

**MODEL NO. ENP7000 SERIES (ACTIVE PFC)**

This specification describes the requirements of 200,220,250,275Watts with full range voltage, 275W with 230Vac only voltage switching power supply with an FLEX-ATX form-factor and TFX 12V,+5V standby voltage, remote on/off .

**☛ 1.0 AC INPUT****1.1 AC input requirements**

The input voltage, current, and frequency requirements for continuous operation are stated below.

**Table 1 AC Input Line Requirements**

Parameter	Min	Nom.	Max	Unit
Vin	90	100-240	264	VACrms
Vin Frequency	47		63	Hz
Iin(200,220W)		3---1.3		Arms
Iin(250W)		3.5--1.5		Arms

Parameter	Min	Nom.	Max	Unit
Vin	180	200      240	264	VACrms
Vin Frequency	47		63	Hz
Iin(275W)		2		Arms

Power factor correction (PF)>0.9 at full load.

**1.2 Inrush current regulation**

The power supply must meet inrush requirements for any rated AC voltage, during turn on at any pf of AC voltage, during a single cycle AC dropout condition, during repetitive ON/OFF cycling of AC, and over the specified temperature range (Top). The peak inrush current shall be less than the ratings of its critical components (including input fuse, bulk rectifiers, and surge limiting device).

**☛ 2.0 DC OUTPUT****2.1 DC voltage regulation**

Parameter	Range	Min	Nom.	Max	Unit
+3.3V	±5%	+3.14	+3.3	+3.47	Volts
+5V	±5%	+4.75	+5.0	+5.25	Volts
+12V1	±5%	+11.4	+12.0	+12.6	Volts
+12V2	±5%	+11.4	+12.0	+12.6	Volts
-12V	±10%	-10.8	-12.0	-13.2	Volts
+5VSb	±5%	+4.75	+5.0	+5.25	Volts

1.At no load,3.3V output +/-5% regulation limits do not apply.

2.At +12V surge, regulation can go to +/-10%.

## 2.2 LOAD RANGE

### 2.2.1 ENP7000( 200 Watts)

Parameter	Min	Nom.	Max	Peak	Unit
+3.3V	0.1	-	13		Amps
+5V	0.2	-	14		Amps
+12V1	0.6	-	14	16	Amps
+12V2	0.6	-	14	16	Amps
-12V	0.0	-	0.3		Amps
+5VSB	0.0	-	2	2.5	Amps

Notes:

- ( 1 ) +5VSB is a SELV standby voltage that is always present when AC mains voltage is present.
- ( 2 ) The maximum combined load on +5V and +3.3V outputs shall not exceed 80W
- ( 3 ) The maximum continuous average DC outputs power shall not exceed 200W
- ( 4 ) The maximum peak total DC outputs power shall not exceed 220W
- ( 5 ) When +12V load is 14A,the Min load of +5V is 2A.
- ( 6 ) +12V total DC output power shall not exceed 176W
- (7) Peak total output power not to exceed 12 seconds in duration .

### 2.2.2 ENP7000( 220 Watts)

Parameter	Min	Nom.	Max	Peak	Unit
+3.3V	0.1	-	13		Amps
+5V	0.2	-	14		Amps
+12V1	0.6	-	16	18	Amps
+12V2	0.6	-	16	18	Amps
-12V	0.0	-	0.3		Amps
+5VSB	0.0	-	2	2.5	Amps

Notes:

- ( 1 ) +5VSB is a SELV standby voltage that is always present when AC mains voltage is present.
- ( 2 ) The maximum combined load on +5V and +3.3V outputs shall not exceed 80W
- ( 3 ) The maximum continuous average DC outputs power shall not exceed 220W
- ( 4 ) The maximum peak total DC outputs power shall not exceed 240W
- ( 5 ) When +12V load is 14A,the Min load of +5V is 2A.
- ( 6 ) +12V total DC output power shall not exceed 200W
- (7) Peak total output power not to exceed 12 seconds in duration .

