

1. INTRODUCTION

The "TNN350APF-V1" is a Power Supply designed to be used "ATX12V" form factor server computer systems

1.1 SCOPE

The scope of this document is limited to the requirements of "ATX12V" PC form factor switching Power Supply. Especially, It is applied to the line input capability, remote ON/OFF, cooling, standby voltage("VSB") and electrical characteristics.

Form-factor		ATX/ATX12V		
POWER		380. Watt max peak 350. Watt max Continuous		
Efficiency		80% at Full load		
Output voltage	Regulation	Min load(Amps)	Max load(Amps)	Peak current(Amps)
+12VDC1	5%	1A	10.0A	18
+12VDC2	5%	1A	15.0A	
+5VDC	5%	0.5A	20.0A	
+3.3VDC	5%	0.5A	20.0A	
-12VDC	5%	0A	0.3A	
+5VSB	5%	0A	2.0A	2.5A

2. ELECTRICAL SPECIFICATION

2.1 AC INPUT LINE REQUIREMENTS

Parameter	MIN	NOM	MAX	UNIT
Vin(115VAC)	90	115	135	VACrms
Vin(230VAC)	180	230	265	VACrms
Vin FREQUENCY	47	-	63	Hz
Vin(115VAC)			15	A
Vin(230VAC)			8	A

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2.1.1 INRUSH CURRENT

Max. inrush current shall not exceed 60 CA(Peak to Peak).

2.2 DC OUTPUT REQUIREMENTS

2.2.1 OUTPUT REQUIREMENTS

TEST POINT : OUTPUT CONNECTOR LOAD TERMINALS.

Parameter	MIN	NOM	MAX	UNIT
+12VDC1	+11.4	+12.00	+12.6	Volts
+12VDC2	+11.4	+12.00	+12.6	Volts
+5VDC	+4.75	+5.00	+5.25	Volts
+3.3VDC	+3.14	+3.30	+3.47	Volts
-12VDC	-10.80	-12.00	-13.20	Volts
+5VSB	+4.75	+5.00	+5.25	Volts

2.2.2 DC output CURRENT

- 1) Maximum continuous total DC output power shall not exceed 350Watts.
- 2) Maximum +5V and +3.3V output power shall not exceed 120Watts.
- 3) Maximum Peak Total DC output power shall not exceed 380Watts.
- 4) It shall not exceed 17 seconds in duration at Total +12VDC1, +12VDC2 output power, 300Watts.
- 5) Output voltage of +5VSB shall be maintained within the power shut down.

Range	Parameter	MIN	NOM	MAX	PEAK	UNIT
Range 1 (Normal Load)	+12VDC1	1.0	-	8A		Amps
	+12VDC2	1.0		12A		"
	+5VDC	0.5	-	10A		"
	+3.3VDC	0.5	-	14.1A		"
	-12VDC	0.0	-	0.3		"
	+5VSB	0.0	-	2.0A	2.5A	"
Range 2 (High Load)	+12VDC	1.0	-	5A		Amps
	+12VDC	1.0	-	9A		"
	+5VDC	0.5	-	3A		"
	+3.3VDC	0.5	-	5A		"
	-12VDC	0.0	-	0.3		"
	+5VSB	0.0	-	2A	2.5A	"

