

Model: BPA-PFS5000

AC/DC Power Series for Industrial Application



Highlight

- Cost Effective
- SiC based, high efficiency
- 5kW max continuous output
- 6kW Peak Power capability
- 8"x11.9"x1.67" compact size
- -20°C-70°C operation temperature range
- Output voltage and constant current programmable
- Build-in active PFC
- Intelligent fan speed control
- DC_OK analog indication signal
- Remote sense, Remote ON/OFF control
- Active current sharing support, optional droop current share
- 5000m operation altitude
- Meet Semi F47-0706
- 12V/0.5A standby optional
- Support semi-custom design
- Optional PMBUS or CANBUS
- Optional battery charger version



Typical Application

- Lithium-battery charger
- Industrial automation production line
- Robot and Motor control
- Semiconductor manufacture
- Amplifier

Product Overview


The **BPA-FS5000** is a highly reliable, compact, 5000W, AC to DC, single output power supply module. With a 3 Phase full range input of 180-528VAC, this power supply module achieves the highest performance and efficiency by incorporating digital control technology. The BPA-FS5000 family also includes CANBus interface to monitor and control all essential functions of the power supply module.

Custom controls available.

Key Specification

Model	BPA-PFS5000T24	BPA-PFS5000T30	BPA-PFS5000T36	BPA-PFS5000T48	BPA-PFS5000T60
Output voltage	24V	30V	36V	48V	60V
Rated Current	0-208.3A	0-166.7A	0-138.9A	0-104.2A	0-83.3A
Model	BPA-PFS5000T72	BPA-PFS5000T85	BPA-PFS5000T100	BPA-PFS5000T120	BPA-PFS5000T150
Output voltage	72V	85V	100V	120V	150V
Rated Current	0-69.4A	0-58.8A	0-50A	0-41.7A	0-33.3A
Model	BPA-PFS5000T250	BPA-PFS5000T330	BPA-PFS5000T400	BPA-PFS5000T650	BPA-PFS5000T800
Output voltage	250V	330V	400V	650V	800V
Rated Current	0-20A	0-15.2A	0-12.5A	0-7.7A	0-6.25A
Rated Power	5000W				
Peak Power	6000W for 5s				
Dimension	8"x11.9"x1.67" or 204mm x 302.5mm x 42.5mm				
EMC	CLASS A Conducted and Radiated Emissions.				

Ordering Model Name

BPA-P	F	S	5000	T	24	
Series Name	Package Type	Outputs	Rated Power	Connector Type	Output Voltage	Control Code
	F: Force air cooling enclosed	S: Single output	5000W	T: Screw terminal		AA: Default for Standard model

Note: for any custom design and model name, please consult with BluTek Power, Inc.

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Input Specification

Function	Minimum	Typical	Maximum	Condition
Rated Input Voltage	200Vac		480Vac	3 Phase Line to Line voltage
Input Voltage Range	180Vac		528Vac	3 Phase Line to Line voltage. Refer to power derating curve for detail.
Input Frequency	47Hz	50 / 60Hz	63Hz	
Input Current			17A	@380VAC
Power Factor		0.99		With max rated output power
Efficiency		94%		480Vac, exclude fan power
Inrush Current			32A	480Vac

Output Specification

Function	Minimum	Typical	Maximum	Condition
Output Voltage Trim Range	24V	24V	28V	24V Model
	28V	30V	32V	30V Model
	32.4V	36V	38V	36V Model
	42V	48V	53.5V	48V Model
	54V	60V	66V	60V Model
	67V	72V	75V	72V Model
	77V	85V	94V	85V Model
	90V	100V	110V	100V Model
	110V	120V	130V	120V Model
	135V	150V	165V	150V Model
	225V	250V	275V	250V Model
	297V	330V	363V	330V Model
	360V	400V	430V	400V Model
	600V	650V	700V	650V Model
	750V	800V	850V	800V Model
Output Power	0W		5000W	
Initial Tolerance			±0.5%	Trim in factory
Total Regulation			3%	Include line and load regulation
Output Ripple			1%	Peak-Peak value, measure at board end with 0.1uF Ceramic and 47uF electrolytic capacitor, 20MHz BW
Dynamic Response			5%	with 50% load step
Capacitive Load				No special requirement
Power up time			2s	
Rise time			50ms	without cap load
Hold up time	10ms			380Vac/50Hz input @ 4000W load

Protection Specification

Function	Minimum	Typical	Maximum	Condition
Input under voltage		160Vac		Auto-restart after fault is removed
Over current protection (OCP)				Auto-restart, Clamp by constant current
Short circuit protection (SCP)				Auto-restart after fault is removed
Over voltage protection (OVP)			130%	Latch off
Over temperature protection (OTP)				Latch off

*Protection mode latch or auto-restart can be customized, contact BluTek Power, Inc. for more details.