**2.2.3 ENP7000( 250 Watts)**

Parameter	Min	Nom.	Max	Peak	Unit
+3.3V	0.1	-	13		Amps
+5V	0.2	-	14		Amps
+12V1	0.6	-	18	20	Amps
+12V2	0.6	-	18	20	Amps
-12V	0.0	-	0.3		Amps
+5VSb	0.0	-	2	2.5	Amps

Notes:

- ( 1 ) +5VSb is a SELV standby voltage that is always present when AC mains voltage is present.
- ( 2 ) The maximum combined load on +5V and +3.3V outputs shall not exceed 80W
- ( 3 ) The maximum continuous average DC outputs power shall not exceed 250W
- ( 4 ) The maximum peak total DC outputs power shall not exceed 270W
- ( 5 ) When +12V load is 14A,the Min load of +5V is 2A.
- ( 6 ) +12V total DC output power shall not exceed 225 W
- (7) Peak total output power not to exceed 12 seconds in duration .

**2.2.4 ENP7000( 275 Watts , 200-240Vac)**

Parameter	Min	Nom.	Max	Peak	Unit
+3.3V	0.1	-	14		Amps
+5V	0.2	-	15		Amps
+12V1	0.6	-	20		Amps
+12V2	0.6	-	20		Amps
-12V	0.0	-	0.3		Amps
+5VSb	0.0	-	2	2.5	Amps

Notes:

- ( 1 ) +5VSb is a SELV standby voltage that is always present when AC mains voltage is present.
- ( 2 ) The maximum combined load on +5V and +3.3V outputs shall not exceed 80W
- ( 3 ) The maximum continuous average DC outputs power shall not exceed 275W
- ( 4 ) The maximum peak total DC outputs power shall not exceed 290W
- ( 5 ) When +12V load is 14A,the Min load of +5V is 3A.
- ( 6 ) +12V total DC output power shall not exceed 250 W
- ( 7 ) Peak total output power not to exceed 12 seconds in duration .

## 2.3 Output Ripple

### 2.3.1 Ripple regulation

Parameter	Ripple&Noise	Unit
+3.3V	50	mVp-p
+5V	50	mVp-p
+12V1	120	mVp-p
+12V2	120	mVp-p
-12V	120	mVp-p
+5VSb	50	mVp-p

### 2.3.2 Definition

The ripple voltage of the outputs shall be measured at the pins of the output connector when terminated in the load impedance specified in figure1. Ripple and noise are measured at the connectors with a 0.1uF ceramic capacitor and a 10uF electrolytic capacitor to simulate system loading. Ripple shall be measured under any condition of line voltage, output load, line frequency, operation temperature.

