SPECIFICATION

SWITCHING POWER SUPPLY

SFX Platinum
1000W / 1100W (Full Range Input)
1300W(230V Only)

PM	EE	ME	Package
Ivan Pan	Hank Chen	Level Ren	Level Ren Mars
Safety	DQE	PD	
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REV.	Description	Date	Approved
1.0	Initial release	2022-3-17	Janson Dennis

1.0 SCOPE

This document provides design suggestions and reference specifications for a family of power supplies that comply with the **SFX12V Rev. 3.42 & Compatible with ATX 12V Rev.3.0** Specification for motherboards and chassis. It includes supplementary information not expressly detailed in the SFX

Specification, such as information about the physical form factor of the power supply, cooling requirements, connector configuration, and pertinent electrical and signal timing specifications.

2.0 Applicable Documents

The latest revision in effect of the following documents forms a part of this document to the extent specified.

Apply Mark	Standard
CB	IEC 62368-1:2014 IEC 60950-1:2005+ Am 1:2009 + Am 2:2013
cTUVus	UL 62368-1, 2nd Edition, CSA C22.2 No. 62368-1-14, 2nd Edition, 2007-12
TUV	EN 62368-1:2014+ALL
Rohs2.0	2011/65/EU&2015/863/EU
REACH	EC 1907/2006
CE	EN 55032:2015 AC:2016 Class B EN 61000-3-2:2014 .EN 61000-3-3:2013 EN 55024:2010/A1:2015&EN55035:2017 IEC 61000-4-2Edition 2.0 2008-12 IEC 61000-4-3Edition 3.2 2010-04 IEC 61000-4-4Edition 3.0 2012-04 IEC 61000-4-5Edition 3.0 2014-05 IEC 61000-4-6Edition 4.0 2013-10 IEC 61000-4-8Edition 2.0 2009-09 IEC 61000-4-11Edition2.0 2004-03
FCC	47 CFR FCC Rules and regulations part 15 subpart B,IECS-003 Issue 6,Class B
BSMI	CNS13438, CNS14336-1
CCC	GB17625.1-2012; GB4943.1-2011; GB/T9254-2008
RCM	Safety of Information Technology Equipment
EAC	Safety of Information Technology Equipment
UKCA	Safety of Information Technology Equipment

3.0 Electrical

The Following electrical requirements must be met over the environmental ranges as defined in **Section 7**。

3.1 AC Input

Table 1 lists AC input voltage and frequency requirements for continuous operation. The power supply shall be capable of supplying full-rated output power over two input voltage ranges rated 90~264 VAC RMS nominal. The correct input range for use in a given environment may be either switch-selectable or auto-ranging. The power supply shall automatically recover from AC power loss。

Table 1. AC Input Line Requirements

Rating Power	Range	Minimum	Nominal	Maximum	Units
1000W	Input Voltage	90	100~240	264	Vac
	Input Current	-	13-6.5	-	A
1100W	Input Voltage	90	100~240	264	Vac
	Input Current	-	14-6.5	-	A
1300W	Input Voltage	180	200-240	264	Vac
	Input Current	-	7.7	-	A
	Input Frequency	47	50-60	63	Hz

Note ; 1300W is only used in the 180V~264V voltage input range, and the full range condition is de-rate to the maximum output power of 1100W.

3.1.1 Input Over Current Protection

The power supply is required to incorporate primary fusing for input over current protection to prevent damage to the power supply and meet product safety.

3.1.2 Range Switching

Not Applicable, Must have active PFC design and support universal voltage range input

3.1.3 Wave Forms

Harmonic Content shall meet EN61000-3-2 Class D.

3.1.4 Inrush Current

25A maximum at 115Vac, 50A maximum at 230Vac, 25°Celsius, and in AC phase 90°,Cold Start Condition.

Note: The inrush current shall be limited to a level below the surge rating of the Power cord, AC on/off switch, bridge rectifier, fuse and EMI filter components.

Note: The inrush current shall be limited to a level below the surge rating of The Power cord, AC on/off switch, bridge rectifier, fuse and EMI filter components.
No hazards shall occur or components damage.
The design of the fuse must withstand 100,000 Pulses and follow the Test plan provided by CM.

3.1.5 Active Power Factor Correction

The power supply must maintain a true power factor, Must meet the following conditions and requirements at Normal input Range.

Table 2: Power Factor Correction Requirement

Rated of Load	20% ~ 50%	>50%
115V	≧ 0.95	≧ 0.99
230V	≧ 0.90	≧ 0.95

3.1.6 AC Input Brown IN/OUT

The following conditions must be met under the rated input frequency and any load conditions and meet the requirements of **6V/1min** input voltage regulation.

Table 3. AC Brown IN / OUT Requirements

For Full Range

Behavior	Minimum	Normal	Maximum	Units
Brown IN	75	82.5	90	Vac
Brown OUT	60	67.5	75	Vac

For 230V Only

Behavior	Minimum	Normal	Maximum	Units
Brown IN	160	170	180	Vac
Brown OUT	140	150	160	Vac

Note : 1. Load conditions of 10%~50% of the rated maximum output power must meet the above requirements.

3.1.7 AC Line Transient Requirement

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 sag and surge conditions.

For testing interval definition, please follow the test plan requirements to implement

Table 4: AC Line Sag Transient Performance

Duration	Sag	Operating AC Voltage	Line Frequency	Load	Performance Criteria
Continuous	10%	115/230VAC	50/60 Hz	100%	No loss of function or performance
16mS	95%	115/230VAC	50/60 HZ	**1000W at 75% Load / 1100W at 70% Load / 1300W at 60% Load**	No loss of function or performance
>1 AC cycle	> 30%	115/230VAC	50/60 Hz	100%	Loss of function Acceptable, Self- recoverable

Table 5: AC Line Surge Transient Performance

Duration	Surge	Operating AC Voltage	Line Frequency	Load	Performance Criteria
Continuous	10%	115/230VAC	50/60 Hz	100%	No loss of function or performance
0 - 1 AC cycle	30%	115/230VAC	50/60 Hz	100%	

3.1.8 AC Line Cycle Dropout

- An AC line dropout is defined to be when the AC input drops to 0VAC at any phase (eg. 0、45、90、135 degree) of the AC line for any length of time.
- During an AC dropout the power supply must meet dynamic voltage regulation requirements. An AC line dropout of any duration shall not cause tripping of control signals or protection circuits.
- If the AC dropout lasts longer than the hold up time the power supply should recover and meet all turn on requirements.
- The power supply shall meet the AC dropout requirement over rated AC voltages and frequencies.
- A dropout of the AC line for any duration shall not cause damage to the power supply.

3.2 DC Output

3.2.1 DC Voltage Regulation

Output	DC load regulation	Minimum	Nominal	Maximum	Unit
+12VDC	± 5%	+11.40	+12.00	+12.60	Volts
+5VDC	± 5%	+4.75	+5.00	+5.25	Volts
+3.3VDC	± 5%	+3.13	+3.30	+3.46	Volts
-12VDC	± 10%	-12.60	-12.00	-11.40	Volts
+5Vsb	± 5%	+4.75	+5.00	+5.25	Volts

NOTE:

1. The regulation range for Timing Applications is +/-5% of Nominal Voltage at +12V、+5V、+3.3V、+5VSB Rail and -12VDC is +/-10%.
2. For +12V Output rail Peak Power regulation rate as defined in Section 3.2.8 +12V Rail Peak Power Requirement.
3. Set point condition is set at 50% load，For mass production output voltage consistency requirements.
4. The criterion of DC load regulation is = (Vmax-Vmin) / Vnominal.
   Measured Vmax and Vmin voltage of 10%,20%...100% load. (per 10% Load)

3.2.2 DC Output Load Current Ranges

Combined Line and Cross-Load Regulations Over any combination of line voltage specified in Section 3.1 and the cross-load condition shown Table below. The output

voltage must be as shown in the following

Table 7. DC Output Load / Current Ranges & Cross Load Defined

1000W DC Output Load /Current Ranges

Output#	Output	I min	I max.	I peak
1	+12 V	1A	83.3A	
2	+5 V	0A	20A	
3	+3.3 V	0A	20A	
4	-12 V	0A	0.3A	
5	+5 VSB	0A	3A	3.5A
+5V & +3.3V Max. combined load			120W	
Total power rating			1000W	

1100W DC Output Load /Current Ranges

Output#	Output	I min	I max.	I peak
1	+12 V	1A	91.6A	
2	+5 V	0A	20A	
3	+3.3 V	0A	20A	
4	-12 V	0A	0.3A	
5	+5 VSB	0A	3A	3.5A
+5V & +3.3V Max. combined load			120W	
Total power rating			1100W	

1300W DC Output Load /Current Ranges (For 230Vac Only)

