UNIPOWER
Powering Technology

SSD9233-R1U

280 WATT SERVER POWER SUPPLY
FAULT-TOLERANT POWER SYSTEM

10.47 x 4.17 x 1.63” | 266 x 106 x 41.5mm

DESCRIPTION

UNIPOWER’s **SSD9233-R1U** is a 280 Watt fault-tolerant power system manufactured to support high-end server and communication equipment. The power system consists of two SSD3000 Power Modules which mate into the SSDR1U Chassis / Backplane.

The SSD3000 Power Module:

- Universal AC Input with Active PFC
- >85% Efficiency (at 50% Load)
- +12V Main with 5VSB outputs
- Active Current Share with OR’ng Diodes
- >100,000 Hours MTBF (MIL217F)

The SSDR1U Chassis:

- DC-DC Regulation atx 2.0 outputs
- Parallel Connecting the Power Modules
- ATX Output Harness (standard)

The power system provides hot-swap / redundant functionality of the AC-DC Power Supplies and the backplane’s dc-dc regulators feature reliability measured in millions of hours to support high-reliability applications.

FEATURES

- >75% Efficiency (115 VAC / Full Load)
- 1U High: 1.63”
- 0°C to +40°C Operation (Full Load)
- Universal AC Input with Active PFC
- >0.95 Power Factor (minimum)
- ATX 2.0 Compliant Ouutput Voltgaes
- Hot Swappable Power Modules
- International Approvals and Class B Emissions
- LED Indicators
- PMBus Serial Communications
- Variable Speed Cooling Fans

TWO-YEAR WARRANTY

INTERNATIONAL STANDARDS

UL/cUL 60950-1, TUV EN 60950-1
CB IEC 60950-1, WEEE, CE Mark (LVD)

E130645 · B 13 03 61384 028 · 2006/95/EC · RoHS

Fault-Tolerant Power System

MODEL	POWER	VOUT	IOUT
SSD9233-R1U (integrated system)	280W	3.3V 5V 12V -12V 5VSB	20A 20A 22A 0.5 2A

Component Parts

MODEL	DESCRIPTION
SSD3000	280 Watt Hot-Swap Power Module
SSDR1U	280 Watt Chassis & Backplane

1. Purpose

This specification defines the performance characteristics and functions of a 280 watts 1U form factor of switching mode redundant power supply with Active PFC (Power Factor Correction).

2. AC Input Requirements

2.1 Input Voltage and Frequency

Voltage (sinusoidal) : 100~240 VAC full range, with ±10% tolerance. Input frequency ranges from 47hz~63hz

2.2 AC Input Current and Inrush Current

AC line inrush current shall not damage any component nor cause the AC line fuse to blow under any DC conditions and with any specified AC line input voltage and frequency. Repetitive On/Off cycling of the AC input voltage shall not damage the power supply.

Table 1: AC Input Current and Inrush Current

Parameter	Minimum	Rated	Maximum	Max. Current	Inrush Current
Voltage (115V)	90 Vac	100-127Vac	132 Vac	4A	50A@115VAC
Voltage (230V)	180 Vac	200-240Vac	264Vac	2A	100A@230VAC

2.3 Input Power Factor Correction (Active PFC)

The power factor at 100% of rated load shall be ≥ 0.95 at nominal input voltage.

2.4 AC Line Transient Specification

AC line transient conditions are characterized as “sag” and “surge” conditions. Sag conditions (also referred to as “brownout” conditions) will be defined as the AC line voltage dropping below nominal voltage. Surge conditions will be defined as the AC line voltage rising above nominal voltage. The power supply shall meet the regulation requirements under the following AC line sage and surge conditions.

