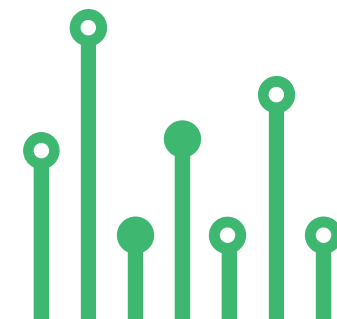


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350W Power Factor Boost Converter for Inverter-Fed BLDC and PMSM Motors



SKU: EL139018

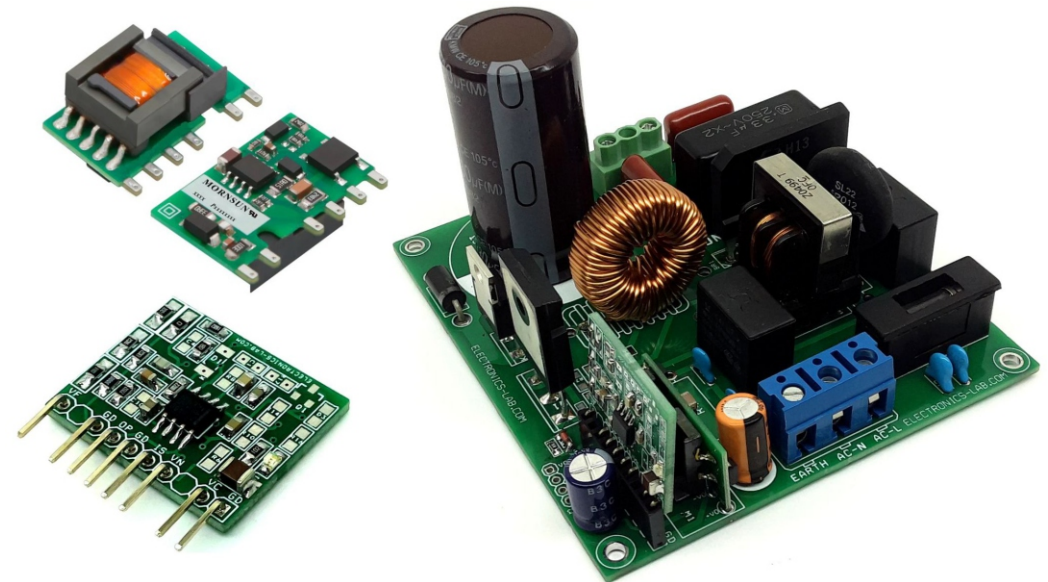
350W Power Factor Boost Converter for Inverter-Fed BLDC and PMSM Motors



This 350W power factor boost converter is designed for inverter-fed BLDC/PMSM motor appliances, A/C units, Refrigerators, and industrial power supplies. The circuit is a continuous-conduction-mode boost converter implemented using a UCC28180 PFC controller module which provides all the necessary built-in protections. It's a robust output supply protected for output cover current, output over-voltage, and output under voltage conditions. The converter has two parts, the main power board and the UCC28180 PFC controller/Breakout board. PFC boost converter provides 380VDC regulated output at 0.9A load current. The PFC converter accommodates an input voltage range of 85VAC to 265 VAC and uses average current mode control at a fixed programmable switching frequency of 120Khz.

Features

- Output 380V DC
- Output Load Current 0.9A
- Full Load Efficiency 94%
- Input AC Range 85V to 265V AC
- Input Frequency 47 to 63 Hz
- No Load Input Current 70mA
- Operating Frequency 120Khz
- Average Current Mode PWM Control
- No AC Line Sensing Needed
- 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
- Soft Start
- PCB Dimensions 97.79 X 89.22 MM
- 4 X 3MM Mounting Holes



UCC28180 – PFC Controller (Schematic and PCB Layout Bellow)

The UCC28180 module provides high performance and offers a series of benefits to address the next-generation requirement of low THD standards for appliances. The UCC28180 is a high-performance, compact continuous conduction mode (CCM), Frequency is programmed 120Khz using R11 and R15 The UCC28180 uses trimmed current loop circuits to achieve less than a 5% THD from a medium-to-full load (50% to 100%). A reduced current sense threshold enables the UCC28180 device to utilize a 50% smaller shunt resistor, resulting in lower power dissipation while maintaining low THD. The UCC28180 also consists of an integrated fast gate driver, with a drive of +2-A source current and -1.5-A sink current, which eliminates the requirement for an external gate driver.

