SPECIFICATION

REDUNDANT POWER SUPPLY

HOT-SWAPPABLE

With Active PFC Function

BPS-450RP3 6-OUTPUT

450W+230W

BEST POWER SOLUTIONS, INC.

9F, NO.196-7, SEC.3, TA-TUNG RD SHI CHIH,
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1.0 General

This specification describes the physical, functional and electrical characteristics of a redundancy 450+230 watts, 6-output, fan-cooled switching power supply with Active PFC function.

1.1 Parameter Specifications

Unless specified otherwise, all parameters must be not over the limits of temperature, load and input voltage.

2.0 Input Characteristics

2.1 Input Voltage

Input voltage range set with a Full Range 115 ~ 230 VAC.

2.2 Input Waveform

The unit is capable of operating with a 10% distorted sinewave input as measured by a distortion analyzer. Its flattopping clipped 10% from the peak value of standard sinewave.

2.3 Input Frequency

47 Hz to 63 Hz

2.4 Input current

Input Power	600W
Vin: 115VAC	9 A
Vin: 230VAC	5 A

2.5 In-Rush Current

CONDITIONS	**LIMITS**
115 ~ 230VAC, Full load. Turn off 1 sec; turn on at peak of input voltage cycle. 25℃ Air Ambient cold start.	No damage shall occur or components over stressed, input fuse shall not blow.

2.6 Line Regulation

CONDITIONS	**LIMITS**

Full load, +/1%

115 ~ 230 VAC input

2.7 Input Leakage Current

Input leakage current from line to ground will be less than 3.5 mA rms. Measurement will be made at 240 VAC and 60Hz.

2.8 Isolation (Hi-pot)

1500VRMS, 50Hz, for one (1) minute between each input AC line and the grounding conductor.

3000VRMS, 50Hz, for one (1) Minute between the input AC lines and secondary low voltage outputs and shields.

All isolation transformers will have been tested prior to assembly into a power supply unit. Any such transformers without a grounded shield will be tested to 3750 VRMS.

3.0 Output Characteristics

3.1 DC Output Characteristics

To be met under all combinations of loading.

Output Voltage	V1 +5V	V2 3.3V	V3 +12V	V4 -5V	V5 -12V	5VSB Standby
Max. Load Min. Load	45A 3A	25A 0A	25A 1A	1A 0A	2A 0A	2.5A 0A
Max. Power	250W 410W			5W	24W	12.5W
Load Reg. %	+/-5%	+5/-3%	+/-5%	+/-10%	+/-10%	+/-5%
Cross Reg. %	+/-5%	+5/-3%	+/-5%	+/-10%	+/-10%	+/-5%
Line Reg. %	+/-1%	+/-1%	+/-1%	+/-1%	+/-1%	+/-1%
Ripple %	+/-1%	+/-1%	+/-1%	+/-2%	+/-2%	+/-1%
Noise %	+/-1%	+/-1%	+/-1%	+/-2%	+/-2%	+/-1%

Note 1: The +12 Volt output of the power supply must be capable of 28 Amps peak for 10 seconds. A +/-5% tolerance is permissible. Output voltage is measured at the load and of the output cable.

Note 2: Noise bandwidth is from DC to 20 MHz.

Note 3: Regulation tolerance shall include temperature change, warm up drift and dynamic load.

3.2 Overshoot

Any output overshoot at TURN-ON shall not exceed 5% (+5V/+12V/+3.3V outputs) and 10% (-5V/-12V outputs) of nominal voltage value.

3.3 Efficiency

70% min. at full load test.

4.0 Time Sequence

4.1 Hold-Up Time

Unit shall continue to supply regulated DC outputs and power good signal for at least 20 milliseconds at 115 ~ 230 VAC full load after a loss of AC input voltage which shall be represented by a short circuit at the AC input.

4.2 Power Good Signal

When the power supply is turned off for a minimum of 1.0 second and turned on, the power-good signal as described below will be generated. The power supply shall provide a power-good signal to indicate proper operation of the power supply. This signal shall be a TTL compatible high level for normal operation; low level for fault conditions. Power-good shall go to a low level at least 1 ms before the +5V output voltage falls below the regulation limits described in 3.1 DC output Characteristics. The operation point used as a reference for measuring the 1ms shall be minimum line voltage and maximum load.