Output	Output	I min	I max.	I peak
1	+12 V	1A	108.3A	
2	+5 V	0A	20A	
3	+3.3 V	0A	20A	
4	-12 V	0A	0.3A	
5	+5 VSB	0A	3A	3.5A
+5V & +3.3V Max. combined load			120W	
Total power rating			1300W	

1000W CROSS LOAD REGULATION CHARACTERISTICS

NO	LOAD	+3.3V	+5V	+12V	-12V	+5Vsb	NOTE
1	COND.1	-	-	-	-	0A	5Vsb remote off
2	COND.2	-	-	-	-	3A	5Vsb MAX remote off
3	COND.3	-	-	-	-	3.5A	5Vsb Peak remote off
4	COND.4	0A	0A	1.0A	0A	0A	NO LOAD
5	COND.5	0A	0A	1.0A	0A	3A	5Vsb max
6	COND.6	6.1A	20.0A	1.0A	0A	0A	5V&3.3V Combined only (5V)
7	COND.7	20.0A	10.8A	1.0A	0A	0A	5V&3.3V Combined only (3.3V)
8	COND.8	6.1A	20.0A	73.0A	0.3A	0.1A	5V&3.3V Comb. Max Power(5V)
9	COND.9	20.0A	10.8A	73.0A	0.3A	0.1A	5V&3.3V Comb. Max Power(3.3V)
10	COND.10	20.0A	0.0A	1.0A	0A	0A	3.3V Max. Load
11	COND.11	0.0A	20.0A	1.0A	0A	0A	5V Max. Load
12	COND.12	0.0A	0.0A	1.0A	0.3A	0A	-12V Max. Load
13	COND.13	0.0A	0.0A	83.3A	0A	0A	12V Max. Load
14	COND.14	0.254A	0.254A	1.464A	0.005A	0.053A	2% Load (for reference)
15	COND.15	2.54A	2.54A	14.64A	0.05A	0.53A	20% load for 80Plus
16	COND.16	6.35A	6.35A	36.59A	0.13A	1.32A	50% load for 80Plus
17	COND.17	12.70A	12.70A	73.19A	0.26A	2.64A	100% load for 80Plus

1100W CROSS LOAD REGULATION CHARACTERISTICS

NO	LOAD	+3.3V	+5V	+12V	-12V	+5Vsb	NOTE
1	COND.1	-	-	-	-	0A	5Vsb remote off
2	COND.2	-	-	-	-	3A	5Vsb MAX remote off
3	COND.3	-	-	-	-	3.5A	5Vsb Peak remote off
4	COND.4	0A	0A	1A	0A	0A	NO LOAD
5	COND.5	0A	0A	1A	0A	3A	5Vsb max
6	COND.6	20A	10.8A	1A	0A	0A	5V&3.3V Combined only (5V)
7	COND.7	6.1A	20A	1A	0A	0A	5V&3.3V Combined only (3.3V)
8	COND.8	20A	10.8A	77.2A	0.3A	0.1A	5V&3.3V Comb. Max Power(5V)
9	COND.9	6.1A	20A	77.2A	0.3A	0.1A	5V&3.3V Comb. Max Power(3.3V)
10	COND.10	20A	0A	1A	0A	0A	3.3V Max. Load
11	COND.11	0A	20A	1A	0A	0A	5V Max. Load
12	COND.12	0A	0A	1A	0.3A	0A	-12V Max. Load
13	COND.13	0A	0A	91.7A	0A	0A	12V Max. Load

14	COND.14	0.257A	0.257A	1.628A	0.005A	0.053A	2% Load (for reference)
15	COND.15	2.57A	2.57A	16.28A	0.05A	0.53A	20% load for 80Plus
16	COND.16	6.42A	6.42A	40.71A	0.13A	1.33A	50% load for 80Plus
17	COND.17	12.84A	12.84A	81.41A	0.27A	2.66A	100% load for 80Plus

1300W CROSS LOAD REGULATION CHARACTERISTICS (For 230Vac Only)

NO	LOAD	+3.3V	+5V	+12V	-12V	+5Vsb	NOTE
1	COND.1	-	-	-	-	0A	5Vsb remote off
2	COND.2	-	-	-	-	3A	5Vsb MAX remote off
3	COND.3	-	-	-	-	3.5A	5Vsb Peak remote off
4	COND.4	0A	0A	1A	0A	0A	NO LOAD
5	COND.5	0A	0A	1A	0A	3A	5Vsb max
6	COND.6	20A	10.8A	1A	0A	0A	5V&3.3V Combined only (5V)
7	COND.7	6.1A	20A	1A	0A	0A	5V&3.3V Combined only (3.3V)
8	COND.8	20A	10.8A	93.9A	0.3A	0.1A	5V&3.3V Comb. Max Power(5V)
9	COND.9	6.1A	20A	93.9A	0.3A	0.1A	5V&3.3V Comb. Max Power(3.3V)
10	COND.10	20A	0A	1A	0A	0A	3.3V Max. Load
11	COND.11	0A	20A	1A	0A	0A	5V Max. Load
12	COND.12	0A	0A	1A	0.3A	0A	-12V Max. Load
13	COND.13	0A	0A	108.3A	0A	0A	12V Max. Load
14	COND.14	0.261A	0.261A	1.958A	0.005A	0.054A	2% Load (for reference)
15	COND.15	2.61A	2.61A	19.58A	0.05A	0.54A	20% load for 80Plus
16	COND.16	6.53A	6.53A	48.95A	0.14A	1.36A	50% load for 80Plus
17	COND.17	13.07A	13.07A	97.89A	0.27A	2.71A	100% load for 80Plus

NOTE:

1. +5V & +3.3V Max combined load must follow the definition of each rated output power.
2. 5VSB is a SELV standby voltage that is always present when AC mains voltage is present.
3. No Load condition, the output must be maintained and there can be no damage or abnormality.

3.2.3 Output Ripple & Noise Requirement

Ripple and noise are defined as periodic or random signals over a frequency band of 10 Hz to 20 MHz. Measurements shall be made with an oscilloscope with 20 MHz bandwidth. Outputs should be bypassed at the connector with a 0.1uF ceramic disk capacitor and a 10uF electrolytic capacitor to simulate system loading.

Table 8. DC Output Ripple & Noise Requirements

Output	Maximum Ripple & Noise	UNIT
+12VDC	120mV	mV p-p
+5VDC	50mV	mV p-p
+3.3VDC	50mV	mV p-p
-12VDC	120mV	mV p-p
+5Vsb	50mV	mV p-p
PWR_OK	400	mV p-p
PSON#	400	mV p-p

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) Measurements measured at locations where remote sense wires are connected.

e) Regulation tolerance shall include temperature change, warm up drift and dynamic load

f) The measurement must be at an ambient temperature of **35 Deg.C**

g) Filter capacitor does not contain Power good & PSON# signal.

h) When performing this test, the probe clips and capacitors should be located close to the load

The test set-up shall be as shown below.

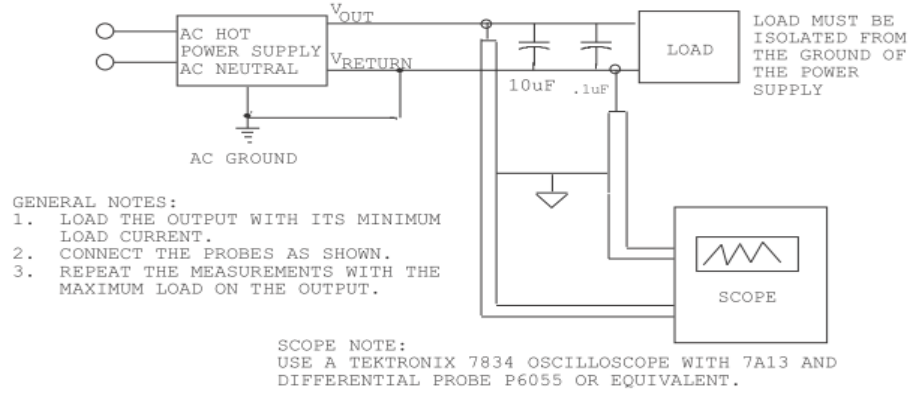


Figure 1. Measurement Model

3.2.4 ERP Requirement

5VSB efficiency should meet EUP(2013)、ErP Lot 3 2014、ALPM as below:.

Table 9. ERP Requirement

5VSB Load Target	5VSB Actual Load	Efficiency Target (Both 115V and 230V Input)	Remark
Max / Label	3.0A / Label	≧75%	
1.5A		≧75%	ALPM and ErP Lot 3 2014
1.00A		≧75%	
0.55A		≧75%	ALPM and ErP* Lot 3 2014
90mA		≧45%	ErP* Lot 6 2010
45mA		≧45%	ErP* Lot 6 2013

3.2.5 Efficiency Requirement

The power efficiency shall meet 80PLUS Platinum Standard (115V Internal & 230V EU Internal) specified in **Table 10**.specified in below table .

