

300W off-line power factor correction (PFC) boost converter

The circuit presented here is a 300W off-line power factor correction (PFC) boost converter providing a nominal regulated output voltage of 375V @ 0.8A of load current. The project accommodates an input voltage range of 85V AC to 265VAC and uses average current mode control at a fixed programmable switching frequency of 116KHz. The project is based on UCC28180 PFC controller module which incorporates a wide range of protection features to ensure safe system operation. The controller operates under average current mode control at a fixed programmable switching frequency of 116 kHz. Simple external current and voltage loop compensation, along with advanced protection features, make this controller ideal for server and desktop power supplies, industrial power supplies, and white goods. The project includes onboard fuse for short circuit protection, EMI filter, NTC to control inrush current, Bridge rectifier for DC rectification, high voltage/current MOSFET for switching, switching diode, high current inductor, high-value DC bus filter capacitor on the output. This project requires UCC28128 based controller board that can be mounted vertically on the PCB socket.

Heat Sink: Use appropriate heatsink for MOSFET and Switching Diode.

Fan: A fan, capable of 200 LFM to 400 LFM, should be used to maintain component temperatures within safe operating ranges at all times during operation.

Note: This project has 2 blocks, the power board and controller board, information about controller board is available here:

<https://www.electronics-lab.com/project/programmable-frequency-continuous-conduction-mode-ccm-boost-power-factor-correction-pfc-controller/>

More Information about Power factor correction (PFC) is available here:

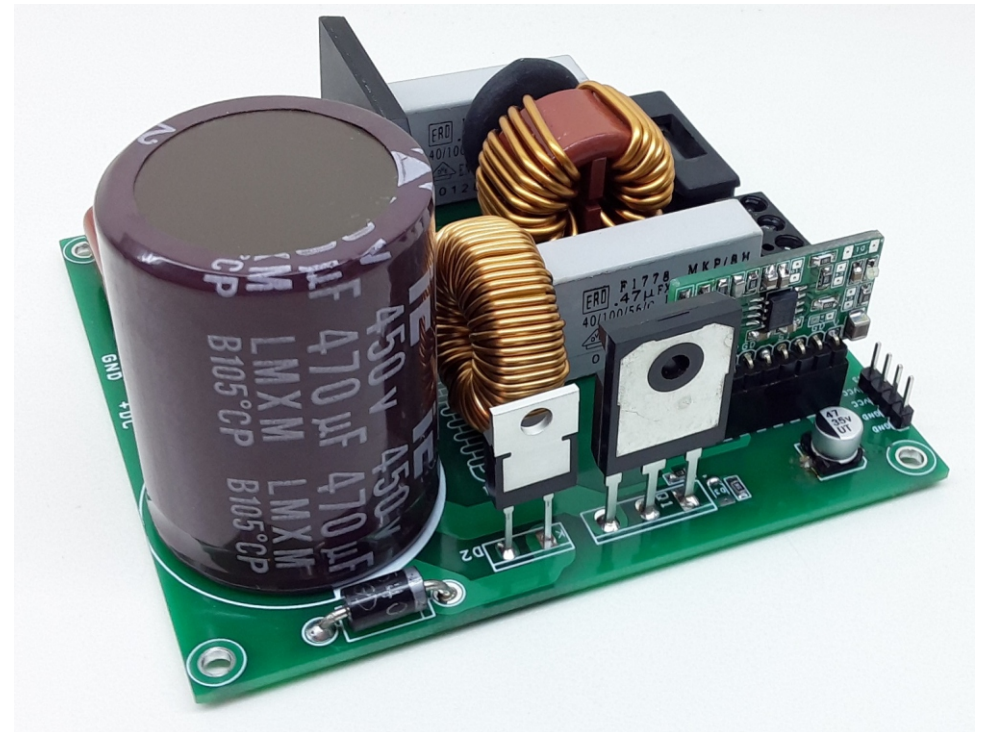
<https://toshiba.semicon-storage.com/info/docget.jsp?did=68570>