Standby Output Specification

Function	Minimum	Typical	Maximum	Condition
Output voltage	11.4V	12V	12.6V	0 – 0.5A Load
Over current protection (OCP)	1A			Auto-restart after fault is removed
Short circuit protection (SCP)				Auto-restart after fault is removed

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Reliability

Function	Minimum	Typical	Maximum	Condition
MTBF	500Khrs			According to Telecordia SR-332. 380Vac 25°C ambient with rated load
Life	5 years			Rated nominal conditions

EMC

Conducted Emissions	EN 55011 / EN 55032, Class A
Radiated Emissions	EN 55011 / EN 55032, Class A
Note: BPA-PFS5000T is a enclosed type PSU as a component intended to be assembled and built inside the system cabinet, PSU normally is to mounted connecting to an earthed metal plate, all the EMC tests are performed with the PSU and resistive loads plated on a metal plate to simulate the system application. The final system must re-evaluate to confirm it can still meet the EMC directives.	
Harmonic Current Emissions	IEC 61000-3-2 Meet Class A limit
Voltage Flicker	IEC 61000-3-3
Electrostatic Discharge	IEC 61000-4-2 Level 4 (Air Discharge: 15 kV, Contact Discharge: 8 kV) Criteria A
Radiated Field	IEC 61000-4-3 Criteria A
Electrical Fast Transient / Burst	IEC 61000-4-4 Level 3 (2 kV), Criteria A
Surge	IEC 61000-4-5 Level 3 (Common Mode 2kV, Differential Mode 1kV), Criteria A
CS	IEC 61000-4-6 Level 2 (150 kHz-80 MHz, 3 Vrms, 6 Vrms at ISM bands and Amateur radio bands), Criteria A
Power Frequency Magnetic Fields	IEC 61000-4-8 Criteria A, Magnetic field strength 30 A/m
Voltage Dips	IEC 61000-4-11 30% 10 ms Criteria A 60% 100 ms Criteria B 100% 5000 ms Criteria B
Voltage Dips	Criteria A @ 3000 W or lower 0% UT, 0.5 cycle (10 ms) (0°, 45°, 90°, 135°, 180°, 225°, 270°, 315°, 360°) Criteria B 0% UT, 1 cycle (20 ms), 0° Criteria B 70% UT, 25 cycle (500 ms), 0° Criteria B 0% UT, 250 cycle (5000 ms), 0°

Criteria A: Normal operation within spec limit

Criteria B: Out of regulation or restart to normal operation after test

Safety / Directives

ITE Safety *		IEC 62368-1 UL 62368-1+CAN/CSA 62368-1 GB 4943.1-2011, GB 9254-2008, GB 17625.1-2012
CE *		EMC Directive 2014/30/EU and Low Voltage Directive 2014/35/EU
UKCA *		In conformance with Electrical Equipment (Safety) Regulations 2016, and Electromagnetic Compatibility Regulations 2016
Dielectric Voltage	Input to/Output	3000Vac
	Input to/Ground	1800Vac
	Output to/Ground	500VAC for 48V and below models 1500VAC for 60V and above models

*Compliance only, contact BluTek Power, Inc. for detailed safety certifications



Environmental

Function	Min	Typical	Max	Condition
Operation Temperature	-20°C		70°C	See power derating curve Fig.2
Operation Humidity	10%RH		90%RH	Non-condensing
Storage Temperature	-40°C		70°C	
Storage Humidity	10%RH		90%RH	Non-condensing
Operation Altitude			5000m or 16,405 feet	
Fan Acoustic Noise			45dB	80% Load, 1m distance
Shock			196m/s2	Base plate mounting
Vibration			19.6m/s2	10-500Hz 1 Hour for each axis. Base plate mounting

Leakage Current

Function	Min	Typical	Max	Condition
Input-PE Leakage			2mA	480Vac/60Hz Normal Condition
			4mA	480Vac/60Hz Single Fault Condition
Output-PE Leakage			100uA	480Vac/60Hz Normal Condition
			500uA	480Vac/60Hz Single Fault Condition