All waveform transitions shall be smooth and monotony, i.e. no oscillations. The power-good signal shall stay low (during POWER-ON) until all output voltages are stable within regulation limits. The power-good signal shall have a TURN-ON delay greater than 100 ms but less than 500 ms.

4.2.1 Fan-out

Power-Good output circuit shall consist of an active pull down component and passive pull up resistor.

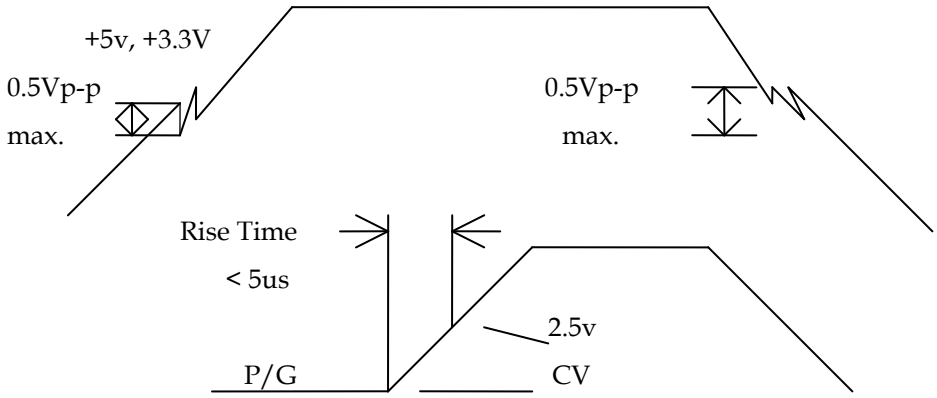
Power-Good output voltage to be met under recommended loading conditions.

CONDITIONS	LIMITS
IoH= -140uA Min.	VoH= 2.7V Min.
IoL= 2.8mA Min.	VoL= 0.4V Min.

4.3 +5 V & +3.3V and Power Good Outputs Rise Time

4.3.1 +5 V & +3.3V Output Rise Time

The +5 Volt and +3.3 Volt output shall have a turn-on rise time of less than 100ms under all load conditions. Rise time is measured between 0.0 and 2.48/4.75 volts. The +5 V and +3.3V output shall not vary from a smooth curve by more than 0.5 VP-P during turn-on and turn-off.



4.4 Start-up timing

All outputs shall be stable and in regulation in less then 2.0 second under all load and line conditions. Start-up time is measured between the AC turn-on and 4.75 volts on +5v output.

4.5 Dynamic Load Response Time

Transient response is measured by switching the output load from 80 to 100 to 80 percent of its full value at a frequency of 100 Hz and 50% duty cycle, step load change is 0.5A/us, The magnitude Vr is less than +/- 5% of +5V and +12V outputs, the recovery time Tr is less than 1ms.

5.0 Protection

5.1 Over Power Protection

This power supply shut down all DC outputs when +5 Vdc and +12 Vdc outputs are overloaded to the limit. The power supply logic shall latch into the off state requiring a power on cycle to be performed by the operator. The power supply will turn-off within 20 ms of the occurrence of the overload. The -5 Vdc and -12 Vdc outputs will be internally current limited.

CONDITIONS	LIMIT
115 ~ 230 VAC input	When output power is over to 120%

5.2 Over Voltage Protection

The power supply shall latch off if the +5 VDC or 3.3VDC or +12 VDC maximum voltages exceeds the limits shown. The AC must be recycled to restart.

+5 VDC

CONDITIONS	LIMITS
All operating	6.25 VDC +/- 0.65 VDC

+3.3 VDC

CONDITIONS	LIMITS
All operating	4.10 VDC +/- 0.40 VDC

+12 VDC

CONDITIONS	LIMITS
All operating	13.6 — 15.6 VDC

5.3 Short Circuit Protection

A short circuit placed on any output shall cause no damage to this unit.