The efficiency should be measured at 115VAC/60Hz (For 1000W & 1100W) and 230VAC/50HZ (For 1300W) Input , 25℃ Ambient Condition.

Table 10. Efficiency Requirement

1000W (80Plus Internal standard)

Loading	+3.3V	+5V	+12V	-12V	+5Vsb	Required minimum Efficiency & Power Factor	
20%	2.54A	2.54A	14.64A	0.05A	0.53A	≧90%	-
50%	6.35A	6.35A	36.59A	0.13A	1.32A	≧92%	≧0.95
100%	12.70A	12.70A	73.19A	0.26A	2.64A`	≧89%	≧0.95

1100W (80Plus 115V Internal standard)

Loading	+3.3V	+5V	+12V	-12V	+5Vsb	Required minimum Efficiency & Power Factor	
20%	2.57A	2.57A	16.28A	0.05A	0.53A	≧90%	-
50%	6.42A	6.42A	40.71A	0.13A	1.33A	≧92%	≧0.95
100%	12.84A	12.84A	81.41A	0.27A	2.66A`	≧89%	≧0.95

1300W (230V EU Internal standard)

Loading	+3.3V	+5V	+12V	-12V	+5Vsb	Required minimum Efficiency & Power Factor	
20%	2.61A	2.61A	19.58A	0.05A	0.54A	≧92%	-
50%	6.53A	6.53A	48.95A	0.14A	1.36A	≧94%	≧0.95
100%	13.07A	13.07A	97.89A	0.27A	2.71A	≧90%	≧0.95

Note:

1. For 1000W,1100W and 1300W Meet 80Plus Requirement **(guarantee MP spec)** is required at 20%, 50% and 100% loads.
2. For 80plus efficiency test, the power factor must meet the requirements, and the power factor design requirements are based on 3.1.5
3. Efficiency measurement and setting conditions must be implemented with reference to the test protocol officially announced by 80Plus

3.2.6 TRANSIENT RESPONSE (STEP LOAD)

The power supply shall be stable and output voltage over/ undershoot shall be within the regulation band specified in **Table 11** under Load transient conditions as:

- +5V or +3.3V transients to 40% rated o/p current.
- +12V transients to 60% rated o/p current.
- 5VSB transients to 0.5A rated o/p current.
- -12V transients to 0.1A rated o/p current.
- The transients slew rate shall not be greater than 1.0A/μS.
- Transients frequency: 50Hz to 10KHz, 50% duty cycle.
- Capacitive loading per Paragraph **3.2.7**
- **For 1000 & 1100W the +12V Rail Minimum Load = 3A during dynamic testing and +5V & +3.3V Minimum Load =1A.**
- **For 1300W the +12V Rail Minimum Load = 5A during dynamic testing and +5V & +3.3V Minimum Load =1A.**

Table 11. DC Dynamic Regulation

Output	Range
+12V	±5%
+5V	±5%
+3.3V	±5%
-12V	±5%
`+5Vsb	±5%

3.2.7 Capacitive Load

The power supply should be able to power up and operate with the regulation limits defined in **Table 12** with the following capacitances simultaneously present on the DC outputs.

Table 12. Output Capacitive Load

Output	Capacitive load (uF)
+12V	6,600
+5V	3,300
+3.3V	3,300
-12V	330
+5Vsb	330

3.2.8 +12V Rail Peak Power Requirement

In ATX V3.0, the +12V Rail must meet the following Peak power requirements, including Duty cycle 5%, 8%, 12.5%, 25% in **+12V Rail** rated maximum output 120%，160%，180%，200% Load condition requirements.

These test conditions must use and the output voltage must be within **Table 13** regulation rate of +12V Output.

Test Condition:

- Input Voltage : 90VAC / 264VAC
- Capacitive Load : +12V rail 6,600uF
- Slow rate: **5A/us**
- Each test time must be at the maximum operating ambient temperature of the product and exceed 40 minutes. Continue until thermal equilibration, during which Components must not exceed Thermal stress specifications.

Table 13. + 12V Peak Power Regulation Requirement

Output	Peak Power Voltage Regulation	Minimum	Nominal	Maximum	Unit
+12VDC	+5% ~ -7%	+11.2	+12.00	+12.6	Volts

Table 14. + 12V Rail Peak Power Setting Requirement

Power Excursion % of PSU Rated Size PSU > 450 Watts & 12VHPWR Connector present	Time for Power Excursion (T_E)	Testing Duty Cycle
200%	100 µs	5%
180%	1 ms	8%
160%	10 ms	12.5%
120%	100 ms	25%
100%	Infinite	--

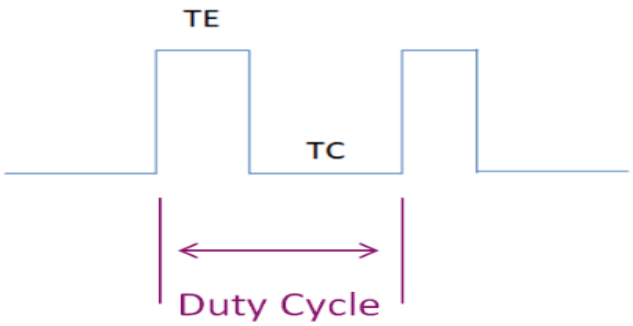


Figure 2. Peak power duty cycle definition

For 1000W Rating Peak power Test Conditions Requirements

Max output power==>				1000	Power Excursion	Avg. power (W)	Slow rate
Duty Cycle	TE(ms)	TC(ms)	TE (Power)	TC (Power)			
5%	0.1	1.9	2,000	918	200%	972	5A/us
8%	1	11.5	1,800	897	180%	970	5A/us
12.5%	10	70	1,600	882	160%	971	5A/us
25%	100	300	1,200	924	120%	993	5A/us

	0.1ms Peak Test		1ms Peak Test		10ms Peak Test		100ms Peak Test	
PSU Output Rails	Te (A)	Tc (A)	Te (A)	Tc (A)	Te (A)	Tc (A)	Te (A)	Tc (A)
5 V	10.16	10.16	10.16	10.16	10.16	10.16	10.16	10.16
3.3 V	10.16	10.16	10.16	10.16	10.16	10.16	10.16	10.16
-12V	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5 VSB	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53
12V	159.42	69.23	142.75	67.53	126.09	66.22	92.75	69.73
PSU Power	2000.0	917.7	1800.0	897.3	1600.0	881.6	1200.0	923.8

For 1100W Rating Peak power Test Conditions Requirements

Max output power==>				1100	Power Excursion	Avg. power (W)	Slow rate
Duty Cycle	TE(ms)	TC(ms)	TE (Power)	TC (Power)			
5%	0.1	1.9	2,200	1,009	200%	1,069	5A/us
8%	1	11.5	1,980	987	180%	1,067	5A/us
12.5%	10	70	1,760	970	160%	1,068	5A/us
25%	100	300	1,320	1,016	120%	1,092	5A/us

	0.1ms Peak Test		1ms Peak Test		10ms Peak Test		100ms Peak Test	
PSU Output Rails	Te (A)	Tc (A)	Te (A)	Tc (A)	Te (A)	Tc (A)	Te (A)	Tc (A)
5 V	10.27	10.27	10.27	10.27	10.27	10.27	10.27	10.27
3.3 V	10.27	10.27	10.27	10.27	10.27	10.27	10.27	10.27
-12V	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5 VSB	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53
12V	176.01	76.79	157.67	74.93	139.34	73.48	102.67	77.35
PSU Power	2200.0	1009.4	1980.0	987.1	1760.0	969.7	1320.0	1016.1

For 1300W Rating Peak power Test Conditions Requirements

Max output power==>				1300	Power Excursion	Avg. power (W)	Slow rate
Duty Cycle	TE(ms)	TC(ms)	TE (Power)	TC (Power)			
5%	0.1	1.9	2,600	1,193	200%	1,263	5A/us
8%	1	11.5	2,340	1,167	180%	1,260	5A/us
12.5%	10	70	2,080	1,146	160%	1,263	5A/us
25%	100	300	1,560	1,201	120%	1,291	5A/us

	0.1ms Peak Test		1ms Peak Test		10ms Peak Test		100ms Peak Test	
PSU Output Rails	Te (A)	Tc (A)	Te (A)	Tc (A)	Te (A)	Tc (A)	Te (A)	Tc (A)
5 V	10.45	10.45	10.45	10.45	10.45	10.45	10.45	10.45
3.3 V	10.45	10.45	10.45	10.45	10.45	10.45	10.45	10.45
-12V	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5 VSB	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54
12V	209.21	91.96	187.54	89.76	165.88	88.05	122.54	92.62
PSU Power	2600.0	1193.0	2340.0	1166.5	2080.0	1146.0	1560.0	1200.9

3.2.9 Closed-loop Stability

The power supply shall be unconditionally stable under all line/load/transient load conditions including capacitive loads specified in **Section 3.2.7.** A minimum of 45 degrees phase margin and 10 dB gain margin is recommended at both the maximum and minimum loads.

