CHANNEL WELL TECHNOLOGY

Power Supply Specification

Model Number: PSG250B-S0

Revision: GB-02 (RoHS Compliance)

ATX12V 250 Watt 5 Outputs

80% Efficiency at Typical Load

Ordering Number: PSG250B-S0-GB02-H501-0000XF

Revision History

Rev	Description	Owner	Date
X-01	Initial release	Tony Wu	08/21/02
B-01	Production Release	Tony Wu	10/11/02
GB-01	RoHS Compliance	Feilong Wang	01/05/06
GB-02	Output rating updated and high efficiency design	Feilong Wang	01/18/08

1. Scope

This document defines a 250W ATX12V power supply for an 1U system application. The AC Input is rated 90-264Vrms with power factor corrected. There are five outputs: +5V/20.0A, +12V/18.0A, -12V/0.5A, +3.3V/19.0A, and +5VSB/2.5A. A 40mm high Reliability fan made by Delta is applied to this power supply for cooling the power supply and part of the system.

2. Electrical

The electrical specifications that follow are to be met over the environmental ranges specified in Section 4 unless otherwise noted.

2.1. AC Input

Table 1 lists AC input voltage and frequency range for continuous operation. The power supply is capable of supplying full-rated output power over the input voltage ranges specified.

Parameter	Min	Nominal Input	Max	Unit
V_{in} Voltage	90	100-240	264	Vrms
V_{in} Frequency	47	50/60	63	Hz
V_{in} Current		6.3		A

Table 1. AC input

- The inrush current is less than 80A under the conditions of 240Vrms input and 25°C ambient cold start.
- The leakage current is less than 1.75mA.
- The repetitive ON/OFF cycling of AC input voltage will not damage the power supply.
- The power supply can automatically recover from AC power loss.
- The power supply is equipped with primary fuse for input over-current protection, and meet product safety requirement.

2.2. DC Output

2.2.1. DC Output Voltage Regulations

The DC output voltages remain within the regulation ranges shown in Table 2 when measured at the load end of the output connectors under all AC line, O/P loads, and environmental conditions. The voltage regulation will be maintained under continuous operation for a period of time equal to the MTBF specified in section 5.2 at any steady state temperature and operating conditions specified in section 3.

Output	Range	Min	Nom	Max	Unit
+5V	±5%	+4.75	+5.00	+5.25	Volt
+12V	±5%	+11.40	+12.00	+12.60	Volt
-5V	N/A	N/A	N/A	N/A	Volt
-12V	±10%	-10.80	-12.00	-13.20	Volt
+3.3V	±5%	+3.14	+3.35	+3.46	Volt
+5Vsb	±5%	+4.75	+5.00	+5.25	Volt

Table 2. DC Output Voltage Regulations

- The remote sensing is provided to +3.3V output to compensate for excessive cable drops.
- The remote sensing wire for +3.3V output is connected to pin 1 of the main power connector.

2.2.2. DC Output Load Distributions

The Table 3 defines the power supply typical output load distribution.

Output	Min. Current	Max. Current	Peak Current	Unit
+5V	1.0	20.0	---	A
+12V	1.0	18.0	20.0	A
-5V	N/A	N/A	N/A	A
-12V	0.0	0.50	---	A
+3.3V	0.3	19.0	---	A
+5Vsb	0.0	2.50	---	A

Table 3. DC Output Load Distribution

- The total continuous output power is 250W max.
- The total combined output of 3.3V and 5V is 115W max.
- +12V peak current may last over 15 seconds with no more than one occurrence per minute
- The –12V, +3.3V, and +5Vsb can be optional.

2.2.3. DC Output Efficiency

The power supply efficiency is 80% min. under maximum rated load and nominal line input.