5.4 No Load Operation

When primary power is applied, with no load on any output voltage, no damage or hazardous conditions shall occur. In such a case, the power supply shall power up and stabilize. However, minimum loading required for +5V with 3A and 1A for +12V.

5.5 5VSB (Standby)

The 5VSB output is always on (+5V Standby) when AC power is applied and power switch is turned on. The 5VSB line is capable of delivering at a maximum of 5A for PC board circuit to operate.

5.6 PS-ON (Remote ON/OFF)

PS-ON is an active low signal that turns on the entire main power rail including 3.3V, 5V, -5V, 12V & -12V power rails. When this signal is held by the PC board or left open circuited, outputs of the power rails should not deliver current and should be held at a zero potential with respect to ground. Power should only be delivered to the rails if PS-ON signal is held at ground potential. This signal should be held at +5VDC by a pull-up resistor internal to the power supply.

Power On	P1-PIN #14 PS-ON	Power Switch	P1-PIN #14 PS-ON
ON	L	ON	IN
OFF	H	ON	IN
OFF	X	ON	OUT
OFF	X	OFF	X

5.7 3.3V Sense

A remote 3.3V sense line can be added to the P1 connector Pin2 to allow for accurate control of the 3.3VDC line directly at motherboard loads. Due to potential voltage drops across the connector and traces leading to the motherboard components, it may be advantageous to implement a 3.3V sense line that remotely monitors the 3.3VDC power level at the load on the motherboard.

6.0 System Interface Signal

6.1 Power System Fault Signal

The Hot-Swap Redundant Power Supply shall give fault signal (an open collector output) that will indicate the status of the power supply operation. If one of the power supply unit shut down, the power fault signal could be generated. This signal shall be high level for normal operation. Low level for fault conditions.

6.2 Alarm Beeping Sound

The alarm system monitors the power supply failure and provides alarm to indicate the status of the power system. By checking the LED on the power supply, end users will be able to locate the defective power unit. The alarm system will give a beeping sound to indicate the power supply failure until that particular power unit is replaced. Beeping sound could be suspended before the failure power supply unit replaced by pressing the Alarm Switch.

7.0 Physical Characteristics

7.1 Size

151*86*183mm

7.2 Mounting Requirements

See Appendix

7.3 Weight

3 Kg

7.4 Cooling

Fans: SUNON (KD1204 PKB1), equivalent or better. Airflow from the power supply should be in exhaust direction and shall be rated at 7.3 cfm minimum.

8.0 Connections

8.1 DC Output Wire List

+ For ATX Mother Board

Connector	Output	Wire Color	Wire Size
ATX 24 PIN			
P1-1	+3.3V	BRN	16 AWG
P1-2	+3.3V	BRN	16 AWG
P1-3	GND	BLK	18 AWG
P1-4	+5V	RED	18 AWG
P1-5	GND	BLK	18 AWG
P1-6	+5V	RED	18 AWG
P1-7	GND	BLK	18 AWG
P1-8	PW-OK	ORG	18 AWG
P1-9	5VSB	BRN	18 AWG
P1-10	+12V	YEL	18 AWG
P1-11	+3.3V	BRN	16 AWG
P1-12	-12V	BLUE	18 AWG
P1-13	GND	BLK	18 AWG
P1-14	PS-ON	GRN	18 AWG
P1-15	GND	BLK	18 AWG
P1-16	GND	BLK	18 AWG
P1-17	GND	BLK	18 AWG
P1-18	-5V	WHT	18 AWG
P1-19	+5V	RED	18 AWG
P1-20	+5V	RED	18 AWG
P1-21	+5V	RED	18 AWG
P1-22	+5V	RED	18 AWG
P1-23	+5V	RED	18 AWG
P1-24	GND	BLK	18 AWG
12V 8 PIN FOR CPU			
P1-1	+12V	YEL	18 AWG
P1-2	+12V	YEL	18 AWG
P1-3	+12V	YEL	18 AWG
P1-4	+12V	YEL	18 AWG

