



**HIGH POWER ELECTRONIC CO., LTD**

**Part Name: 91.650BR.R1H01**

**Model No: HPG-650BR-H14C (HP)**

**Document Version: A0**

## PRODUCT SPECIFICATION

*Release Date: 2012/11/01*

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# Switching Power Supply Specifications

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## 1. General

### 1.1 Scope

This specification defines the performance characteristics of a single phase 650 watts, 5 output power supply. This specification also defines worldwide safety and electromagnetic compatibility requirements for the power supply which is intended for use in computer products.

## 2. Input Characteristics

### 2.1 Input Voltage

Nominal Voltage	Voltage Variation Range
-----	-----
230 Vrms	207 - 253 Vrms

### 2.2 Input Frequency

Nominal Frequency	Frequency Variation Range
-----	-----
50 Hz	47 Hz to 63 Hz

\* The power supply must operate at above frequency with 207 - 253VACrms input voltage range.

### 2.3 Max. Input AC Current

Max. Input Current	Measuring Range
-----	-----
6.3A	207 - 253 Vrms

### 2.4 Inrush Current

The power supply must meet inrush requirements for any rated AC voltage, during turn on at any phase of AC voltage, during a single cycle AC dropout condition, during repetitive ON/OFF cycling of AC, and over the specified temperature range. The peak inrush current shall be less than the ratings of its critical components (including input fuse, bulk rectifiers, and surge limiting device).

### 2.5 Efficiency

HPG-650BR-H14C provides an efficiency of **82%** when measured at full load under 230V/50Hz condition.



## Switching Power Supply Specifications

### 3. Output characteristics

#### 3.1 Normal Operation Output

Output Voltage	Load MIN	Range MAX	Peak	Regulation	Ripple & Noise P-P Max.
1. +5V	0.2A	22.0A		±5%	50mV
2. +3.3V	0.1A	22.0A		±5%	50mV
3. +12V	0.6A	48.75A		±5%	120mV
4. -12V	0.0A	0.3A		±10%	120mV
5. +5Vs	0.0A	2.5A	3.5A	±5%	50mV

- Maximum continuous total DC output power should not exceed 650W.
- Maximum continuous combined load on +3.3VDC and +5VDC outputs shall not exceed 120W.
- Maximum combined load on 12V outputs shall not exceed 585W.

#### NOTE:

Noise test should be measured with 20 MHz bandwidth frequency oscilloscope. The output terminal shall add a tantalum capacitor of 10uF in parallel with a ceramic capacitor of 0.1uF.

#### 3.2 Remote On/Off Controlled mode

The PSON# signal is required to remotely turn on/off the power supply, PSON# is an active low signal that turns on the output power rails. When this is not pulled low by the system, or left open, the outputs (except the +5VSB) turn off. This signal is pulled to a standby voltage by a pull-up resistor internal to the power supply.

TTL level "H" 2.0 V - 5.25 V

"L" 0.0 V - 1.0 V

#### 3.3 Regulation

The cross regulation defined as follows, the output regulation should be within the specified range.

Load	+5V	+3.3V	+12V	-12V	+5Vsb
Light Load.	2.61 A	2.61 A	8.79 A	0.05 A	0.45A
Typical Load	6.52 A	6.52 A	21.97A	0.14 A	1.13 A
Full Load	13.03 A	13.03 A	43.94A	0.27 A	2.25A



## Switching Power Supply Specifications

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### 3.4 Rise Time

DC output rise time is less than 20 mS at nominal line and full load.

### 3.5 Hold-up Time

DC +5V output maintains at least 16mS , after power off , under 230V/50Hz 75%Load condition.

### 3.6 5VSB

5VSB is required for the implementation of PS-ON described above. 5VSB is a standby voltage that may be used to power circuits that require power input during the powered-down state of all power rails. The 5 VSB pin should deliver  $5V \pm 5\%$  at a minimum of 2.5 A for PC board circuits to operate. Conversely, PC board should draw no more than 2.5A maximum from this pin. This power may be used to operate circuits such as soft power control.