2.2.4. DC Output Ripple & Noise

The output ripple & noise specifications listed in Table 4 will be met throughout the load ranges as specified in section 2.2.2 and the nominal line input voltage conditions as specified in section 2.1. Ripple & noise is defined as periodic of random signals over a frequency band of 10Hz to 20MHz. Measurements should be made with an oscilloscope with 20MHz bandwidth. Add a 10uF electrolytic capacitor and a 0.1uF ceramic capacitor across output terminal during ripple & noise measurement.

Output	Max. Ripple (mV P-P)	Max Ripple & Noise (mV P-P)
+5V	50	50
+12V	120	120
-5V	N/A	N/A
-12V	120	120
+3.3V	50	50
+5Vsb	50	50

Table 4. DC Output Ripple & Noise

2.2.5. DC Output Transient Overshoot

10% max. of the rated output voltage with 20% change of the rated maximum load. The transient load slew rate is 1.0A/us.

2.2.6. DC Output Voltage Hold-up Time

The power supply will maintain outputs in regulation per section 2.2.1 despite a loss of input power at the nominal range of AC input and at maximum continuous output load as applicable for a minimum of 16 ms.

2.3. Timing / Housekeeping / control

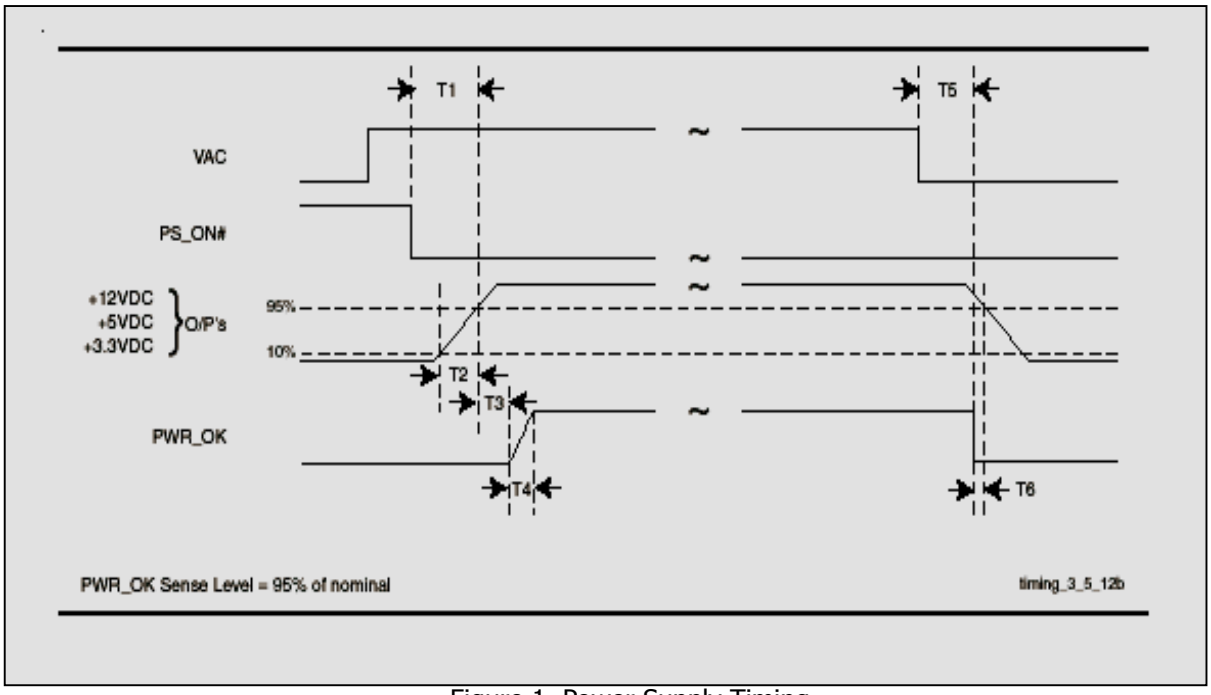


Figure 1. Power Supply Timing

Notes: T1 is defined is section 2.3.4
T2 is defined in section 2.3.5
T3, T4, T5 and T6 are defined in Table 5

2.3.1. PWR_OK (Power Good Signal)

PWR_OK is a "power good" signal. It will be asserted high by the power supply to indicate that the +5V output is above the under voltage threshold listed in Table 2 of Section 2.2. PWR_OK will be de-asserted to a low state when +5V output voltage falls below under voltage threshold, or when AC power has been removed for a time sufficiently such that power supply operation cannot work normally. The electrical and timing characteristics of the PWR_OK signal are given in Table 5 and in figure 1.