3.2.10 +5VDC / +3.3VDC Power / Sequencing

The +5VDC output level is equal to or greater than the +3.3VDC output at all times during power-up and normal operation. The time between the +5VDC output reaching its minimum in-regulation level and 3.3VDC reaching its minimum in-regulation level shall be less than or equal to 20mS.

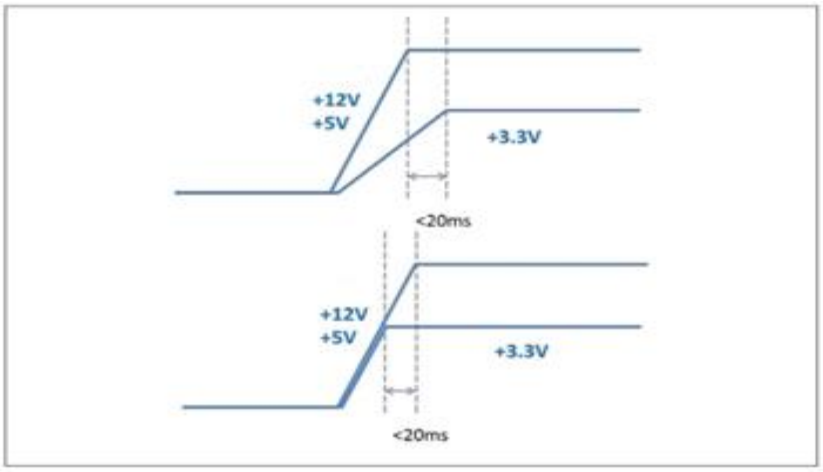


Figure 3. Power Supply Timing

4.0 Timing / Housekeeping / Control

Table 15. Timing Requirement

Timing	Required	Remark
AC Power on Time	< 2s	
Power-on Time	< 150ms	
Rise Time	0.1ms ~ 20ms	
PWR_OK delay	100ms ~ 150ms	
PWR_OK rise time	≤ 10ms	
AC loss to PWR_OK hold-up time	≥ 16ms	1000W at 75% Load 1100W at 70% Load 1300W at 60% Load
Power-down warning	≥ 1ms	100% Load

Note: Value in the recommended column for “Recommend for Non-Alternative Sleep Mode” to be required in the year 2020.

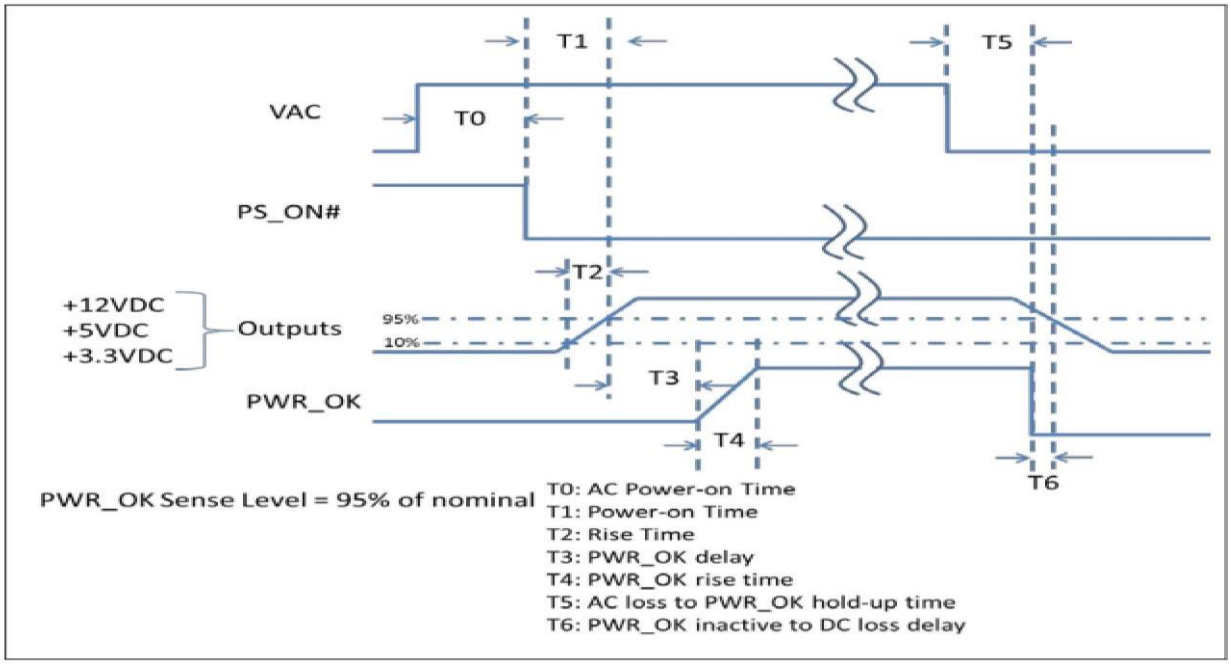


Figure 4. Power Supply Timing

4.1 Power Good signal (PWR-OK)

The power good signal (TTL compatible) shall be provided to indicate normal operating conditions of the power supply. The power good signal will be asserted (low state) during power up until the +5VDC outputs are within the regulation range defined in Section 3.2.1 The electrical and timing characteristics of the power good signal, are shown in **Table 16 and Figure4: Power Supply Timing.**

Table 16. PWR_OK Signal Characteristics

Signal Type	+5 V TTL compatible
Logic level low	< 0.4 V while sinking 4 mA
Logic level high	Between 2.4 V and 5 V output while sourcing 200 µA
High-state output impedance	1 kΩ from output to common
PWR_OK delay	100 ms < T3 < 150 ms
PWR_OK rise time	T4 ≦ 10 ms
AC loss to PWR_OK hold-up time	T5 ≧ 16 ms 1000W/75% ; 1100W/70% ; 1300W/60% Load
Power-down warning	T6＞1 ms at Full load

4.2 PS_ON#

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 should turn on the five main DC output rails: +12VDC, +5VDC, +3.3VDC, and -12VDC. When PS_ON# is pulled to TTL high or open-circuited, the DC output rails should not deliver current and should be held at zero potential with respect to ground. PS_ON# has no effect on the +5VSB output, which is always enabled whenever the AC power is present.

Table 17. PS_ON# Signal Characteristics

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

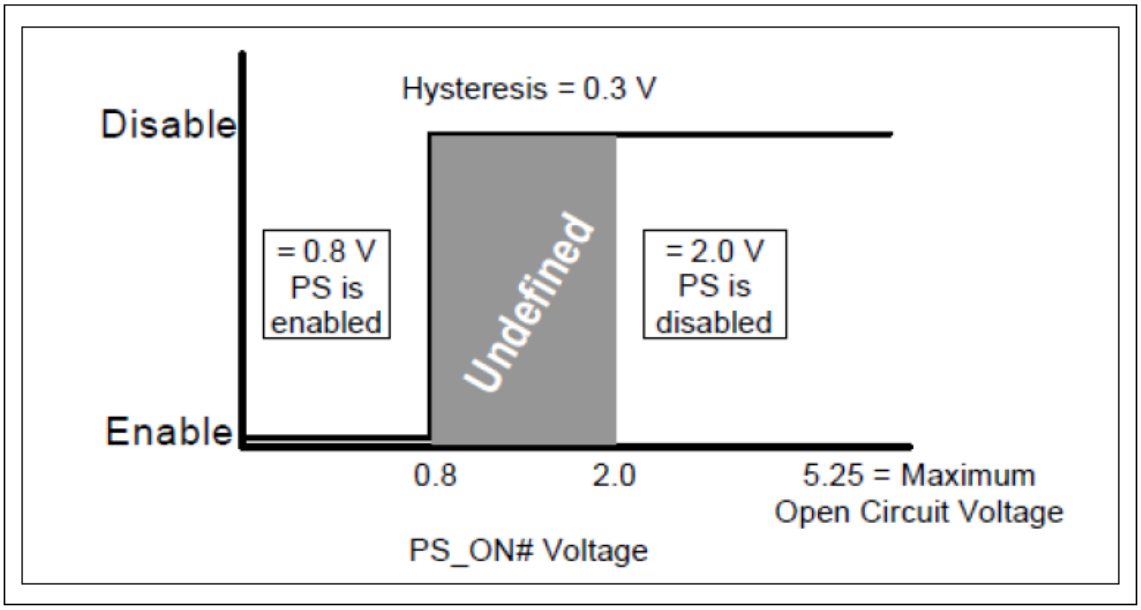


Figure 5. PS_ON# Signal Voltage level

4.3 +5VSB

+5VSB is a standby supply output that is active whenever the AC power is present. This output provides a power source for circuits that must remain operational when the five main DC output rails are in a disabled state. Example uses include soft power control, Wake on LAN, wake-on-modem, intrusion detection, Alternative Low Power Modes (ALPM) or suspend state activities.