Table 2: AC Line Sag Transient Performance

Duration	Sag	Operating AC Voltage	Line Frequency	Load	Performance Criteria
Continuous	10%	Nominal AC Input ranges	50/60 Hz	100%	No loss of function or performance
0-1 AC cycle	100%	Nominal AC Input ranges	50/60 Hz	80%	No loss of function or performance
> 1 AC cycle	> 10%	Nominal AC Input ranges	50/60 Hz	100%	Loss of function Acceptable,

Table 3: AC Line Surge Transient Performance

Duration	Surge	Operating AC Voltage	Line Frequency	Performance Criteria
Continuous	10%	Nominal AC Voltage	50/60 Hz	No loss of function or performance
0 - ½ AC cycle	30%	Mid-point of Nominal AC Voltage	50/60 Hz	No loss of function or performance

3. DC Output Specification

3.1 Output Power / Currents

Table 4: Load Range

Voltage	Minimum Continuous Load	Maximum Continuous Load
+3.3V	0A	20A
+5V	0A	20A
+12V	0.5A	22A
-12V	0A	0.5A
+5VSB	0A	2A

Notes:
1: The +3.3 &+5 Volt total outputs shall not exceed 120W.
2: Noise bandwidth is from DC to 20 MHz

3.2 Voltage Regulation, Ripple and Noise

Table 5: Regulation, ripple and noise

Output Voltage	+3.3V	+5V	+12V	-12V	+5VSB
Load Reg.	±5%	±5%	±5%	±5%	±5%
Line Reg.	±1%	±1%	±1%	±1%	±1%
Ripple & Noise	60mV	60mV	120mV	120mV	60mV

Ripple and noise shall be measured using the following methods:
a) Measurements made differentially to eliminate common-mode noise
b) Ground lead length of oscilloscope probe shall be ≤ 0.25 inch.
c) Measurements made where the cable connectors attach to the load.
d) Outputs bypassed at the point of measurement with a parallel combination of 10uF tantalum capacitor in parallel with 0.1uF ceramic capacitors.
e) Oscilloscope bandwidth of 0 Hz to 20MHz.
f) Measurements measured at locations where remote sense wires are connected.
g) Regulation tolerance shall include temperature change, warm up drift and dynamic load

3.3 Capacitive Loading

The power supply shall be stable and meet all requirements in the following table, except dynamic loading

requirements.

Table 6: Capacitive Loading Conditions

Output	MIN	MAX	Units
+3.3V	10	12,000	uF
+5V	10	12,000	uF
+12V	10	11,000	uF
-12V	1	350	uF
+5VSB	1	350	uF

3.4 Dynamic Loading

The output voltages shall remain within the limits specified in ***Table-Regulation, ripple and noise*** for the step loading and within the limits specified in ***Table-Transient Load Requirement*** for the capacitive loading. The load transient repetition rate shall be tested between **50Hz and 5kHz** at duty cycle ranging from 10%-90%. The load transient repetition rate is only a test specification. The Δ step load may occur anywhere within the MIN load to the MAX load shown in ***Table-Load Range.***

Table 7: Transient Load Requirements

Output	ΔStep Load Size	Load Slew Rate	Capacitive Load
+5V	30% of Max. Load	0.5 A/uS	1000 uF
+3.3V	30% of Max. Load	0.5 A/uS	1000 uF
+12V	50% of Max. Load	0.5 A/uS	2200 uF
+5VSB	30% of Max. Load	0.5 A/uS	1 uF

3.5 Overshoot at Turn-on/Turn-off

Any output overshoot at turn on shall be less than 10% of the nominal output value. Any overshoot shall recover to be within regulation requirements in less than 10ms.

3.6 Timing Requirements

Table 8: Output Voltage Timing

Item	Description	MIN	MAX	Units
Tvout_rise	Output voltage rise time from each main output	1	25	mS
	Output voltage rise time for the 5Vsb out put	1	25	mS
Tvout_on	All main output must be within regulation of each other within this time.		50	mS
Tvout_off	All main output must leave regulation within this time		400	mS

