

## DESCRIPTION

The EVHFC0310-S-00A is an evaluation board for the HFC0310. It is configured to provide a regulated 12V output at up to 0.6A load current, and 6V output at up to 0.1A load current from a 85V<sub>AC</sub> - 420V<sub>AC</sub> input.

HFC0310 uses peak current mode to provide excellent transient response and ease loop compensation. When the output power falls below a given level, the controller enters burst mode to lower the stand-by power consumption.

An external capacitor connected between the FSET pin and GND programs the HFC0310 switching frequency. Otherwise, the HFC0310 uses a frequency shaping function that greatly reduces the noise level, and reduces the cost of the EMI filter.

## ELECTRICAL SPECIFICATION

Parameter	Symbol	Value	Units
Input voltage	V <sub>IN</sub>	85 – 420	V <sub>AC</sub>
Output1 voltage	V <sub>OUT1</sub>	12	V
Output1 current	I <sub>OUT1</sub>	0.6	A
Output2 voltage	V <sub>OUT2</sub>	6	V
Output2 current	I <sub>OUT2</sub>	0.1	A

## FEATURES

- Programmable switching frequency up to 600kHz
- Frequency shaping ( $\pm 3.5\%$ )
- Current-mode operation
- Very low start-up current (12 $\mu$ A)
- Very low standby power consumption via active-burst mode
- Internal 350ns leading-edge blanking
- Built-in 3ms soft-start function
- Internal slope compensation
- Built-in PRO pin pull-up (>3.25V) auto-restart function

## APPLICATIONS

- Power Meters
- Switching Mode Power Supplies
- AC/DC Adapters, Switching Chargers

All MPS parts are lead-free and adhere to the RoHS directive. For MPS green status, please visit MPS website under Quality Assurance.

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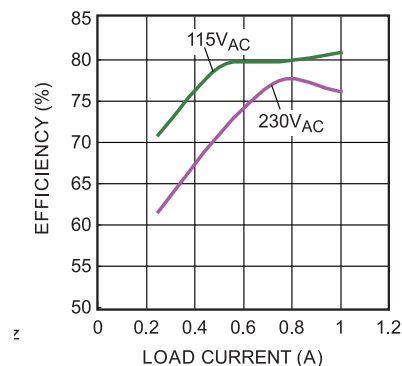
## EVHFC0310-S-00A EVALUATION BOARD