### 3.7 PG-OK

PG-OK is a power good signal and should be asserted high by power supply to indicate that the +5 VDC and +3.3 VDC outputs are above the under-voltage thresholds of the power supply. When this signal is asserted high, there should be sufficient mains energy stored by the converter to guarantee continuous power operation within specification. Conversely, when either the +5VDC or the +3.3VDC output voltage falls below the under-voltage threshold, or when mains power has been removed for a time sufficiently long so that power supply operation is no longer guaranteed, PG-OK should be deasserted to a low state. See Figure 1 for a representation of the timing characteristics of the PG-OK,PS-ON, and germane power rail signals.

### 3.8 3.3V Sense

A default 3.3V sense line should be implemented pin 13 of the connector.

### 3.9 Capacitive Load

The power supply should be able to power up and operate normally with the following capacitances simultaneously present on the DC outputs.

Output	Capacitive load (uF)
+5V	6000
+12V	8000
+3.3V	6000
-12V	350
+5VS	350



## **Switching Power Supply Specifications**

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### **4. Protection**

#### **4. 1 Input Protection**

In primary circuit of the power supply , a protected fuse is inserted. Only internal fault of the power supply will cause the fuse blown. Any overload or short circuit at DC output will keep from fuse brown or fire hazard.

#### **4. 2 Output Protection**

##### **4. 2. 1 Under voltage protection**

The +5V/+3.3V DC output are protected against the under voltage condition . range value can't be exceed 3.3~3.7V at 5V terminal and 2.0~2.4V at 3.3V.

##### **4. 2. 2 Over Voltage Protection**

The +5V/+12V/+3.3V DC output are protected against the over voltage condition . Maximum value can't be over 6.5V at 5V terminal and 15.5V at 12V, 4.3V at 3.3V.

##### **4. 2. 3 Over Power Protection**

The power supply can be used electronic circuit to limit the output current against exceeding 50% of surge output power or protected against excessive power delivery since short circuit of any output or over total power at high line.

##### **4. 2. 4 Short Circuit Protection**

Short circuit placed on +5V,+12V,+3.3V,-12V will latch off. +5VSB will auto-recovery.

### **5. Start Stability**

#### **5.1 No Load Start**

When power is applied to HPG-650BR-H14C with no load connected or under minimum load connected, neither damage to power supply nor hazards to users will occur.

#### **5.2 Cold Start**

The power supply shall operate properly when first applied at normal input voltage and or so maximum load after 4 hours storage in 0°C environment.





**Switching Power Supply Specifications**

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**6. Environments**

**6.1 Temperature and Humidity**

**6.1.1 Operating**

Temperature 0 to 35 °C

Relative Humidity 20 to 90 %

**6.1.2 Storage**

Temperature -40 to 70 °C

Relative Humidity 20 to 95 % noncondensing

**6.2 Altitude**

The power supply can operate normally at any altitude between 0 to 10000 feet.

**6.3 Vibration and Shock**

**Sweep and resonance search for each of X,Y,Z, axis at the sweep.**

RATE of 1/OCTAVE/Min.

Frequency	Duration	Amplitude
5-55-10 Hz	30 minutes	0.35 mm

**7. Conducted EMI**

**8. Product Safety**

**8.1 Safety Requirement**

TUV, CB,CCC

**8.2 Leakage Current**

The AC leakage current is less than 3.5mA when the power supply connect to 253Vac/50Hz .

**8.3 Insulation Resistance**

The insulation resistance should be not less than 30M ohm after applying of 500VDC for 1 minute.

**8.4 Dielectric Voltage Withstand**

The power supply shall withstand for 1 minute without breakdown the application of a 60Hz 1500V AC voltage applied between both input line and chassis (20mA DC cut-off current). Main transformer shall similarly withstand 3000Vac applied between both primary and secondary windings for a minimum of one minute.

