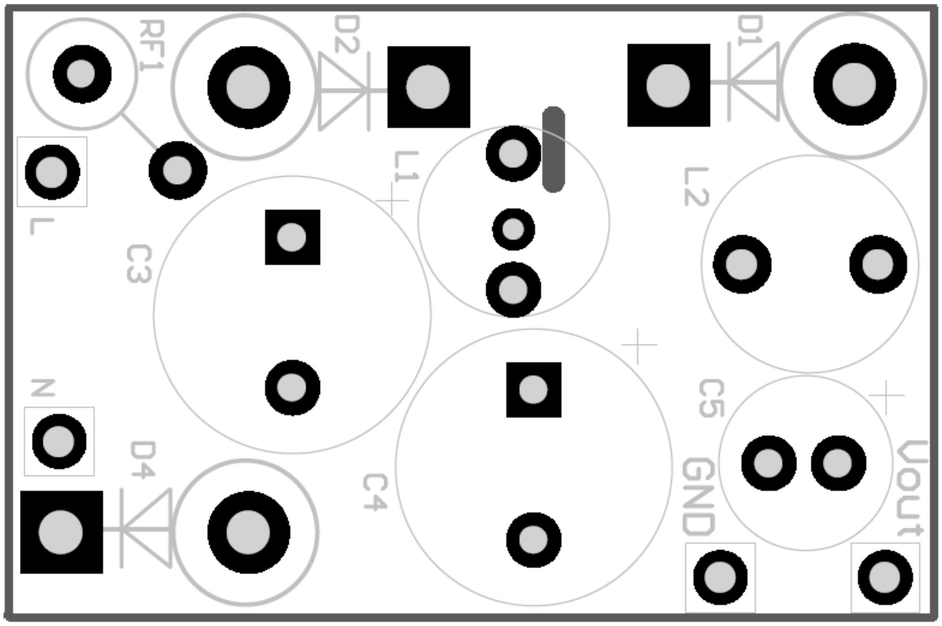


Figure 1 — Top Silk Layer

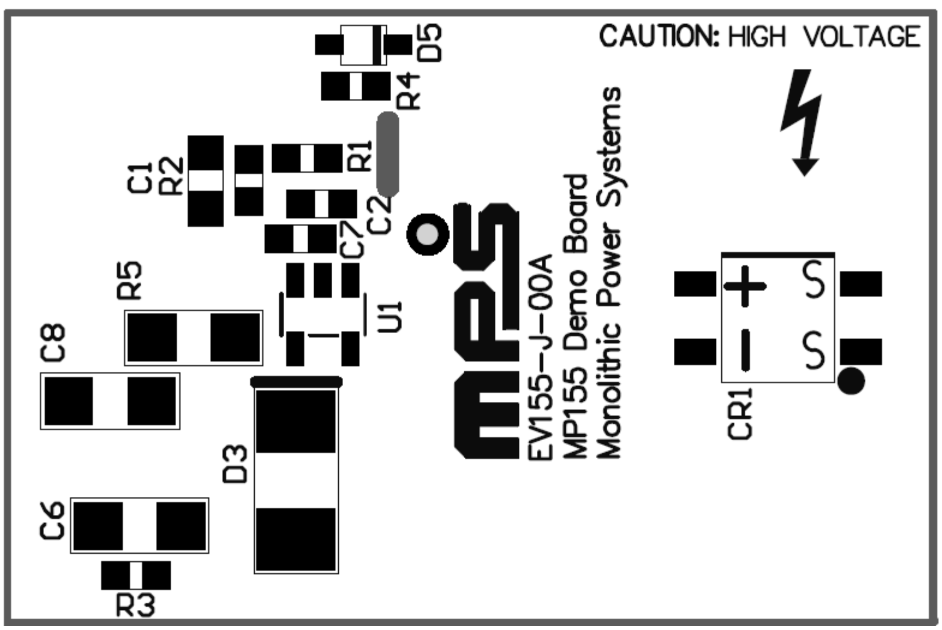


Figure 2 — Bottom Silk Layer

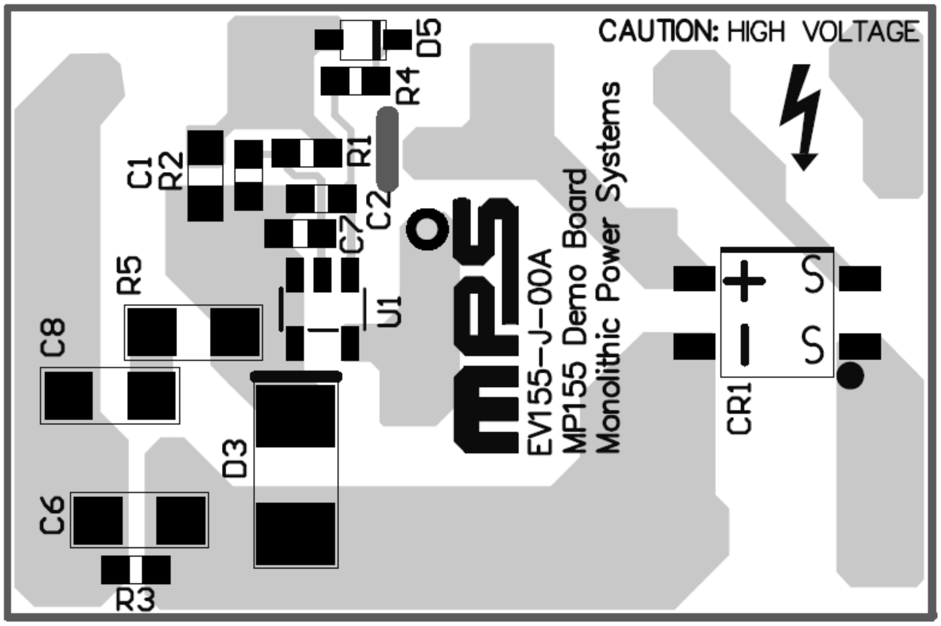


Figure 3 — Bottom Layer

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 port.
4. Connect the positive terminal of the load to V_{OUT} port, and connect the negative terminal of the load to GND port.
5. Turn Power Supply on after making connections.