

Model: **BPA-R950-560-120A** **Dual Output 950W**

The **BPA-R950-560-120A** is a highly reliable, 950W, AC to DC, dual output, redundant / removable power supply module. With a full range input of 90-264VAC, the power supply achieves the highest performance and efficiency by incorporating CCM PFC and half bridge resonance with synchronized rectification.



Special Features

- Compact Size of 39.6 x 101.6 x 152.4 mm
- High efficiency up to 93.5%
- Active Power Factor Correction
- 56V Output Isolated from 12V Output & Ground
- Wide input voltage range: 90 – 264VAC
- Redundant operation
- Hot insertion/removal (hot plug)
- Single wire current sharing
- Fully secure(OTP, OVP, OCP, SCP)
- LEDs Status :OK, Fault
- P_OK, PG_56, PS_ON
- CE Compliant
- RoHS Compliant
- Three Year Warranty
- Approved to latest edition of the following Safety Standards: UL/cUL 60950-1 and 62368-1, and DEMKO
- **Custom modifications available**

Total Power	Input Voltage	Output Voltage	Minimum	Maximum
950 W	90-264 VAC	56V	0A	14A
		12V	0A	16.7A

***Requires 20 CFM Fan Cooling.**

Applications

- Switches (POE)
- Telecommunication
- Industrial Application



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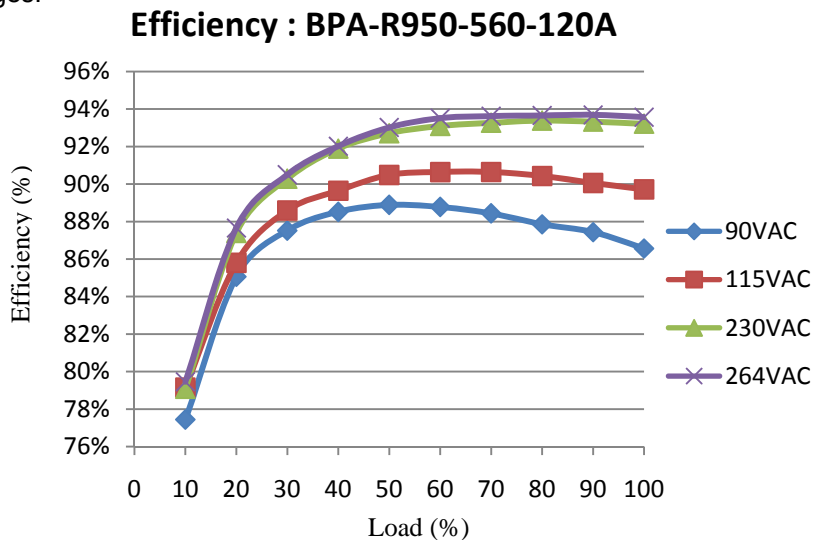
1. Input Specifications

Parameter	Description/Condition	Min	Nom	Max	Units
$V_{i\ nom}$	Nominal Input Voltage	100		240	VAC
V_i	Input Voltage Ranges	Normal operating (V_{min} to V_{max})		264	VAC
$I_{i\ max}$	Max. Input Current	$V_{in} = 90VAC/60HZ, Full Load$		12.5	A_{rms}
$I_{i\ p}$	Inrush Current	264 $V_{rms}, 25^{\circ}C$		32	A_p
	Leakage Current			1.8	mA
F_i	Input Frequency	47	50/60	63	Hz
PF	Power Factor	$V_{in} = 230V/50Hz$		0.99	W/VA
$V_{i\ on}$	Turn-on Voltage	Ramping Up		89	VAC
$V_{i\ off}$	Turn-off Voltage	Ramping Down		72	VAC
Power _i	Input Power	$V_{in} = 90VAC-264VAC$		1150	W
		$V_{in} = 230V, 56V / 2.8A, 12V / 3.34A, T_A = 25^{\circ}C$		88	
η	Efficiency without Fan	$V_{in} = 230V, 56V / 7.0A, 12V / 8.35A, T_A = 25^{\circ}C$		92	%
		$V_{in} = 230V, 56V / 14A, 12V / 16.7A, T_A = 25^{\circ}C$		93	
T_{hold}	Hold-up Time			15	ms

1.1 Input Fuse An internal 12.5A input fuse, in series with the input line, protects against severe defects.

1.2 Inrush Current When the power supply module is connected to the main input, it exhibits a low and short peak current due to an X-capacitance's initial charge. The internal bulk capacitor is charged through a controlled NTC circuit which will limit the inrush current.