Figure 1: Output Voltage Timing

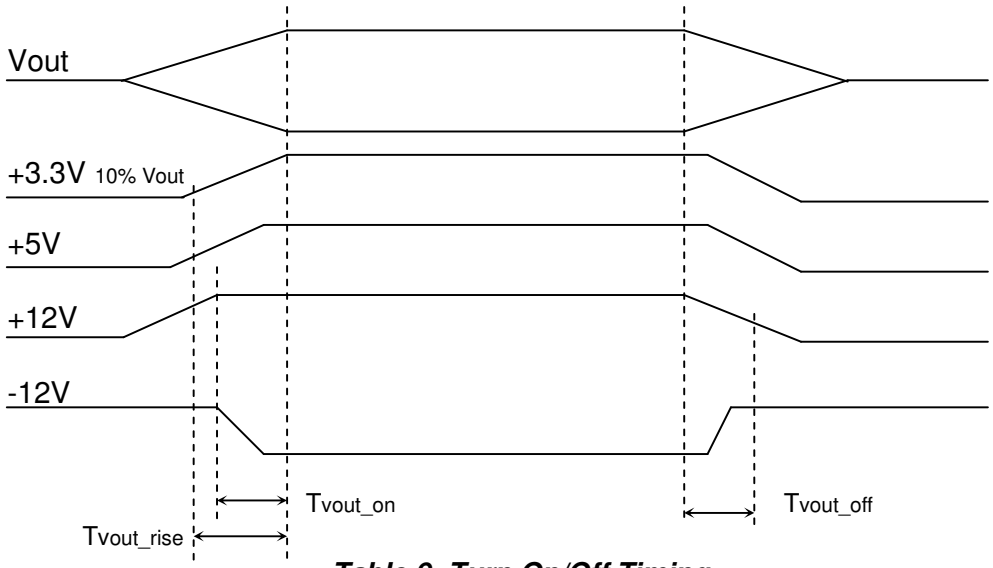
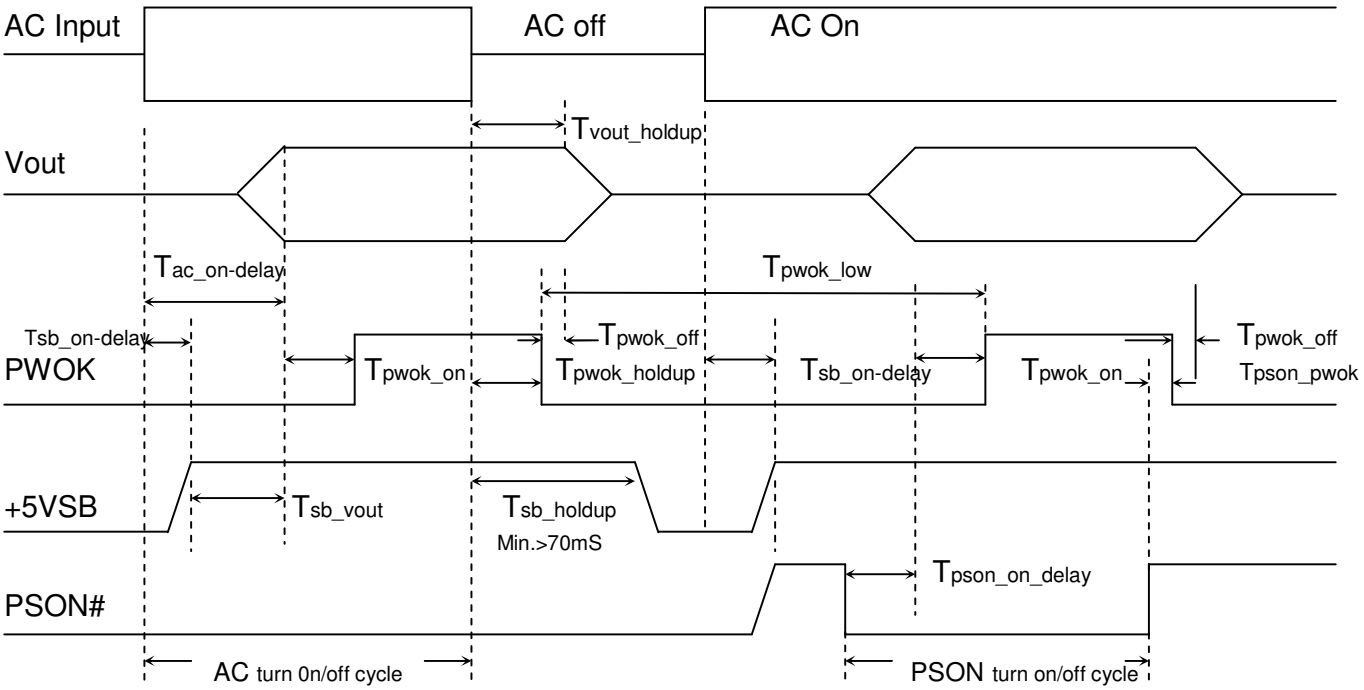