Signal type	+5V TTL compatible
Logic level low	Less than 0.4V while sinking 10mA
Logic level high	Greater than 4.75V while sourcing 500uA
High-state output impedance	1kΩ from output to common
PWR_OK delay	100ms < T_3 <500ms
PWR_OK rise time	$T_4 \leq$ 10ms
AC loss to PWR_OK hold-up Time	$T_5 \geq$ 16ms
Power-down warning	$T_6 \geq$ 1ms

Table 5. PWR_OK Signal Characteristics

2.3.2. PS_ON (DC Soft Start)

PS_ON is an active-low, TTL-compatible signal that allows a motherboard to remotely control the power supply in conjunction with features such as soft on/off, Wake on LAN, or wake-on modem. When PS_ON is pulled to TTL low, the power supply will turn on the main DC output rails: +12V, +5V, +3.3V, -5V, and –12V. When PS_ON is pulled to TTL high or open-collected, the DC output rails will not deliver current and will be held at zero potential with respect to ground. PS_ON has no effect to the +5Vsb output, which is always enabled whenever the AC power is present. Table 6 lists PS_ON signal characteristics.

	Min	Max
V_{IL}, Input Low Voltage	0.0V	0.8V
I_{IL}, Input Low Current (Vin = 0.4V)		-1.6mA
V_{IH}, Input high Voltage (Iin = -200uA)	2.0V	
V_{IH}, open circuit, Iin =0		5.25V

Table 6. PS_ON Signal Characteristics

2.3.3. +5Vsb (Standby Voltage Output)

+5Vsb is a standby voltage output that is active whenever the AC power is present. It provides a power source for circuits that must remain operational when the four main DC output rails are in a disabled state. Example uses include soft power control, Wake on LAN, wake on modem, intrusion detection, or suspend state activities. There is over current protection on the +5Vsb output to ensure the power supply will not be damaged if external circuits draw more current than the supply can provide.

2.3.4. Power-on Time

The power-on time is defined as the time from when PS_ON is pulled low to when the12V, +5V, and +3.3V output are within the regulation ranges specified in Section 2.2.1. The power-on time will be less than 800ms (T_1 <800ms). +5Vsb has a power on time of two seconds max. after the valid AC Voltages applied.

2.3.5. Rise Time

The output voltage rise from ≤ 10% of nominal to within the regulation ranges specified in section 2.2.1 within 0.1 ms to 20 ms (0.1 ms ≤ T_2 ≤ 20 ms)

2.3.6. Overshoot at Turn-on / Turn-off

The output voltage overshoot upon the application or removal of the input voltage, or the assertion / de-assertion of PS_ON will be less than 10% above the nominal voltage.

2.3.7. Reset after Shutdown

If the power supply latches into a shutdown state because of a fault condition on its outputs, the power supply can return to normal operation only after the fault condition has been removed and the PS_ON has been cycled OFF/ON with a minimum OFF time of 1 second.

2.3.8. +5Vsb at AC Power-down

After AC power is removed, the +5Vsb standby voltage output should remain at its steady state value for the minimum hold-up time specified in Section 2.2.6 until the output begins to decrease in voltage. The decrease can be monotonic in nature, dropping to 0.0V. There is no other perturbations of this voltage at or following removal of AC power.

2.4. Output Protection

2.4.1. Over Voltage Protection

The power supply can provide latch-mode over voltage protection as defined in Table 7.

