

# SPECIFICATION

## SWITCHING POWER SUPPLY

BPS-250DS 6-OUTPUT

SINGLE POWER 250W

BEST POWER SOLUTIONS, INC.

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## 1.0 General

This specification describes the physical, functional and electrical characteristics of a DC/DC single power 250 watts, 6-output, fan-cooled switching power supply.

### 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

Normal	Minimum	Maximum
-48VDC	-36 VDC	-72 VDC

### 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 current

Input Power	363W
Vin: -48VDC	7A

### 2.4 In-Rush Current

#### CONDITIONS

-48VDC, full load.

Turn off 1 sec; turn on at peak of input voltage cycle.

25°C Air Ambient cold start.

#### LIMITS

No damage shall occur or components over stressed, input fuse shall not blow.

### 2.6 Line Regulation

Full load,

-48VDC INPUT

+/-1%

## 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 -48 VDC and 10A.

## 2.8 Isolation (Hi-pot)

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

3000VRMS, 50Hz, for one (1) Minute between the input DC 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	30A	15A	12A	0.5A	0.5A	2A
Min. Load	0.5A	0A	1A	0A	0A	0A
Max. Power	150W			2.5W	6W	10W
	234W					
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 15 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 -48 VDC full loads after a loss of DC input voltage, which shall be represented by a short circuit at the DC 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 a passive pull up resistor. Power-Good output voltage to be met under recommended loading conditions.

#### CONDITIONS

IoH= -140uA Min.

IoL= 2.8mA Min.

#### LIMITS

VoH= 2.7V Min.

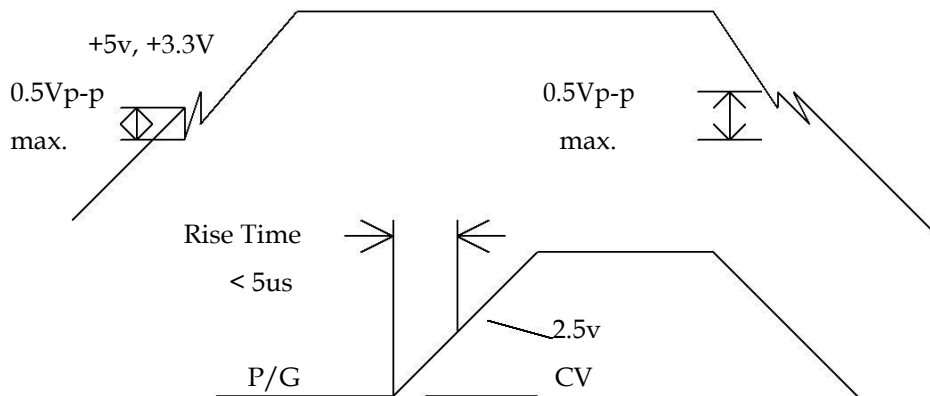
VoL= 0.4V Min.

### **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 than 2.0 second under all load and line conditions. Start-up time is measured between the DC 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/ $\mu s$ , The magnitude  $V_r$  is less than  $\pm 5\%$  of +5V and +12V outputs, the recovery time  $T_r$  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

-48 VDC input

##### LIMIT

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 voltage exceeds the limits shown. The DC must be recycled to restart.

**+5 VDC**

**CONDITIONS**

All operating

**LIMITS**

6.25 VDC +/- 0.65 VDC

**+3.3 VDC**

**CONDITIONS**

All operating

**LIMITS**

4.10 VDC +/- 0.40 VDC

**+12 VDC**

**CONDITIONS**

All operating

**LIMITS**

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 load required 0.5A for +5V and 1A for +12V.

### 5.5 5VSB (Standby)

The 5VSB output is always on (+5V Standby) when DC 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 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 Physical Characteristics

### 6.1 Size

100\*40.5\*190mm

### 6.2 Mounting Requirements

See Figure 6

### 6.3 Weight

1 Kg

### 6.4 Cooling

**Fans:** NMB (1608KL-04W-B50), equivalent or better. Airflow from the power supply should be in exhaust direction and shall be rated at 0.27 cfm minimum.

## 7.0 Connections

### 7.1 DC Output Wire List

+For ATX Mother Board

<u>Connector</u>	<u>Output</u>	<u>Wire Color</u>	<u>Wire Size</u>
<u>ATX 20PIN</u>			
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	PURPLE	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
<b>4PIN FOR P4</b>			
P1-1	GND	BLK	18 AWG
P1-2	GND	BLK	18 AWG
P1-3	+12V	YEL	18 AWG
P1-4	+12V	YEL	18 AWG
<b>P11, P12</b>			
P11-1	+5V	RED	22 AWG
P11-2	COM	BLK	22 AWG
P11-3	COM	BLK	22 AWG
P11-4	+12V	YEL	22 AWG
<b>P13, P14</b>			
Pn-1	+12V	YEL	18 AWG
Pn-2	COM	BLK	18 AWG
Pn-3	COM	BLK	18 AWG
Pn-4	+5V	RED	18 AWG
<b>P15, P16</b>			
Pn-1	+12V	YEL	18 AWG
Pn-2	COM	BLK	18 AWG
Pn-3	COM	BLK	18 AWG
Pn-4	+5V	RED	18 AWG

## 7.2 DC Input

3 Pin DC/DC terminals.

## 8.0 Environmental

### 8.1 Temperature

#### 8.1.1 Operating

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

#### 8.1.2 Non-Operating

-4.0 to 140 °F (-20 to 60°C)

## **8.2 Relative Humidity**

### **8.2.1 Operating**

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

### **8.2.2 Non-Operating**

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

## **8.3 Altitude**

### **8.3.1 Operating**

Sea level to 10,000 feet.