P1-5	GND	BLK	18 AWG
P1-6	GND	BLK	18 AWG
P1-7	GND	BLK	18 AWG
P1-8	GND	BLK	18 AWG
P11、P12 FDD			
Pn-1	+12V	YEL	22 AWG
Pn-2	COM	BLK	22 AWG
Pn-3	COM	BLK	22 AWG
Pn-4	+5V	RED	22 AWG
P13、P14 ODD			
Pn-1	+12V	YEL	18 AWG
Pn-2	COM	BLK	18 AWG
Pn-3	COM	BLK	18 AWG
Pn-4	+5V	RED	18 AWG
P15、 P16 ODD			
Pn-1	+12V	YEL	18 AWG
Pn-2	COM	BLK	18 AWG
Pn-3	COM	BLK	18 AWG
Pn-4	+5V	RED	18 AWG
P17、 P18 ODD			
Pn-1	+12V	YEL	18 AWG
Pn-2	COM	BLK	18 AWG
Pn-3	COM	BLK	18 AWG
Pn-4	+5V	RED	18 AWG

8.2 AC Input

IEC 320 power inlet with EMI filter.

9.0 Environmental

9.1 Temperature

9.1.1 Operating

50 to 122 °F (0 to 50 °C). Derate Linearly to 50% at 70 °C

9.1.2 Non-Operating

-4.0 to 140 °F (-20 to 60°C)

9.2 Relative Humidity

9.2.1 Operating

20 to 90 % non-condensing at 104°F (40 °C).

9.2.2 Non-Operating

5 to 95 % non-condensing at 122°F (50°C).

9.3 Altitude

9.3.1 Operating

Sea level to 10,000 feet.

9.3.2 Non-Operating

Sea level to 40,000 feet.

9.4 Shock

9.4.1 Operating

The power supply shall exhibit no sings of damage or degradation of performance when subjected to a shock of 5g`s for 11 ms, with a 1/2 sine wave for each of the perpendicular axes X, Y and Z.

9.4.2 Non-Operating

The power supply shall exhibit no sings of damage or degradation of performance when subjected to a shock of 30g's for 11 ms, with a 1/2 sine wave for each of the perpendicular axes X, Y and Z.

9.5 Vibration

9.5.1 Operating

The power supply shall be subjected to a vibration test consisting of a 10 to 500 Hz sweep at a constant acceleration of 0.5g for a duration of one (1) hour for each of the perpendicular axes X, Y and Z. The output voltages shall remain within specification.

9.5.2 Non-Operating

The power supply shall be subjected to a vibration test consisting of a 10 to 300 Hz sweep at a constant acceleration of 2.0g for a duration of one (1) hour for each of the perpendicular axes X, Y and Z. The power supply

shall not incur physical damage or degradation of any characteristics below the performance specifications.

9.6 Power Line Transient

9.6.1 Drop Out

With a full cycle input voltage dropout at 50Hz, the unit shall operate within the prescribed voltages with a dropout cycle repetition rate of 500ms.

CONDITIONS	LIMITS
Full load, Nom. Input AC Voltage	Meet all requirements

9.6.2 Transient Voltage Spikes

The unit shall meet the following standards, The IEEE Standard 587-1980 for surge withstand capability under categories A and B. The crest value of the first half peak of the injected Ring wave (0.5/10us) and Bi-wave (1.2/50us) will be 3K volts open circuit and 3KA (8us×20us) short circuit.

IEC 801-2 (ESD) to a level of 8KV contact, and 15K air discharge without causing the device(s) to fail the test.

IEC 801-4 (EFT) on the power lines and all I/O cables to a level of 2.5KV without

causing the Device(s) to fail the test.

IEC 801-5 Surge immunity measurement on the input power source of 2.5KV.

All output shall be stable and in regulation.

9.7 Acoustic Noise

The power supply shall be tested in accordance with the ANSIS12.10-1985 standard specifications. The "A" weighted overall sound pressure level as well as individual octave band levels from 63 Hz to 16,000 Hz is measured with the noise meter placed 1 meter from the nearest vertical surface of center of fan installed in power supply.

