SPECIFICATION

1U
480 Watts
Compliant with EPS1U
Active PFC

Revision: 1.1

Model: P6481E 1FE

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Table of Content

1.0 General

This specification describes the physical, functional and electrical characteristics of a 480W watts switching power supply with power factor correction capabilities.

1.1 Parameter Specifications

Unless specified otherwise, all parameters must be met over the limits of Temperature, load and input voltage.

2.0 Input Characteristics

2.1 Input Voltage

AC Input with Active Power Factor

Table 1: AC Input Voltage

Normal	Minimum	Maximum
115 VAC	90 VAC	264 VAC

2.2 Input Waveform

The unit is capable of operating with a 10% distorted sine wave input as measured by a distortion analyzer. Its flattopping clipped 10% from the peak value of standard sine wave.

2.3 Input Frequency

Table 2: AC Input Frequency

Min.	Normal	Max	Unit
47	50/60	63	Hz

2.4 Input Current

Table 3: AC Input Current

Output Power	480W
Vin: 115VAC	8 A
Vin: 230VAC	4 A

2.5 Power Factor Correction

The Power Supply shall incorporate universal power input with active power factor correction, which shall reduce line harmonic current in accordance with the EN61000-3-2 and JETI MITI standards.

2.5.1 Power Factor

PF ≥ 0.95, at max load and nominal input voltage

2.5.2 Harmonic Distortion

Meet the EN61000-3-2 standards

2.6 In-Rush Current

CONDITION	**LIMITS**
132/264 VAC, Full load Turn off 1 sec; turn on at peak of input voltage cycle. 25℃ Air Ambient cold star	No damage shall occur or over stressed input fuse shall not blow

2.7 Line Regulation

CONDITIONS	LIMITS
Full load, 90 to 264 VAC	±1%

2.8 Input Leakage Current

Input leakage current from line to ground will be less than 3.5 mA rms. Measurement will be made at 240 VAC and 60Hz.

2.9 Isolation (Hi-pot)

1500Vrms, 50Hz for one (1) minute between each input AC line and the grounding conductor. All isolation transformers will have been tested prior to assembly into a power supply unit. Any such transformers without a grounded shield will be tested to 3750 Vrms.

3.0 Output Characteristics

3.1 DC Output Characteristics

To be met under all combinations of loading:

Table 4: DC output Character

Output # Voltage	+5V	+3.3V	+12V1	+12V2	-5V	-12V	+5VSB
Max. Load	30A	30A	18A	18A	0.3A	0.8A	2A
Min. Load	1A	0A	0.5A	0.5A	0A	0A	0A
Load Reg.	+/-5 %	+/-5 %	+/-5 %	+/-5 %	+10 %	+10 %	+/-5 %
Cross Reg.	+/-5 %	+/-5 %	+/-5 %	+/-5 %	+10 %	+10 %	+/-5 %
Line Reg.	+/-1%	+/-1%	+/-1%	+/-1%	+/-1%	+/-1%	+/-1%
Ripple & Noise	50mV	50mV	120mV	120mV	100mV	120mV	50mV

Note 1: The +5 & +3.3 Volt total output shall not be exceed 200 Watts.

Note 2: The +5, +12 & +3.3 Volt total output shall not be exceed 460 Watts.

Note 3: The +12V1 & +12V2 combine output current 32A maximum

3.2 Remote Sensing

The +3.3V, +5V, +12V outputs should have provision for remote sensing to compensate for 200mV of cable, connector, and PCB trace drops.

3.3 Overshoot

Any output overshoot at TURN-ON shall not exceed 10% of nominal voltage value.

3.4 Efficiency

70% minimum at full load and nominal AC input.

4.0 Time Sequence

4.1 Hold-Up Time

Unit shall continue to supply regulated DC outputs and power good signal for at least 20 milliseconds at 115/230 VAC full load after a loss of AC input voltage, which shall be represented by a short circuit at the AC input.

4.2 Power Good Signal

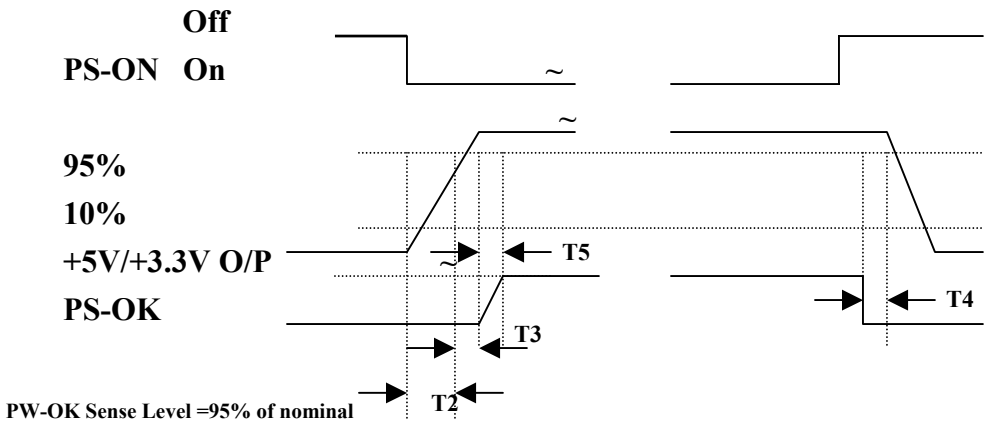

Figure 1

Note:

T2: The output voltage shall rise from <10% of nominal to within the regulation specified in Section 2.2 within 0.1 to 70 ms.(0.1ms ≤T2 ≤70ms)

T3、T4 and T5 are as following Table5:

Table 5 Out power Signal Summary

Signal Type:	+5VDC,TTL compatible
Logic level low	<0.4V while sinking 4 mA
Logic level high	Between 2.4VDC and 5VDC output while sourcing 200μA
High state output impedance	1KΩ from output to common
PS-OK delay	100ms < T3 < 500 ms
PS-OK rise time	T5 ≤ 100u
Power down warning	T4 > 1 ms

4.2.1 Fanout

Power Good output circuit shall consist of an active pull down component and a passive pull up resistor.

Power Good output voltage to be met under recommended loading conditions.

CONDITIONS	LIMITS
I_{OH}= -200uA Min.	V_{OH}= 2.7V Min.
I_{OL}= 4mA Min.	V_{OL}= 0.4V Max.

4.3 Output Rise Time

The each output current shall have a turn-on rise time of less than 70ms under all load conditions. Rise time is measured between 10% and 95%.

4.4 Start-up timing

All outputs shall be stable and in regulation in less then 2.0 second under all load and line conditions. Start-up time is measured between the AC turn-on and 4.75 volts on +5V output. See Figure 1.

4.5 Dynamic Load Response Time

Transient response is measured by switching the output load from 70 to 100 to 70 percent of its full value at a frequency of 100 Hz and 50% duty cycle, step load change is 0.5A/us, The magnitude Vr is less than +/- 5% of +5V, +3.3V and +12V outputs, the recovery time Tr is less than 1ms.

5.0 Protection

5.1 Over Current Protection

This power supply shut down all DC outputs when the outputs are overloaded to the limit. The power supply shall into the off state and recovery by toggling the PSON signal or by an AC power interruption.

The +5VSB outputs will be internally current limited.

Table 6: Over Current Limits Summary

Voltage	Minimum	Maximum	Shutdown Mode
+3.3V	110%	150%	Latch Off
+5V	110%	150%	Latch Off
+12V1	110%	150%	Latch Off
+12V2	110%	150%	Latch Off
-5V	--	--	Auto Recovery
-12V	--	--	Auto Recovery
5VSB	--	--	Auto Recovery

5.2 Over Voltage Protection

The power supply shall shutdown and latch off after an over voltage condition occurs. This latch shall be cleared by toggling the PSON signal or by an AC power interruption.

Table 7: Over Voltage Limits Summary

Voltage	Minimum	Maximum	Shutdown Mode
+3.3V	3.9V	4.5V	Latch Off
+5V	5.7V	6.5V	Latch Off
+12V1	13.3V	14.5V	Latch Off
+12V2	13.3V	14.5V	Latch Off
-5V	--	--	Auto Recovery
-12V	--	--	Auto Recovery
5VSB	--	--	Auto Recovery

5.3 Short Circuit Protection

A short circuit placed on any output shall cause no damage to this unit. The power supply shall shutdown and latch off if the short circuit shown. This latch shall be cleared by toggling the

PSON signal or by an AC power interruption.

Table 8: Short Circuit Character

Input Voltage	V1 +5V	V2 +12V1	V3 +12V2	V4 +3.3V	V5 -5V	V6 -12V	V7 5VSB
Latch OFF	V	V	V	V			
Auto Recovery					V	V	V

5.4 No Load Operation

When the primary power is applied, with no load on any output voltage, no damage or hazardous conditions shall occur. In such a case, the power supply shall power up and stabilize.

5.5 +5VSB (Standby)

The +5VSB output is always on (+5V Standby) when AC power is applied and power switch is turned on. The +5VSB line is capable of delivering at a maximum of 2.0A for PC board circuit to operate.

5.6 PS-ON (Remote ON/OFF)

PS-ON is an active low signal that turns on all of the main power rails including +3.3V; +5V, +12V & -12V power rails. When this signal is held by the PC board or left open circuited, outputs of the power rails should not deliver current and should be held at a zero potential with respect to ground. Power should only be delivered to the rails if PS-ON signal is held at ground potential. This signal should be held at +5VDC by a pull-up resistor internal to the power supply.

5.7 Over Power Protection

This power supply shut down all DC outputs when +5 VDC and +12 VDC outputs are overloaded to the limit. The power supply logic shall latch into the off state requiring a power on cycle to be performed by the operator. The power supply will turn-off within 20 ms of the occurrence of the overload of 110%~150%.