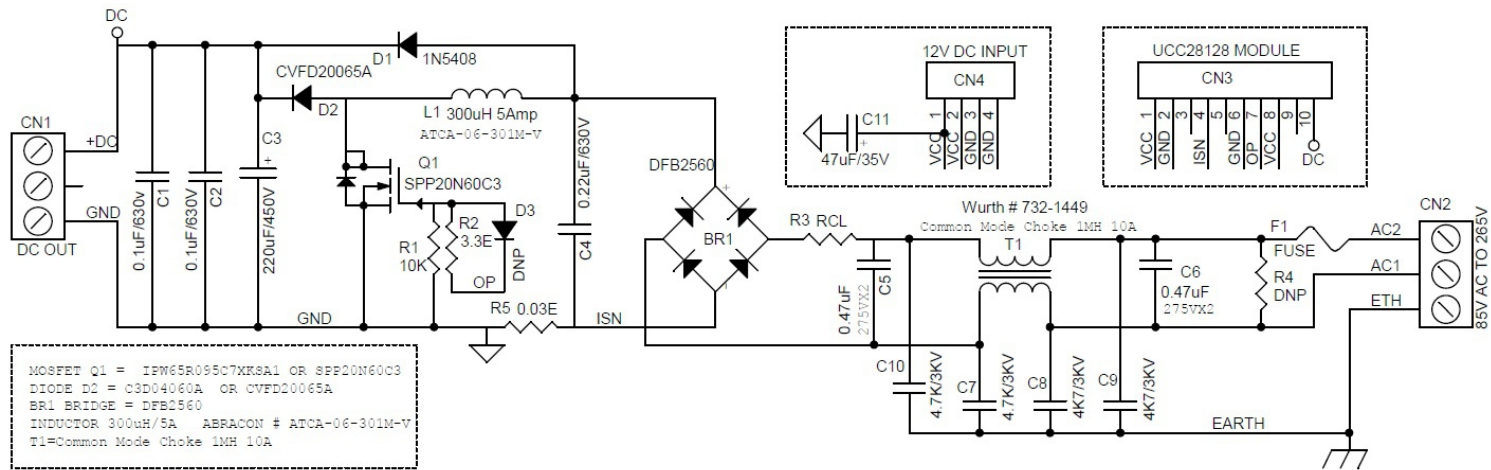
<https://www.sunpower-uk.com/glossary/what-is-power-factor-correction/>

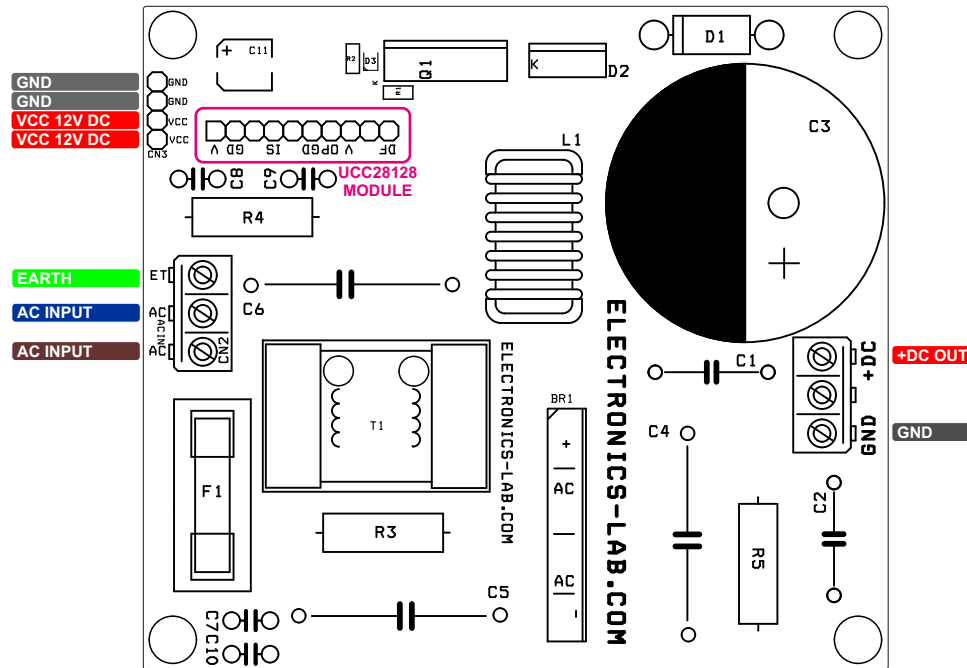
<https://training.ti.com/power-factor-correction-pfc-basics>

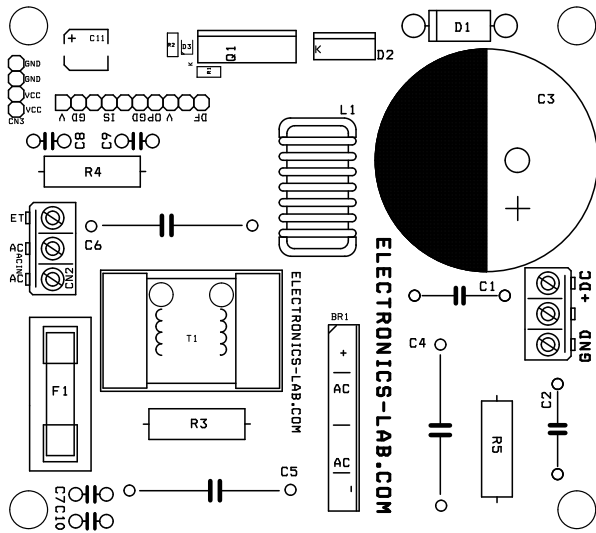
Features

- AC Input Range 85V AC to 265V AC
- AC Frequency 47Hz to 63Hz
- DC Supply for Logic Circuit 12V DC @ 100mA
- 300W, 275V DC Output
- Average Current Mode PWM Control
- Fixed 116Khz Oscillator Frequency
- Soft Over Current and Cycle-by-Cycle Peak Current Limiting
- VCC Under Voltage Lockout with Low Start-Up Current
- Voltage Regulation Open Loop Detection
- Output Over-Voltage Protection with Hysteresis Recovery
- Enhanced Dynamic Response
- Soft Start
- PCB Dimensions 97.89MM X 87.63MM