Table 9: Turn On/Off Timing

Item	Description	MIN	MAX	Units
Tsb_on-delay	Delay from AC being applied to +5VSB being within regulation.		1500	mS
Tac_on-delay	Delay from AC being applied to all output voltages being within regulation.		2500	mS
Tvout_holdup	Time all output voltage stay within regulation after loss of AC tested at 80% of maximum load.	16		mS
Tpwok_holdup	Delay from loss of AC deassertion of PWOK tested at 70% of maximum load.	15		mS
Tpson_on_delay	Delay from PSON# active to output voltage within regulation limits.	5	400	mS
Tpson_pwok	Delay from PSON# deactive to PWOK being deasserted.		50	mS
Tpwok_on	Delay from output voltage within regulation limits to PWOK asserted at turn on.	100	1000	mS
Tpwok_off	Delay from PWOK deasserted to output voltages (+5V, +3.3V, +12V, -12V) dropping out of regulation limits, tested at 70% of maximum load.	1		mS
Tpwok_low	Duration of PWOK being in the deasserted state during an off/on cycle using AC or the PSON# signal. .	100		mS
Tsb_vout	Delay from +5VSB being in regulation to O/Ps being in regulation at AC turn on.	50	1000	mS

Figure 2: Turn On/Off Timing



3.7 Efficiency

a. The minimum efficiency of power module shall be ≧83% measured at nominal input voltage 230 V, while output +12V/20A and +5VSB/0.5A without Fan;
b. The efficiency should be ≧80% measured at input voltage 115V while output +12V/20A and +5VSB/0.5A with Fan.
c. The efficiency should be ≧75%, ATE tested while both modules are installed. Condition as below:

AC 115V/60Hz (With Fan)				
+5V	+3.3V	+12V	-12V	+5Vsb
12.56A	12.56A	13.81A	0.31A	1.26A

4. Protection Circuits

Protection circuits inside the power supply shall cause only the power supply's main outputs to shutdown. If the power supply latches off due to a protection circuit tripping, an AC cycle OFF for 15 sec and a PSON# cycle HIGH for 1 sec must be able to restart the power supply.

4.1 Over Current Protection (OCP)

The power supply shall have current limit to prevent the +5V, +3.3V, and +12V outputs from exceeding the values shown in ***Table-Over Current Protection.*** The power supply shall latch off if the current exceeds the limit.

Table 10: Over Current Protection

Voltage	Minimum	Maximum	Shutdown Mode
+5V	22A	32A	Latch Off
+3.3V	22A	32A	Latch Off
+12V	24A	35A	Latch Off

4.2 Over Voltage Protection (OVP)

The power supply shall shut down and latch off after an over voltage conditions occurs.

Table 11: Over Voltage Protection

Voltage	Minimum	Maximum	Shutdown Mode
+5V	+5.7V	+6.5V	Latch Off
+3.3V	+3.9V	+4.5V	Latch Off
+12V	+13.3V	+14.5V	Latch Off

4.3 Short Circuit Protection

The power supply shall shut down in latch off mode when the output voltage is short circuit.

4.4 No Load Operation

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

4.5 Over Temperature Protection (OTP)

The power supply will shut down when an over temperature condition occurs; no damage shall be caused.

5. Environmental Requirements

5.1 Temperature

Operating Ambient: 0℃ ~ 40℃ (32℉~ 104℉)
Non-operating Ambient:: -40℃ ~ 70℃ (-40℉~ 158℉)

5.2 Humidity

Operating: 20% ~ 90%RH non-condensing
Non-Operating: 5% ~ 95%RH non-condensing

5.3 Altitude

Operating: Sea level to 10,000 ft
Non Operating: Sea level to 40,000 ft

5.4 Mechanical Shock

Non-Operating: 50 G Trapezoidal Wave, 11mS half sin wave. The shock is to be applied in each of the orthogonal axes.

5.5 Vibration (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 duration of one (1) hour for each of the perpendicular axes X, Y and Z (0.1 octave/minute). The output voltages shall remain within specification.