The power supply must be able to provide the required power during a “wake up” event. If an external USB device generates the event, there may be peak currents as high as **3.5 A**., lasting no more than **500ms.**

Over current protection is required on the +5VSB output regardless of the output current rating. This ensures the power supply will not be damaged if external circuits draw more current than the supply can provide.

4.4 Power-on Time

The power-on time is defined as the time from when PS_ON# is pulled low to when the +12 VDC, +5 VDC, and +3.3 VDC outputs are within the regulation ranges specified in Section 3.2.1. The power-on time shall be less than 150 mS (T1 < 150 ms).+5 VSB shall have a power-on time of two seconds maximum after application of valid AC voltages.

4.5 Rise Time

The output voltages shall rise from 10% of nominal to within the regulation ranges specified in **Section 3.2.1** within 0.1 mS to 20 mS (0.1 mS ≦ T2 ≦ 20 mS).

4.6 HOLD-UP TIME

Upon the loss of AC input power, the output shall remain within regulation under maximum **1000W / 75% ;1100W / 70% ; 1300W / 60%** load as specified in paragraph 3.2.2 and at nominal input voltage for minimum of **16 mS** after the last current pulse drawn from the line. When AC input is lost, it must be cut off at AC Sine-wave of Phase **0 or 45** degrees.

4.7 Overshoot at Turn-on / Turn-off

Any output overshoot at turn on shall be less than **110%** of the nominal output voltage.
The output voltage overshoot upon the application or removal of the input voltage, or the assertion/de-assertion of PS_ON#, No voltage of opposite polarity shall be present on any output during turn-on or turn-off.

4.8 +5 VSB at AC Power-down

After AC power is removed, the +5 VSB standby voltage output should remain at its steady state value for the minimum hold-up time specified in Section 4.6 until the output begins to decrease in voltage. The decrease shall be monotonic in nature, dropping to 0.0 V. There shall be no other perturbations of this voltage at or following removal of AC power.

4.9 +5VSB Fall Time - Recommendation

Power supply 5VSB is recommended to go down to low level within **3** seconds under any load condition after AC power is removed as shown in **Figure 6**. Intel test plan will test at Light 20% Load. If system requires specific +5VSB fall time, the PSU design is recommended to support it.

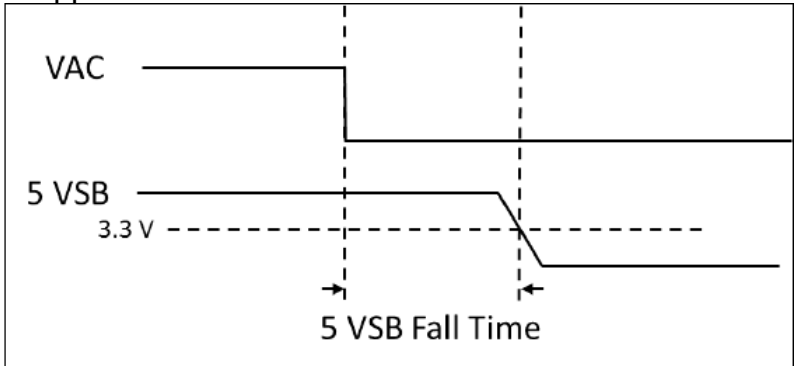


Figure 6: 5VSB Fall Time

5.0 Output Protection

5.1 Short-circuit Protection

A short circuit placed between DC return and Cross output (Impedance less than 0.1 ohm) For each output to ground), shall Cause no damage and the main output shall shutdown and latch off, but only the +5VSB shall recover automatically.

5.2 Over Voltage Protection

When the DC output (+5V,+12V,+3.3V & +5Vsb) have over voltage condition , the power supply shall provide latch mode over voltage protection.

Table 18. Over Voltage Protection

Output	Minimum	Nominal	Maximum	Unit
+12V	13.4	15.0	15.6	Vdc
+5V	5.74	6.3	7.0	Vdc
+3.3V	3.76	4.2	4.3	Vdc
+5Vsb	5.74	6.3	7.0	Vdc

5.3 Under Voltage Protection

Table 19. Under Voltage Protection

Output	Min.	Typ.	Max.	Unit
+3.3V For P.G	2.55	2.69	2.83	Vdc
+5V For P.G	4.1	4.3	4.47	Vdc
+12V For P.G	8.0	9.5	10.5	Vdc

Note: Under Voltage protection trigger condition is based on PWR_OK signal.

5.4 Over Current Protection

Overload current applied to each tested output rail will cause the output to trip between **110% ~ 150%** of max current for all +12V、+5V and +3.3V rails.

Must meet ATX V3.0 specification Peak power **Option #1** condition for +12V rail.

For testing purpose, the over-current should be step at a minimum rate of **0.1A/100mS** starting from Max current to PSU Latch off.

After the over-current condition is removed, the PSU must be started normally again through Remote ON/OFF, and there must be no damage.

5.5 Over Power Protection

The power supply shall be shut down and latch off, if the wattage of the power supply is between **110% ~ 150%** of maximum load at 100Vac condition.

Must meet ATX V3.0 specification Peak power **Option #1** condition for +12V Rail

For testing purpose, the over-power should be step at a minimum rate of **0.1A/100mS** starting from Max power or Maximum combined power to PSU Latch off. the cut-off current shall not exceed the lower limit of each Output Rail OCP protection.

After the over-power condition is removed, the PSU must be started normally again through Remote ON/OFF, and there must be no damage.

5.6 Over Temperature Protection

The power supply will be protected against over temperature conditions caused by loss of fan cooling or excessive ambient temperature. In an OTP condition, the PSU will shut down.

(Allow Latch-off or soft-recovery). When the power supply temperature drops to within specified limits, the power supply Remote on / off **(or AC ON/OFF)** shall restore power. OTP circuit must have built in hysteresis such that the power supply will not oscillate on and off due to temperature recovering condition.

5.7 Reset after Shutdown

If the power supply latches into a shutdown state because of a fault condition on its outputs, the power supply shall return to normal operation only after the fault has been removed and the PS_ON# has been cycled OFF/ON with a minimum OFF time of 0.5 second.

5.8 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.

When the power supply is in the PSON# signal = Low state, the power supply must maintain normal operation without any trigger protection or shutdown behavior.

5.9 Output Bypass

The output return shall be connected to the chassis.

5.10 Catastrophic Failure Protection

The primary circuit design and the components specified in the same shall be such that should a component failure occur, the power supply does not exhibit any of the following:

- Startling noise
- Flame
- Excessive smoke
- Charred PCB
- Fused PCB conductor

6.0 Mechanical Specifications

6.1 Mechanical Housing

6.1.1 Housing Size

Dimension	Maximum Dimension
Length	100mm
Width	125mm
Height	63.5mm

6.1.2 Housing Finish

Black powder coat, textured finish

6.1.3 Housing Material

Sheet metal for top and bottom case housing

6.1.4 Weight

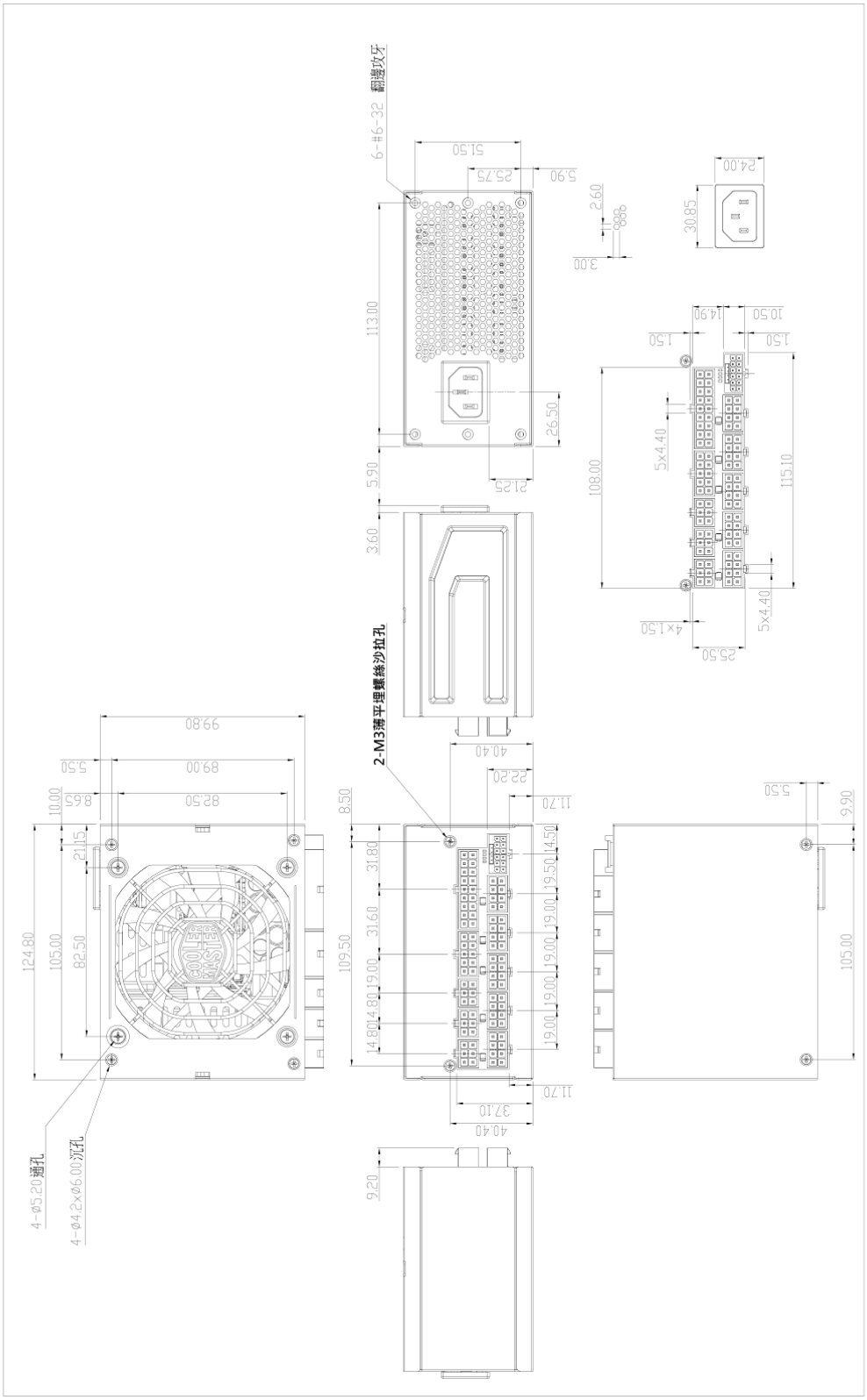
<3.0 Kg

6.1.5 Housing ID

(Images are for reference only)

6.1.6 Mechanical outline

The following outline is for reference only, Detail outline specified in Outline drawing might be changed, Detailed drawing Please refer to the official 2D drawing.



6.2 Connectors and Cables

(Flat Cable & all connector material must be UL94V-0 rated)

6.2.1 DC Power Connectors and DC Cable Harness

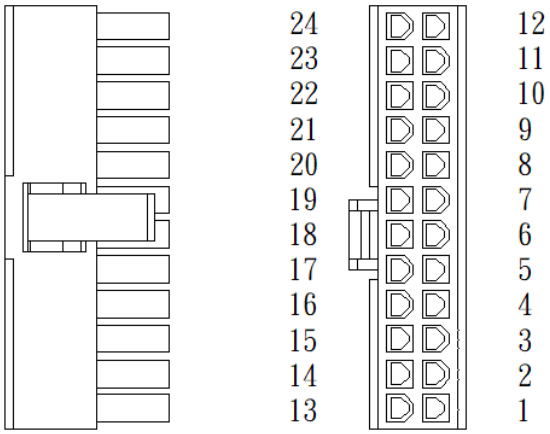
Please refer the attached file for all models

							
	ATX24 Pin	**CPU 4+4 Pin**	**CPU 8 Pin**	**PCI-e 6+2 Pin**	**SATA**	**Peripheral**	**12VHPWR**
Gauge	18 AWG	16 AWG	16AWG	16AWG /18AWG	18 AWG	18 AWG	16AWG/28AWG
Wire Color	Black						
Connector Color	Black						
Cable Type	**Flat cable**	**Flat cable**	**Flat cable**	**Flat cable**	**Flat cable**	**Flat cable**	**Sleeve Cable (use 3 Weave)**
1000W / 1100W / 1300W	1 × 300mm	1 × 450mm	1× 450mm	3× 400mm	2 × 100(s)+ 150(s)+ 150(s)+ 150(s) mm	1 × 100(p)+ 120(p)+ 120(p)+ 120(p)mm	1x 400mm

Note :

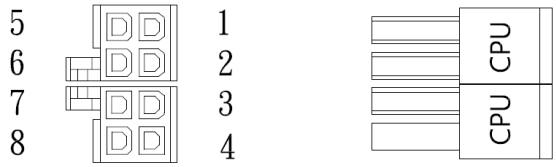
1. **PCI-e 6+2P terminal pin contact material: Copper Alloy.**
2. **12VHPWR 12+4P Among them, Pin1~Pin12 terminal pin contact material: Copper Alloy.**
3. **Unspecified terminal material is phosphor bronze.**

6.2.2 ATX Main Mother Board Power Connector 24 pin(Flat Cable)



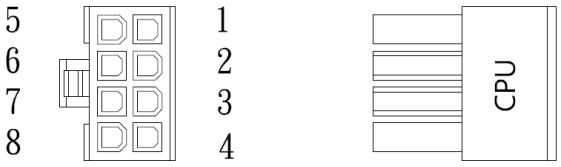
PIN	1	2	3	4	5	6	7	8	9	10	11	12
Description	+3.3V	+3.3V	GND	+5V/ +5Vs	GND/ GNDs	+5V	GND	PW-OK	+5Vsb	+12V/ +12Vs	+12V	+3.3V
PIN	13	14	15	16	17	18	19	20	21	22	23	24
Description	+3.3V/ +3.3Vs	-12V	GND	PS-ON	GND	GND	GND	NC	+5V	+5V	+5V	GND

6.2.3 EPS/ATX 12V Power Processor Connector 8 Pin (4+4 Split)



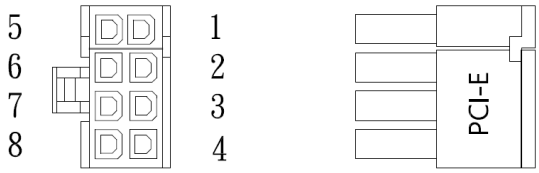
PIN	1	2	3	4
Description	GND	GND	GND	GND
PIN	5	6	7	8
Description	+12V	+12V	+12V	+12V

6.2.4 EPS/ATX 12V Power Processor Connector 8 Pin



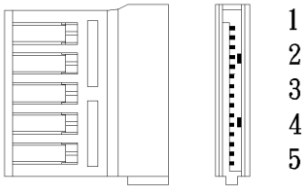
PIN	1	2	3	4
Description	GND	GND	GND	GND
PIN	5	6	7	8
Description	+12V	+12V	+12V	+12V

6.2.5 PCI-Express Connector 8 pin(6+2 split)



PIN	1	2	3	4
Description	GND	+12V	+12V	+12V
PIN	5	6	7	8
Description	GND	GND	GND	GND

6.2.6 Serial ATA,SATA ,Power Connector

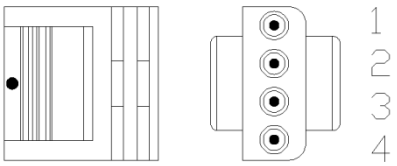


PIN	1	2	3	4	5
Description	+3.3V	GND	+5V	GND	+12V

s1、SATA TYPE

s2 SATA TYPE

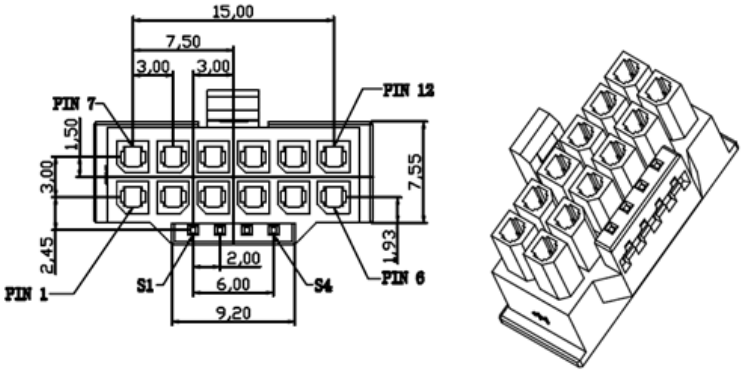
6.2.7 Peripheral Flat Power Connectors (4 pin)