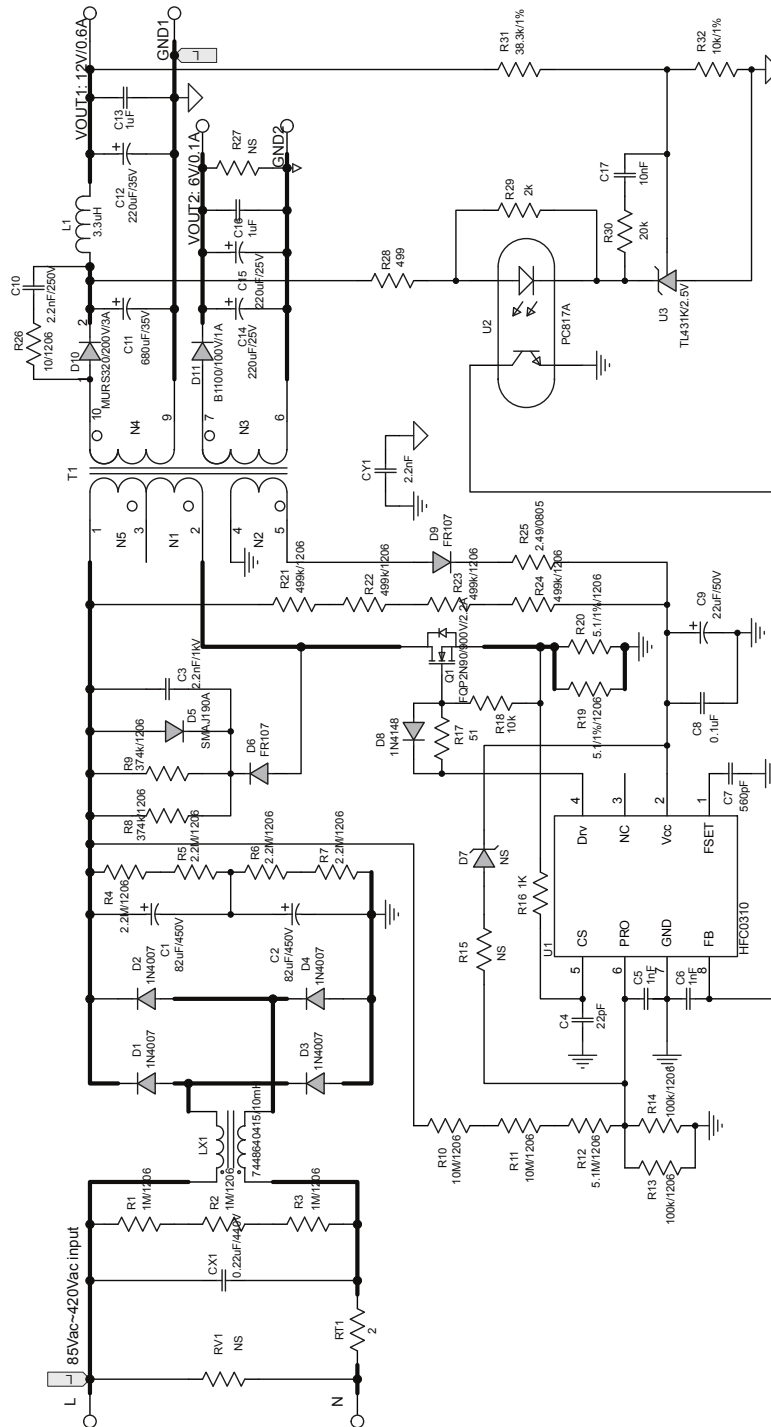
(L x W x H) 103mm x 52mm x 35mm

Board Number	MPS IC Number
EVHFC0310-S-00A	HFC0310

### Efficiency



## EVALUATION BOARD SCHEMATIC



**EVHFC0310-S-00A BILL OF MATERIALS**

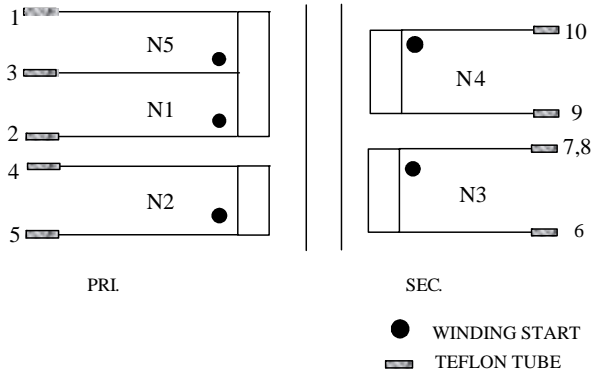
Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer P/N
2	C1,C2	82µF	Electrolytic Cap, 450V	DIP	Jianghai	CD266-450V82uF
1	C3	2.2nF	Film Cap, 1kV	DIP	Any	Any
1	C4	22pF	Ceramic Cap, 50V, C0G	0603	Murata	GRM1885C1H220JA01
2	C5,C6	1nF	Ceramic Cap, 50V, X7R	0603	TDK	C1608X7R1H102K
1	C7	560pF	Ceramic Cap, 50V, C0G	0603	TDK	C1608C0G1H561K
1	C8	0.1µF	Ceramic Cap, 50V, X7R	0603	Murata	GRM188R71H104KA93D
1	C9	22µF	Electrolytic Cap, 50V	DIP	Jianghai	CD281L-50V22
1	C10	2.2nF	Ceramic Cap, 250V, X7R	0805	TDK	C2012X7R2E222K
1	C11	680µF	Electrolytic Cap, 35V	DIP	Jianghai	CD287-35V680
1	C12	220µF	Electrolytic Cap, 35V	DIP	Jianghai	CD287-35V220