The UCC28180 device also has a complete set of system protection features that significantly improve reliability and further simplify the design.

- Soft overcurrent
- Cycle-by-cycle peak current limit
- Output Overvoltage
- VCC undervoltage lockout (UVLO) protection
- Open pin protections (ISENSE and VSENSE pins)

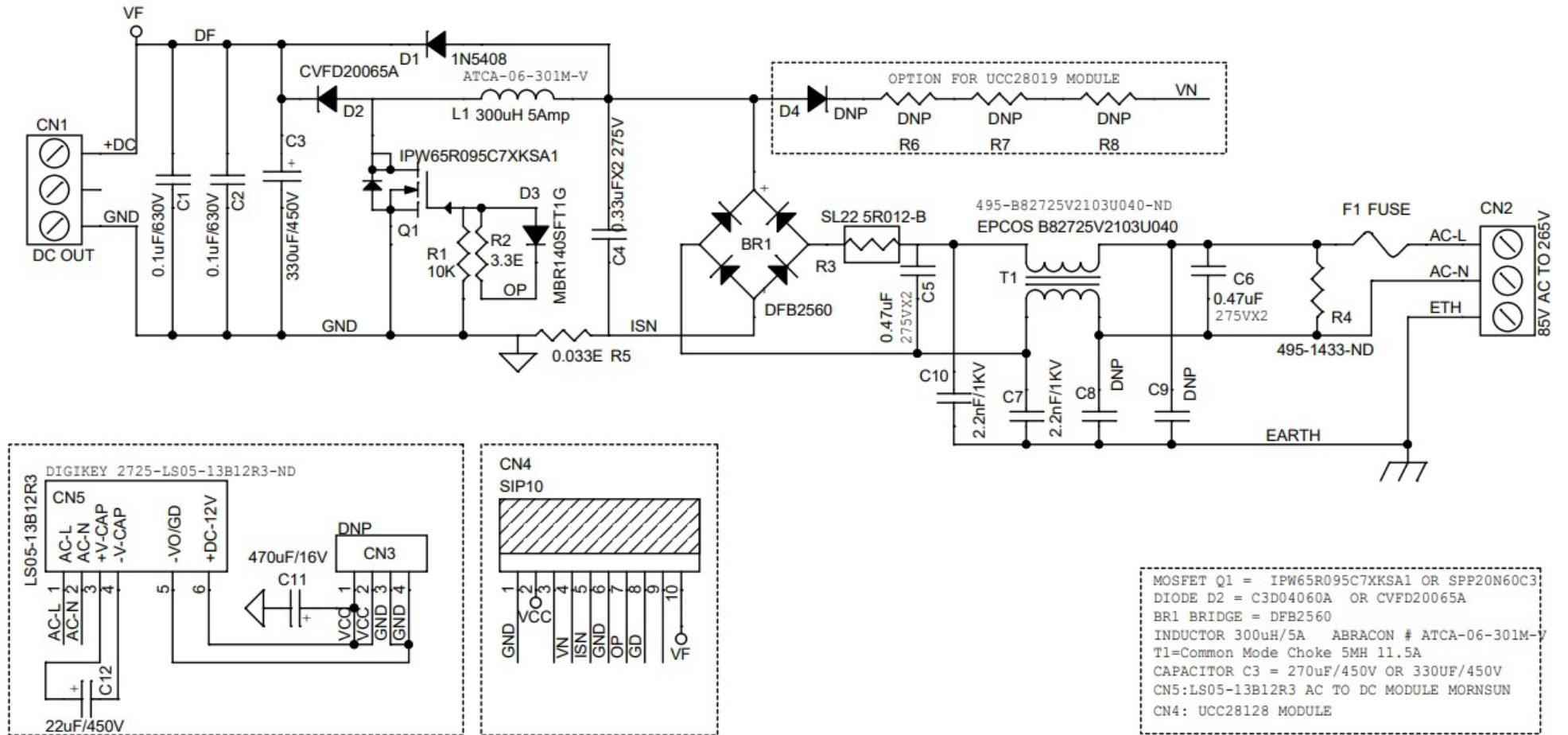
Main Power Board

The main power board consists CN2 AC power input connector, Fuse F1 for short circuit protection, R4 Varistor for spike protection, EMI filter built using T1 choke, Capacitor C5, C6, C7, C8, C9, and C10. Resistor R3 NTC is provided to control