Output	Min.	Nom.	Max.	Unit
+12VDC	13.6	14.6	15.6	Volts
+5VDC	5.5	6.25	7.0	Volts
+3.3VDC	3.7	4.1	4.5	Volts

Table 9. Over Voltage Protection

2.4.2. Short-circuit Protection

Output short circuit is defined as any output impedance of less than 0.1 ohms. The power supply can shut down and latch off for shorting the +3.3VDC, +5VDC, or +12VDC rails to return or any other rails. Shorts between main output rails and +5Vsb will not cause any damage to power supply. The power supply will either shut down and latch off or fold back for shorting the negative rails. +5Vsb can be capable of being shorted indefinitely, but when the short is removed, the power supply will recover automatically or by cycling PS_ON. The power supply can be capable of withstanding a continuous short circuit to the output without damage or overstress to the unit (for example, to components, PCB traces, connectors) under the input conditions specified in section 2.1.

2.4.3. No-load Operation

No damage or hazardous condition will occur with all the DC output connectors disconnected from the load. The power supply may latch into the shutdown state.

3. Environmental

The following subsections define recommended environmental specifications and test parameters. Based on the typical conditions to which an ATX power supply may be subjected during operation or shipment.

3.1. Temperature

Operating	+0°C to +50°C
Non-operating	-40°C to +80°C

3.2. Humidity

Operating	10% to 90% relative humidity (non-condensing) at 40°C
Non-operating	5% to 95% relative humidity (non-condensing) at 50°C

3.3. Altitude

Operating	0 to 10,000 feet
Storage	0 to 50,000 feet

3.4. RoHS Compliance

The power supply meet the requirement of RoHS Compliance with necessary exemption allowed.

4. Electromagnetic Compatibility

The following subsections outline applicable product regulatory specifications for this power supply.

4.1. Emissions

The power supply can comply with FCC Part 15, EN55022: 1998 and CISPR22: 1997, meeting Class B for both conducted and radiated emissions with a 3 db margin.

4.2. Immunity

The power supply can comply with EN 55024:1998.

5. Reliability

5.1. Component De-rating

The derating process promotes quality and high reliability. All electronic components are designed with conservative derating for use in commercial and industrial environments.