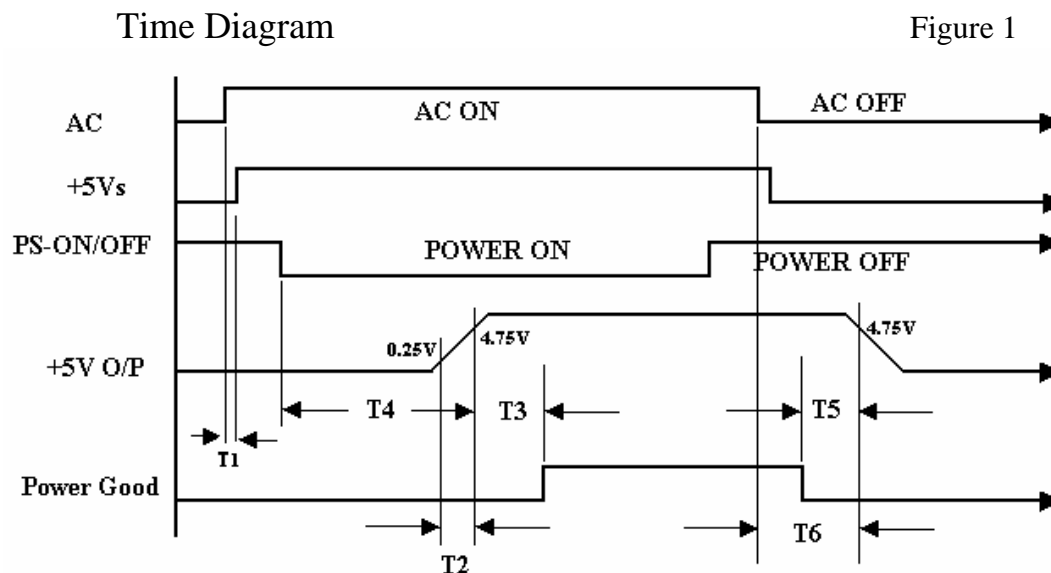
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## Switching Power Supply Specifications

### 9. Power Good Signal

A TTL compatible signal for the purpose of initiating an orderly start-up procedure under normal input operating conditions. During power up, this signal is asserted ( low ) until +5V is under regulation and AC reaches min. line specification range. After all voltage are going appropriate level, the system may have a turn on delay of 100mS, but no greater than 500mS. During power off the signal should go to low level before +5V is out of regulation. The low level is 0 to 0.8V and high level is 4.75 to 5.25V. The " Power Good "signal can drive up to 6 standard TTL loads.



- \* T1 : Turn on time ( 2 sec. Max.)
- \* T2 : Rise time (  $\leq 20\text{mS}$  Max.)
- \* T3 : Power good turn on delay time (  $100 < T3 < 500 \text{ mS}$  )
- \* T4 : Switch on time (0.5 sec. Max.)
- \* T5 : Power good turn off delay time ( 1.0 mS Min.) PS-ON/OFF
- \* T6 : Power hold-up time ( 16 mS Min.)
- \* Power on-off cycle :

When the power supply is turned off for a minimum of 2.0 sec. and turn on again, the power good signal will be asserted.



## **Switching Power Supply Specifications**

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### **10. MTBF**

The MTBF of the power should be 50,000 hours min.

### **11. Burn-In**

#### **11.1 Input Voltage**

Applying 220Vac for 230Vac model.

#### **11.2 Test Condition**

Applying 75% loads for the power supply in 40 (+/-5) °C chamber for 4 hours.

### **12. Harmonics**

The product shall meet requirement for EN61000-3-2 & EN61000-3-3 :2003 standard of class D, test at 230Vac 50Hz.

### **13. Power Factor**

The power supply with active power factor correction, and meet the EN61000-3-2 standards, The power factor is greater than 0.9 at 230V/50Hz, Max. load.

### **14. Mechanical Specification**

#### **14.1 Outline Dimension**

Please refer the mechanical drawing of HPG-650BR-H14C.

#### **14.2 Weight**

Maximum weight is 1.65 Kgs.