the inrush current. BR1 bridge rectifier provides DC output from AC input. R5 is the current sense resistor, C4 acts as the filter capacitor, Q1 MOSFET acts as the switching transistor, and D2 high speed switching diode. C1, C2, and C3 are bulk storage capacitors. CN1 provides 380V@0.9A output.

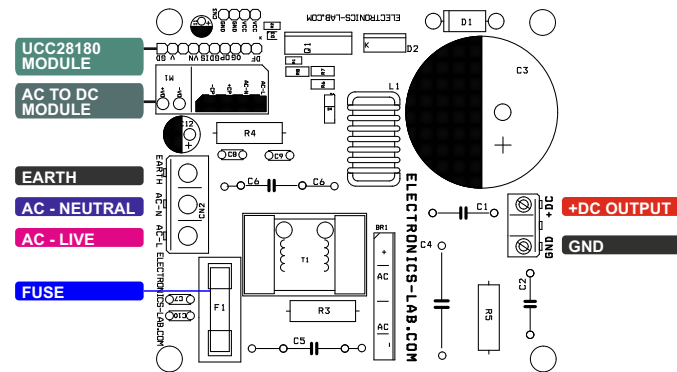
AC to DC Module (LS05-13B12R3)

This module provides 12V DC output from AC input. It is used to provide VCC power supply to UCC28180 PFC controller module/Breakout Board.

Schematic



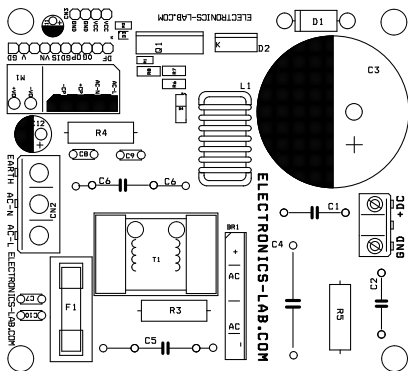
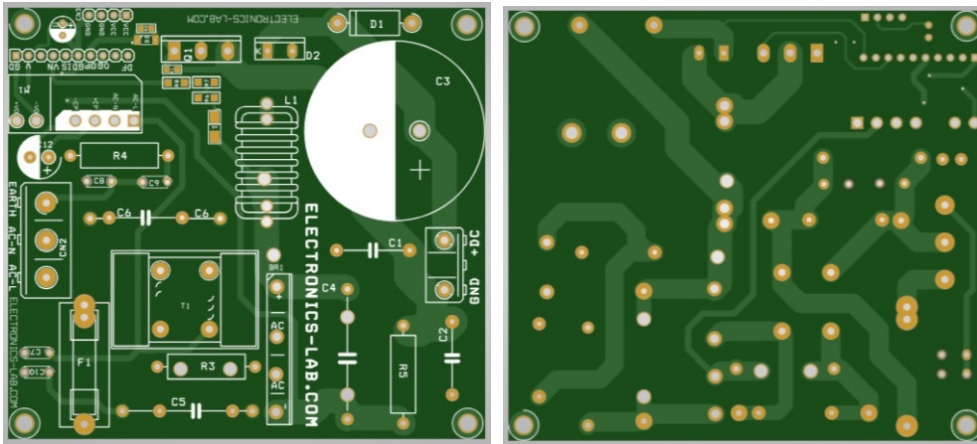
Connections