2	C13,C16	1µF	Ceramic Cap, 50V, X7R	0805	TDK	C2012X7R1E105K
2	C14,C15	220µF	Electrolytic Cap, 25V	DIP	Panasonic	220uF/25V
1	C17	10nF	Ceramic Cap, 50V, X7R	0603	Murata	GRM188R71H103KA01D
1	CX1	0.22µF	Film Cap, 440Vac, X1	DIP	Faratronic	MKP65-224K
1	CY1	2.2nF	Film Cap, 4000V, Y1	DIP	Hongke	JN12E222MY02N
3	R1,R2,R3	1MΩ	Film Res., 1%	1206	Yageo	RC1206FR-071ML
4	R4,R5,R6, R7	2.2MΩ	Film Res., 5%	1206	Any	Any
2	R8,R9	374kΩ	Film Res., 1%	1206	Yageo	RC1206FR-07374KL
2	R10,R11	10MΩ	Film Res., 1%	1206	Royalohm	1206F1005T5E
1	R12	5.1MΩ	Film Res., 5%	1206	Yageo	RI1206L515JT
2	R13,R14	100kΩ	Film Res., 5%	1206	Yageo	RM12JTN104
1	R15	NS				
1	R16	1kΩ	Resistor, 1%	DIP	Any	Any
1	R17	51Ω	Film Res., 1%	0603	Yageo	RC0603FR-0751RL
2	R18,R32	10kΩ	Film Res., 1%	0603	Yageo	RC0603FR-0710KL
2	R19,R20	5.1Ω	Film Res., 1%	1206	Yageo	RC1206FR-075R1L
4	R21,R22, R23, R24	499k	Film Res., 1%	1206	Royalohm	RC1206FR-07499KL
1	R25	2.49Ω	Film Res., 1%	0805	Yageo	RC0805FR-072R49L