1.3 Power Factor Correction Power factor correction (PFC) is achieved by controlling the input current waveform synchronous with the input voltage. A semi-digital controller is implemented giving outstanding PFC results over wide input voltage and load ranges.



2. Output Specifications

Parameter	Description/Condition	Min	Nom	Max	Units	
56V Main Output V₁						
V _{1 nom}	Nominal Output Voltage	0.5 · I _{1 nom} , T _{amb} =25°C		56.00	VDC	
V _{1 set}	Output Setpoint Accuracy	0.5 · I _{1 nom} , T _{amb} =25°C		-0.02	0.02	V
P _{1 nom}	Nominal Output Power	V ₁ =56 VDC		784	W	
I _{1 nom}	Nominal Output Current	V ₁ =56 VDC		14	A _{DC}	
V _{1 pp}	Output Ripple Voltage	V _{1 nom} , I _{1 nom} , 20MHz BW		280	mV _{pp}	
dV _{1 Load}	Load Regulation	V _i =V _{i nom} , 0 - 100% I _{1 nom}		-1	1	%V
dV _{1 Line}	Line Regulation	V _i =V _{i min}V _{i max}		-0.2	0.2	%V
dV _{1 tot}	Total Regulation	V _{i min} to V _{i max} , 0 to 100% I _{1 nom} , T _{a min} to T _{a max}		-1	1	%V
dI _{share}	Current Sharing	when Bus load ≥ (20%)		-5	5	%A
dI _{share}	Current Sharing	when Bus load < (20%)		-10	10	%A
dV _{dyn}	Dynamic Load Regulation	I _{out} :10%--60% of full load;50--100% of full load		-2	2	%V
T _{rec}	Recovery Time	dI ₁ /dt =1A/μs, recovery within 1% of V _{1 nom}			1	ms
t _{AC V1}	Start-up Time from AC	Varies with Input Line			2	sec
tV _{1 rise}	Rise Time	V ₁ =10%.....90% V _{1 nom}		12		ms
C _{Load}	Capacitive Loading	T _{amb} =25°C			36000	μF
12V Output V₂						
V _{2 nom}	Nominal Output Voltage	0.5 · I _{1 nom} , T _{amb} =25°C		12.00	VDC	
V _{2 set}	Output Setpoint Accuracy	0.5 · I _{1 nom} , T _{amb} =25°C		-0.02	.02	V
P _{2 nom}	Nominal Output Power	V ₂ = 12VDC		200	W	
I _{2 nom}	Nominal Output Current	V ₂ = 12VDC		16.7	A _{DC}	
V _{2 pp}	Output Ripple Voltage	V ₂ , I ₂ , 20MHz BW		120	mV _{pp}	
dV _{2 Load}	Load Regulation	V _i =V _{i nom} , 0 - 100% I _{1 nom}		-1	1	%V
dV _{2 Line}	Line Regulation	V _i =V _{i min}V _{i max}		-0.2	0.2	%V
dV _{2 tot}	Total Regulation	V _{i min} to V _{i max} , 0 to 100% I _{2 nom} , T _{a min} to T _{a max}		-1	1	%V
dI _{share}	Current Sharing	when Bus load ≥ (20%)		-5	5	%A
dI _{share}	Current Sharing	when Bus load < (20%)		-10	10	%A
dV _{2 dyn}	Dynamic Load Regulation	ΔI ₂ = 50%, I _{SB nom} , I _{SB} 5.....100% I _{SB nom} ,		-2%	2%	%V
T _{rec}	Recovery Time	dI ₁ /dt =1A/μs, recovery within 1% of V _{SB nom}			1	ms
t _{AC V2}	Start-up Time from AC	Varies with Input Line			2	sec
tV _{2 rise}	Rise Time	V ₂ = 10%90% V _{SB nom}		20		ms
C _{Load}	Capacitive Load	T _{amb} =25°C			36000	μF

2.1. Output Voltage Ripple Ripple and noise are measured with 0.1 μF of ceramic capacitance and 10 μF of tantalum capacitance on each of the outputs.

