

Model: BPA-WFS3000

Programmable Power Supply for Industrial/Medical Application



Highlight

- Ultra cost effective compared to programmable DC source
- 3000W constant power for wide output range
- Low Output ripple
- Full output adjustment range by Digital or 0-5V analog input
- 90V-264Vac universal input range
- 5.2"x11.8"x1U 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 ON/OFF control
- Remote sense function for low voltage models
- 5000m operation altitude
- Medical grade 2xMOPP isolation
- Meet Semi F47-0706
- 12V/2A standby optional
- Support semi-custom design
- CAN or RS485 communication
- Optional TCP/IP communication
- One or two connection screw holes



Product Overview

The **BPA-WFS3000** is a 3000 W highly reliable, low cost, programmable , AC to DC, single output power supply module. With a full range input of 90-264VAC, this power supply module achieves the highest performance and efficiency by incorporating digital control technology. The BPA-WFS3000 family also includes CANBus interface to monitor and control all essential functions of the power supply module.

Custom controls available.

Typical Application

- Electrosurgical Unit
- Test Equipment
- Semiconductor manufacture

Key Specification

Model	BPA-WFS3000 T48	BPA-WFS3000T 60	BPA-WFS3000T 100	BPA-WFS3000T 200	BPA-WFS3000T 300	BPA-WFS3000T 400
Output voltage	48V	60V	100V	200V	300V	400V
Rated Current	0-125A	0-100A	0-60A	0-30A	0-20A	0-15A
Rated Power	3000W					
Dimension	5.2"x11.8"x1.65" or 132mmx300mmx42mm					
EMC	Class B Emissions. Compliance with IEC60601-1-2 4th edition					

Ordering Model Name

<u>BPA-W</u>	<u>F</u>	<u>S</u>	<u>3000</u>	<u>I</u>	<u>48</u>	<u>□□</u>
Series Name	Package Type	Outputs	Rated Power	Connector Type	Output Voltage	Control Code
	F: Force air cooling enclosed	S: Single output	3000W	T: Screw terminal P: Push-in terminal		AA: Default for Standard model MA: Medical 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	100Vac		240Vac	See Fig.1 for power derating curve
Input Voltage Range	90Vac		264Vac	
Input Frequency	47Hz	50 / 60Hz	63Hz	
Input Current			18A	With rated input voltage
Power Factor	0.95			With max rated output power
Peak Efficiency (exclude fan power)			92%	@ 230Vac
Inrush Current			40A	240Vac
Input surge voltage			300Vac	last for 1second

Output Specification

Function	Minimum	Typical	Maximum	Condition
Output Voltage Trim Range				See output range curve
Output Power	0W		3000W	
Initial Tolerance			±0.5%	Trimmed in factory
Total Regulation			3%	Include line and load regulation
Output Ripple			0.5%	Peak-Peak value, full load 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			115Vac/60Hz input @ 1200W load
Programming delay			20ms	From command to output reach regulation

Protection Specification

Function	Minimum	Typical	Maximum	Condition
Input under voltage		80Vac		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 power protection (OPP)	110%			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	
Over current protection (OCP)	2.6A			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. 115Vac 25°C ambient with rated load
Life	5 years			Rated nominal conditions

EMC

Conducted Emissions	EN 55011 / EN 55032, Class B
Radiated Emissions	EN 55011 / EN 55032, Class B
Note: BPA-WFS3000T is an enclosed type PSU as a component intended to be assembled and built inside the system cabinet, PSU normally is to be mounted 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	IEC 60601-1-2 Criteria A @ 1000 W or lower 0% UT, 0.5 cycle (10 ms) (0°, 45°, 90°, 135°, 180°, 225°, 270°, 315°, 360°) Criteria B, can meet Criteria A with 700 W or lower load 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

Medical Safety *		IEC 60601-1 3rd+A1 edition TUV EN 60601-1:2006 UL 60601-1+CAN/CSA 60601-1: (Ed.3.2005)
ITE Safety *		IEC 62368-1 UL 62368-1+CAN/CSA 62368-1 GB 4943.1-2022, GB/T 9254.1-2021, GB 17625.1-2022
CE *		EMC Directive 2014/30/EU and Low Voltage Directive 2014/35/EU EN 60601-1: 2006 + A11: 2011 + A1: 2013 + A12: 2014 & EN 60601-1-2: 2015
UKCA *		In conformance with Electrical Equipment (Safety) Regulations 2016, and Electromagnetic Compatibility Regulations 2016, Medical Devices Regulations 2002 (UK MDR 2002)
Dielectric Voltage	Input to/Output	4000Vac (2XMOPP)
	Input to/Ground	1800Vac (1XMOPP)
	Output to/Ground	1800Vac (1XMOPP)
	Output to/0-10V Control	1800Vac