### 2.3.3 Ripple voltage test circuit

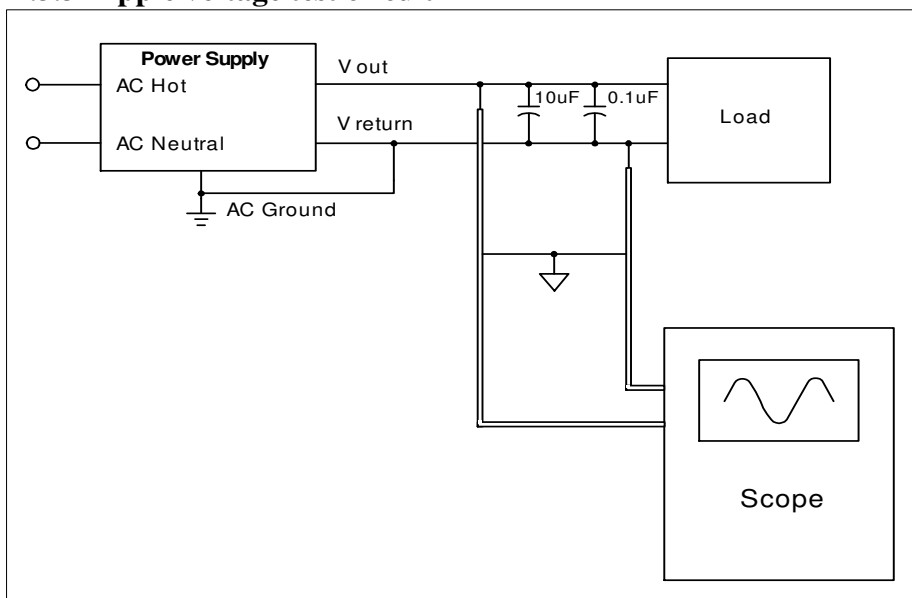


Figure 1. Ripple voltage test circuit

## 2.4 Overshoot

Any overshoot at turn on or turn off shall be less 10% of the nominal voltage value, all outputs shall be within the regulation limit of section 2.0 before issuing the power good signal of section 5.0.

## 2.5 Efficiency

Power supply efficiency typical 80% at normal AC main voltage and full load on all outputs.

## 2.6 Remote on/off control

When the logic level "PS-ON" is low, the DC outputs are to be enabled.

When the logic level is high or open collector, the DC outputs are to be disabled.

☛ 3.0 PROTECTION

3.1 Over-power protection

The power supply will be shutdown and latch off when output power over 110% ~ 150% of rated DC output.

3.2 Over voltage protection

The over voltage sense circuitry and reference shall reside in packages that are separate and distinct from the regulator control circuitry and reference. No single point fault shall be able to cause a sustained over voltage condition on any or all outputs. The supply shall provide latch-mode over voltage protection as defined in Table.

output	Minimum	Nominal	Maximum	Unit
+12 VDC	13.4	15.0	15.6	Volts
+5 VDC	5.74	6.3	7.0	Volts
+3.3 VDC	3.76	4.2	4.3	Volts

3.3 Short circuit

An output short circuit is defined as any output impedance of less than 0.1 ohms. The power supply shall shut down and latch off for shorting the +3.3 VDC,+5 VDC,or+12 VDC rails to return or any other rail. Shorts between main output rails and +5VSB shall not cause any damage to the power supply. The power supply shall either shut down and latch off or fold back for shorting the negative rails.+5VSB must be capable of being shorted indefinitely, but when the short is removed,the power supply shall recover automatically or by cycling PS\_ON#.The power supply shall be capable of withstanding a continuous short-circuit to the output without damage or overstress to the unit

3.4 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.

☛ 4.0 TIMING

4.1 Signal timing drawing

Figure 2 is a reference for signal timing for main power connector signals and rails.

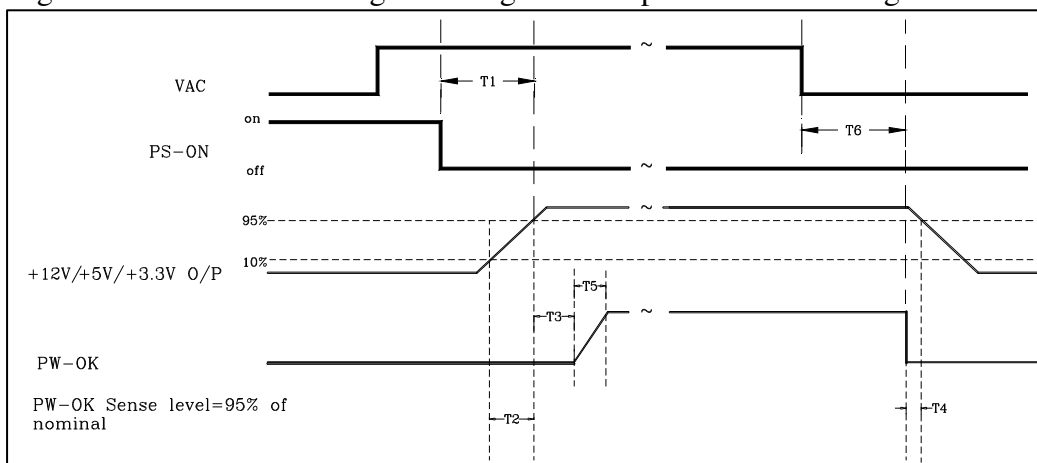


Figure 2. PS-OK Timing Sequence

- (1)T2: Rise time (0.2ms~20ms)
- (2)T3: Power good signal turn on delay time (100ms~500ms)
- (3)T4: Power good signal turn off delay time (1ms min)
- (4)T5: Rise time (10ms max)

**4.2 .Output Transient Response**

Table 13. summarizes the expected output transient step sizes for each output. The transient load slew rate is =1.0A/us.