3. Protection

Parameter	Description/Condition	Min	Nom	Max	Units
F ₁	Input Fuse		12.5		A
V _{1 OV}	Overvoltage Threshold V ₁	58.0		60.0	VDC
t _{OV V1}	Overvoltage Latch Off Time V ₁			1	ms
V _{2 OV}	Overvoltage Threshold V ₂	13.2		14.4	VDC
t _{OV V2}	Overvoltage Latch Off Time V _{SB}			1	ms
I _{V1 lim}	Current Limit	Hiccup		23	A
I _{V1 lim}	Current Limit	Latch Off		23	A
I _{V2 lim}	Current Limit	Latch Off		18.5	A
T _{V2}	Latch Off Time		3	5	s
V _{1 SC Max}	Short Circuit Current V ₁	V ₁ < 3V		80	A
t _{V1 SC off}	Short Circuit Latch Off Time	Time to latch off when in short circuit	3	5	s
V _{2 SC Max}	Short Circuit Current V ₁	V ₁ < 3V		80	A
t _{V2 SC off}	Short Circuit Latch Off Time	Time to latch off when in short circuit	3	5	s
T _{SD}	Over Temperature Protection	Internal temperature	90	100	°C

3.1 Overvoltage Protection The power supply module will shut down if the output voltage exceeds the overvoltage threshold. The power supply module must be manually repowered by recycling AC Source for a minimum of 30 sec or by toggle PS_ON..

3.2 Undervoltage Protection The power supply module will shut down after 3 sec if the output voltage falls more than 10% under the rated output voltage. The power supply module must be manually repowered by recycling AC Source for a minimum of 30 sec or by toggle PS_ON.

3.3 Overload Protection Hiccup/ Latch for the V1 Output and constant current latch for the V2 output. The power supply will latch off after 3 sec. The power supply module must be manually repowered by recycling AC Source for a minimum of 30 sec or by toggle PS_ON.

3.4 Short-circuit Protection Latching method on the V1 and V2 output. The power supply module must be manually repowered by recycling AC Source for a minimum of 30 sec or by toggle PS_ON.

3.5 Over Temperature Protection The power supply module will shut down if temperature exceeds the over temperature threshold (internal temperature). The power supply module must be manually repowered by recycling AC Source for a minimum of 30 sec or by toggle PS_ON.

4. Safety/Approval

Parameter	Description/Condition	Min	Nom	Units
Agency Approvals	Approved to the latest edition of the following standards: UL/cUL 62368-1,60950-1 2 nd ed, Demko IEC/EN 62368-1,60950-1 2 nd ed, Demko		Approved by independent body	
Isolation Strength	Input(L/N) to Case (PE)	1500	Basic	Vrms
	Input (L/N) to Output	3000	Reinforced	Vrms
	V1 to V2	1500	Basic	Vrms
	V1 to Case(PE)	1500	Basic	Vrms
Electrical Strength Test	Input to Case	2121		VDC
	Input to Output	4242		VDC

5. Electromagnetic Compatibility

5.1 Immunity

Parameter	Description/Condition	Criterion
ESD Contact Discharge	IEC/EN61000-4-2, Level 2 ±4kV	A
Radiated Electromagnetic Field	IEC/EN61000-4-3, Level 2 (3V/m) 80-1000MHz, 1.4-2.0GHz, Level 1 (1V/m) 2.0-2.7GHz	A A
Electrical Fast Transients/ Burst	IEC/EN61000-4-4, level 2 AC port ±1kV, 1 minute	A
Surge	IEC/EN61000-4-5, Level 2 AC port ± 1kV, 1 min CM, Level 3 AC port ±2kV, 1 min CM	A A
RF Conducted Immunity	IEC/EN 61000-4-6, Level 2, 3 V, CW, 0.15 ... 80MHz Amplitude Modulation 1kHz/80%	A
Magnetic Field Immunity	IEC/EN 61000-4-8, Level 2 3A/m	A
Voltage Dips and Interruptions	IEC/EN61000-4-11 1.0% residual voltage, 0.5 cycle 2.0% residual voltage, 1 cycle 3.40% residual voltage, 5 cycles 4.70% residual voltage, 0.5 cycle 5.70% residual voltage, 25 cycles/50Hz 6.0% residual voltage, 250 cycles/50Hz	A B B A B B

5.2 Emission

Parameter	Description/Condition	Criterion
Conducted Emissions	EN 55032 / EN 55016-2-1 conducted	Class B
Radiated Emission	EN 55032 / EN 55016-2-3 radiated	Class B
Harmonics Emission	IEC61000-3-2, $V_{in} = 230VAC/50Hz$, 100% Load	Class A
Acoustical Noise	46dB at 1 meter, 25 C, 50% Load	-
AC Flicker	IEC61000-3-3, $V_{in} = 230VAC/50Hz$, 100% Load, <20Arms	Pass