### **8.3.2 Non-Operating**

Sea level to 40,000 feet.

## **8.4 Shock**

### **8.4.1 Operating**

The power supply shall exhibit no signs 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.

### **8.4.2 Non-Operating**

The power supply shall exhibit no signs 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.

## **8.5 Vibration**

### **8.5.1 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.

### **8.5.2 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.

## 8.6 Power Line Transient

### 8.6.1 Drop Out

With a full cycle input voltage drop-out at 50Hz, the unit shall operating within the prescribed voltages with a drop-out cycle repetition rate of 500ms.

CONDITIONS

Full load, Nom. Input AC Voltage

LIMITS

Meet all requirements

### 8.6.2 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.

## 8.7 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

115 VAC Input, full load of +5V  
0.5A of +12V.

LIMITS

Acoustic noise is 40 db maximum

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

## 9.0 Regulatory Agency Certification

### 9.1 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 1<sup>st</sup> edition with Amendment #1, #2, and EN60950
- d) CB Certificate & Test report deviation for the Nordic countries.
- e) CE Certificate & Test report.

## 10.0 Reliability

### 10.1 Mean Time Between failures (MTBF)

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

### 10.2 Warranty

Two (2) years manufacture's warranty

Date code indicating week and year of manufact

# 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-00193) were made in accordance with the procedures given in ANSI C63.4 (1992)/CISPR 22(1993)+Amd.1(1996) and the energy emitted by the sample EUT tested as described in follows is in compliance with the **Class B** conducted and radiated emission limits of **CISPR 22/FCC Rules Part 15, Subpart B**.

**Report No.** : NEI-FCC-00193  
**Project No.** : 00E1944  
**Equipment** : Switching Power Supply  
**Model No.** : BPS-300DS, BPS-300DSP, BPS-250DS  
**Applicant** : Best Power Solution., Inc  
9F, No. 196-7, Sec. 3, Ta-Tung Rd., Shijr City  
Taipei Hsien, Taiwan, R.O.C.



(Authorized Signature)

General Manager  
(Title / Position)

Jan. 31, 2001

(Date)

**NVLAP Laboratory Code:200145-0**  
**NEUTRON ENGINEERING INC.**

**No. 132-1, Lane 329, Sec. 2, Palain Rd.,**  
**Shijr City, Taipei Hsien, Taiwan**

**TEL : (02) 2646-542 FAX : (02) 2646-6815**



**E-PS**  
MODEL: E-PS-3000  
SWITCHING POWER SUPPLY  
9V 1.8A 16W  
12V 1.5A 18W  
15V 1.2A 18W  
18V 1.0A 18W  
24V 0.75A 18W  
30V 0.6A 18W  
TOTAL MAX 18W  
CAUTION  
DO NOT TOUCH  
INTERNAL PARTS  
ELECTRICAL SHOCK  
DANGER  
ACHTUNG!  
NICHT ANFAHREN  
ELEKTROSTROM  
GEFÄHRDUNG

IEC SYSTEM FOR CONFORMITY TESTING  
AND CERTIFICATION OF ELECTRICAL  
EQUIPMENT (IECEE)  
CB SCHEME

SYSTÈME CEI D'ESSAIS DE CONFORMITÉ  
ET DE CERTIFICATION DES ÉQUIPEMENTS  
ÉLECTRIQUES (IECEE)  
MÉTHODE OC

### CB TEST CERTIFICATE CERTIFICAT D'ESSAI OC

Product  
*Produit*

Name and address of the applicant  
*Nom et adresse du demandeur*

Name and address of the manufacturer  
*Nom et adresse du fabricant*

Name and address of the factory  
*Nom et adresse de l'usine*

Rating and principal characteristics  
*Valeurs nominales et caractéristiques principales*

Trade mark (if any)  
*Marque de fabrique (si elle existe)*

Model/type Ref.  
*Ref. de type*

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*

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*

DC to DC Switching Power Supply  
Best Power Solution Inc.  
9F, No. 198-7, Sec. 3, Ta-Tung Rd., Shi-Ching, Taipei, Taiwan R.O.C.  
same as applicant  
same as applicant  
10A-48V IP 20 Class III  
BPS  
BPS250DS  
output: 5V 30A, 3.3V 15A, 12V 12A, 5V 0.5A, 12V 0.5A, 5V 2ZA  
PUBLICATION EDITION  
IEC 60950:1991, A1:1992, A2:1993  
A3:1995, A4:1996  
01DK05745

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 06-02-2002

Signature

Steen Lumbly  
Certification Manager



UL International Demko A/S  
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DK-2730, Herlev, Denmark  
Telefon: +45 44856565  
Fax: +45 44856506

Internal Ref:  
Boks C-24



# 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-00216) carried out by the Laboratory comply with the requirements relating to EMC Directive (89/336/EEC).

**Project No.** : 00E1944  
**Equipment** : Switching Power Supply  
**Model No.** : BPS-300DS, BPS-300DSP, BPS-250DS  
**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:

**Generic Standard** : EN50081-1:1992  
EN50082-1:1997  
**Product Family Standard** : EN55022:1998  
CISPR 22:1993+Amd.1:1995+Amd.2:1996-Amd.3:1997  
**Basic Standard** : EN 61000-4-2:1995 EN 61000-4-5:1995  
EN 61000-4-3:1995 EN 61000-4-6:1996  
EN 61000-4-4:1995 EN 61000-4-11:1994

  
\_\_\_\_\_  
(Authorized Signature)

General Manager

\_\_\_\_\_  
(Title / Position)

Jan. 31, 2001

\_\_\_\_\_  
(Date)

**NEMKO EMC Laboratory Aut.No. ELA-136**

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