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

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Environmental

Function	Min	Typical	Max	Condition
Operation Temperature	-20°C		70°C	See Fig.2 power derating curve
Operation Humidity	10%		90%	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, room temperature, test set up ISO-7779
Shock			196m/s2	With Package
Vibration			19.6m/s2	10-55Hz (1 min sweep). 1 Hour for each axis. With package

Leakage Current

Function	Min	Typical	Max	Condition
Input-PE Leakage			300uA	264Vac/50Hz Normal Condition
			1mA	264Vac/50Hz Single Fault Condition
Output-PE Leakage			100uA	264Vac/50Hz Normal Condition
			500uA	264Vac/50Hz Single Fault Condition

Output Power De-rating Curve

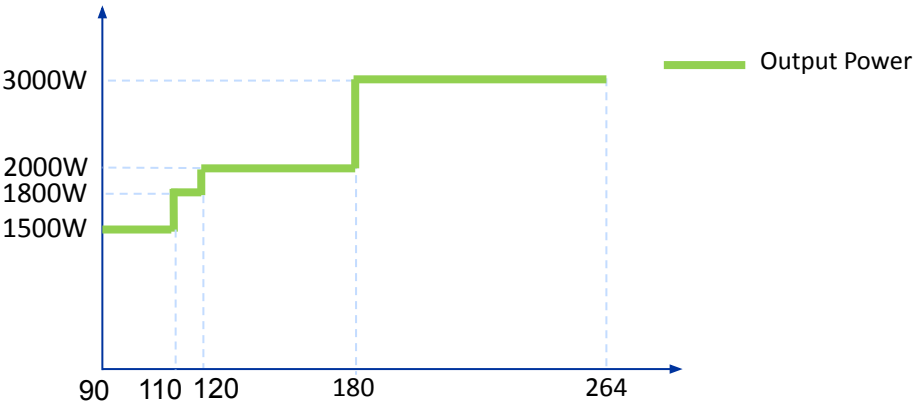


Fig.1 Power Derating Curve vs. Input Voltage (Vac)