5.2. Mean Time between Failures (MTBF)

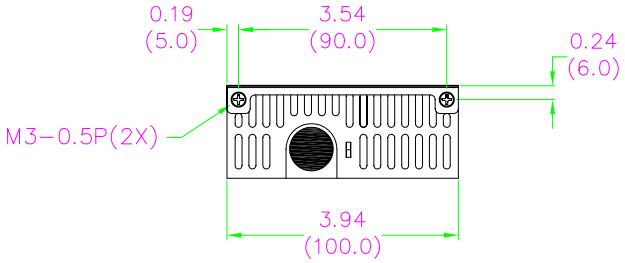
100K hours minimum at full load 25°C

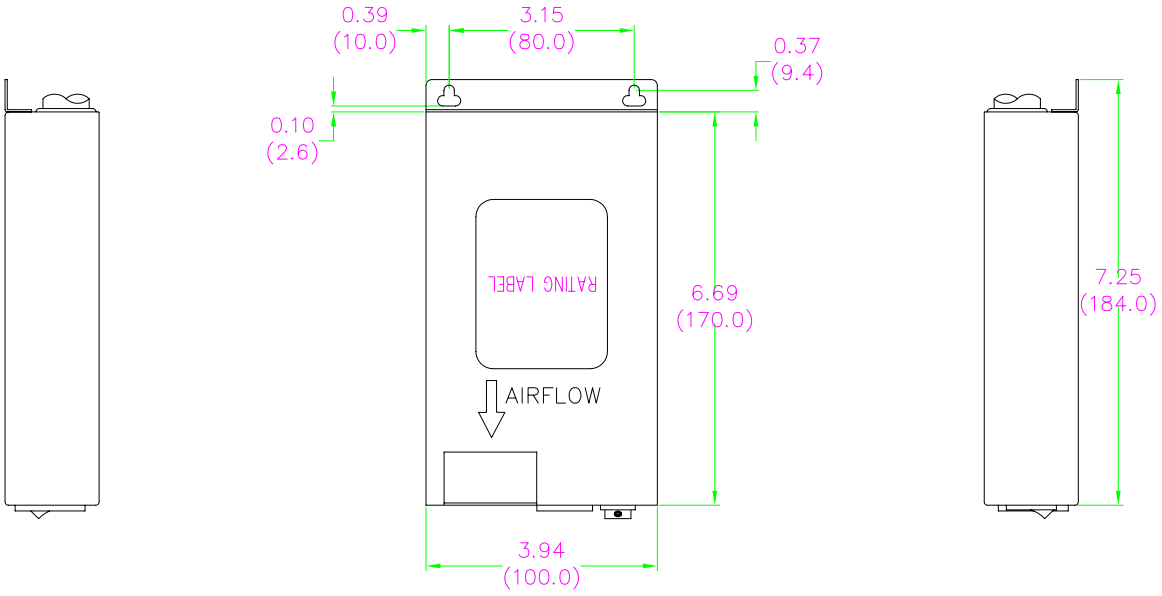
6. Safety

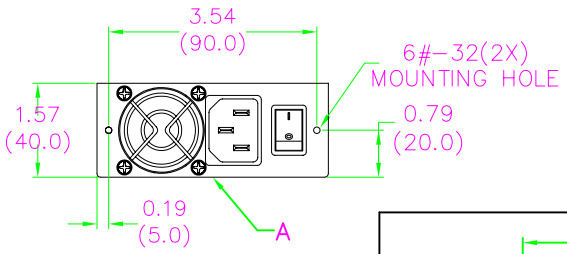
cUL	UL 60950-1
TUV	EN 60950-1
CB	IEC 60950-1: 2001
CE	EN 55022: 1998+A1: 2000+A2: 2003 Class B
	EN 61000-3-2: 2000 Class D
	EN 61000-3-3: 1995+A1: 2001
	EN 55024: 1998+A1: 2001+A2: 2003, including
	IEC 61000-4-2: 1995+A1: 1998+A2: 2000 Criterion B
	IEC 61000-4-3: 2002+A1: 2002 Criterion A
	IEC 61000-4-4: 1995+A1: 2000+A2: 2001 Criterion B
	IEC 61000-4-5: 1995+A1: 2000 Criterion B
	IEC 61000-4-6: 1996+A1: 2000 Criterion A
	IEC 61000-4-8: 1993+A1: 2000 Criterion A
	IEC 61000-4-11: 1994+A1: 2000 Criterion B/C/C

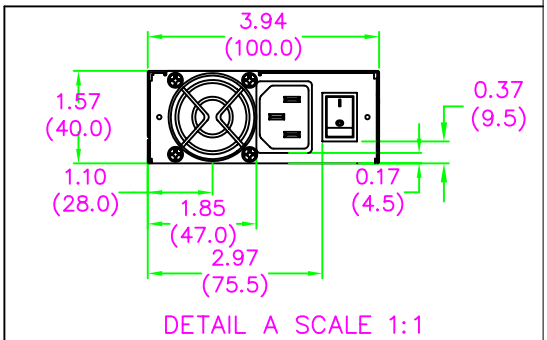
7. Mechanical

Please see attached outline drawing and output cable drawing in detail.

