SPECIFICATION

Model: R6403E 1F

1U 400W
REDUNDANT POWER SUPPLY
EASY HOT-SWAPPABLE
With Active PFC
6-Output ATX

Specification subject to change without prior notice.

TOP MICROSYSTEMS

3261 Keller St.
Santa Clara, CA 95054
Tel: 408-980-9813
Fax: 408-980-8626
E-mail: info@topmicro.com

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1.0 General

This specification describes the physical, functional and electrical characteristics of a 1U 400 watts Redundant Power Supply with power factor correction and hot-swappable 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

100 to 240 VAC, ±10%

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

47 Hz to 63 Hz

2.4 Input Current

6Amps –3Amp

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 50% of rated load and nominal input voltage

2.5.2 Harmonic Distortion

Meet the EN61000-3-2 class “B” 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	50A Max. at 115VAC, 80A Max. at 230VAC No damage shall occur or over stressed input fuse shall not blow

2.7 Line Regulation

CONDITIONS	LIMITS
Full load, 100 to 240VAC	+/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.
3000Vrms, 50Hz for one (1) Minute between the input AC lines and secondary low voltage outputs and shields.
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

There are two choices as below, to be met under all combinations of loading.

Output # Voltage	V1 +5V	V2 +3.3V	V3 +12V	V4 -5V	V5 -12V	V6 5VSB
Max. Load	30A	28A	30A	1.5A	1.5A	2A
Min. Load	3A	0A	1.0A	0A	0A	0A
Load Reg.	±5 %	+/-5%	±5 %	±10 %	±10 %	±5%
Cross Reg.	±5 %	+/-5 %	±5 %	±10%	±10 %	±5%
Line Reg.	±1%	±1%	±1%	±1 %	±1 %	±1%
Ripple & Noise	50mV	50mV	120mV	100mV	120mV	50mV

Note 1: The +5 & +3.3 Volt total output shall not exceed 200 Watts.
Note 2: The +5, +3.3 & +12Volt total output shall not exceed 370 Watts.
Note 3: Regulation tolerance shall include temperature change, warm up drift and dynamic load.

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.

3.4 Overshoot

Any output overshoot at TURN-ON shall not exceed 5% of nominal voltage value.

3.5 Efficiency

65% 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. See Figure 2.

4.2 Power Good Signal

When the power supply is turned off for a minimum of 1.0 second and turned on, the power-good signal as described below will be generated.
The power supply shall provide a power-good signal to indicate proper operation of the power supply. This signal shall be a TTL compatible high level for normal operation; low level for fault conditions.
Power-good shall go to a low level at least 1 ms before the +5V output voltage falls below the regulation limits described in 3.1 DC output Characteristics. The operation

point used as a reference for measuring the 1ms shall be minimum line voltage and maximum load.
All waveform transitions shall be smooth and monotony, i.e. no oscillations.
The power-good signal shall stay low (during POWER-ON) until all output voltages are stable within regulation limits. The power-good signal shall have a TURN-ON delay greater than 100 ms but less than 500 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 +5 Volt and +3.3 Volt output shall have a turn-on rise time of less than 100 ms under all load conditions. Rise time is measured between 0.0 and 2.48/4.75 volts.
The +5 V and +3.3V output shall not vary from a smooth curve by more than 0.5 VP-P during turn-on and turn-off.

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 +5 VDC, +3.3 VDC and +12 VDC outputs are overloaded to the limit. The power supply logic shall into off state and auto restart when the circumstance dispelled. The +5VSB outputs will be internally current limited.

+5 VDC

CONDITIONS	LIMITS
100/240 VAC input	when output current is over to 110% - 130%

+3.3 VDC

CONDITIONS	LIMITS
100/240 VAC input	when output current is over to 110% - 130%

+12 VDC

CONDITIONS	LIMITS
100/240 VAC input	When output current is over to 110% - 130%

5.2 Over Voltage Protection

The power supply shall latch off if the +5 VDC or 3.3VDC or +12 VDC maximum voltage exceeds the limits shown. The AC must be recycled to restart.

+5 VDC

CONDITIONS	LIMITS
All operating	5.6 VDC ─ 6.5 VDC

+3.3 VDC

CONDITIONS	LIMITS
All operating	3.8 VDC ─ 4.3 VDC

+12 VDC

CONDITIONS	LIMITS
All operating	13.6 VDC ─ 15.6 VDC

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.

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 Over Power Protection

The power supply shall shut down all DC outputs when outputs power are overloaded to 110~130%

5.7 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 , -5V 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.

Power On	PS-ON	Power Switch	PS-ON Connector
ON	L	ON	IN
OFF	H	ON	IN
OFF	X	ON	OUT
OFF	X	OFF	X

5.8 Remote Sense

A remote +3.3VDC sense line connector allow for accurate control of the +3.3VDC line directly at load. Due to potential voltage drops across the connector and traces leading to the PCB components, it may be advantageous to implement a +3.3V sense line that remotely monitors the +3.3VDC power level at the load.