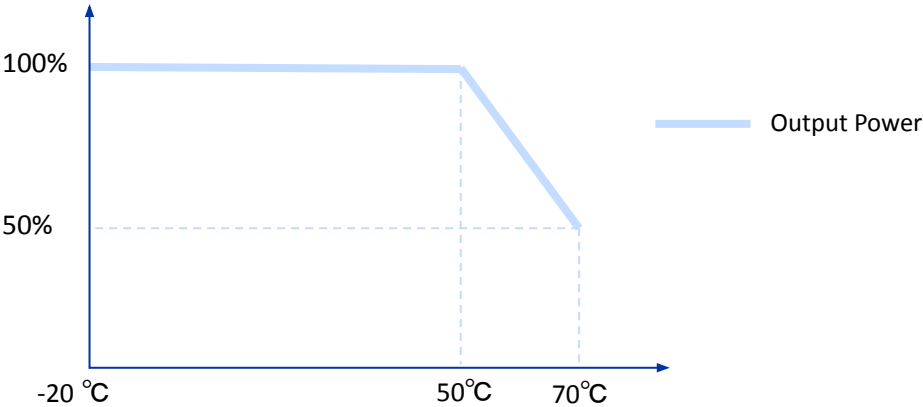


Fig.2 Power Derating Curve vs. Ambient Temperature

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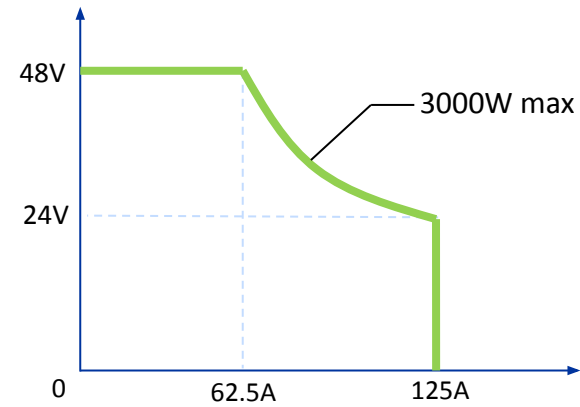
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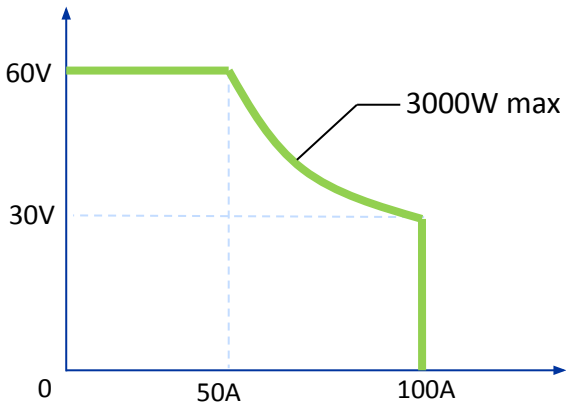
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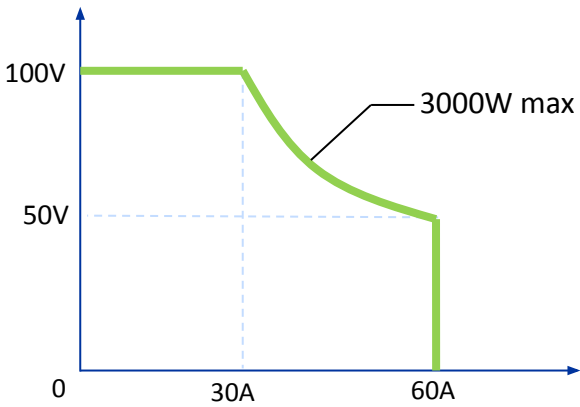
Output Curve @ 240VAC



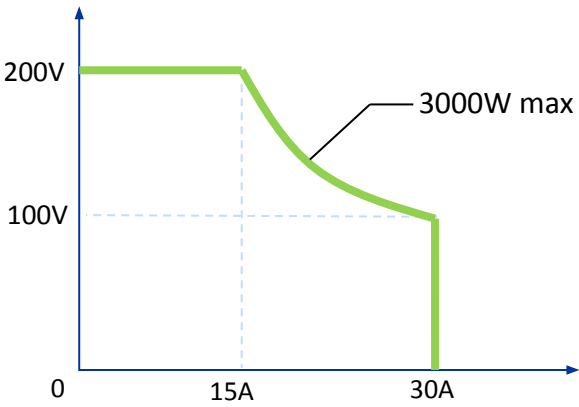
BPA-WFS3000T48



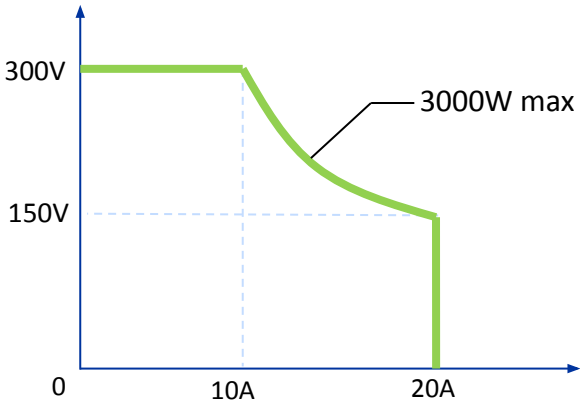
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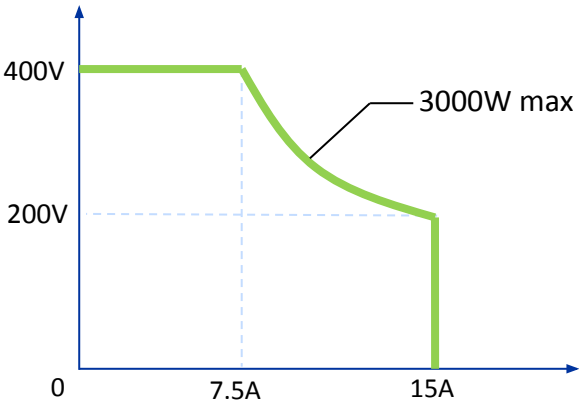
BPA-WFS3000T100