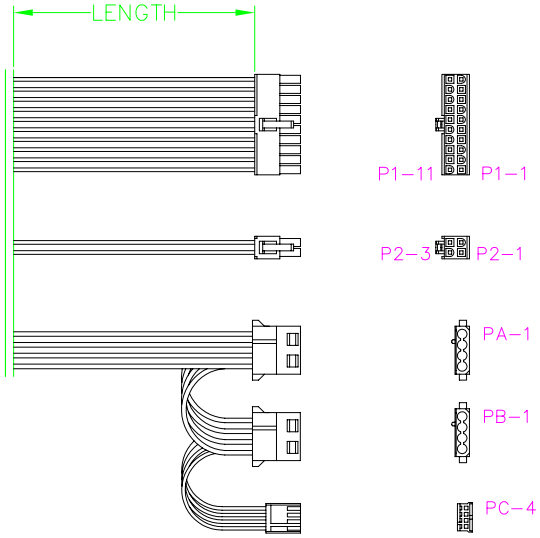








CWT Channel Well Technology CO., LTD.	APPROVED: ZHAO BO	DRAWING NO.: B-1U-AC01-00	UNIT: INCHES(MM)	REV.: 0.4
TITLE: PSG SERIES B CASE; 120W~250W OUTPUT	DATE: JUL 03, 2007	MODEL NO.: PSGxY-zz/Y=B	TOLERANCES: .X = ±0.2 .Xx= ±0.15	SHEET: 1/1



CONN	PIN	WIRE COLOR	OUTPUT	WIRE AWG	LENGTH
P1	1	ORANGE	+3.3V	18	20.0±1.0 (508±25)
		ORANGE	+3.3Vs	20	
	2	ORANGE	+3.3V	18	
	3	BLACK	GND	18	
	4	RED	+5V	18	
	5	BLACK	GND	18	
	6	RED	+5V	18	
	7	BLACK	GND	18	
	8	GRAY	PG	22	
	9	PURPLE	+5VSB	20	
	10	YELLOW	+12V	18	
	11	ORANGE	+3.3V	18	
	12	BLUE	-12V	20	
	13	BLACK	GND	18	
	14	GREEN	PS-ON	22	
	15	BLACK	GND	18	
	16	BLACK	GND	18	
	17	BLACK	GND	18	
	18	NC	NC	NC	
	19	RED	+5V	18	
	20	RED	+5V	18	
P2	1	BLACK	GND	18	
	2	BLACK	GND	18	
	3	YELLOW	+12V	18	
	4	YELLOW	+12V	18	
PA	1	YELLOW	+12V	18	
	2	BLACK	GND	18	
	3	BLACK	GND	18	
	4	RED	+5V	18	
PB	1	YELLOW	+12V	18	6.0±0.5 (150±12)
	2	BLACK	GND	18	
	3	BLACK	GND	18	
	4	RED	+5V	18	
PC	1	RED	+5V	18	
	2	BLACK	GND	18	
	3	BLACK	GND	18	
	4	YELLOW	+12V	18	

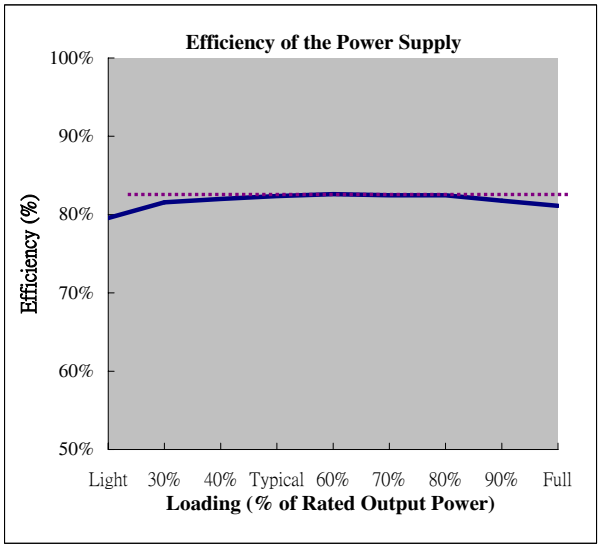
NOTE:

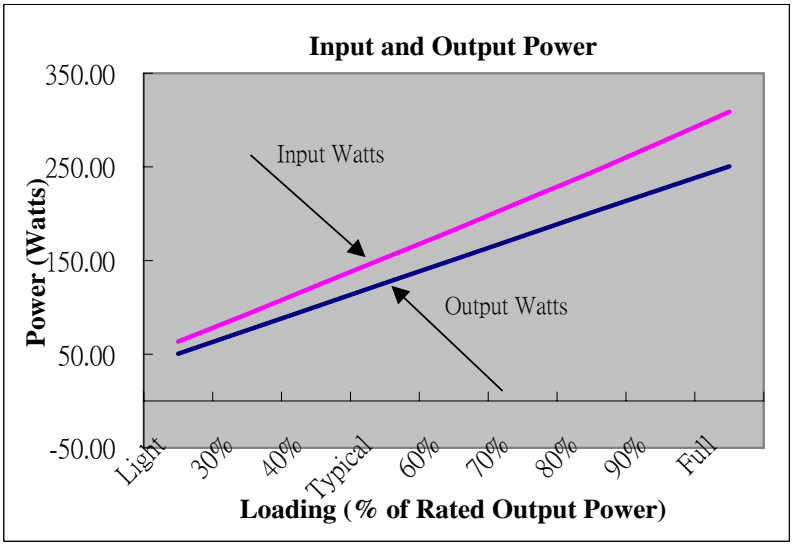
P1	HOUSING:	MOLEX 39-01-2200	OR EQU
	TERMINAL:	MOLEX 39-00-0060	
P2	HOUSING:	MOLEX 39-01-3042	OR EQU
	TERMINAL:	MOLEX 39-00-0059	
PA,PB	HOUSING:	AMP 1-480424-0	OR EQU
	TERMINAL:	AMP 60619-4	
PC	HOUSING:	AMP 171822-4	OR EQU
	TERMINAL:	AMP 170262-2	

CWT *Channel Well Technology CO., LTD.*	APPROVED: ZHAO BO	DRAWING NO.: H-5-01	UNIT: INCHES(MM)	REV.: 0.1
TITLE: PSG SERIES – ATX 5 O/P CABLE	DATE: JUL 03, 2006	MODEL NO.: PSGxy-zz	TOLERANCES: .X= ±0.2 .XX=±0.15	SHEET: 1/1

PSG250B Rev. GB-02 Efficieny Test Report at 115Vac

	TOTAL 250W										
	TOTAL 216W				TOTAL 115W		6.00W	0.00W	10.00W	347.00	
O/P Volt	12	12	12	12	3.3	5	-12	-5	5		
O/P Amp	18.0A	0.0A	0.0A	0.0A	18.0A	20.0A	0.5A	0.0A	2.0A		
O/P Watt	216W	0W	0W	0W	59.4W	100W	6.0W	0.0W	10W		
O/P Load %	+12V1	+12V2	+12V3	+12V4	+3.3V	+5V	-12V	-5V	+5SB	**True output power**	**Input power**	**Efficiency %**
Light	2.59A	0.00A	0.00A	0.00A	1.87A	2.08A	0.07A	0.00A	0.29A	**50.45**	63.4	79.57%
	12.13V				3.35V	5.00V	--12.11V		5.03V			
30%	3.89A	0.00A	0.00A	0.00A	2.81A	3.12A	0.11A	0.00A	0.43A	**75.61**	92.7	81.56%
	12.13V				3.34V	4.99V	--12.11V		5.02V			
40%	5.19A	0.00A	0.00A	0.00A	3.74A	4.16A	0.14A	0.00A	0.58A	**100.76**	122.9	81.99%
	12.13V				3.34V	4.98V	--12.12V		5.01V			
Typical	6.48A	0.00A	0.00A	0.00A	4.68A	5.20A	0.18A	0.00A	0.72A	**125.95**	152.9	82.37%
	12.12V				3.34V	4.98V	--12.13V		5.09V			
60%	7.78A	0.00A	0.00A	0.00A	5.61A	6.24A	0.22A	0.00A	0.86A	**150.87**	182.6	82.62%
	12.11V				3.33V	4.97V	--12.13V		5.00V			
70%	9.08A	0.00A	0.00A	0.00A	6.55A	7.28A	0.25A	0.00A	1.01A	**176.13**	213.6	82.46%
	12.10V				3.35V	4.98V	--12.13V		5.01V			
80%	10.37A	0.00A	0.00A	0.00A	7.48A	8.32A	0.29A	0.00A	1.15A	**201.29**	244.1	82.46%
	12.10V				3.35V	4.98V	--12.14V		5.00V			
90%	11.67A	0.00A	0.00A	0.00A	8.42A	9.36A	0.32A	0.00A	1.30A	**225.87**	276.2	81.78%
	12.09V				3.32V	4.96V	--12.15V		4.98V			
Full	12.97A	0.00A	0.00A	0.00A	9.36A	10.40A	0.36A	0.00A	1.44A	**250.57**	308.9	81.12%
	12.07V				3.32V	4.95V	--12.14V		4.96V			