**EVHFC0310-S-00A BILL OF MATERIALS (continued)**

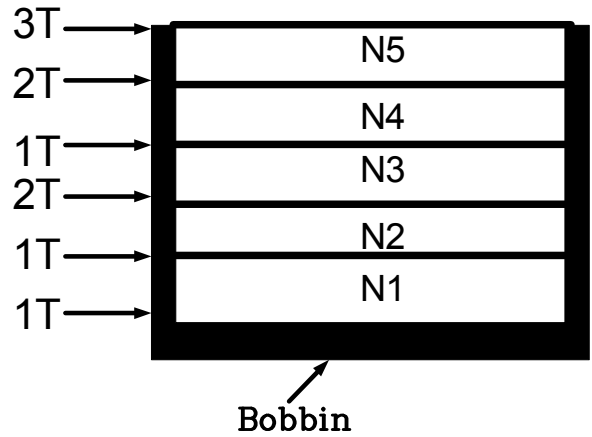
Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer P/N
1	R26	10Ω	Film Res., 5%	1206	Yageo	RC1206JR-0710R
1	R27	NS				
1	R28	499Ω	Film Res., 1%	0603	Yageo	RC0603FR-07499RL
1	R29	2kΩ	Film Res., 1%	0603	Yageo	RC0603FR-072KL
1	R30	20kΩ	Film Res., 1%	0603	Yageo	RC0603FR-0720KL
1	R31	38.3kΩ	Film Res., 1%	0603	Yageo	RC0603FR-0738K3L
4	D1,D2, D3,D4	1N4007	Diode, 1A/1000V	DO41	Diodes	1N4007
1	D5	SMAJ190A	Diode, 1mA/190V	SMA	Brightking	SMAJ190A
2	D6,D9	FR107	Diode, 1A/1000V	DO41	Diodes	FR107
1	D7	NS				
1	D8	1N4148	Diode, 0.2A/75V	SOD323	Diodes	IN4148
1	D10	MURS320T3	Diode, 3A/200V	SMC	ON Semiconductor	MURS320T3
1	D11	B1100	Diode, 1A/100V	SMA	Diodes	B1100-13-F
1	Q1	FQP2N90	N-Channel Mosfet,2.2A/900V	TO220	Fairchild	FQP2N90
1	RT1	2Ω	NTC Res;	DIP	Xingshun	2D2-10
1	L1	3.3μH	Inductor, 2.66A	DIP	TOKO	8RHB2#822LY3R3M
1	LX1	10mH	Common filter	DIP	Würth	7448640415
1	T1		EF20, Primary Inductance: 2.5mH, N1:N2:N3:N4:N5=46: 12:12:6:46	DIP	Any	Any
1	RV1	NS				
1	U1	HFC0310	HFC0310GS	SOIC8	MPS	HFC0310GS
1	U2	PC817A	Opto-coupler	DIP	Sharp	PC817A
1	U3	TL431K	Shunt Regulator 2.5V	SOT-23	TI	TL431K