CONDITIONS	LIMITS
115 VAC Input, full load of +5V 0.5A of +12V.	Acoustic noise is 40 db maximum

Octave Band Center Frequency (Hz)								A-Weighted
125	250	500	1k	2k	4k	8k	16k	Max. Sum
20	36	42	42	42	36	30	20	40dBA

10.0 Regulatory Agency Certification

10.1 RFI/EMI Standards

The power supply, when installed in system, shall comply with the following radiated and conducted emissions standards:

a) FCC part 15, Subpart A, Class A computing devices.

b) CISPR22 (EN55022) Class B.

c) VCCI Class 2.

These limits shall be met with a margin of at less 6dB at all applicable frequencies. The unit shall comply with the above limits when tested under all normal working conditions and with all interface cables connected.

10.2 Safety Standards

The power supply shall be certified with the following safety standards,

a) UL 1950 (Information Processing/Business equipment).

b) CSA C22.2, NO. 234-M90 level 6 (Safety of component, power supplies) or CSA C22.2, NO. 950-M89.

c) TUV Certification to IEC 950 1st edition with Amendment #1, #2, and EN60950

d) CB Certificate & Test report deviation for the Nordic countries.

e) CE Certificate & Test report.

11.0 Reliability

11.1 Mean Time Between failures (MTBF)

Using MIL217E the calculated MTBF = 100,000 hours at 25°C

11.2 Warranty

Two (2) years manufacture's warranty

Date code indicating week and year of manufacture.

TEST CERTIFICATE

We herewith confirm that:

The test data, data evaluation, test procedures, and equipment configurations shown in this test report (**Ref. No. NEI-EMC-01250**) carried out by the Laboratory comply with the requirements relating to **EMC Directive (89/336/EEC).**

Project No.	:	01E1823
Equipment	:	Power Supply
Model No.	:	BPS-450RP3
Applicant	:	Best Power Solution., Inc
		9F, No. 196-7, Sec. 3, Ta-Tung Rd., Shijr City
		Taipei Hsien, Taiwan, R.O.C.

For the evaluation regarding to the **Directive**, following **EEC** harmonized standard(s) were applied:

Product Family Standard	:	EN55022:1998/CISPR22:1997	
		EN61000-3-2:1995+A1:1998+A2:1998	
		EN61000-3-3:1995	
		EN55024:1998	
Basic Standard	:	EN61000-4-2:1995	EN61000-4-3:1996
		EN61000-4-4:1995	EN61000-4-5:1995
		EN61000-4-6:1996	EN61000-4-8:1993
		EN61000-4-11:1994	

NEUTRON ENGINEERING 中子科技股份有限公司

(Authorized Signature)

General Manager

(Title / Position)

Feb. 08, 2002

(Date)

NEMKO EMC Laboratory Aut.No. ELA-136

NEUTRON ENGINEERING INC.

No. 132-1, Lane 329, Sec. 2, Palain Road,

Shijr Jen Taipei, Taiwan, R.O.C.

TEL : (02) 2646-5426 FAX : (02) 2646-6815

TEST CERTIFICATE

We herewith confirm that:

The test data , data evaluation , test procedures, and equipment configurations shown in this test report **(Ref. No. NEI-FCC-02008)** were made in accordance with the procedures given in **ANSI C63.4 (1992)/CISPR 22 (1997)** and the energy emitted by the sample EUT tested as described in follows is in compliance with the **Class A** conducted and radiated emission limits of **CISPR 22/FCC Rules Part 15, Subpart B.**

Report No. :	NEI-FCC-02008
Project No. :	01E1823
Equipment :	Power Supply
Model No. :	BPS-450RP3
Applicant :	Best Power Solution., Inc
	9F, No. 196-7, Sec. 3, Ta-Tung Rd., Shijr City
	Taipei Hsien, Taiwan, R.O.C.

NEUTRON ENGINEERING 新威科技股份有限公司

(Authorized Signature)

General Manager

(Title / Position)

Feb. 08, 2002

(Date)

NVLAP Laboratory Code:200145-0

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TÜV Product Service Asia Ltd. Taiwan Branch
5F., No. 4, Lane 609, Chung Hsin Rd., Sec. 5,
San Chung City, Taipei Hsien, Taiwan, R.O.C.
Tel: 886-2-2999-3950; Fax: 886-2-2999-3949

Best Power Solution ., Inc.