PSG250B Rev. GB-02 Efficieny Test Report at 230Vac

	TOTAL 250W										
	TOTAL 216W				TOTAL 115W		6.00W	0.00W	10.00W	347.00	
O/P Volt	12	12	12	12	3.3	5	-12	-5	5		
O/P Amp	18.0A	0.0A	0.0A	0.0A	18.0A	20.0A	0.5A	0.0A	2.0A		
O/P Watt	216W	0W	0W	0W	59.4W	100W	6.0W	0.0W	10W		
O/P Load %	+12V1	+12V2	+12V3	+12V4	+3.3V	+5V	-12V	-5V	+5SB	**True output power**	**Input power**	**Efficiency %**
Light	2.59A	0.00A	0.00A	0.00A	1.87A	2.08A	0.07A	0.00A	0.29A	**50.45**	62.3	80.97%
	12.13V				3.35V	5.00V	--12.11V		5.03V			
30%	3.89A	0.00A	0.00A	0.00A	2.81A	3.12A	0.11A	0.00A	0.43A	**75.57**	90.1	83.88%
	12.12V				3.34V	4.99V	--12.12V		5.03V			
40%	5.19A	0.00A	0.00A	0.00A	3.74A	4.16A	0.14A	0.00A	0.58A	**100.66**	119.5	84.23%
	12.11V				3.34V	4.98V	--12.12V		5.01V			
Typical	6.48A	0.00A	0.00A	0.00A	4.68A	5.20A	0.18A	0.00A	0.72A	**125.82**	148.6	84.67%
	12.11V				3.34V	4.98V	--12.13V		5.00V			
60%	7.78A	0.00A	0.00A	0.00A	5.61A	6.24A	0.22A	0.00A	0.86A	**150.79**	177.4	85.00%
	12.10V				3.33V	4.97V	--12.13V		5.00V			
70%	9.08A	0.00A	0.00A	0.00A	6.55A	7.28A	0.25A	0.00A	1.01A	**175.84**	207.2	84.86%
	12.10V				3.33V	4.96V	--12.13V		4.99V			
80%	10.37A	0.00A	0.00A	0.00A	7.48A	8.32A	0.29A	0.00A	1.15A	**200.77**	236.6	84.86%
	12.09V				3.32V	4.96V	--12.14V		4.98V			
90%	11.67A	0.00A	0.00A	0.00A	8.42A	9.36A	0.32A	0.00A	1.30A	**225.53**	267.9	84.18%
	12.07V				3.32V	4.95V	--12.15V		4.97V			
Full	12.97A	0.00A	0.00A	0.00A	9.36A	10.40A	0.36A	0.00A	1.44A	**250.36**	298.5	83.87%
	12.07V				3.31V	4.94V	--12.16V		4.95V