



## Revision

Rev.	Page	Item	Date	Description
A2	4	2.5	2003.08.06	Add Item 2.5 Power factor correction
A3	4	2.1 8.4	2004.07.01	Update 2.1 Voltage range Add 8.4 CCC Standards
A4	8	11.0	2004.09.27	Add 11.0 Fan speed control & noise
A5	4 4 6 7 7 7	2.3 3.1 7.1 7.3 8.1 8.2	2004.11.25	Update 2.3 Steady-state current Update 3.1 DC load requirements Update 7.1 Operation temperature Update 7.3 Primary to secondary Update 8.1 Underwriters laboratory UL 60950. Update 8.2 Canadian standards association (CUL)
A6	7	4.2.4	2004.12.15	Add item 4.2.4 Restart after protection
A7	5	3.1	JUN-20-2006	Update -5V & -12V rating

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# MODEL NO. HG2-6400P

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1.0 Scope

This specification defines the performance characteristics of a grounded, Ac input, 400 watts, 6 output level power supply. This specification also defines world wide safety requirements and manufactures process test requirements.

2.0 Input requirements

2.1 Voltage (sinusoidal) : 100~240 VAC full range(With  $\pm 10\%$  tolerance).

2.2 Frequency

The input frequency range will be 47hz~63hz.

2.3 Steady-state current

8A/4A at any low/high range input voltage.

2.4 Inrush current

65/125 Amps @ 115/230 VAC

2.5 Power factor correction

The power supply shall incorporate universal power input with active power factor correction, which shall reduce line harmonics in accordance with the IEC61000-3-2 standards.

PFC can reach the target of 95% @230VAC, Full load.

3.0 Output requirements

3.1 DC load requirements

Normal Output voltage	Load current(A)		Regulation tolerance	
	Min.	Max.	Max.	Min.
+5V	3	35	+5%	-5%
+12V	2	30	+5%	-5%
-5V	0	0.5	+5%	-5%
-12V	0	0.8	+5%	-5%
+3.3V	1.0	28	+5%	-5%
+5Vsb	0.1	2.0	+5%	-5%

Total power : 400W(MAX)

+5V AND +3.3V Total Max.:45A

When doing the cross regulation test (one output channel at high load and the other output channels at low load), it is requested to set the higher output channel at 80% max. of its spec., and the lower output channels at 20% max. of theirs.

### 3.2 Regulation

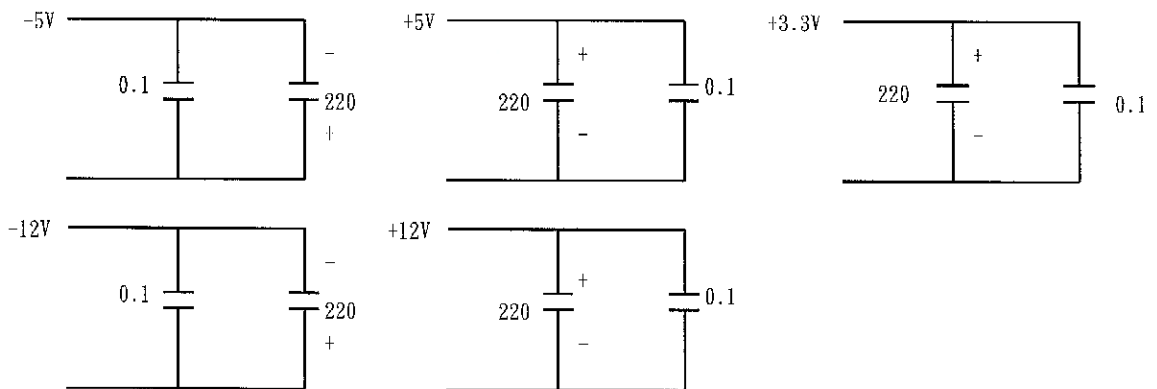
Output DC voltage	Line regulation
+5V	±50mV
-5V	±50mV
+12V	±50mV
-12V	±50mV
+3.3V	±50mV
+5Vsb	±50mV

### 3.3 Ripple and noise

#### 3.3.1 Specification

+5V	50mV (P-P)
+12V	120mV (P-P)
-5V	150mV (P-P)
-12V	150mV (P-P)
+3.3V	50mV (P-P)
+5Vsb	50mV (P-P)

#### 3.3.2 Ripple voltage test circuit



0.1µf is ceramic the other is tantalum.  
Noise bandwidth is from DC to 20MHz

#### 3.4 Overshoot

Any overshoot at turn on or turn off shall be less 15% of the nominal voltage value , all output shall be within the regulation limit of section 3.2 before issuing the power good signal of section 6.0.