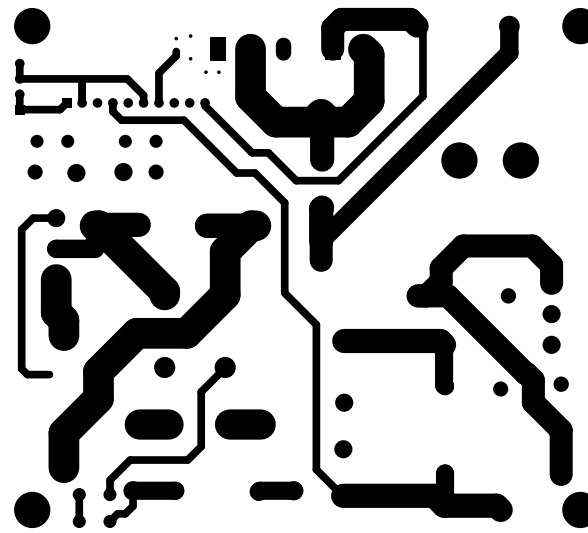




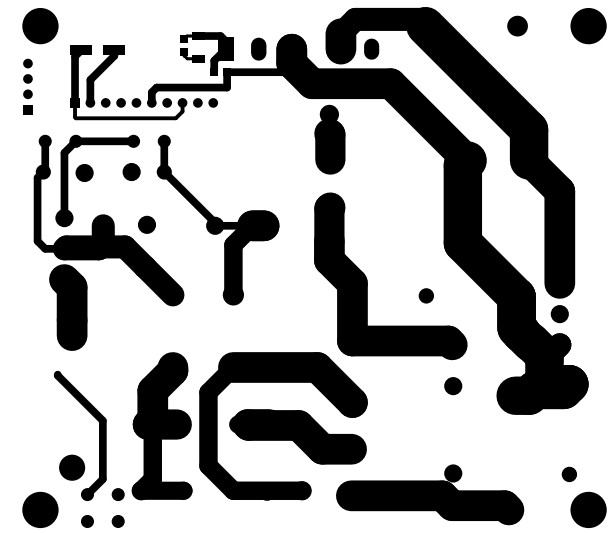




SILK SCREEN TOP



BOTTOM LAYER



TOP LAYER

PCB DIMENSIONS 97.79MM X 87.63MM



BOM						
NO	QNTY.	REF.	DESC.	MANUFACTURER	SUPPLIER	SUPPLIER PART NO
1	1	BR1	BRIDGE RECT. 600V 25A	ON SEMI	DIGIKEY	DFB2560-ND
2	1	CN1	3 PIN SCREW TERMINAL	PHOENIX	DIGIKEY	277-1248-ND
3	1	CN2	3 PIN SCREW TERMINAL	PHOENIX	DIGIKEY	277-1248-ND
4	1	CN3	UCC28128 MODULE	ELECTRONICS-LAB.COM		
5	1	CN4	4 PIN MALE HEADER PITCH 2.54MM	WURTH	DIGIKEY	732-5317-ND
6	2	C1,C2	0.1uF/630V	PANASONIC	DIGIKEY	P12158-ND
7	1	C3	470uF/450V	NICHICON	DIGIKEY	493-3239-ND
8	1	C4	0.22uF/630V	NICHICON	DIGIKEY	493-3661-ND
9	2	C5,C6	0.47uF/275VX2	KEMET	DIGIKEY	399-12744-ND
10	4	C7,C8,C9,C10	4.7K/3KV	TDK	DIGIKEY	445-175519-ND
11	1	C11	47uF/35V	NICHICON	DIGIKEY	493-9586-2-ND
12	1	D1	1N5408	ON SEMI	DIGIKEY	1N5408RLGOSTR-ND
13	1	D2	CVFD20065A	CREE	DIGIKEY	CVFD20065A-ND
14	2	D3,R4	DNP			OMIT
15	1	F1	FUSE HULDER	WURTH	DIGIKEY	732-11376-ND
16	1	F1	FUSE HOLDER CLIP COVER	WURTH	DIGIKEY	732-11379-ND
17	1	F1	FUSE	WURTH	DIGIKEY	507-1270-ND
18	1	L1	300uH 5Amp	ABARCON	DIGIKEY	535-13508-ND
19	1	Q1	IPW65R095C7XKSA1	INFINION	DIGIKEY	IPW65R095C7XKSA1-ND
20	1	R1	10K 5% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
21	1	R2	3.3E 5% SMD SIZE 0805D	MURATA/YAGEO	DIGIKEY	
22	1	R3	SL22 5R012-B	AMETHERM	DIGIKEY	570-1268-ND
23	1	R5	0.033E 1% 4W	OHMITE	MOUSER	588-14AFR033E
24	1	T1	COMMON MODE CHOKE 1MH 10A	WURTH	DIGIKEY	732-1449-ND