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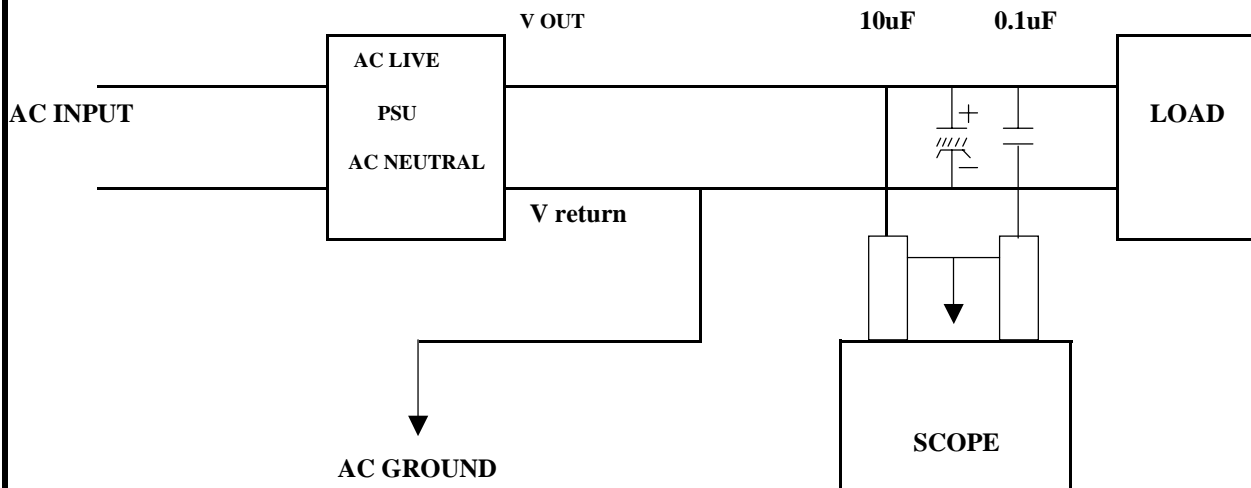
2.2.3 EFFICIENCY

1) The power supply at full load provide AC/DC conversion efficiency 80% minimum.

2.2.4 OUTPUT RIPPLE/NOISE

. The measurements should be made by crossing a 10uF electrolytic capacitor and a 0.1uF Ceramic capacitors at each output with measuring band width from DC to 20MHz.

Parameter	Range	MIN	NOR	MAX	UNIT
+12VDC	1.0%	-		80	mVp-p
+5VDC	1.0%	-		80	"
+3.3VDC	1.0%	-		80	"
-12VDC	1.0%	-		120	"
+5VSB	1.0%	-		50	"



2.2.5 Dynamic Loading

. Load Slew Rate : 0.5A/us

Output	Step Load Size	Load Slew Rate	Capacitive Load
+3.3V	30% of max load	0.5A/us	1000uF
+5V	30% of max load	0.5A/us	1000uF
+12V1,+12V2	65% of max load	0.5A/us	1000uF
+5VSB	25% of max load	0.5A/us	1uF

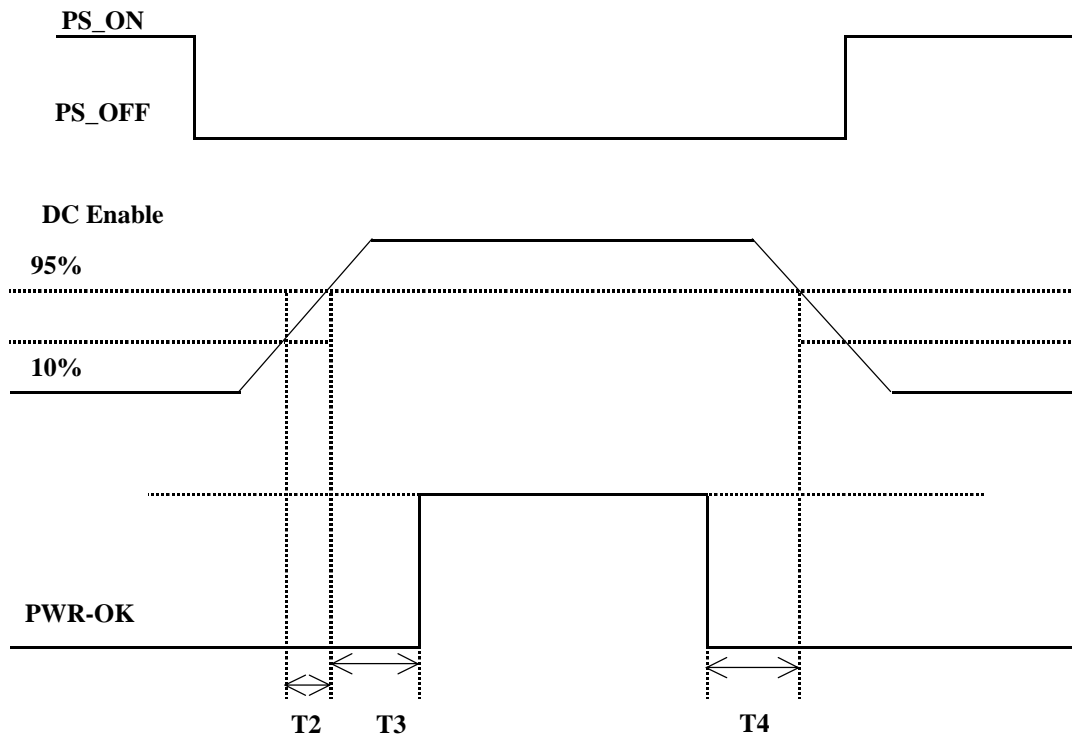
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2.3 TIMING / HOUSE KEEPING