## TRANSFORMER STRUCTURE

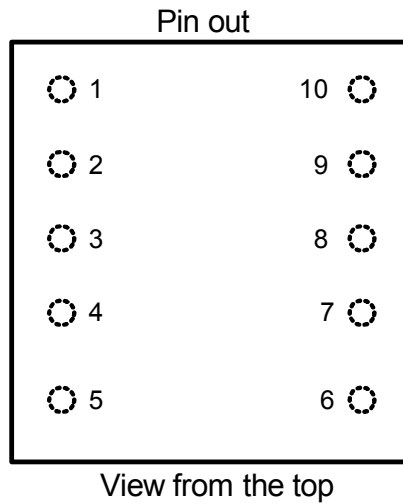
Electrical Diagram



Winding Diagram



### Pin Definition of Bobbin



**Table 1—Electrical Characteristic**

Parameter	Condition	Value
Primary Inductance	Lp(2-1)	2.5mH±5%
Core	/	EF20
Bobbin	/	EF20
Core Material	/	PC40or equivalent
Turn Ratio	N1:N2:N3:N4:N5	46:12:12:6:46

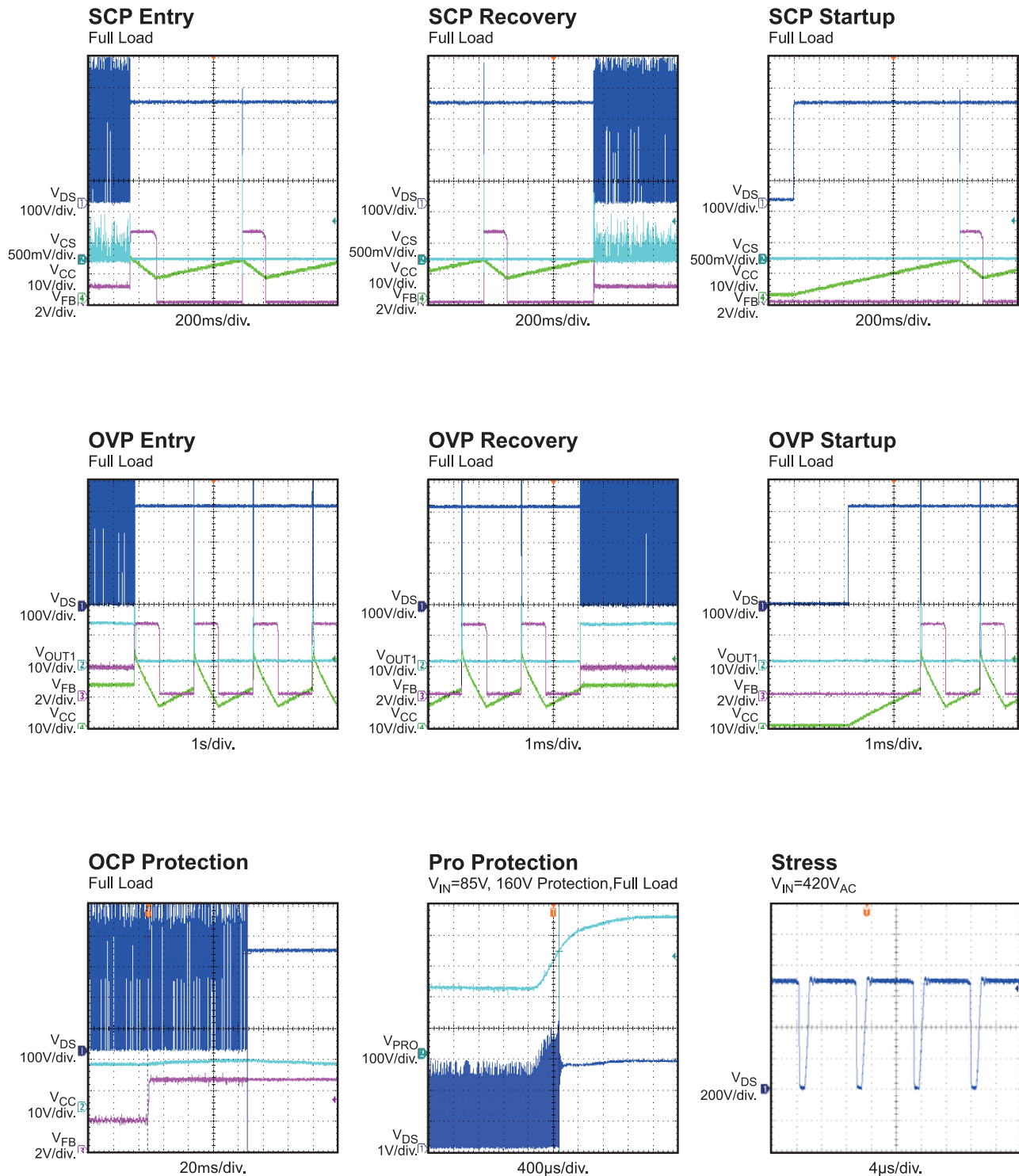
**Table 2—Winding Specification**

Tape Turns	Winding No.	Margin Tapes	Start&End	Wire Diameter (mm)	Turns
1	N1	2mm	2→3	0.2×1	46
2	N2	2mm	5→4	0.2×1	12
1	N3	/	7,8→6	0.5T.I.W.×1	12
2	N4	/	10→9	0.29T.I.W.×1	6