6. Environmental Specifications

Parameter	Description/Condition	Min	Nom	Max	Units
T _A Ambient Temperature	$V_{i min}$ to $V_{i max}, I_{1 nom}, I_{SB nom}$	-20		70*	°C
T _S Storage Temperature	Non- operational	-40		85	°C
Altitude	Operational, above Sea Level		5000 16400		Meter Feet
RH Humidity	Non-condensing	5		95	%
Na Audible Noise	$V_{i nom}, 50\% I_{o nom}, T_a = 25^{\circ}C$		0		dBa

*Derating linearly from 51° -70°C @ 50% load.

7. Signals and Controls

7.1 Electrical Characteristics

Parameter		Min	Nom	Max	Unit
PS_ON					
V _{IL}	Input Low Level Voltage	0		0.8	V
V _{IH}	Input High Level Voltage	2.4		3.6	V
P_OK					
V _{IL}	Input Low Level Voltage	0		0.8	V
V _{IH}	Input High Level Voltage	2.4		3.6	V
SCL/SDA					
V _{IL}	Input Low Level Voltage	0		0.8	V
V _{IH}	Input High Level Voltage	2.4		3.3	V
I _{IL,H}	Maximum Input Sink or Source Current			0.25	mA
R _{puSCL}	Internal Pull Up Resistor on SCL		6.8		k Ω
R _{puSDA}	Internal Pull Up Resistor on SDA		6.8		k Ω
A0					
V _{IL}	Input Low Level Voltage	0		0.8	V
V _{IH}	Input High Level Voltage	2.4		3.3	V
R _{puA0}	Internal Pull Up Resistor on A0		4.7		k Ω
PS_PRE					
R _{puPS_PRE}	Internal Resistor to COM		0		Ω
PG_56					
V _{IH}	Input High Voltage PG_56 (Voltage Divider from 56V)		5.1		V

7.2 PS_ON The PS_ON signal is used to remotely enable/disable both outputs of the front-end. This active-low pin is also used to clear any latched fault condition.

7.3 PS_Present The PS_Present signal is internally connected to COM. This active-low signal is used to indicate to a power distribution unit controller that the power supply module is fully engaged.

7.4 P_OK The P_OK provides a 3.3V signal with an active-high when the AC input voltage is above 88VAC and both outputs are in regulation.

7.5 PG_56 The PG_56 signal uses a voltage divider (30k/3k) from V1 output to approximately provide 9.1% of the rated output voltage.

7.6.1 Current Share (56VCS) When used in a redundant configuration, all the current share pins need to be interconnected in order to activate the sharing function. If a supply has an internal fault or is not turned on, the current share line will automatically disengage from the bus.

7.6.2 Current Share (12VCS) When used in a redundant configuration, all the current share pins need to be interconnected in order to activate the sharing function. If a supply has an internal fault or is not turned on, the current share line will automatically disengage from the bus.

If current share is not required the current share pin can be left open.

7.7.1 Remote Sense (+56VS and -56VS) The main output incorporates sense lines to compensate for voltage drop across the load line.

1. (+) Sense connects to the positive rail of the equipment used. Maximum voltage drop of 200mV.
2. (-) Sense connects to the negative rail of the equipment used. Maximum voltage drop of 200mV.

7.7.2 Remote Sense (+12VS and -12VS) The main output incorporates sense lines to compensate for voltage drop across the load line.

1. (+) Sense connects to the positive rail of the equipment used. Maximum voltage drop of 200mV.
2. (-) Sense connects to the negative rail of the equipment used. Maximum voltage drop of 200mV.

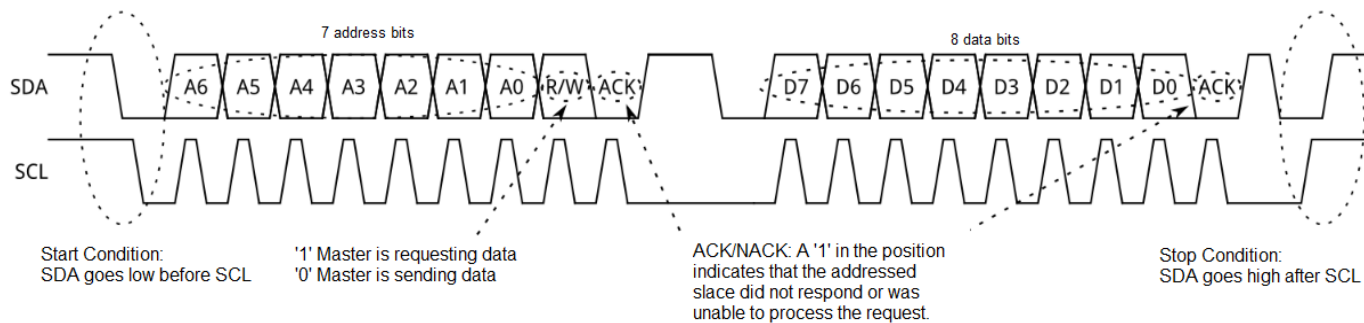
If remote sense is not required the (+) Sense and (-) Sense pins can be left open.