* PW-OK sense level : 95% of nominal

2.3.1 REMOTE ON/OFF CONTROL

The power supply DC outputs (with the exception of +5VSB) shall be enabled with an active-low, TTL-compatible signal("PS-ON"). The +5VSB is on whenever the AC power is present.

- . When PS-ON is pulled to TTL low, the DC outputs are to be enabled.
- . When PS-ON is pulled to TTL high or open circuited, the DC outputs are to be disabled. Turn ON/OFF delay >- 1000ms

2.3.2 POWER UP DELAY

The output voltages shall rise from <10% of nominal to within the regulation ranges specified in sec 2.2.1 within 5 to 70ms.

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2.3.3 POWER GOOD SIGNAL, POK

- . Signal Type : Open Collector +5VDC, TTL compatible.
- . Logic level Low : <0.4V 4mA
- . Logic level High :Between 2.4VDC and 5VDC output while sourcing current, 2mA
- . POK Delay : 200ms<T3<1000ms
- . Power Down Warning : 1ms<T4<200ms

2.3.4 VOLTAGE HOLD-UP TIME

The power supply shall maintain output regulation per section 2.2.1 despite a loss of input power at the low-end nominal range at maximum continuous output load as specified in section 1.1 for a minimum 17ms.

2.4 OUTPUT PROTECTION

2.4.1. OVER VOLTAGE PROTECTION

Parameter	Min	Nom	Max	Unit
+5VDC	5.74	6.3	7.0	V
+12VDC	13.4	15	15.6V	V
+3.3VDC	3.76	4.2	4.3	V

*Change latch mode at above voltage in power supply unit.

2.4.2. SHORT CIRCUIT PROTECTION

- . Shutdown or latch at short +3.3, +5V and +12V.
- . No damage in compenents, PCB trace connector at continous shout.
- . The maximum short circuit current shall not exceed 240VA.

2.4.3. OVER POWER PROTECTION

- . +5V : 25A~ Test Condition : Output Full Load
- . +3.3V : 25A~
- . +12VDC1 : 18A~
- . +12VDC2 : 18A~

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2.4.4 DC INPUT PROTECTION

. Use proper fuse for DC input over current protection.

2.4.5. BURN-IN

Primary lot is output full load at 55 24HR

2.4.6. MEAN TIME BETWEEN FAILURES

. Operating Time 50,000HR at 25.

2.4.7. This power supply shall comply with the followings.

- . UL1950
- . CSA C22.2 NO220 & CSA Bulletin 1402C, Level3
- . VDE 0806, EN60950 A3
- . IEC950

2.4.8. EMI

- . FCC Part 15 Sub Part J, Class B
- . VDE 0871/6.78 Class B

2.4.9. POWER SWITCH On/Off TEST

Control Signal	Output Status
Logic " Low"	On
Logic " High"	Off

2.4.10. INSULATION VOLTAGE WITHSTAND

- . Primary to Secondary : 500VDC 100
- . Primary to FG : 500VDC 100

2.4.11. LEAKAGE CURRENT(IEC950)

. The Maximum Leakage Current Following The Frame / AC Sine Conductor
Shall be 1.0mA Maximum at 220VAC Input