5.6 Electromagnetic Compatibility

Electromagnetic Interference	FCC CFR Title 47 Part 15 Sub Part B EN55022/EN55024	Conducted B Radiated B Class		
Harmonics	IEC61000-3-2 Class D			
Flicker	IEC61000-3-3			
ESD Susceptibility	EN-61000-4-2	±8KV by Air, ±4KV by Contact Performance Criteria B		
Radiated Susceptibility	EN61000-4-3	80MHz~1000MHz (3V/m(mns) Amplitude 80% AM 1KHz Criteria A		
EFT/Burst	EN61000-4-4	5KHz, AC: 1KV, DC: 0,5 KV, Performance Criteria B		
Surge Voltage	EN61000-4-5	Line-to-Line: 1KV Line-to-Ground: 2KV Performance Criteria B		
Conducted Susceptibility	EN61000-4-6	0.15MHz~80MHz 3V/m Amplitude 80% AM 1KHz Performance Criteria A		
RF Conducted	EN61000-4-8	50 Hz/3A(ms)/m Performance Criteria A		
Voltage Dips and Interruptions	EN61000-4-11	30%(Voltage Dips) 60%(Voltage Dips) >95%(Voltage Dips)	10 ms 100ms 500ms	Criteria B Criteria C Criteria C
Leakage Current	EN60950-1	3.5mA@250VAC		

5.7 Safety Agency Requirements

This power supply is designed to meet the following safety

Table 12: Product Safety

Product Safety:	UL,cUL UL60950-1 CB IEC60950-1 TUV EN60950-1 CCC

6 Reliability

6.1 Mean Time Between Failures (MTBF)

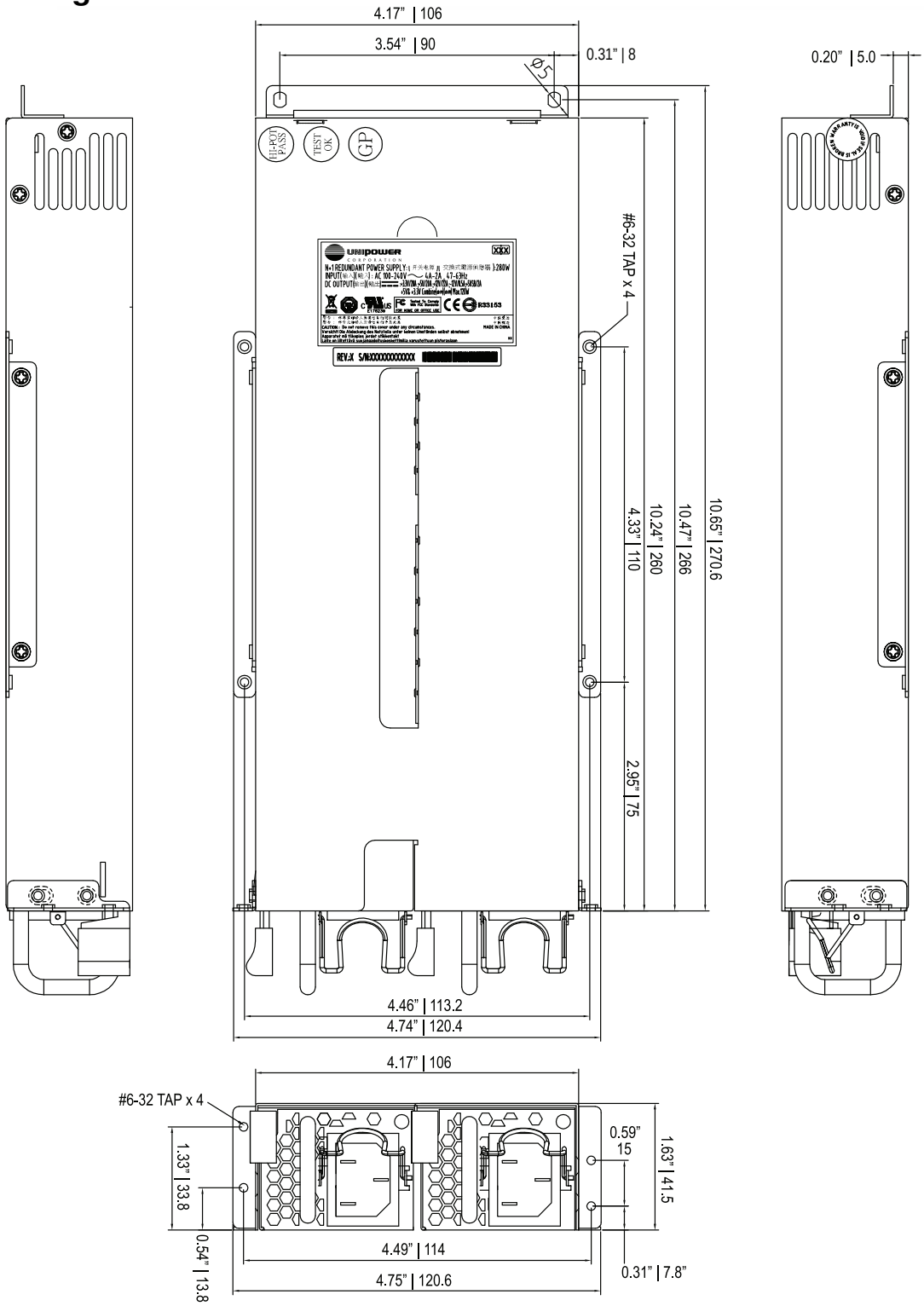
The MTBF of the power supply shall be calculated utilizing the Part-Stress Analysis method of Bellcore. The calculated MTBF of the power supply shall be greater than 100,000 hours under the following conditions:

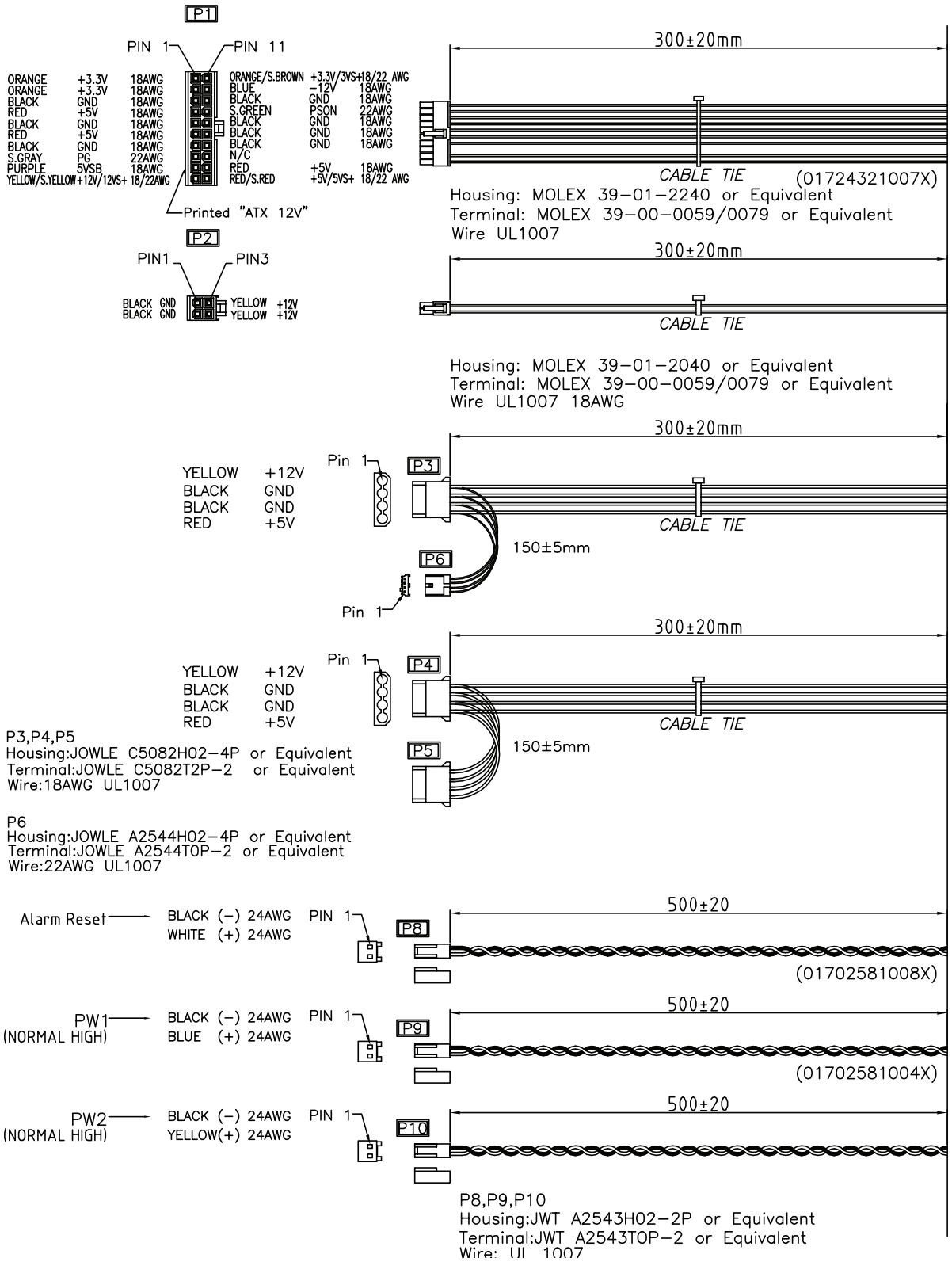
Full rated load; 120V AC input; Ground Benign; 25℃