#### 3.5 Efficiency

Power supply efficiency typical 70% at 115V, full load.

### 4.0 Protection

#### 4.1 Input (primary)

The input power line must have an over power protection device in accordance with safety requirement of section 8.0

## 4.2 Output (secondary)

### 4.2.1 Over power protection

The power supply shall provide over power protection on the power supply latches all DC output into a shutdown state. Over power of this type shall cause no damage to power supply, after over load is removed and a power on/off cycle is initiated, the power supply will restart.

Trip point total power min. 110%, max. 150%.

### 4.2.2 Over voltage protection

If an over voltage fault occurs, the power supply will latch all DC output into a shutdown state.

	Min	Typical	Max
+3.3V	3.9V	4.1V	4.3V
+5V	5.7V	6.1V	6.5V
+12V	13.6V	14.3V	15.0V

### 4.2.3 Short circuit

A short circuit placed on +5V, +3.3V, +12V, -5V, -12V output to DC return shall cause no damage and power supply latch.

### 4.2.4 Restart after protection

After the protection mode (OPP/OVP) or short circuit is removed and a power on/off cycle is initiated, the power supply will restart. If the PSU is using AC power switch to control on/off, it has to be switched off at least for 5 seconds to restart the unit.

## 5.0 Power supply sequencing

### 5.1 Power on (see fig.1)

### 5.2 Hold up time

When power shutdown DC output 5V must be maintain 16msec in regulation limit at. normal input voltage

### 5.3 Power off sequence (see fig. 1)

## 6.0 Signal requirements

### 6.1 Power good signal (see fig. 1)

The power supply shall provide a "power good" signal to reset system logic, indicate proper operation of the power supply.

At power on, the power good signal shall have a turn on delay of at least 100ms but not greater than 500ms after the output voltages have reached their respective minimum sense levels.

## 7.0 Environment

### 7.1 Operation

Temperature -10 to 45 degrees centigrade

### 7.2 Insulation resistance

Primary to secondary : 30 meg. Ohm min. 500 VDC

Primary to FG : 30 meg. Ohm min. 500VDC

### 7.3 Dielectric withstanding voltage

For approval purpose :

Primary to secondary : 3000 VAC for 1min.

Primary to Frame Gnd : 2200 VAC for 1 min.

For production purpose: 100% test

Primary to Frame Gnd : 2200VAC for 1 sec

Cut off current : 15mA

### 7.4 Leakage current

3.5 mA max. at nominal voltage VAC.

## 8.0 Safety

### 8.1 Underwriters laboratory (UL).

The power supply designed to meet UL 60950.

### 8.2 Canadian standards association (CUL)

The power supply designed to meet CSA C22.2 No.60950.

### 8.3 TUV

The power supply shall be designed to meet TUV EN-60950.

### 8.4 CCC Standards

The power supply shall be designed to meet GB4943-1995,GB9254-1998, GB17625.1-1998.

## 9.0 Reliability

### 9.1 Burn in

All products shipped to customer must be burn in. The burn in shall be performed at high line voltage.