6.0 Physical Characteristics

6.1 Size

100 x 40 x 250(W x H x D) mm sees Appendix I: Mechanical Drawing

6.2 Mounting Requirements

See Appendix I: Mechanical Drawing

6.3 Weight

1.2Kg

6.4 Cooling

Fans: Sanyo (109P0412B3D04) equivalent or better. Airflow from the power supply should be in exhaust direction and shall be rated at 10 CFM minimum.

7.0 Connections

7.1 AC Input Connector

IEC 320 AC Inlet with EMI Filter, 10A/250V

7.2 DC Output Wire Harness List

7.2.1 Connector P1:

(1) **24 PIN (For ATX motherboard) (Optional)**

Connector: Molex 39-01-2200 18AWG

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

Note1: The wire of +3.3V will be 16AWG as customer's requirement

※ 8-Pin Molex 39-01-2080 or Equivalent(For SSI motherboard.)

PIN	SIGNAL	18AWG	PIN	SIGNAL	18AWG
1	Com	Black	5	+12 V1	Yellow
2	Com	Black	6	+12 V1	Yellow
3	Com	Black	7	+12 V1	Yellow
4	Com	Black	8	+12 V1	Yellow

※+12V Power connector (for ATX12V Configurations Only)

Connector: Molex 39-01-2040 or equivalent

Pin	Signal	Wire Color
1	COM	Black
2	COM	Black
3	+12V	Yellow
4	+12V	Yellow

※Peripheral Connector(s)(For Hard Drive.)

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

Pin	Signal	18AWG Wire
1	+12VDC	Yellow
2	COM	Black
3	COM	Black
4	+5VDC	Red

※P11(For Floppy Disk or Control Board)

Connector: AMP 171822-4 or approved equivalent.

Pin	Signal	18AWG Wire
1	+5VDC	Red
2	COM	Black
3	COM	Black
4	+12VDC	Yellow

8.0 Environmental

8.1 Temperature

8.1.1 Operating

50 to 104°F (0 to 40 °C). Derate Linearly to 10% at 50°C

8.1.2 Non-Operating

-4.0 to 140 °F (-20 to 60°C)

8.2 Relative Humidity

8.2.1 Operating

20 to 90 % non-condensing at 122 °F (50°C)

8.2.2 Non-Operating

5 to 95 % non-condensing at 140°F (60°C)

8.3 Altitude

8.3.1 Operating

Sea level to 10,000 feet

8.3.2 Non-Operating

Sea level to 40,000 feet

8.4 Shock

8.4.1 Operating

The power supply shall exhibit no sings of damage or degradation of performance when subjected to a shock of 5g`s for 11 ms, with a 1/2 sine wave for each of the perpendicular axes X, Y and Z.

8.4.2 Non-Operating

The power supply shall exhibit no sings of damage or degradation of performance when subjected to a shock of 30g's for 11 ms, with a 1/2 sine wave for each of the perpendicular axes X, Y and Z.

8.5 Vibration

8.5.1 Operating

The power supply shall be subjected to a vibration test consisting of a 10 to 500 Hz sweep at a

constant acceleration of 0.5g for a duration of one (1) hour for each of the perpendicular axes X, Y and Z. The output voltages shall remain within specification.

8.5.2 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 a duration of one (1) hour for each of the perpendicular axes X, Y and Z.

The power supply shall not incur physical damage or degradation of any characteristics below the performance specifications.

8.6 Power Line Transient

8.6.1 Drop Out

With a full cycle input voltage drop-out at 50Hz, the unit shall operating within the prescribed voltages with a drop-out cycle repetition rate of 500ms.

CONDITIONS	LIMITS
Full load, Nom. Input AC Voltage	Meet all requirements

8.7 Acoustic Noise

The power supply shall be tested in accordance with the standard specifications. The overall sound pressure level is measured with the noise meter placed 1 meter from the nearest vertical surface of center of fan installed in power supply.

CONDITIONS	LIMITS
115 VAC Input, full load of +5V 0.5A of +12V.	Acoustic noise is 50 db maximum

9.0 Regulatory Agency Certification

9.1 RFI/EMI Standards

The power supply, when installed in system, shall comply with the following radiated and conducted emissions standards:

a) Meet FCC part 15, Subpart B, Class B computing devices.

b) CISPR22 (EN55022) Class B.

9.2 Safety Standards (pending)

The power supply shall be certified with the following safety standards,

a) UL, cUL1950 (Information Processing/Business equipment).

b) CB certification

c) TUV

d) CCC

10.0 Reliability

10.1 Mean Time Between failures (MTBF)

Using MIL217E the calculated MTBF = 100,000 hours at 25°C

10.2 Warranty

Date code indicating week and year of manufacture.

Technical information in this specification is subject to change without notice.

The revision of specification will be marked on the cover.

Appendix I: Mechanical Drawing