PIN	1	2	3	4
Description	+12V	GND	GND	+5V

6.2.8 12VHPWR Connector (12pin+4pin) For PCIe Gen 5.0

(Cable housing & terminal reference brand: Astron / LST / HYM / DST / WST)



Pin	Signal	Pin	Signal
1	+12V	7	GND
2	+12V	8	GND
3	+12V	9	GND
4	+12V	10	GND
5	+12V	11	GND
6	+12V	12	GND
S1	CARD_PWR_STABLE	S3	SENSE 0
S2	CARD_CBL_PRES#	S4	SENSE 1

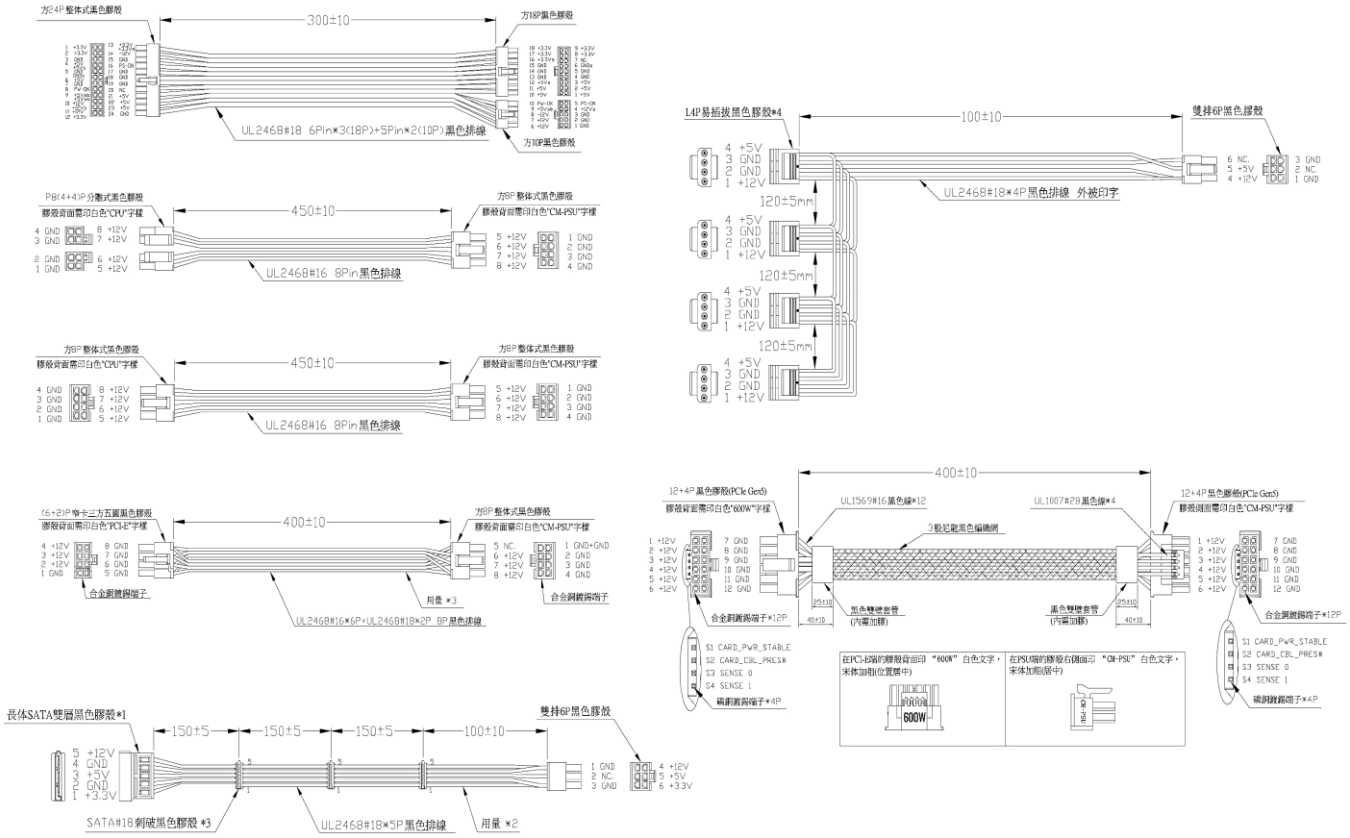
12VHPWR Connector Labeling Example

Sense 0 / Sense 1 Power Limit Setting Requirements

Sense0	Sense1	Initial Permitted Power at System Power Up	Maximum Sustain Power after Software Configuration
Gnd	Gnd	375 W	600 W
Open	Gnd	225 W	450 W
Gnd	Open	150 W	300 W
Open	Open	100 W	150 W

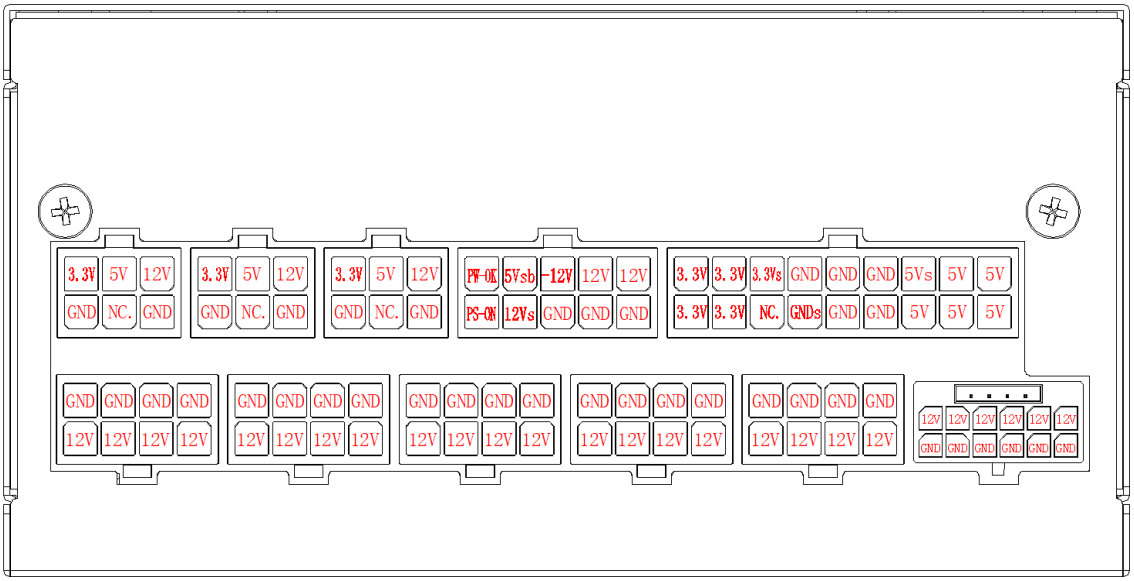
Each power Rating 12VHPWR S1 ~ S4 signal Pin setting

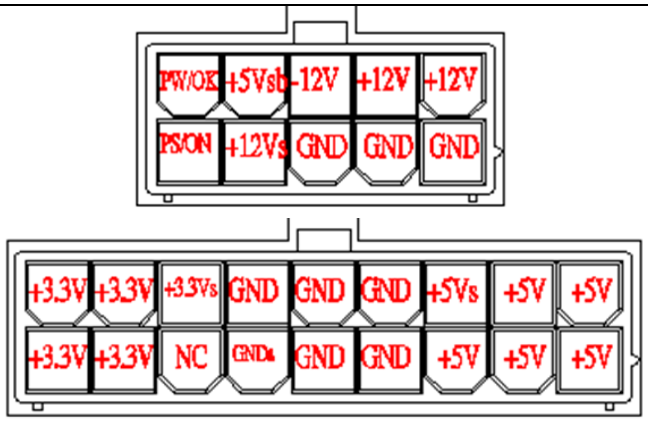
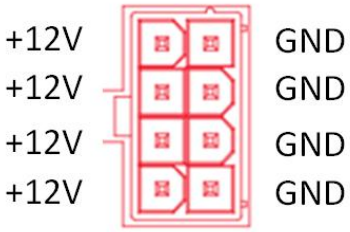
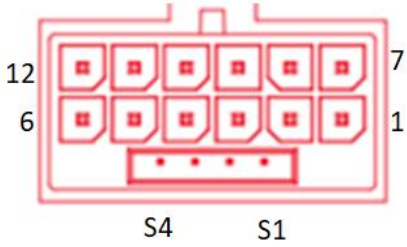
Model	S1	S2	S3(Sense 0)	S4 (Sense 1)	Remark
1000W	4.7kΩ pull-up resistor to +3.3V	100kΩ pull-up resistor to +3.3V	GND	GND	Support 600W
1100W			GND	GND	Support 600W
1300W			GND	GND	Support 600W



備註：
1. 所有HOUSING為黑色，未特別備註端子為磷青銅鍍錫.
2. 所有線材為黑色安規排線.
3. 膠殼、端子限用：Molex/WST/LST/Astron.
4. 膠殼耐燃等級限用UL 94V-0 or UL 94V-2.