## 10.0 Mechanical requirements

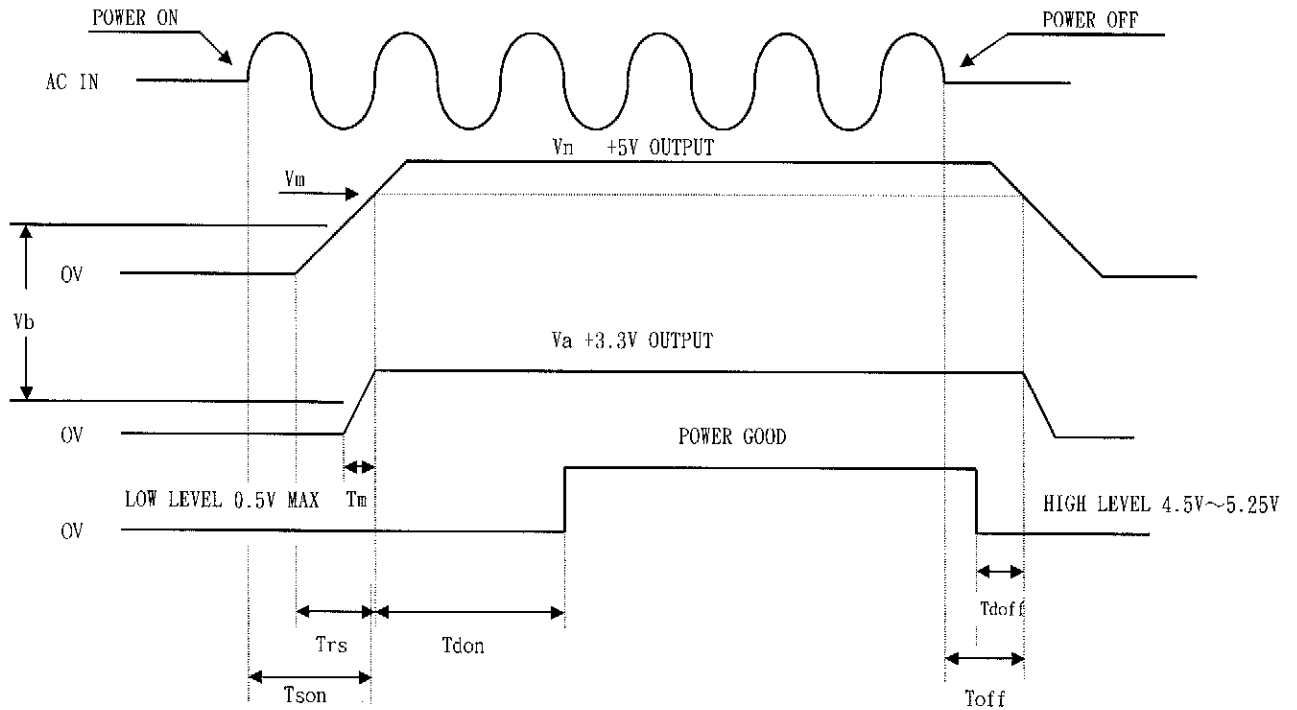
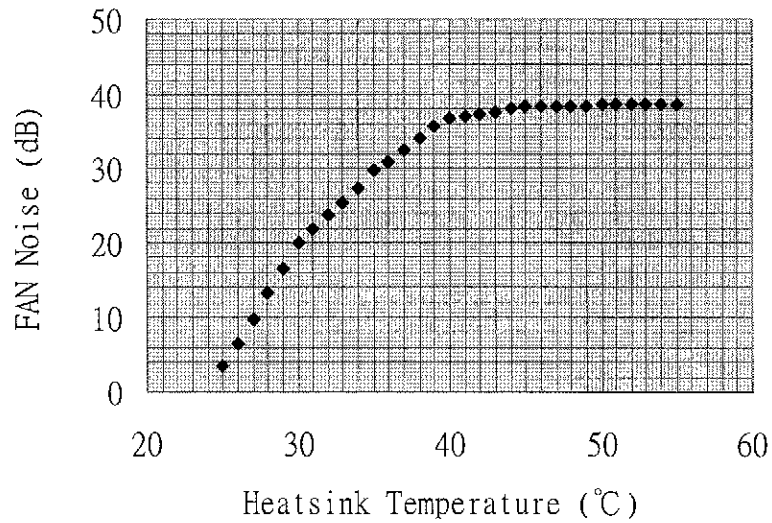
10.1 Physical dimension : 150 mm(D) \* 140 mm(W) \* 86 mm(H)

## 11.0 Fan speed control & noise

Fan speed is in varying with different temperature of heatsinks.

The relationship between fan noise and changes in temperature per shown in the following diagram.





- Vn Nominal voltages +5V
- Vm Minimum voltages +4.5V
- Va Nominal voltages +3.3V
- Vb +2.0V max
- Tson Switch on time (500 ms. max.)
- Trs +5V rise time (50ms. max.)
- Tdon Delay turn-on (100ms. < Tdon < 500ms.)
- Tdoff Delay turn-off (1 ms. min.)
- Toff Hold up time (16ms Min)

《Figure 1》