3	N5	2mm	3→1	0.2×1	46

## EVB TEST RESULTS

Performance waveforms are tested on the evaluation board.

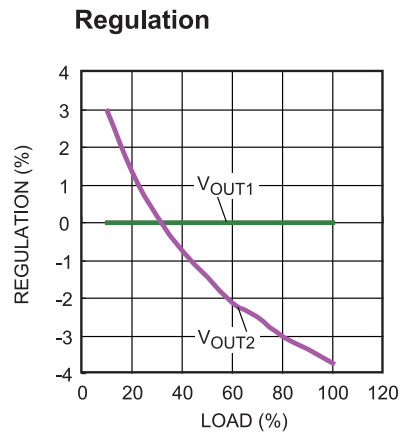
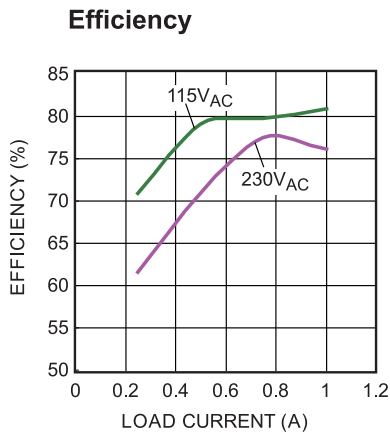
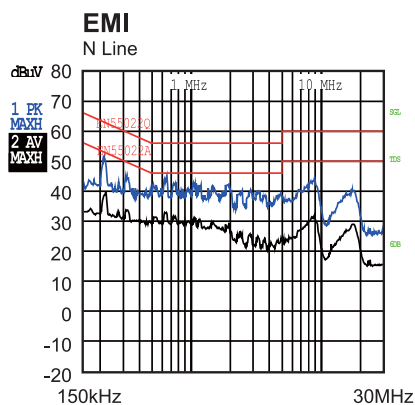
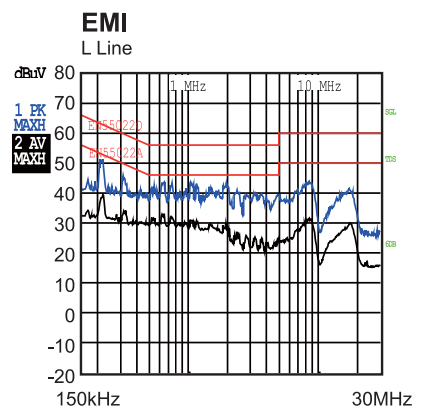
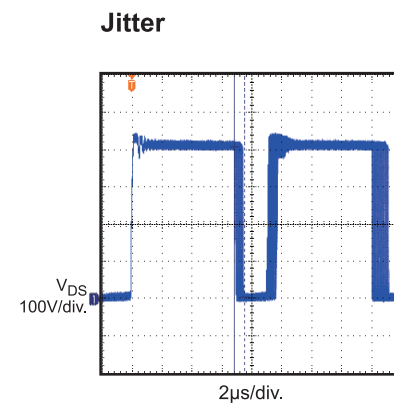
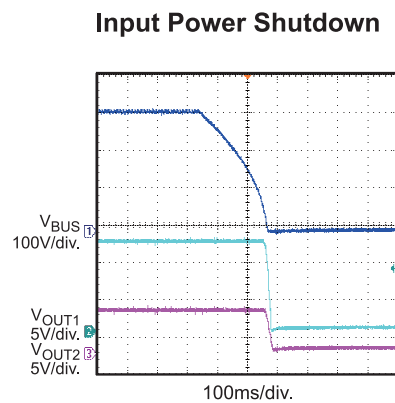
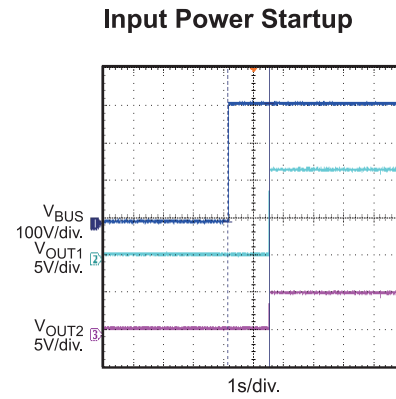
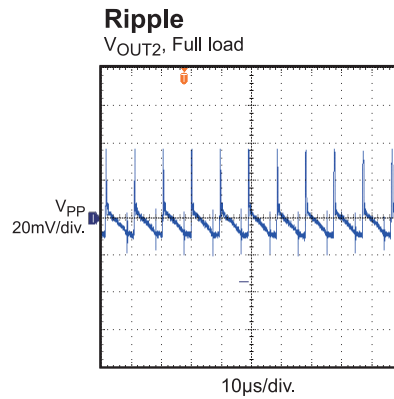
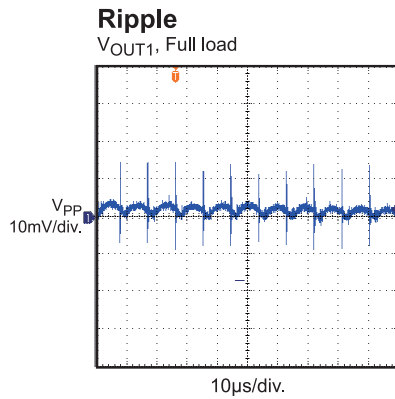
$V_{IN} = 230V_{AC}$ ,  $V_{OUT1} = 12V/0.6A$ ,  $V_{OUT2} = 6V/0.1A$ ,  $T_A = 25^{\circ}C$ , unless otherwise noted.



## EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.

$V_{IN} = 230V_{AC}$ ,  $V_{OUT1} = 12V/0.6A$ ,  $V_{OUT2} = 6V/0.1A$ ,  $T_A = 25^{\circ}C$ , unless otherwise noted.





### PRINTED CIRCUIT BOARD LAYOUT

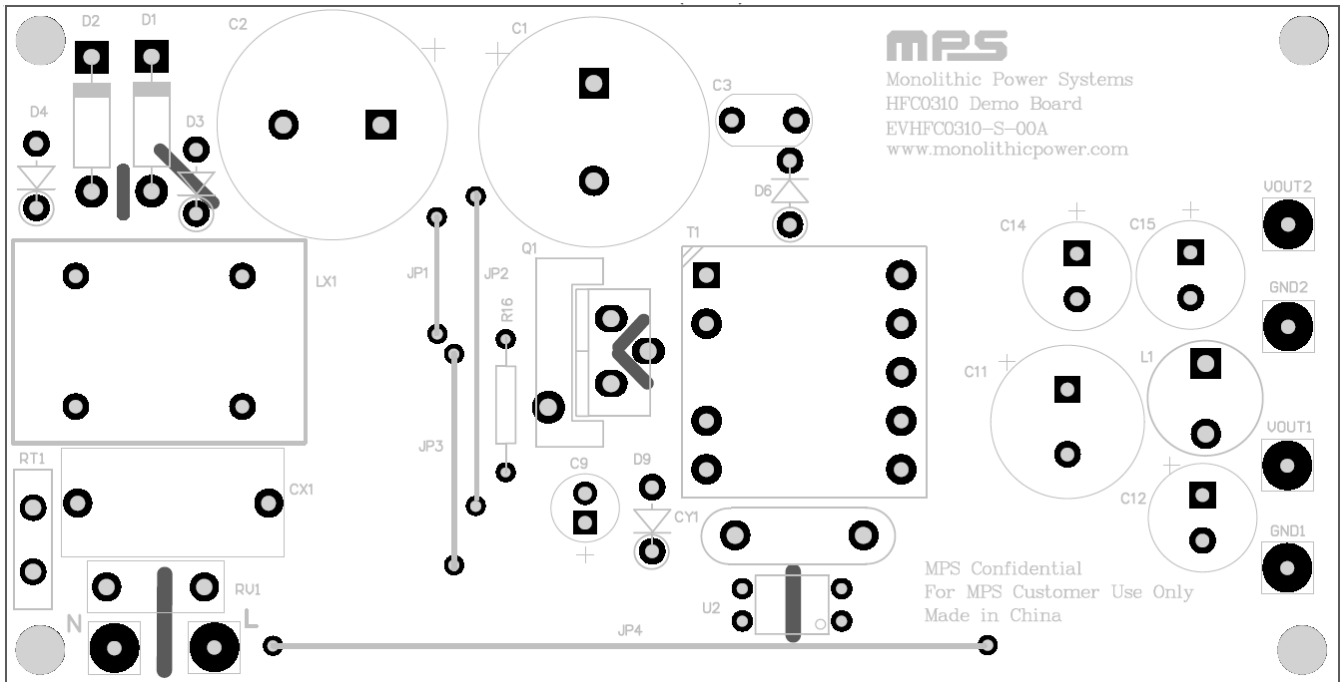


Figure 1—Top Layer

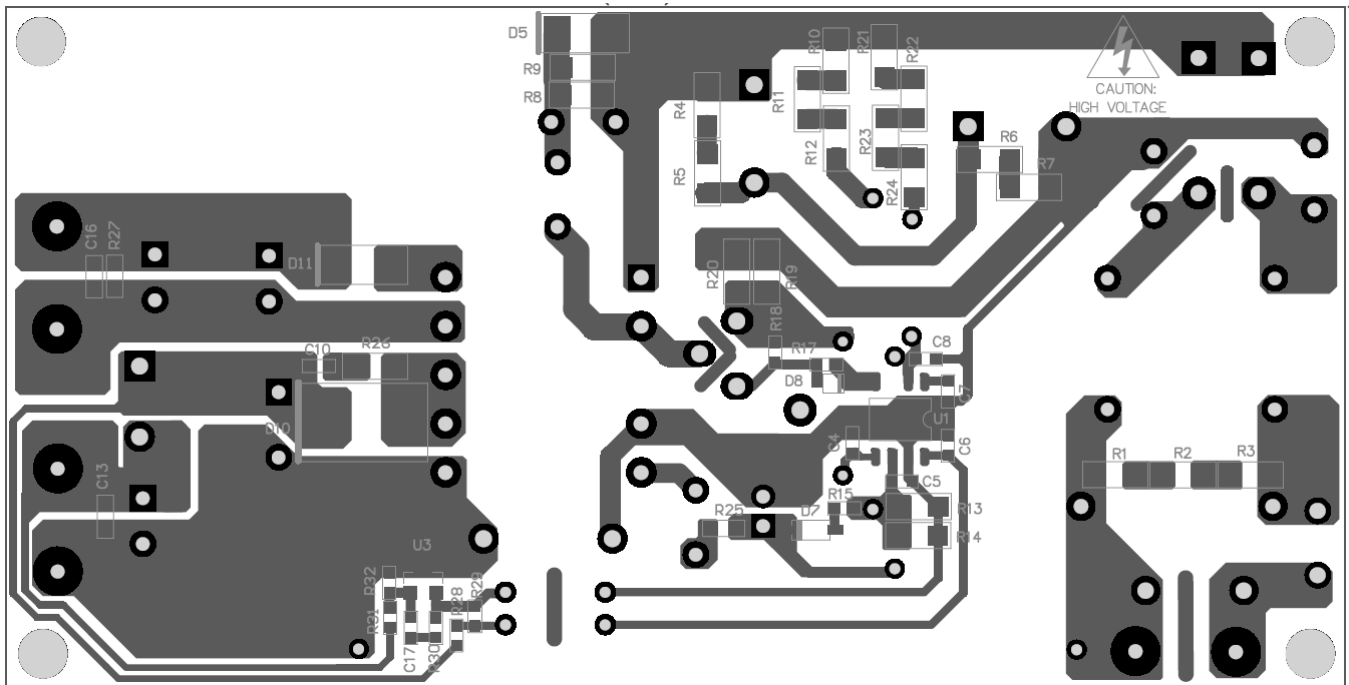


Figure 2—Bottom Layer

## QUICK START GUIDE

1. Preset Power Supply to  $85V_{AC} \leq V_{IN} \leq 420V_{AC}$ .
2. Turn Power Supply off.
3. Connect Power Supply terminals to Line and Neutral
4. Connect Load to  $V_{OUT1}$  and GND1,  $V_{OUT2}$  and GND2
5. Turn Power Supply on. The board will automatically startup.

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