**Table 13. DC Output Transient Step Sizes**

Output	Max.step size (% of rated output amps per Sec 3.2.3) <sup>(1)</sup>	Max.step size (amps)
+12 V1DC	40%	
+12 V2DC	40%	
+5 VDC	30%	
+3.3 VDC	30%	
-12 VDC		0.1A
+5 VSB		0.5A

<sup>(1)</sup> For example, for a rated +5 VDC output of 18A,the transient step would be 30% x 18A=5.4A

Output voltages should remain within the regulation limits of Section 2.1,and the power supply should stable when subjected to load transients per Table 13. from any steady state load, including any or all of the following conditions:

- Simultaneous load steps on the +12 VDC,+5 VDC,and +3.3 VDC outputs (all steps occurring in the same direction)
- Load-changing repetition rate of 50 Hz to 10 kHz
- AC input range per Section 1.0

**4.3 Hold up time**

When the power loss its input power, it shall maintain 16ms in regulation limit at nominal input voltage. (AC:115V/60Hz or 230V/50Hz)

**5.0 ENVIRONMENT**

**5.1 Operation**

Temperature	0 to 40 °C
Relative Humidity	to 85%,on-condensing

**5.2 Shipping and Storage**

Temperature	-40 to 70°C
Relative Humidity	to 95%,non-condensing

**5.3 Altitude**

Operating	<b>2000 meters</b>
Storage	<b>3000 meters</b>

**☛ 6.0 SAFETY****6.1 Underwriters Laboratory (UL) recognition.**

The power supply designed to meet UL 60950

**☛ 7.0 ELECTROMAGNETIC COMPATIBILITY (EMC)****7.1 ELECTROSTATIC DISCHARGE (ESD) - IEC 61000 – 4 - 2 : 2008****7.2 ELECTRICAL FAST TRANSIENT / BURST ( EFT/B) – IEC 61000 – 4 - 4 : 2012****7.3 SURGE – IEC 61000 – 4 - 5 : 2005****7.4 POWER FREQUENCY MAGNETIC FIELD – IEC 61000 – 4 - 8 : 2009****7.5 VOLTAGE DIPS – IEC 61000 – 4 - 11 : 2004****7.6 RADIATED SUSCEPTIBILITY – IEC 61000 – 4 – 3 : 2006+A1 : 2007+A2 : 2010****7.7 CONDUCTED SUSCEPTIBILITY – IEC 61000 – 4 - 6 : 2008****7.8 VOLTAGE FLUCTUATION - EN 61000 – 3 – 3 : 2008****7.9 EN61000-3-2 : 2006+A2 : 2009 harmonic current emissions.**

If applicable to sales in Europe, the power supply shall meet the requirements of EN 61000-3-2 Class D and the Guidelines for the Suppression of Harmonics in Appliances and General Use Equipment Class D for harmonic line current content at full-rated power.

**7.10 EN55022 : 2010/AC : 2011 Class B Radio interference (CISPR 22).****7.11 ANSI C63.4-2009 / FCC Part 15 Subpart B / ICE-003 Issue 5 class B 115VAC operation.****☛ 8.0 MTBF****8.1 MTBF (mean time between failures) calculation**