Output Power De-rating Curve

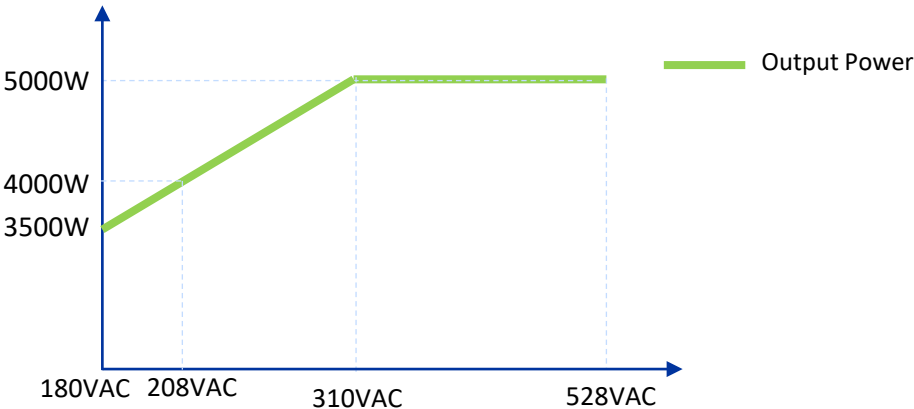


Fig.1 Power Derating Curve vs. Input Voltage

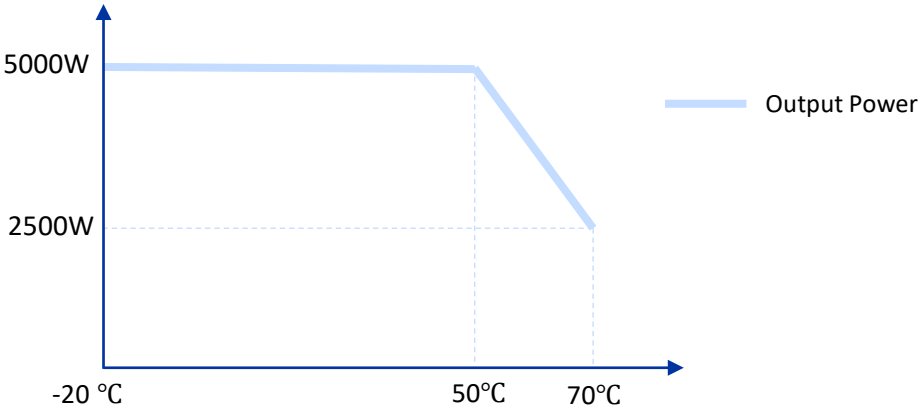


Fig.2 Power Derating Curve vs. Ambient Temperature

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Mechanical Drawing

For models with 120V output or below

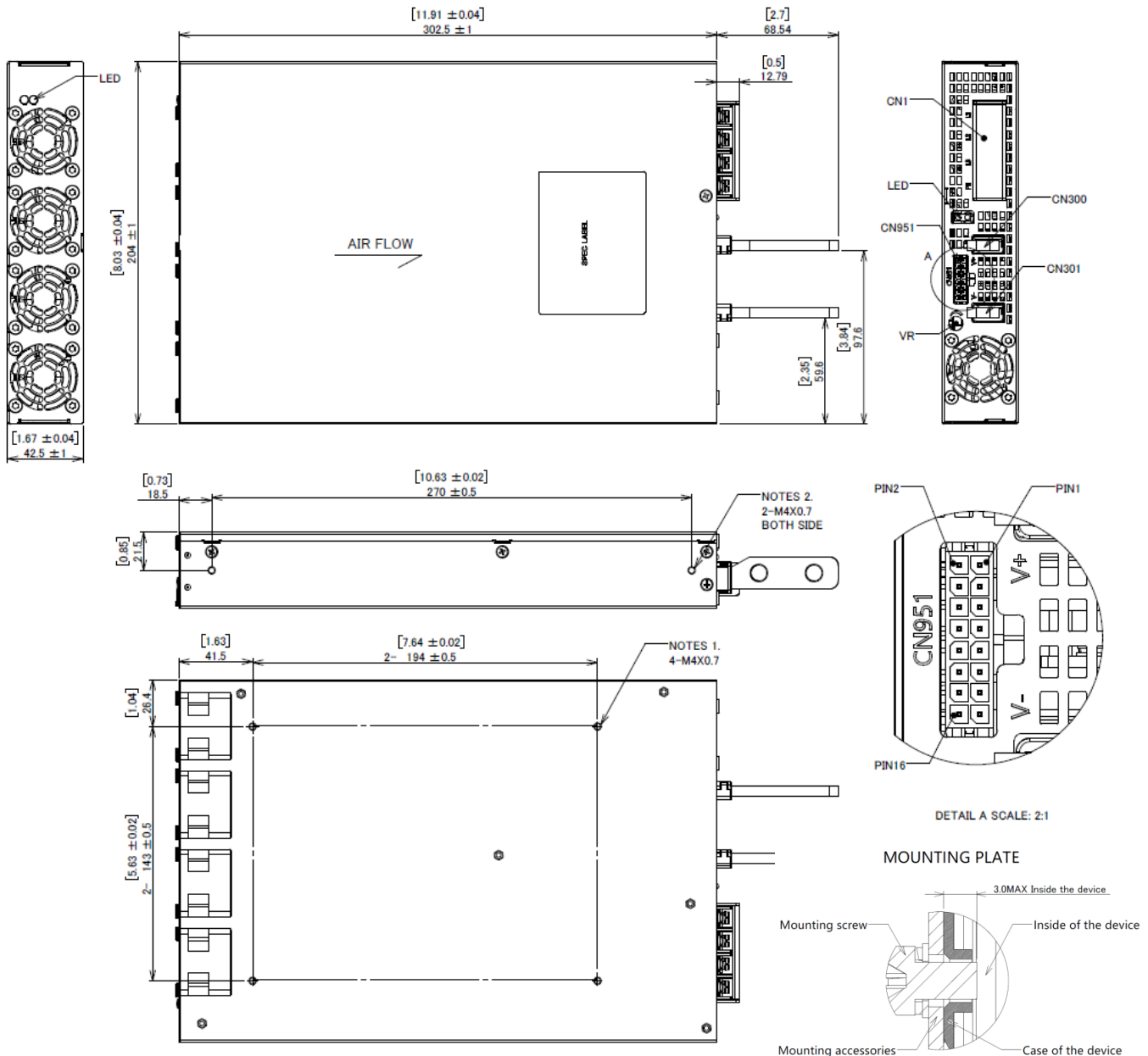


Fig.3

Notes:

1. Base plate mounting, M4 thread holes, maximum penetration 3.0 mm (0.12 inch) from outside face of chassis
2. Side mounting, M4 thread holes, maximum penetration 3.0 mm (0.12 inch) from outside face of chassis
3. CN1 is AC input/output terminal block and with M4 screw in four positions, wire gauge is 8~20AWG
4. CN300/CN301 is DC output/input terminal block and suggest to use M8 screw and nut to fix wire
5. CN951 is signal and control connector, type is MOLEX 430451600, mate with 430251600 or equivalent.
6. VR: clockwise is to increase the output voltage, anti-clockwise is to reduce the output voltage.