6.0 Indicator Function

6.1 Power Fault Signal

The Hot-Swap Redundant Power Supply shall give fault signal (TTL compatible signal) that will indicate the status of the power supply operation.

This signal detects the following conditions:

- ❇ All output voltages V1 to V5 are within regulation.
- ❇ Fan is operating normally
- ❇ Power supply internal temperature is normal

This line has an internal 1KΩ pull up resistor to +5V, and is capable of sinking 20mA, and has a breakdown of 20V.

nGood Low Power Supply Fault	Vol ≤ 0.4V (a) Iol ≤ 20mA
nGood High Power Supply Normal	Voh ≥ 3.5V (a) Ioh ≤ 250uA

6.2 LED Indicator

There will be a bi-color LED to indicate power supply status. When AC is applied to the supply and standby voltages are available the LED shall turn on AMBER. The LED shall turn on GREEN to indicate that all outputs are available. The LED shall turn on AMBER to indicate that the power Supply has failed.

7.0 Physical Characteristics

7.1 Size for power module

W x H x D: 106 x 40.8 x 269.5mm

7.2 Mounting Requirements

See attachment

7.3 Weight

14.3 pounds

7.4 Cooling

Fans: NMB (3110KL-04W-B59) equivalent or better. Airflow from the power supply should be in exhaust direction and shall be rated at 10 CFM minimum.

8.0 Connections

8.1 AC Input Connector

IEC 320 AC Inlet with EMI Filter, 6A/250V

8.2 DC Output Wire Harness List

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

Connector: Molex 39-01-2200 18AWG

Wire Color	Signal	Pin	Pin	Signal	Wire Color
Orange	+3.3VDC	13	1	+3.3VDC	Orange
Blue	-12VDC	14	2	+3.3VDC	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

(2) 20 PIN (For ATX motherboard.)

Connector: Molex 39-01-2200 or approved equivalent see Appendix B

Wire Color	Signal	Pin	Pin	Signal	Wire Color
Orange	+3.3VDC	11	1	+3.3VDC	Orange
BRN.	+3.3V default sense	11			
Blue	-12VDC	12	2	+3.3VDC	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	-5VDC	18	8	PG	Gray
Red	+5VDC	19	9	+5VSB	Purple
Red	+5VDC	20	10	+12VDC	Yellow

(3) P12、P13、P14、P15(For Hard Drive.) See Appendix B.

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

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

(4) P11 (For Floppy Disk or Control Board) see Appendix B.

Connector: AMP 171822-4 or approved equivalent.

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

(5) Auxiliary Power Connector P2 (Optional) see Appendix B.

Connector: Molex 90331-0010 or equivalent

Pin	Signal	Wire Color
1	COM	Black
2	COM	Black
3	COM	Black
4	+3.3VDC	Orange
5	+3.3VDC	Orange
6	+5VDC	Red

(6) +12V Power Connector. See Appendix B

Connector: Molex 39-01-2040 or equivalentP4 (for ATX12V Configurations Only) (Option)

Pin	Signal	20AWG Wire
1	COM	Black
2	COM	Black
3	+12V	Yellow
4	+12V	Yellow

(7) 24-Pin Molex 39-01-2240 or Equivalent (For Dual Althon)

16AWG	SIGNAL	PIN	16AWG	SIGNAL	PIN
Red	5 VDC	1	Red	5 VDC	13
Red	5 VDC	2	Red	5 VDC	14
Black	GDN	3	Black	GDN	15
Black	GDN	4	Purple	5 VR（5Vsb）	16
Green	PWR_ON#	5	Blue	-12 VDC	17
Black	GDN	6	Black	GDN	18
Orange	3.3 VDC	7	Orange	3.3 VDC	19
Orange	3.3 VDC	8	Orange	3.3 VDC	20
Black	GDN	9	Orange	3.3 VDC	21
Black	GDN	10	Black	GDN	22
Yellow	12 VDC	11	Black	GDN	23
Yellow	12 VDC	12	Yellow	12 VDC	24

(8) 8-Pin Molex 39-01-2080 or Equivalent (For Dual Althon)

16AWG	SIGNAL	PIN	16AWG	SIGNAL	PIN
Red	5 VDC	1	Black	GDN	5
Gray	PWRGOOD	2	Yellow	12 VDC	6
Black	GDN	3	Yellow	12 VDC	7
Black	GDN	4	Yellow	12 VDC	8

(9) 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

9.0 Environmental

9.1 Temperature

9.1.1 Operating
50 to 122 °F (0 to 50 °C). Derate Linearly to 75% at 50 °C

9.1.2 Non-Operating
-4.0 to 140 °F (-20 to 60°C)

9.2 Relative Humidity

9.2.1 Operating
20 to 90 % non-condensing at 104°F (40 °C)

9.2.2 Non-Operating
5 to 95 % non-condensing at 122°F (50°C)

9.3 Altitude

9.3.1 Operating
Sea level to 10,000 feet.

9.3.2 Non-Operating
Sea level to 40,000 feet

9.4 Shock

9.4.1 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.