9F, No. 196-7, Sec.3, Ta-Tung Road, Shi Chih City,
Taipei , Taiwan, R.O.C.

Attn.: Mr. Tony Hsu

Your Ref.:	Our Ref.:	Date:
Action	**Best Power 01**	**Feb 03 , 2005**

Notification of Test Result

Dear Mr. Hsu,

This is to notify that your product: **Switching Power Supply**

type designation: **BPS-480RP3 , RP8480-PA ,**
BPS-450RP3 , RP8450-PA

of applicant: **Best Power Solution ., Inc.**

has been type-tested for compliance with
test requirement: **EN/IEC 60950-1 : 2001**

This letter is not a substitute for a certificate.

If you have any questions, please feel free to contact us.

Yours faithfully,

TÜV Product Service Asia Ltd. Taiwan Branch

Kelen Chen

Kelen Chen
Project Engineer / ITE Dept.

IEC IECEE CB SCHEME

Ref. Certif. No.

DE 3 - 53221

IEC SYSTEM FOR MUTUAL RECOGNITION OF TEST CERTIFICATES FOR ELECTRICAL EQUIPMENT (IECEE) CB SCHEME

SYSTEME CEI D'ACCEPTATION MUTUELLE DE CERTIFICATS D'ESSAIS DES EQUIPEMENTS ELECTRIQUES (IECEE) METHODE OC

CB TEST CERTIFICATE
CERTIFICAT D'ESSAI OC

Product Produit	Switching power supply
Name and address of the applicant Nom et adresse du demandeur	Best Power Solutions Inc. 9F,No.196-7,Sec.3,Ta-Tung Rd. Shi-Chih, Taipei Hsien, TAIWAN
Name and address of the manufacturer Nom et adresse du fabricant	Best Power Solutions Inc., 9F,No.196-7,Sec.3,Ta-Tung Rd., Shi-Chih, Taipei Hsien, TAIWAN
Name and address of the factory Nom et adresse de l'usine	Best Power Solutions Inc., 9F,No.196-7,Sec.3,Ta-Tung Rd., Shi-Chih, Taipei Hsien, TAIWAN
Rating and principal characteristics Valeurs nominales et caractéristiques principales	Rated input voltage: 110-240 Vac Rated input current: 7/4 A Rated frequency: 60/50 Hz Rated outputs: See appendix Protection class: I
Trade mark (if any) Marque de fabrique (si elle existe)	1) BPS 2) RM
Model/type Ref. Ref. de type	1) BPS-450RP3, BPS-480RP3 2) RP8450-PA, RP8480-PA
Additional information (if necessary) Information complémentaire (si nécessaire)	
A sample of the product was tested and found to be in conformity with Un échantillon de ce produit a été essayé et a été considéré conforme à la	IEC 60950-1:2001
as shown in the Test Report Ref. No. which form part of this certificate comme indiqué dans le Rapport d'essais numéro de référence qui constitue une partie de ce certificat	TÜV Product Service 081-50308-000

This CB Test Certificate is issued by the National Certification Body
Ce Certificat d'essai OC est établi par l'Organisme **National de Certification**

Date, 2005-03-03
CB 05 03 28112 021

TÜV SÜD Product Service

TÜV Product Service GmbH · Certification Body · Ridlerstrasse 65 · D-80339 München

CB 08.04

UL International, L.L.C., Taiwan Branch

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Fax Cover

Date	February 25, 2005
Attention:	Mr. Tony Hsu
Company:	Best Power Solutions Inc.
Fax Number:	(02)8691-8822
From:	Vita Wang
Fax Number:	886-2-2891-7644
Phone Number:	886-2-2896-7790

TOTAL PAGES, INCLUDING COVER: 3

☐ Urgent	☐ Reply ASAP	☐ Please Comment	☐ Please Review	☐ For Your Information

Our Reference: File E173757 Project 05CA09660

Your Reference:

Subject: UL/C-UL Investigation for Power Supply Modules, Models: BPS-480RP3, BPS-450RP3, RP8480-PA, RP8450-PA - Your Correspondence Dated February 24, 2005


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BUZZER RESET