7.8.1 Connector LED1(Requires LED)

Power Supply Condition	Green LED	Yellow LED	P_OK
Normal Operation	On	Off	High
PSU Faults Condition*			
Input Undervoltage	Off	On	Low
Output Overvoltage	Off	On	Low
Over Temperature	Off	On	Low
Output Over Current	Off	On	Low

*For Faults the power supply module must be manually repowered by recycling AC Source for a minimum of 30sec or by toggle PS_ON.

7.9 SDA & SCL The I2C bus consists of a Serial Clock (SCL) and a Serial Data Line (SDA). Both signals lines are pull up internally to 3.3V bus via 6.8k ohm resistors, if customer requires stronger pull up resistors, it is possible to install additional pull up resistors in the customer's backplane.

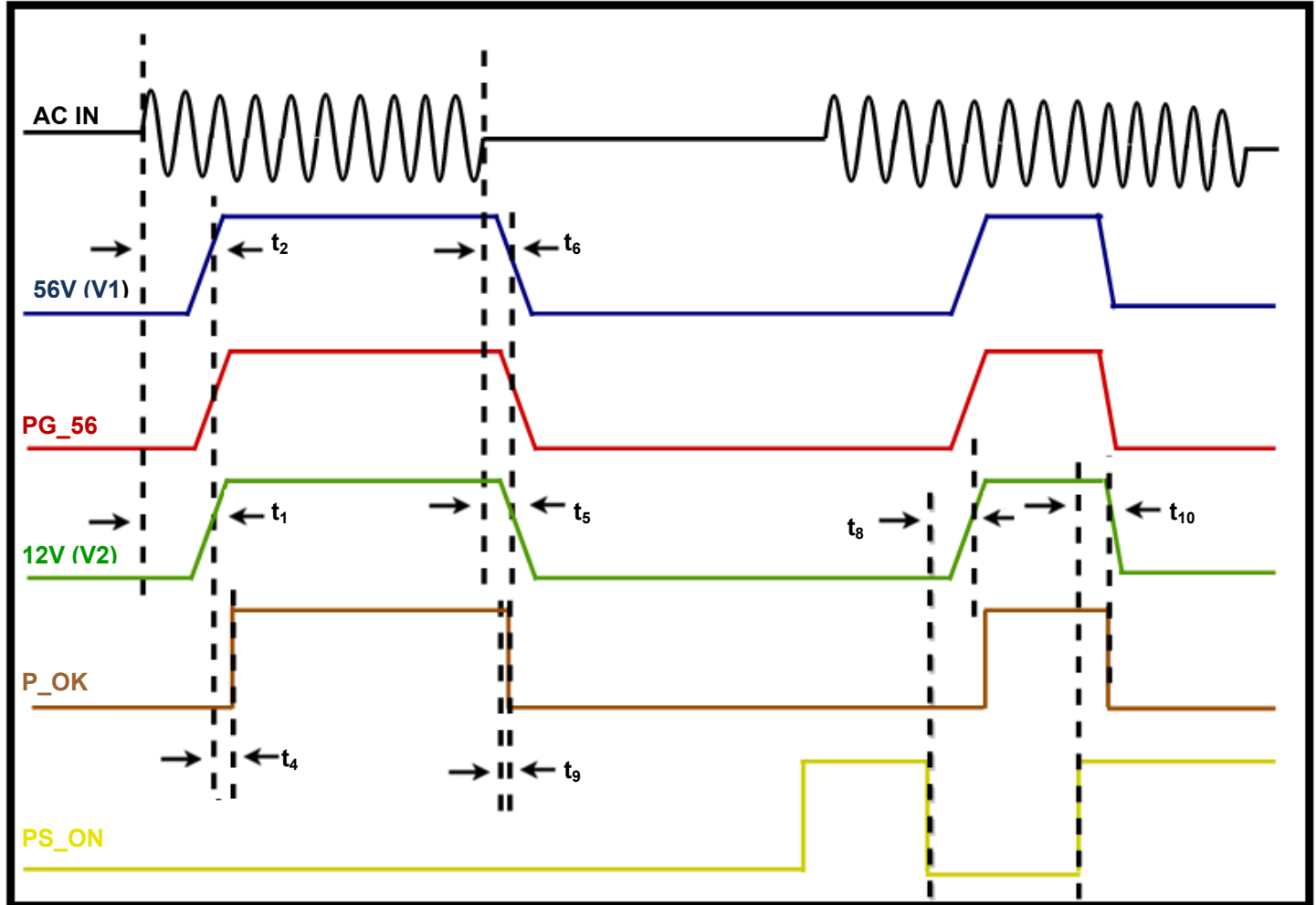


7.10 Address Select (A0) This digital input line is used to set the address of the power supply module. This address is used to differentiate between two power supply modules utilize in a redundant mode within the same system.

7.11 PSU Address Table (Address Bit Settings)

A0	PSU Address Value	A0	Recognize Address
00h	A0h	0	Yes
01h	A2h	1	Yes

7.12 Timing Graph



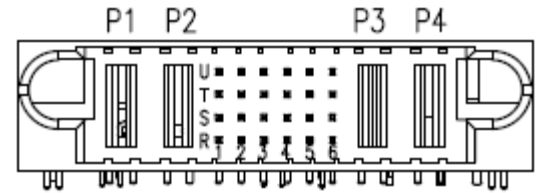