9.4.2 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.

9.5 Vibration

9.5.1 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.

9.5.2 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.

9.6 Power Line Transient

9.6.1 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

9.7 Acoustic Noise

The power supply shall be tested in accordance with the ANSIS12.10-1985 standard specifications. The "A" weighted overall sound pressure level as well as individual octave band levels from 63 Hz to 16,000 Hz 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 40 db maximum

Octave Band Center Frequency (Hz)								A-Weighted
125	250	500	1k	2k	4k	8k	16k	Max. Sum
20	36	42	42	42	36	30	20	40dBA

10.0 Regulatory Agency Certification

10.1 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.

These limits shall be met with a margin of at less 6dB at all applicable frequencies. The unit shall comply with the above limits when tested under all normal working conditions and with all interface cables connected.

10.2 Safety Standards

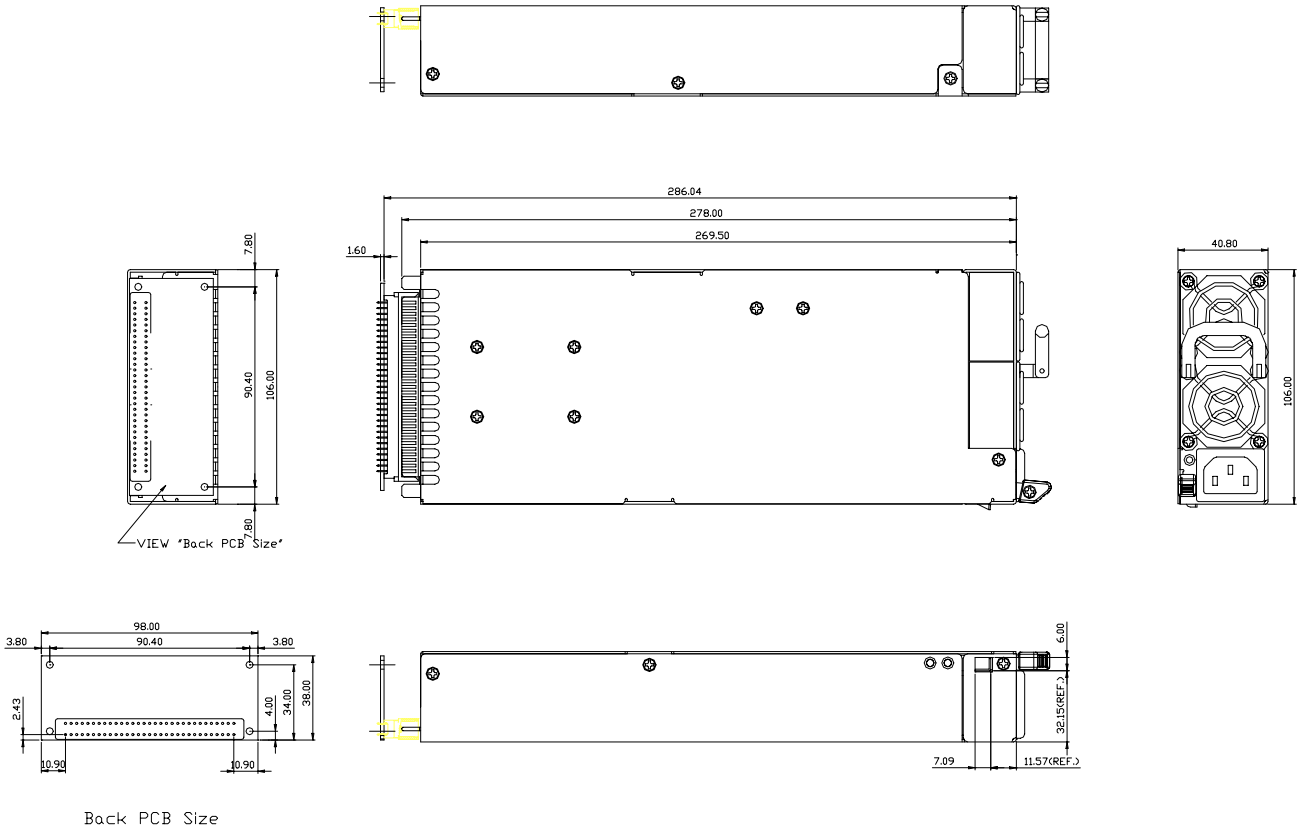
The power supply shall be certified with the following safety standards,
a) UL 1950 (Information Processing/Business equipment).
b) TUV Certification to IEC 950 lst edition with Amendment #1, #2, and EN60950
c) CE Certificate & Test report.

11.0 Reliability

11.1 Mean Time Between failures (MTBF)

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

Appendix I: Mechanical Drawing



Back PCB Size