6.2.9 Output Connector pin Definition



Modular Con. Name	Pin Definition
10P / 18 MB	
SATA / HDD	
8P PCIE & CPU	
12VHPWR	

Pin	Signal
p1 ~ 6	+12V
p7~ 12	GND
S1	CARD_PWR_STABLE (4.7kΩ pull-up resistor to +3.3V)
S2	CARD_CBL_PRES# (100kΩ pull-up resistor to +3.3V)
S3	SENSE 0
S4	SENSE 1

6.3 Fan

6.3.1 Fan Type

FDB, life specification 50,000 hours at 40 degrees Celsius minimum 15~65% relative humidity

Fan Size (minimum)	**92mmX92mmX15mm**

6.3.2 Fan Grill

Black color

6.3.3 Airflow

62.7 CFM maximum

6.3.4 Fan Speed

3500 ±10% RPM

6.3.5 Fan Location

On top of the power supply housing

6.3.6 Fan Acoustic Noise

Average 30dB(A) @0~100% load, Ambient 35 DegC

For Cybenetics noise assessment must meet A- level (Overall Loads 25~30dB(A))

In the semi-anechoic room, the microphone is measured at a distance of 1M from the air outlet of the PSU and measured with reference to the ISO7779 standard. The background noise of the semi-anechoic room must be <10dB.

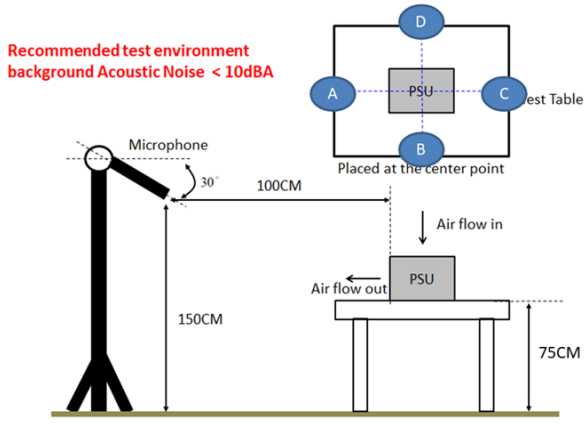
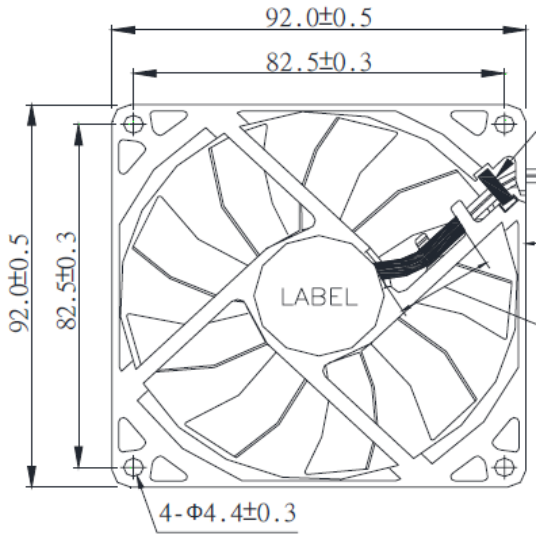
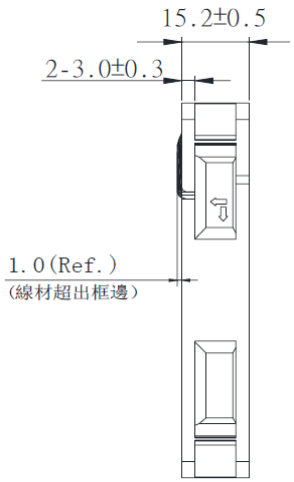


Figure 7. Acoustic Noise test environment settings

6.3.7 Fan ID
(Images are for reference only)



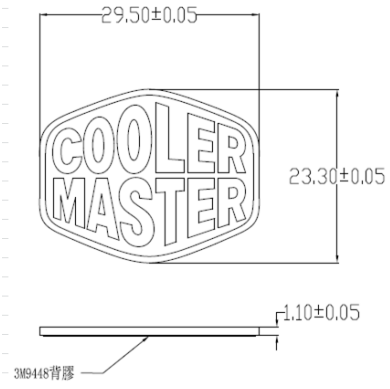


6.4 Logo

6.4.1 Logo Material : Al

6.4.2 Logo Size

logo Size	
Length	29.5mm
Width	23.3mm



備注：
1.字体为CM新字體Verdana，凸起表面需鑽曜並陽極淺黑色,字高0.5mm。
2.底部噴砂180#，陽極黑色。
3.銘板厚度爲1.1mm,背膠厚度爲0.1mm.
工藝：鋁+鍛造+噴砂180#+陽極黑色+鑽曜+陽極淺黑+背膠3M9448

7.0 Environment

7.1 Temperature

Operating ambient :0℃ ~ 50℃

Non-operating ambient: -20℃ ~ +70℃

7.2 Humidity

Operating:5% to 85% relative humidity(non-condensing)

Non-operating:5% to 95% relative humidity(non-condensing)

7.3 Altitude

Operate properly at any altitude between 0 and 2,000 meter

7.4 Mechanical shock

Non-operating:50g,trapezoidal input; velocity change≧170 in/s three drops on each of six faces are applied to each sample.

7.5 Vibration

Non-operating:0.01 g^2/Hz at 5 Hz, sloping to 0.02 g^2/Hz at 20 Hz, and maintaining 0.02 g^2/Hz from 20 Hz to 500 Hz. The area under the PSD curve is 3.13 gRMS. The duration shall be 10 minutes per axis for all three axes on all samples.

8.0 Electromagnetic Compatibility (EMC)

Parameter	Standard	Conditions / Criteria	
Electromagnetic Interference	CISPR 32 EN 55032 : 2015	Conducted B Class Radiated B Class	
Harmonics	EN 61000-3-2 : 2019 Class D		
Flicker	EN 61000-3-3 : 2013/A1:2019 Class B		
ESD Susceptibility	IEC 61000-4-2 : 2008	±8KV by Air, ±4KV by Contact Performance Criteria A	
Radiated Susceptibility	IEC 61000-4-3 : 2006+A1 : 2007+A2 : 2010	80MHz~6000MHz ; 3V/m(rms) ; Amplitude 80% AM(1KHz) Performance Criteria A	
EFT/Burst	IEC 61000-4-4 : 2012	Repetition Rate 5KHz, AC port: 1KV, DC: 0.5 KV, Performance Performance Criteria A	
Lightning Surge Immunity	IEC 61000-4-5 : 2014	Line-to-Line: 1KV Line-to-Ground: 2KV Rise time : 8uS , Decay time : 20uS Phase:0/90/180/270deg Performance Criteria A	
Conducted Susceptibility	IEC 61000-4-6 : 2013	0.15MHz~80MHz 3V/m Amplitude 80% AM 1KHz Performance Criteria A	
Power frequency magnetic field	IEC 61000-4-8 : 2009	50 Hz, 1A/m Performance Criteria A	
Voltage Dips and Interruptions	IEC 61000-4-11 : 2004	>95%(Voltage Dips) 30%(Voltage Dips) >95%(Voltage Dips)	Criteria A Criteria A Criteria C

9.0 Ground Leakage Current

The ground leakage current shall be less than 1mA at 264Vac.

10.0 BURN IN TEST(reference)

The power supply do the burn in test that with **80%** load for each piece power supply, the tested temperature be controlled at **40+/-5** degree centigrade. The test be finished after **1Hr** later.**(Or follow CoolerMaster official Burn-in regulations)**

During the Burn in process, 80% load for 40min→ 20% load for 10 min→ 80% load ac on/off interval 1min total 5 cycle to end of burn in test.

11.0 Dielectric Withstand Voltage:

11.1 Primary To Secondary: 3000Vdc for 60 sec.
Primary To F.G: 1500Vdc for 60sec.

11.2 Insulation Resistance: Primary To Safety Ground: 500Vdc, 10MΩ Min.

11.3 Leakage Current: Measured At 264Vac/50Hz and 1mA Max

12.0 Mean Time Between Failures (MTBF)

The calculated MTBF shall be greater than 100K hours. While tempered at 25℃ Ambient

13.0 Bracket (Option)

ID: Images are for reference only
Material: SECC or SGCC
Color: Black