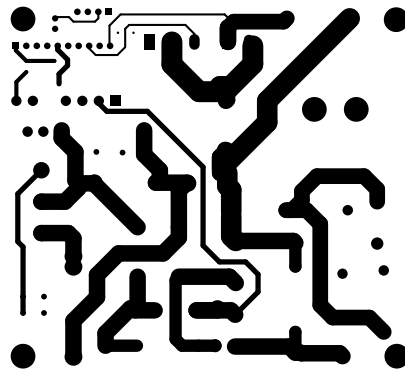
Connection and Other Details

- CN1: Pin 1 = +DC Output 380V DC, Pin 2 = NC, Pin 3 = GND
- CN2: Pin 1 = AC Live Input, Pin 2 = AC Neutral, Pin 3 = Earth
- Cn3: Pin 1 and 2 = VCC, Pin 3,4 = GND (Don't Install)
- CN4: Pin 1 = GND, Pin 2 = VCC, Pin 3 = NC, Pin 4 = VINS, Pin 5 = ISENSE, Pin 6 = GND, Pin 7 = Out, Pin 8 = GND, Pin 9 = NC, Pin 10 = Voltage Feedback
- Cn5: AC To DC Converter Pin 1 = AC Live, Pin 2 = AC Neutral, Pin 3 = High Voltage + Capacitor, Pin 4 = -Capacitor