Parameter	Condition	Description	Min	Nom	Max	Unit
$V2t_{\text{risetime}}$	12VOUT,0V to 12V		15		35	ms
$V2L_{\text{trigger}}$	P_OK(low)		10.8		11.4	V
$V1t_{\text{risetime}}$	56VOUT,0V to 56V		10		20	ms
$V1L_{\text{trigger}}$	P_OK(low)		50.0		52.0	V
Turn-On						
t_1	AC INPUT – V2	Varies due to Line and Load	.3	Varies	2	s
t_2	AC INPUT – V1	Varies due to Line and Load	.3	Varies	2	ms
-	V1 - PG_56	PG_56 Follows V1				
t_4	V2 - P_OK		20		50	ms
t_8	PS_ON(low) – V1/V2	PS_ON Turn-On	50	-	300	ms
Turn-Off						
t_5	AC INPUT – V2	AC IN Turn-Off	15	-	-	ms
t_6	AC INPUT – V1	AC IN Turn-Off	20	-	-	ms
-	PG_56 - V1	PG_56 Follows V1				
t_9	P_OK - V2		4			ms
t_{10}	PS_ON(high) – V2	PS_ON Turn-Off	1			ms

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8. Connection

8.1 Main Connectors



Note: 3S and 3T are short pins

Input ----- CNT1 (3 - ¼ inch fastons terminals L/N/G)

Output ----- CNT2: FCI-51730-145LF or equivalent

	P1	P2	1	2	3	4	5	6	P3	P4
U			12VCS	P_OK	PWM1	SCL	NU	56VCS		
T	COM	V2_PWR	A0	TS-SNS-N	PS_PRE	SDA	NU	PG_56	V1_PWR	V1_RTN
S			12VS (-)	TS-SNS-P	PS_ON	PWM2	NU	56VS (-)		
R			12VS (+)	NU	TACH2	TACH1	NU	56VS (+)		