#### **14.3 Pin Designation**

##### **14.3.1 DC CONNECTOR REQUIREMENTS**

List or recognized component appliance wiring material(AVLV2) , CN , rated min 85°C , 300VAC shall be used for all output wiring.



**Switching Power Supply Specifications**

**14.3.1 BASEBOARD CONNECTOR**

PA Connector : MOLEX 39-01-2200 or Approved Equivalent

18 AWG Wire	Signal	Pin	Pin	Signal	18 AWG Wire
Orange	+3.3 VDC	13	1	+3.3 VDC	Orange
Brown	+3.3V (SENSE)				
Blue	-12 VDC	14	2	+3.3 VDC	Orange
Black	COM	15	3	COM	Black
Green	PS-ON	16	4	+5 VDC	Red
Black	COM	17	5	COM	Black
Black	COM	18	6	+5 VDC	Red
Black	COM	19	7	COM	Black
	None	20	8	PWR_OK	Gray
Red	+5 VDC	21	9	+5 Vsb	Purple
Red	+5 VDC	22	10	+12 VDC	Yellow

**PA1**

Red	+5 VDC	23	11	+12 V DC	Yellow
Black	COM	24	12	+3.3 VDC	Orange

**14.3.2 Peripheral Connectors**

PG/PH/PI

PM

Connector : AMP 1-480424-0 or MOLEX 8981-04P or approved equivalent

Connector : AMP 171822-4 or approved equivalent

Pin	Signal	18AWG Wire	Pin	Signal	22AWG Wire
1	+12 V DC	Yellow	1	+5 VDC	Red
2	COM	Black	2	COM	Black
3	COM	Black	3	COM	Black
4	+5 VDC	Red	4	+12 V DC	Yellow



**Switching Power Supply Specifications**

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**14.3.4 +12V Power Connector**

PB Connector : Molex 39-01-2040 or equivalent

Pin	Signal	18 AWG Wire
1	COM	Black
2	COM	Black
3	COM	Black
4	COM	Black
5	+12 V DC	Yellow
6	+12 V DC	Yellow
7	+12 V DC	Yellow
8	+12 V DC	Yellow

**14.3.3 Serial ATA Power Connector**

PE/PF Connector : MOLEX 88751 or equivalent

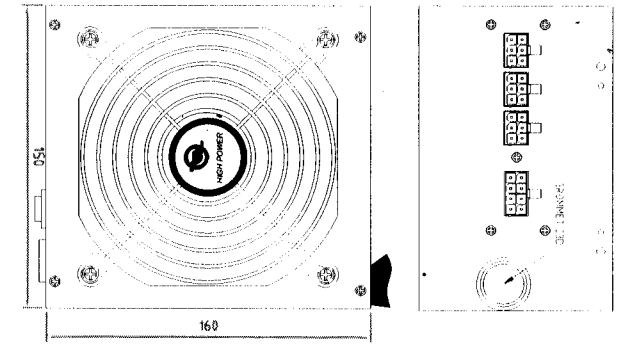
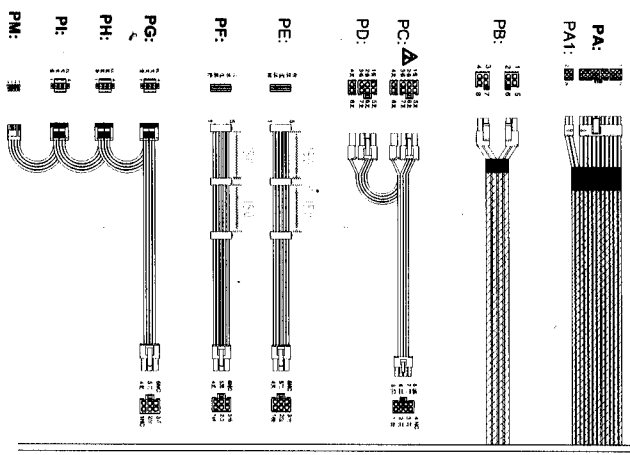
Pin	Signal	18AWG Wire
1	+3.3V DC	Orange
2	COM	Black
3	+5 VDC	Red
4	COM	Black
5	+12V DC	Yellow