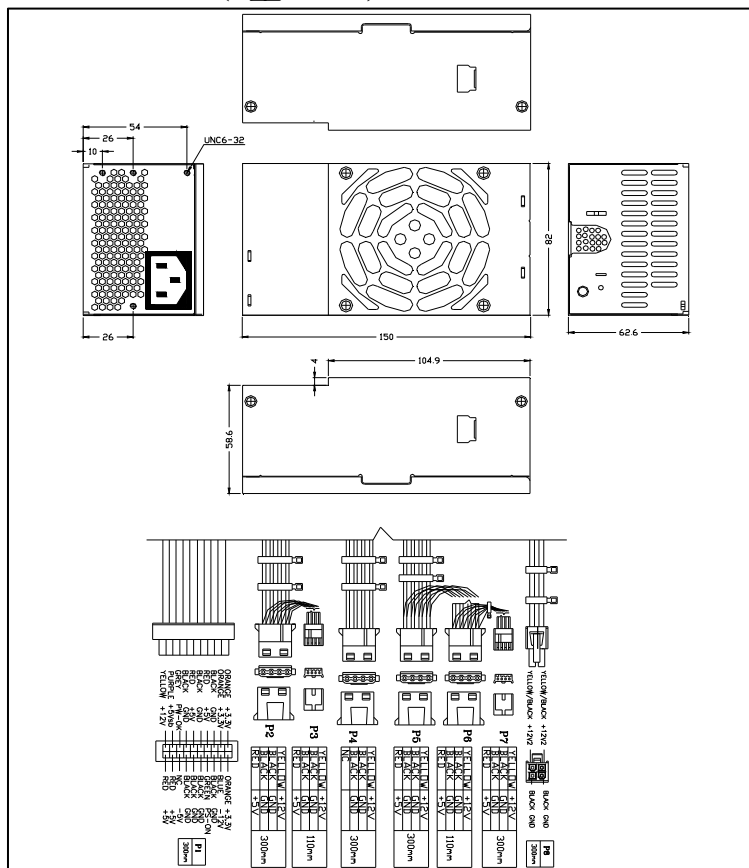
The demonstrated MTBF shall be 100,000 hours of continuous operation at 25°C, 75% of full load and 120V AC input. The MTBF of the power supply shall be calculated in accordance with MIL-HDBK-217F. The DC FAN is not included.





Dim (L150\*W82\*H63)

(F型CASE)



9.2 Connectors (INTEL approved equivalent)

P1 connector (Molex 39-01-2200 or equivalent)

20AWG wire	Signal	Pin	Pin	Signal	20AWG wire
Orange	+3.3V	11	1	+3.3V	Orange
Orange(22AWG)	3.3 sense	11			
Blue	-12VDC	12	2	+3.3V	Orange
Black	COM	13	3	COM	Black
Green	PS-ON	14	4	+5VDC	Red
Black	COM	15	5	COM	Black
Black	COM	16	6	+5VDC	Red
Black	COM	17	7	COM	Black
White	NC	18	8	POK	Grey
Red	+5VDC	19	9	+5VSB	Purple
Red	+5VDC	20	10	+12VDC	Yellow

**P2,P3,P4,P5(AMP 1-480424-0 or Molex 8981-04P or equivalent)**

**P6,P7 (AMP 171822-4 or equivalent)**

20 AWG wire	Signal	Pin	Pin	Signal	22AWG wire
Yellow	+12VDC	1	1	+5VDC	Red
Black	COM	2	2	COM	Black
Black	COM	3	3	COM	Black
Red(optional)	+5VDC	4	4	+12VDC	Yellow

**P8 Optional Connector (Molex 39-01-2060 or equivalent)**

20 AWG wire	Signal	Pin	Pin	Signal	20AWG wire
Black	GND	1	3	Yellow	+12V
Black	GND	2	4	Yellow	+12V

**P9 (optional) Serial ATA Power Connector (Molex\* 88751 or equivalent)**

18 /20AWG wire	Signal	Pin
Orange	+3.3V	5
Black	GND	4
Red	+5V	3
Black	GND	2
Yellow	+12V	1

**P8 Optional Connector (Molex 1-480704-0 or equivalent)**

18 AWG wire	Signal	Pin	Pin	Signal	18AWG wire
YELLOW	+12V	1	4	RED	+5V
Black	GND	2	5	ORANGE	+3.3V
Black	GND	3	6	NC	

**10. FAN SPEED CONTROL**

Fan voltage varies with the ambient temperature and/or output power.