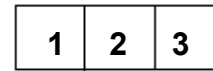
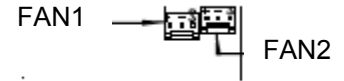
Pins	Pin Type	Assignment	Description/Function
Output			
P3	Power	V1_PWR	These are the +56 voltage output pins.
P4	Power	V1_RTN	These are the 56V return output pins.
P2	Power	V2_PWR	These are the +12 voltage output pins.
P1	Power	COM	These are the 12V return output pins.
Control			
1R	Signal	12VS(+)	(+) Sense - If remote sense is required this pin must be connected to the +12V load on the system backplane. This pin can be left open if remote sense is not required.
1S	Signal	12VS(-)	(-) Sense - If remote sense is required this pin must be connected to the 12V return on the system backplane. This pin can be left open if remote sense is not required.
6R	Signal	56VS(+)	(+) Sense - If remote sense is required this pin must be connected to the +56V load on the system backplane. This pin can be left open if remote sense is not required.
6S	Signal	56VS(-)	(-) Sense - If remote sense is required this pin must be connected to the 56V return on the system backplane. This pin can be left open if remote sense is not required.
1U	Signal	12VCS	Current Share - This pin must be connected to the 12V current share of the redundant power supplies on the system backplane. This pin can be left open if current share is not required.
6U	Signal	56VCS	Current Share - This pin must be connected to the 56V current share of the redundant power supplies on the system backplane. This pin can be left open if current share is not required.
3T	Signal	PS_PRE	Power Supply Present - This signal is connected to the common internally. This signal is used to identify that the power supply module is fully plugged into the system backplane
3S	Signal	PS_ON	Power Supply On - This is the power supply module control pin. This pin must be directly connected to common or controlled by a transistor connected to common on the system backplane.
6T	Signal	PG_56	Power Good 56V - This pin is used as a reference to the the 56V output. The signal's voltage is 9.1% of the rated output voltage.
2U	Signal	P_OK	Power Okay - This pin is used to monitor both output voltages and AC input. The signal on this pin will go high when both outputs are in regulation and AC input is above 88VAC. This signal will go low when either output voltages drop out of regulation or AC fall under 72VAC .
4R	Signal	SDA	Communication Data pin internal pulled up by a 6.8k Ω resistor.
6R	Signal	SCL	Communication Clock pin internal pulled up by a 6.8k Ω resistor.
1T	Signal	A0	Address Pin-This pin operates at 3.3V internal pulled up by a 4.7k Ω resistor.
2T	Signal	TS-SNS-N	(-)Temperature Sensor – negative pin of the sense transistor.
2S	Signal	TS-SNS-P	(+)Temperature Sensor - positive pin of the sense transistor.
4R, 3R	Signal	TACH1, TACH2	Fan speed detection Signal: Passes signal from Fan's connector to the main output connector through the power supply's PCB.
3U, 4S	Signals	PWM1, PWM2	Fan Control Signal: Passes signal from Fan's connector to the main output connector through the power supply's PCB.

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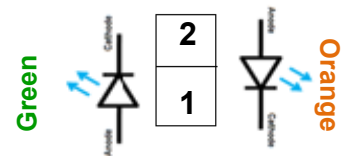
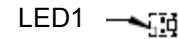
8.2 Additional Connectors

Fan 1 and 2 connector: AMP 640456-3 or equivalent. Requires Fans.



Pins	Assignment	Description
1	PWM	Fan control signal
2	COM	Return for the input signal
3	TACH	Fan speed detect signals

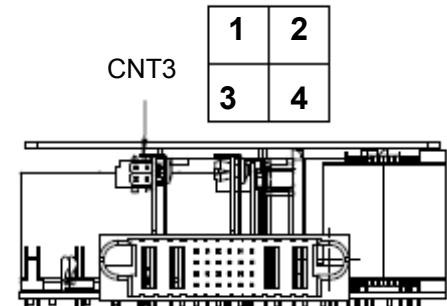
LED1 connector: AMP 640456-2 or equivalent. Used for dual color LED.



Pins	Assignment	Description
1	Status Signal OK	Anode
2	Status Signal Fault	Cathode

CNT3 connector: LCU P302G-2x2-G3-R or equivalent. Used for programming EEPROM.

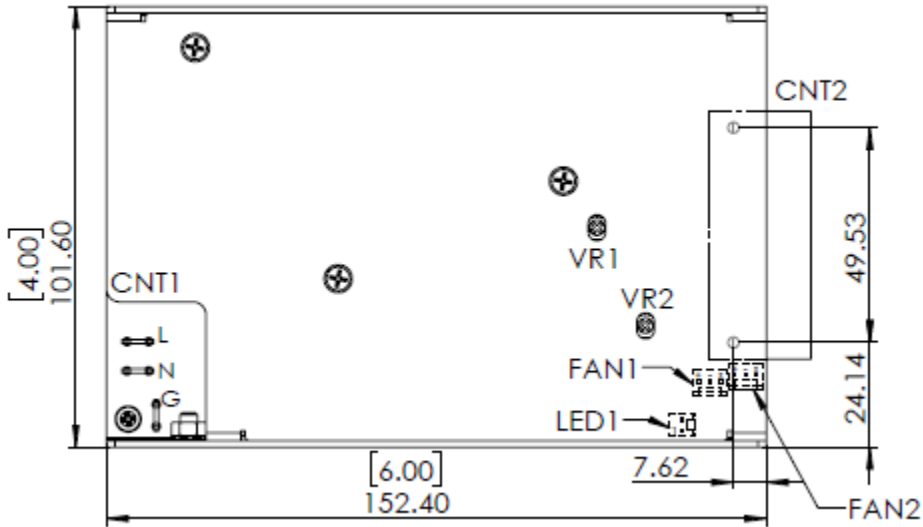
Pins	Assignment	Description
1	SDA	Communication Data pin
2	WP	EEPROM write protection pin
3	SCL	Communication Clock pin
4	COM	Return