**14.3.4 PCI Power Connector**

PC/PD Connector : MOLEX 88751 or equivalent

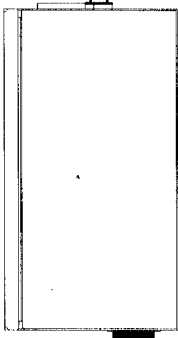
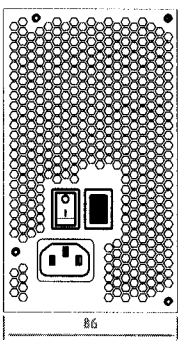
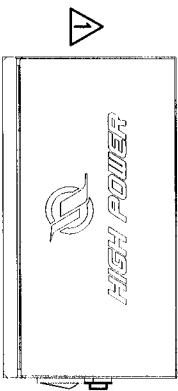
Pin	Signal	18 AWG Wire
1	+12V DC	Yellow
2	+12V DC	Yellow
3	+12V DC	Yellow
4	COM	Black
5	COM	Black
6	COM	Black

DIM	
PA:	500-30MM -0MM
PA1:	505-30MM -0MM
PB:	600-30MM -0MM
PC:	450-30MM -0MM
PD:	150-30MM -0MM
PE:	750-30MM -0MM
PF:	750-30MM -0MM
PG:	450-30MM -0MM
PH:	150-30MM -0MM
PI:	150-30MM -0MM
PM:	150-30MM -0MM



REF.ID.	PIN NO.	COLOR	V
PA	1	ORANGE	+3.3V
	2	ORANGE	+3.3V
	3	BLACK	COM
	4	RED	+5V
	5	BLACK	COM
	6	RED	+5V
	7	BLACK	COM
	8	GRAY	PWR_OK
	9	PURPLE	+5VSB
	10	YELLOW	+12V
PA1	13	BROWN	+3.3V(SENSE)
	14	BLUE	-12V
	15	BLACK	COM
	16	GREEN	PS_ON#
	17	BLACK	COM
	18	BLACK	COM
	19	BLACK	COM
	20		
	21	RED	+5V
	22	RED	+5V
	11	YELLOW	-12V
	12	ORANGE	+3.3V
	23	RED	+5V
	24	BLACK	COM

REF.ID.	PIN NO.	COLOR	V
PG/PH PI	1	YELLOW	+12V
	2	BLACK	COM
	3	BLACK	COM
	4	RED	+5V
PM	1	RED	+5V
	2	BLACK	COM
	3	YELLOW	+12V
PE/PF	1	ORANGE	+3.3V
	2	BLACK	COM
	3	RED	+5V
	4	BLACK	COM
	5	YELLOW	+12V
PB	1	BLACK	COM
	2	BLACK	COM
	3	BLACK	COM
	4	BLACK	COM
	5	YELLOW	+12V
	6	YELLOW	+12V
	7	YELLOW	+12V
	8	YELLOW	+12V
PC	1	YELLOW	+12V
	2	YELLOW	+12V
	3	YELLOW	+12V
	4	YELLOW	+12V
PD	5	BLACK	COM
	6	BLACK	COM
	7	BLACK	COM
	8	BLACK	COM



NO	尺寸	螺絲 (Pos)	彩盒 (PCS)
外箱			
下機板			
上機板			

SHEET METAL TOLERANCE (UNLESS OTHERWISE SPECIFIED)			
DIMENSION	PIERCING	BENDING	ANGULAR
X < 8	±0.1	±0.15	±0.5°
8 < X < 25	±0.1	±0.2	±0.5°
25 < X < 100	±0.15	±0.25	±0.5°
100 < X < 300	±0.2	±0.3	±0.1°
300 < X < 800	±0.3	±0.5	±1.5°

APPROVED	CHECKED	DESIGNED
		曹坤
DATE		2012.12.07

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 REV: A2  
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MODEL NAME	915S0BR.R1H01	916S0BR.R1H01
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