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Mechanical Drawing

For models with 150V output or above

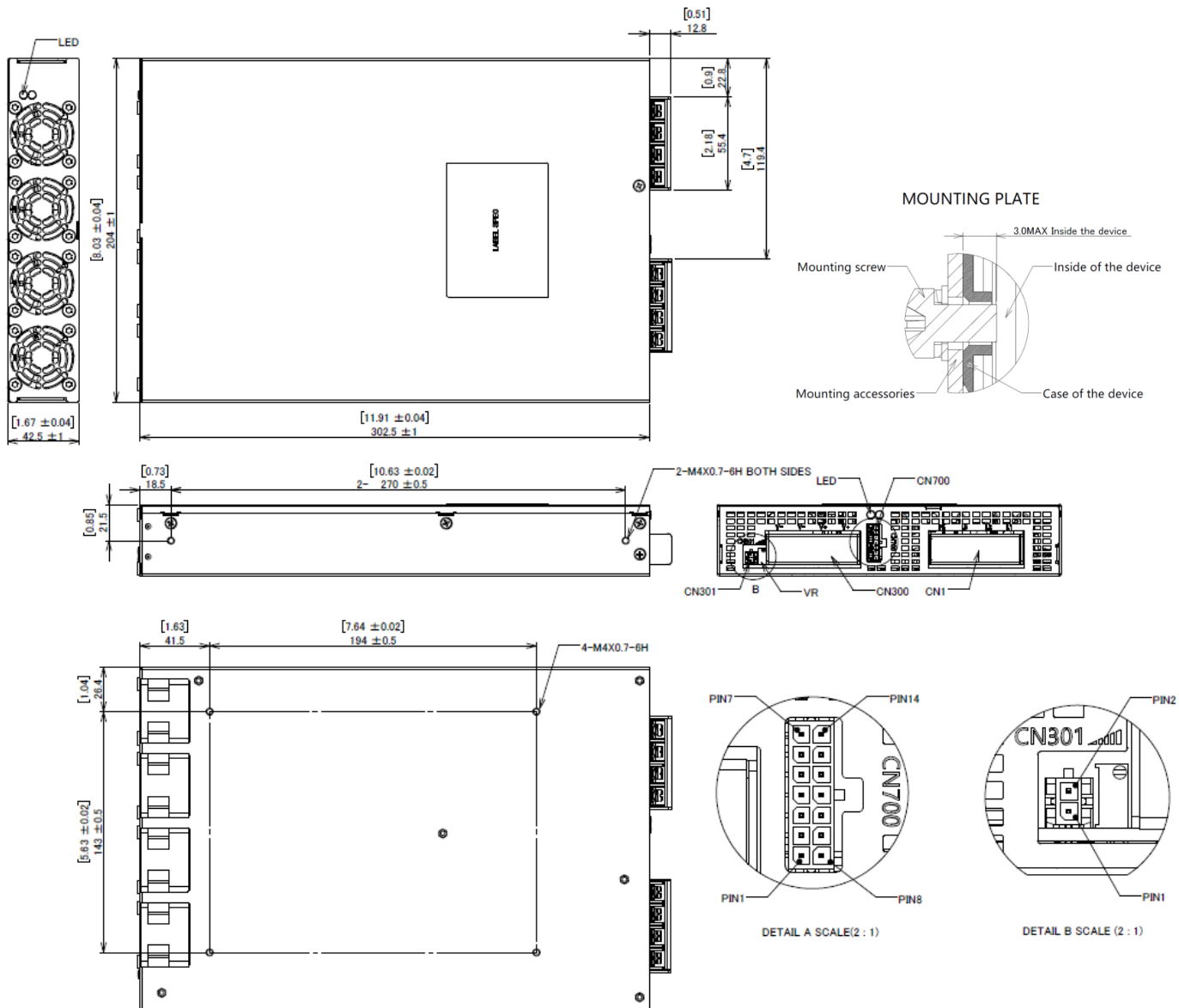


Fig.4

Notes:

1. Base plate mounting, M4 thread holes, maximum penetration 3.0 mm (0.12 inch) from outside face of chassis
2. Side mounting, M4 thread holes, maximum penetration 3.0 mm (0.12 inch) from outside face of chassis
3. CN1 is AC input/output terminal block and with M4 screw in four positions, wire gauge is 8~20AWG
4. CN300 is DC output/input terminal block and with M4 screw in four positions, wire gauge is 8~20AWG
5. CN700 is signal and control connector, type is MOLEX 430451400, mate with 430251400 or equivalent.
6. CN301 is signal connector, type is MOLEX 430450200, mating with MOLEX 430250200 or equivalent.
7. VR: clockwise is to increase the output voltage, anti-clockwise is to reduce the output voltage.

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Connector / Pin Assignment

Connector	Pin	Assignment	Function/Description
CN951 (For models with 120V output or below on Grid Version)	1	CANH	CAN-Bus high Communication pin.
	2	RESERVED	Reserved. Do not connect
	3	RESERVED	Reserved. Do not connect
	4	PS_ON	Remote ON/OFF control pin
	5	5VCAN	This is the CAN-Bus 5V voltage supply pin
	6	ALERT	Fault/Warning - An open collector signal is provided to indicate any fault or warning such as over temperature, overvoltage, over current, undervoltage, and fan fault.
	7	CANL	CAN-Bus low Communication pin.
	8	DC_OK	DC OK indicator
	9	COM	Common - This is the common return pin for the CN951 signal Pin1 to Pin10.
	10	12VSB	This is the 12V standby output voltage pin.
	13	Remote sense+	Remote Sense Positive
	14	Remote sense-	Remote Sense Return
	15,16	Current share	This pin must be connected of the power supplies when DC Output parallel connected.