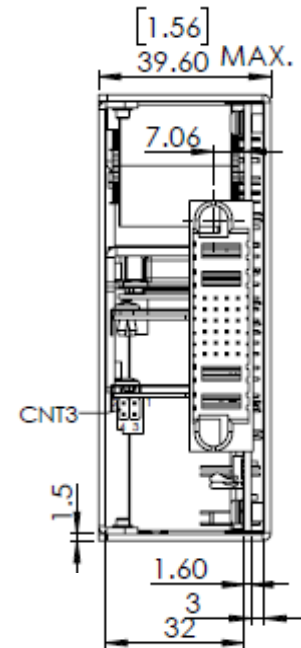
9. Mechanical

Parameter	Description/Condition	Min	Nom	Max	Units
Dimension	Width		101.6(4.00)		mm(in)
	Height		39.6 (1.56)		
	Depth		152.4(6.00)		
Weight			0.89(1.96)		Kg(lbs)

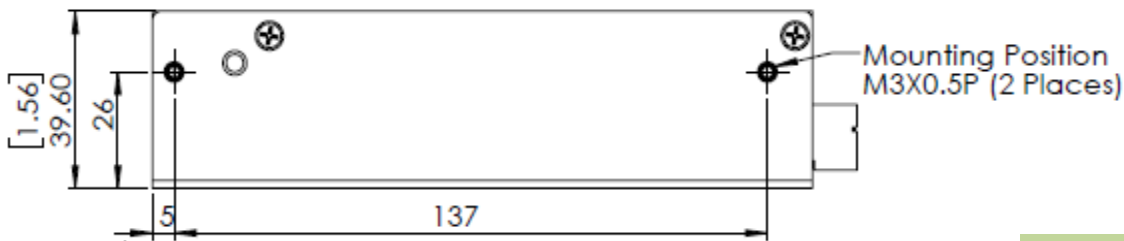
Top View



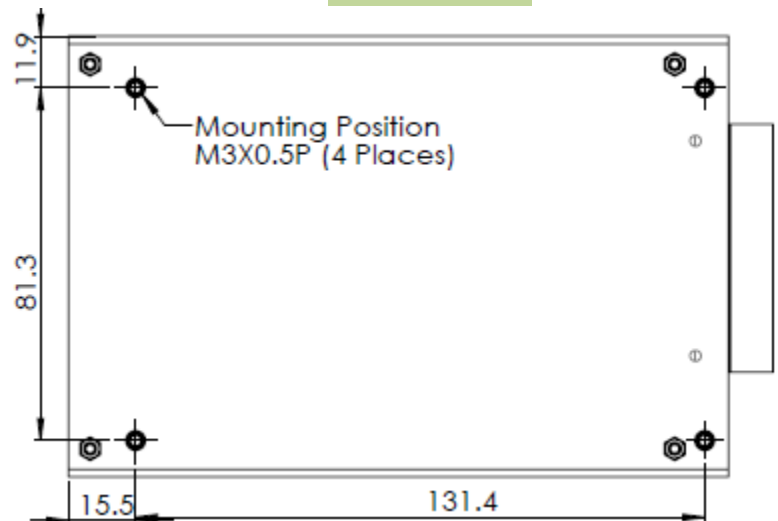
Rear View



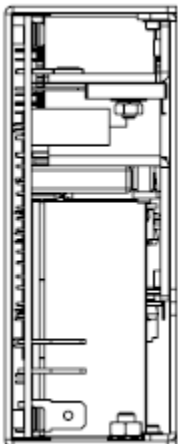
Side View



Bottom View



Front View



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10. Contact Information

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For more information on these products please contact a BluTek Sale Representative.

Technical Revisions – The appearance of products, including safety agency certification pictured on labels, may change depending on the date manufactured. Specifications are subject to change without notice.

Custom Modifications and Voltages are Available