BPA-WFS3000T200



BPA-WFS3000T300



BPA-WFS3000T400

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Mechanical Drawing

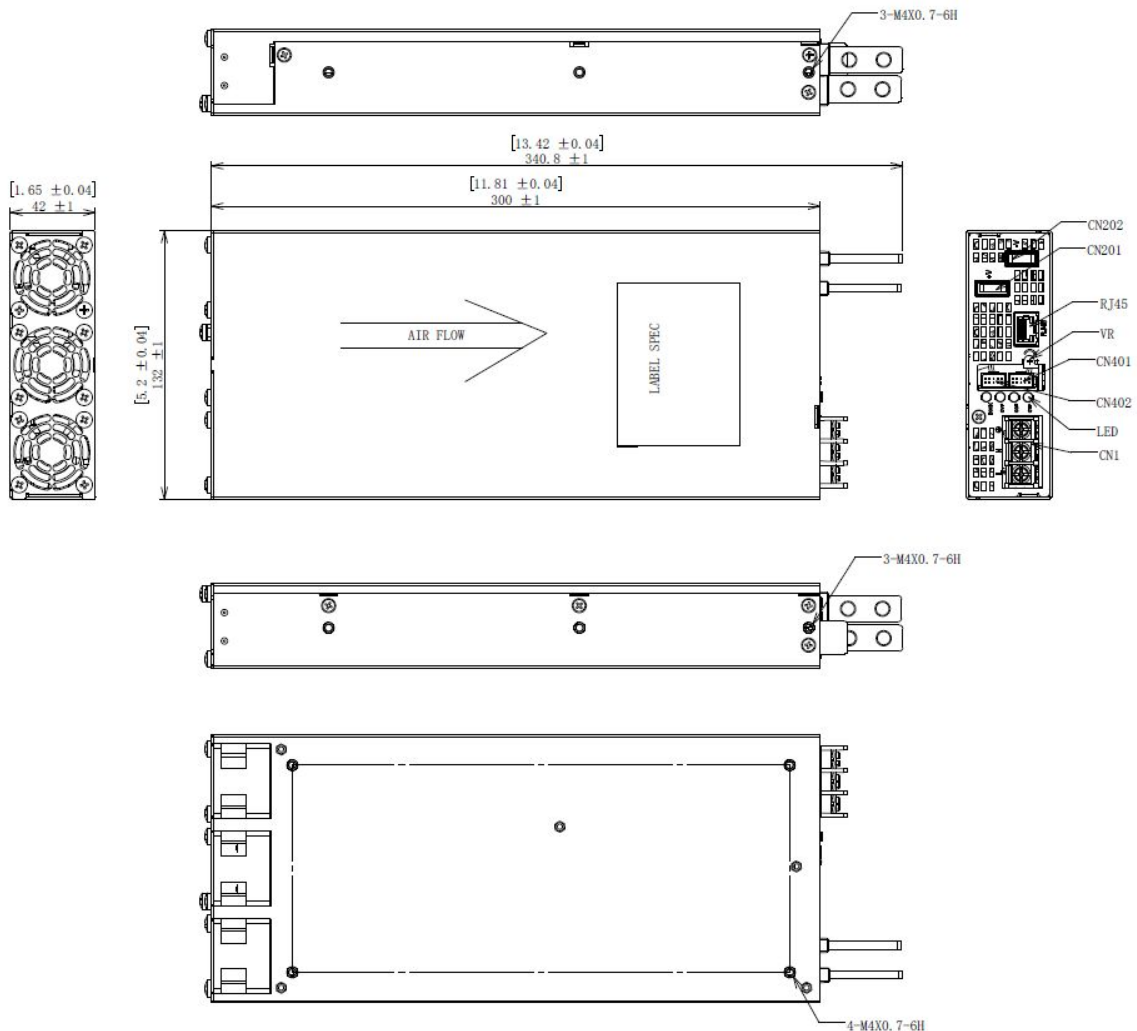
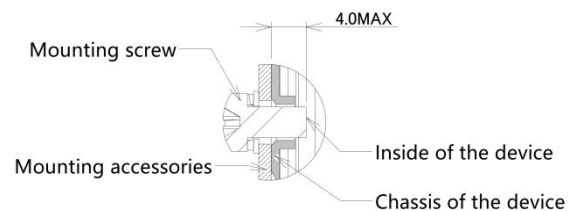
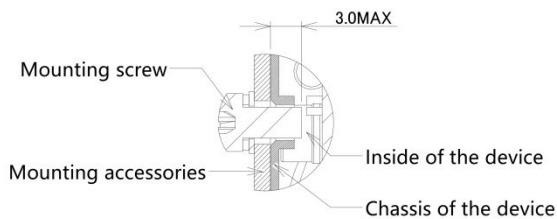


Fig 1 Base plate mounting

Fig 2 Side mounting



Notes:

1. Base plate mounting, M4 thread holes, maximum penetration 3.0 mm (0.12 inch) from outside face of chassis, 10 kgf.cm (8.8 inch.lbs) Max torque refer to fig 1.
2. Side mounting, M4 thread holes, maximum penetration 4.0 mm (0.16 inch) from outside face of chassis, 10kgf.cm (8.8 inch.lbs) Max torque refer to fig 2.
3. CN1 is AC input terminal block and with M4 screw in three positions, wire gauge is 10~18 AWG, 10 kgf.cm (8.8 inch.lbs) Max torque.
4. CN201&CN202 is DC output terminal block and with M6 screw in two positions, wire gauge is 6-18 AWG. 10kgf.cm(8.8inch.lbs) Max torque.
5. CN401&CN402 is control or signal connection.
6. VR: clockwise is to increase the output voltage, anti-clockwise is to reduce the output voltage.

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Connector and Pin Assignment

Position	Connector / Connection	
Input Connector CN1	M4 screw type terminal connector	
	Enclosure Mark	Designation
	L	Line
	N	Neutral
		Earth Ground

Position	Connector / Connection	
Main Output Connector CN201 & CN202	Output terminal blocks, with M6x8 screw and plastic spacer	
	Enclosure Mark	Designation
	Vo+	Output positive
	Vo-	Output return

Position	Connector / Connection	
Control Connector CN401 (100V models or higher)	Mating with CJT connector A2008H-2X4P or equivalent	
	Pin#	Description
	1	Analog Input for Voltage
	2	Analog Input for Current
	3	Standby_12V
	4	Standby_12V
	5	Output return
	6	Output return
	7	Current Share
	8	Output return

Position	Connector / Connection	
Control Connector CN401 (60V models or lower)	Mating with CJT connector A2008H-2X5P or equivalent	
	Pin#	Description
	1	Analog Input for Voltage
	2	Analog Input for Current
	3	Standby_12V
	4	Standby_12V
	5	Output return
	6	Output return
	7	Remote Sense+
	8	Remote Sense-
	9	Current Share
	10	Output return

Position	Connector / Connection	
Control Connector CN402	Mating with CJT connector A2008H-2X5P or equivalent	
	Pin#	Description
	1	Isolated 5V+
	2	Isolated 5V-
	3	CAN_HI or RS485 A
	4	CAN_LO or RS485 B
	5	Reserve
	6	Reserve
	7	Remote ON/OFF-
	8	Remote ON/OFF+
	9	DC_OK-
	10	DC_OK+

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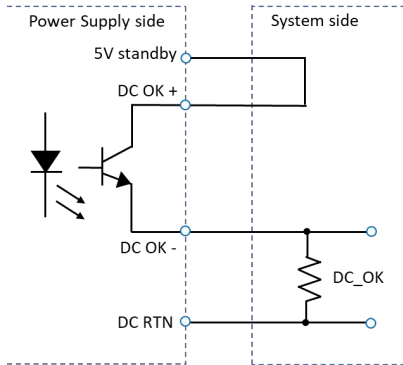
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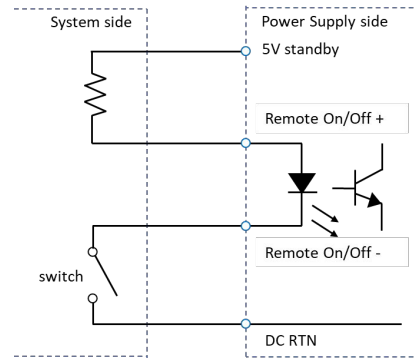
DC_OK Signal

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.



Remote ON/OFF

Remote ON/OFF 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 +5 V Standby output will continue to operate. System can use a switch to conduct through this diode (suggested pull up resistor to 5 V standby with 1 Kohm resistor) to disable the main out. The signal can be floated (no connection to the signal), in order to enable the main output.



Voltage & Current Programming

BPA-WFS3000T series supports digital or analog output voltage and current adjustment. Please refer to the output power curve for BPA-WFS3000T output range.

The output capability is limited by voltage, current and power. User can set power supply at any voltage or current within the given curve.

Using digital communication to set output voltage, please contact BluTek Power, Inc. for communication specification.

Two isolated 0-5V analog inputs can adjust the output voltage and current from 0 to maximum correspondingly.

Keep the analog floating by default the power supply will output maximum power unless digital voltage and current set command is given.

CANBus & RS485 Communication

Isolated CANBus or RS485 communication provides full control and query functions. Please contact BluTek Power, Inc. for communication specification.

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. The function is only available for models with 60V output or lower.

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