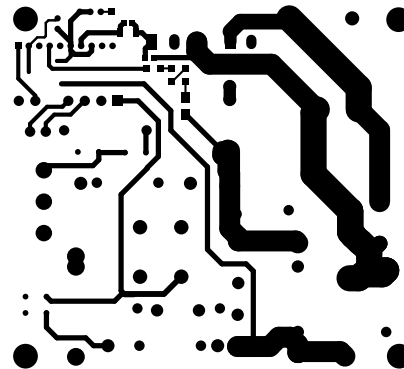
PCB



SILK SCREEN TOP



BOTTOM LAYER

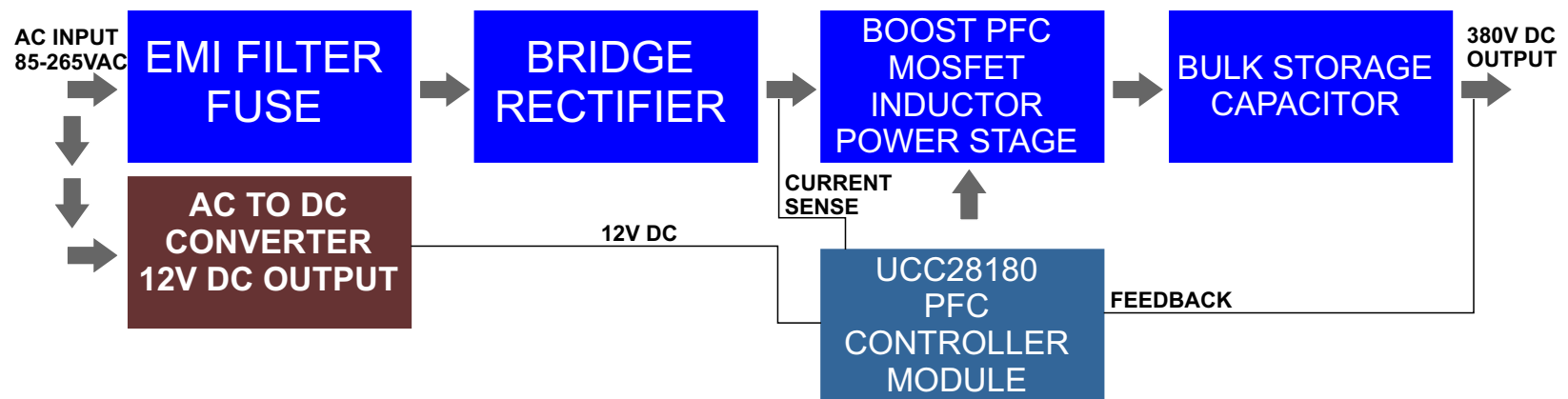


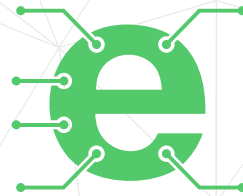
TOP LAYER

PCB DIMENSIONS 97.79 X 89.22 MM

Parts List

BOM						
NO	QNTY	REF	DESC	MANUFACTURER	SUPPLIER	SUPPLIER PART NO
1	1	BR1	DFB2560 - 600V/25A BRIDGE	ON SEMI	DIGIKEY	DFB2560-ND
2	1	CN1	3 PIN SCREW TERMINAL PITCH 5.08MM	PHOENIX		277-1248-ND
3	1	CN2	3 PIN SCREW TERMINAL PITCH 7.62MM	TE CONNECTIVITY	DIGIKEY	A98095-ND
4	7	CN3,D4,R6,R7,R8,C8,C9	DNP			
5	1	CN4	10 PIN FEMALE HEADER PITCH 2.54MM	SULINS CONNECT	DIGIKEY	S7043-ND
6	1	CN5	LS05-13B12R3 AC TO DC MODULE	MORNSUN	DIGIKEY	2725-LS05-13B12R3-ND
7	2	C1,C2	0.1uF/630V	CORNELL	DIGIKEY	1572-1188-ND
8	1	C3	330uF/450V	CORNELL	DIGIKEY	338-3500-ND
9	1	C4	0.33uFX2 275V	EPCOS	DIGIKEY	495-B32922X2334M000-ND
10	2	C5,C6	0.47uF/X2 275V	PANASONIC	DIGIKEY	P14783-ND
11	2	C7,C10	2.2nF/1KV	TDK	DIGIKEY	445-16006-ND
12	1	C11	470uF/16V	RUBYCON	DIGIKEY	1189-3712-1-ND
13	1	C12	22uF/450V	RUBYCON	DIGIKEY	1189-2292-ND
14	1	D1	1N5408	HV COMPONENTS	DIGIKEY	3845-1N5408-ND
15	1	D2	CVFD20065A OR FFSP2065A	ON SEMI	DIGIKEY	FFSP2065AOS-ND
16	1	D3	MBR140SFT1G	ON SEMI	DIGIKEY	MBR140SFT1GOSTR-ND
17	1	F1	FUSE HOLDER	WURTH		732-11376-ND
18	1	L1	300uH 5Amp	ABRACON	DIGIKEY	535-13508-ND
19	1	Q1	IPW65R095C7XKSA1	INFINION	DIGIKEY	448-IPW65R095C7XKSA1-ND
20	1	R1	10K 5% SMD SIZE 0805	YAGEO/MUARTA	DIGIKEY	
21	1	R2	3.3E 5% SMD SIZE 0805	YAGEO/MUARTA	DIGIKEY	
22	1	R3	SL22 5R012-B	AMETHERM	DIGIKEY	570-1268-ND
23	1	R4	B72210S2271K101 VARISTOR	EPCOS-TDK	DIGIKEY	495-1433-ND
24	1	R5	0.033E 1% 4W OR 2W	OHMLITE	DIGIKEY	14AFR033E-ND
25	1	T1	CHOKe 5MH-11.5A B82725V2103U040	EPCOS TDK	DIGIKEY	495-B82725V2103U040-ND
26	1	FUSE	GLASS FUSE	WURTH		507-1270-ND
27	1	FUSE CLIP	FUSE CLIP COVER	WURTH		732-11379-ND





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