7. Mechanical Overview

Dimension: 106mm(W) x 41.5mm(H) x 260mm(D)

Weight: 3 Kg




P1
PIN 1
PIN 11
ORANGE +3.3V 18AWG
ORANGE +3.3V 18AWG
BLACK GND 18AWG
RED +5V 18AWG
BLACK GND 18AWG
RED +5V 18AWG
BLACK GND 18AWG
S.GRAY PG 22AWG
PURPLE 5VSB 18AWG
YELLOW/S.YELLOW +12V/12VS+ 18/22AWG
ORANGE/S.BROWN +3.3V/3VS+ 18/22 AWG
BLUE -12V 18AWG
BLACK GND 18AWG
S.GREEN PSON 22AWG
BLACK GND 18AWG
BLACK GND 18AWG
BLACK GND 18AWG
N/C
RED +5V 18AWG
RED/S.RED +5V/5VS+ 18/22 AWG
Printed "ATX 12V"
300±20mm
CABLE TIE
(01724321007X)
Housing: MOLEX 39-01-2240 or Equivalent
Terminal: MOLEX 39-00-0059/0079 or Equivalent
Wire UL1007
P2
PIN1
PIN3
BLACK GND
BLACK GND
YELLOW +12V
YELLOW +12V
300±20mm
CABLE TIE
Housing: MOLEX 39-01-2040 or Equivalent
Terminal: MOLEX 39-00-0059/0079 or Equivalent
Wire UL1007 18AWG
YELLOW +12V
BLACK GND
BLACK GND
RED +5V
Pin 1
P3
300±20mm
CABLE TIE
150±5mm
P6
Pin 1
YELLOW +12V
BLACK GND
BLACK GND
RED +5V
Pin 1
P4
300±20mm
CABLE TIE
150±5mm
P5
P3,P4,P5
Housing:JOWLE C5082H02-4P or Equivalent
Terminal:JOWLE C5082T2P-2 or Equivalent
Wire:18AWG UL1007
P6
Housing:JOWLE A2544H02-4P or Equivalent
Terminal:JOWLE A2544TOP-2 or Equivalent
Wire:22AWG UL1007
Alarm Reset
BLACK (-) 24AWG
WHITE (+) 24AWG
PIN 1
P8
500±20
(01702581008X)
PW1
(NORMAL HIGH)
BLACK (-) 24AWG
BLUE (+) 24AWG
PIN 1
P9
500±20
(01702581004X)
PW2
(NORMAL HIGH)
BLACK (-) 24AWG
YELLOW(+) 24AWG
PIN 1
P10
500±20
P8,P9,P10
Housing:JWT A2543H02-2P or Equivalent
Terminal:JWT A2543TOP-2 or Equivalent
Wire: UL 1007

7.1 AC Inlet Requirements

The SSD3000 module uses a 3Pin IEC C14 inlet.

8. LED Indicators

There will be a LED on each power module to indicate power status

Table 13: LED Color and Power Status

Power Supply Status	Color
Works Normally	Green
Standby (Only +5VSB output)	Amber
Power Fail	Red
Fan Fail	Red

9. Signals from Wire Harness

Table 14: Signals from Wire Harness

Power Supply Status	Signal Type
Works Normally	High
Power Module Not Inserted or Pulled Out	Low
Power Fail	Low
Fan Fail	Low

Alarm reset is used to clear power fail status by shorting circuit activities.
Buzzer shall alarm if signal goes low.

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