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2.4.12. DIELECTRIC STRENGTH

- . Between Input and Output : 1500VAC 10mA 1min or 1800VAC 10mA 3sec
- . Between Input and FG : 1500VAC 10mA 1min or 1800VAC 10mA 3sec

2.4.13. TEMPRATURE RANGE

- . Operating : 5 ~ 40
- . Storage : -20 ~ 85

2.4.14. HUMIDITY RANGE

- . Operating : 20% ~ 80%
- . Storage : 10% ~ 95%

2.4.15. VIBRATION TEST

- . Non Operation : Sweep Test
- . Frequency : 5 -> 20 -> 500 -> 5Hz
- . Acceleration :0.02G
- . Airection : X, Y, Z
- . Period : 6 Minutes
- . Cycie : 10

2.4.16. ACOUSTIC NOISE

- . The power Supply Must not generate Acoustic Noise in excess of 30dB at a Distance of 1 Meter from any Point on The requirments Surface.

2.4.18. AC LINE NOISE

- . The Power Supply Shall Operate Normally When AC Line Noise is Applied
- . Noise Crest Value : 1000VAC
- . Polarity : +, -
- . Pulse Width : 1us
- . Phase : 0 - 360
- . Mode : Common, Normal
- . Time : 3Minutes

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2.5. DC CONNECTOR REQUIREMENTS

2.5.1 BASE BOARD CONNECTOR

PS-1 Connector : MOLEX 39-01-2240 or equivalent

Pin	Signal	Pin	Pin	Signal	Wire Color
1	+3.3VDC	Orange	13	+3.3VDC	Orange
2	+3.3VDC	Orange	14	-12VDC	Blue
	sense	Brown			
3	COM	Black	15	COM	Black
	sense	Black			
4	+5VDC	Red	16	PS-ON	Green
	sense	Red			
5	COM	Black	17	COM	Black
	sense	Yellow			
6	+5VDC	Red	18	COM	Black
7	COM	Black	19	COM	Black
8	POK	Gray	20		
9	+5VSB	Violet	21	+5VDC	Red
10	+12VDC	Yellow	22	+5VDC	Red
11	+12VDC	Yellow	23	+5VDC	Red
12	+3.3VDC	Orange	24	COM	Black

. 18AWG is suggested for all wire except for the 3.3V sense return wire, pin 13 (22AWG) For 300W configurations, 16AWG is recommended all 12VDC, +5VDC, +3.3VDC, and COM

Processor Power Connector : MOLEX 39-01-2080 or equivalent

Pin	Signal	Wire Color	Pin	Signal	Wire Color
1	COM	Black	5	+12DC1	Yellow
2	COM	Black	6	+12DC1	Yellow
3	COM	Black	7	+12DC1	Yellow
4	COM	Black	8	+12DC1	Yellow

Pin	Signal	Wire Color	Pin	Signal	Wire Color
1	COM	Black	5	+12DC2	Yellow
2	COM	Black	6	+12DC2	Yellow
3	COM	Black	7	+12DC2	Yellow
4	COM	Black	8	+12DC2	Yellow

2.5.2. PERIPHERAL CONNECTORS

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. Connector : AMP 1-480424-0 or Molex 8981-04P or equivalent.

. Contacts : AMP 61314-1 terminals or equivalent.

Pin	Signal	Wire Color
1	+12VDC1	Yellow
2	COM	Black
3	COM	Black
4	+5VDC	Red

. PB(Floppy Drive Connector)

. Connector : AMP 171822-4 or equivalent.

Pin	Signal	Wire Color
1	+5VDC	Red
2	COM	Black
3	COM	Black
4	+12VDC1	Yellow

.+12V Power Connector

3. MECHANICAL

3.1. PHYSICAL DIMENSION

Dimension : L * W * H mm

294*200*67

3.2. LABELING /MARKING

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FCC Compliance Statement

This device complies with Part 15 of the FCC Rules.
Operation is subject to the following two conditions:
(1) This Device may not cause harmful interference, and
(2) This device must accept any interference received,
including interference that may cause undesired operation.

Caution : Any changes or modifications in construction of this device which are not expressly approved the party responsible for compliance could void the user's authority to operate the equipment.

NOTE : This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications, However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.