Connector	Pin	Assignment	Function/Description
CN700 (For models with 150V output or above)	1, 8	12VSB	This is the 12V standby output voltage pin.
	2, 9	12V GND	This is the 12V GND pin. It is isolated from the main output.
	3	CANH	CAN-Bus high Communication pin.
	4	ALERT	Fault/Warning - An open collector signal is provided to indicate any fault or warning such as over temperature, overvoltage, over current, undervoltage, and fan fault.
	5	DC_OK-	DC OK Return
	6	RESERVED	Reserved. Do not connect
	10	CANL	CAN-Bus low Communication pin.
	11	PS_ON	Remote ON/OFF control pin
	12	DC_OK+	DC OK Positive
	13	RESERVED	Reserved. Do not connect
	7, 14	5VCAN	This is the CAN-Bus 5V voltage supply pin

Connector	Pin	Assignment	Function/Description
CN301 (For models with 150V output or above)	1, 2	Current share	This pin must be connected for current share function

LED & signals Indicator

Power Supply Condition	Alert	Front		Rear		DC_OK
		Green LED	Yellow LED	Green LED	Yellow LED	
Normal Operation	Low	On	Off	On	Off	High
Standby Mode	Low	Off	Blink	On	On	Low
Fault Condition						
DC Undervoltage	High	Off	On	On	Off	Low
DC Overvoltage	High	Off	On	On	Off	Low
Fan fault	High	Off	On	On	Off	Low
Over Temperature	High	Off	On	On	Off	Low
AC Undervoltage	High	Off	On	Off	On	Low
DC Overcurrent	High	Off	On	On	Off	Low
AC Overcurrent	High	Off	On	On	On	Low

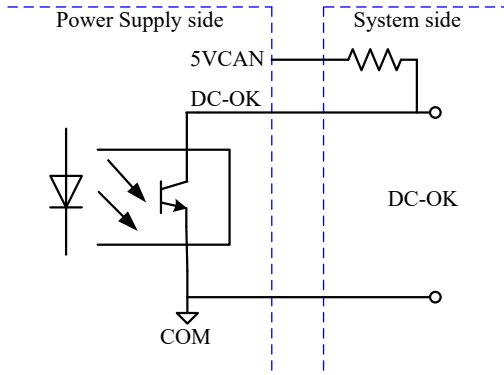
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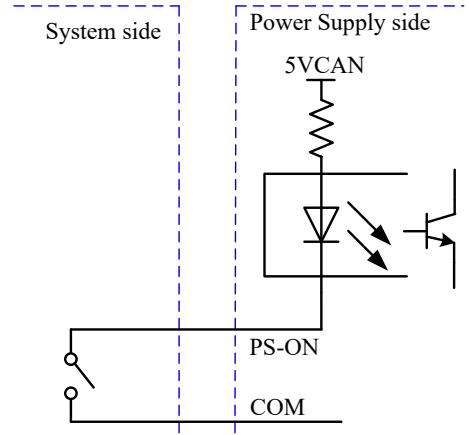
DC_OK Signal

DC_OK Signal is designed to indicate the main DC output status. When DC output is present, DC_OK Signal (Shown in below figure) generated will be high. When DC output is off, the internal transistor will be turned off. When AC input is off, there will be a minimum of 5 milliseconds between the time the DC_OK internal transistor turns off, and the time when the output reaches 90% of its rated value.



PS_ON

PS_ON input can be used to turn off or turn on the power supply main output. The output ON/OFF can be controlled by conducting an isolated diode located within the power supply. When the main output is disabled, the 5V CAN output will continue to operate. System can use a switch to conduct through this diode to disable the main out. The signal can be floated (no connection to the signal), in order to enable the main output.



Remote Sense

Remote sense feature can be used to compensate for the extra voltage drop on output wires that are connected from the main output terminals, to the load. With wires connected from the remote sense pins, at the same locations as the wires from the main output, the remote sense function can compensate up to 500mV voltage drop.

Current Sharing

BPA-PFS5000T series supports current sharing function. Please connect Current Share pin on control connector together while parallel the power supply output.

Voltage Trimming

The power supply provides a potentiometer for user to adjust the output voltage. Switch the potentiometer clockwise to increase the output voltage, switch the potentiometer counterclockwise to decrease the output voltage. Please reference to Output Specification for the output voltage range which user shall trim the voltage within.

When the output is adjusted below nominal value, the maximum output current is the same as the nominal output, when the output is adjusted above nominal value, the output power cannot exceed the nominal maximum power (the maximum output current used should be reduced accordingly).

CANBus Communication

Isolated CANBus communication for fully control the power supply unit. Please contact BluTek Power, Inc. for communication specification.