



# DC

REDUNDANT POWER SUPPLY SPECIFICATION

# CP-49040

**CLAYPOWER**  
C O M P A N Y

REV.00

TEL 626.303.8885 FAX 626.301.0588 11911 Clark St. Suite C Arcadia, CA 91006

[www.claypowercompany.com](http://www.claypowercompany.com)

- 1.0 General**
- 1.1 Parameter Specifications**
  
- 2.0 Input Characteristics**
- 2.1 Input Voltage**
- 2.2 Input Current**
- 2.3 In-Rush Current**
- 2.4 Line Regulation**
- 2.5 Input Leakage Current**
- 2.6 Dielectric Withstand Voltage**
- 2.7 Insulation Resistance**
  
- 3.0 Output Characteristics**
- 3.1 DC Output Characteristics**
- 3.2 Overshoot**
- 3.3 Efficiency**
  
- 4.0 Time Sequence**
- 4.1 Hold-Up time**
- 4.2 Power Good Signal**
- 4.3 +5V Volt and Power Good Output Rise Time**
- 4.4 Start-Up Time**
- 4.5 Dynamic Load Response Time**
  
- 5.0 Protection**
- 5.1 Over Power Protection**
- 5.2 Over Voltage Protection**
- 5.3 Short Circuit Protection**
- 5.4 No Load Operation**
  
- 6.0 System Interface Signal**
- 6.1 Power System Fault Signal**
- 6.2 Alarm Beeping Sound**
  
- 7.0 Physical Characteristics**

- 7.1 Size**
- 7.2 Mounting Requirments**
- 7.3 Cooling**
  
- 8.0 Connectors**
- 8.1 DC Output Wire List**
- 8.2 DC Input**
  
- 9.0 Environmental**
- 9.1 Temperature**
- 9.2 Relative Humidity**
- 9.3 Altitude**
- 9.4 Shock**
- 9.5 Vibration**
- 9.6 Acoustic Noise**
  
- 10.0 Regulatory Agency Certification**
- 10.1 RFI/EMI Standards**
- 10.2 Safety Standard**
  
- 11.0 Reliability**
- 11.1 Mean Time Between Failures(MTBF)**
- 11.2 Warranty**

## 1.0 General

This specification describes the physical, functional and electrical Characteristics of a redundancy 400+400 watts. 6-output, fan-cooled switching power supply.

## 1.1 Parameter Specification

Unless specification otherwise, all parameters must be meet over the limits of temperature, load and input voltage.

## 2.0 Input Characteristics

### 2.1 Input Voltage

Normal	Minmum	Maximumn
-48Vdc	-38Vdc	-72Vdc

### 2.2 Input current

19A (One Power Supply)

### 2.3 In-Rush Current

<u>CONDITION</u>	<u>LIMITS</u>
72Vdc, Full load Turn off 1 sec; turn on again. 25°C Air Ambient cold start.	No damage shall occur or components over stressed, Input Fuse shall not blow.

### 2.4 Line Regulation

<u>CONDITION</u>	<u>LIMITS</u>
Full Load -38 To -72 Vdc input	%1

### 2.5 Input Leakage Current

Input leakage current from line to frame ground will be less than 3.5mA rms.

Condition : -48Vdc

### 2.6 Dielectric Withstand Voltage

Primary to Secondary : 1500Vrms/50Hz for 1 Minute.

Primary to Safety Ground : 1500Vrms/50Hz for 1 Minute.

Also isolation transformers will have been tested prior to assembly into a power

supply units. Any such transformers without a grounded shield will be tested to 1500 Vrms.

## 2.7 Insulation Resistance

Primary to Safety Ground : 500Vdc,50Mohms Minimum.

## 3.0 Output Characteristics

### 3.1 DC Output Characteristics

To be met under all combinations of loading.

Output voltage	V1 +5V	V2 +3.3	V3 +12	V4 -5	V5 -12	Vsb +5
Max.Load	42A	20A	14A	1A	3A	1.0A
Min Load	2A	0A	0.5A	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 %	+/-1%	+/-1%	+/-1%	+/-2%	+/-2%	+/-1%
Noise %	+/-1%	+/-1%	+/-1%	+/-2%	+/-2%	+/-1%

Note1: The +12Volt output of the power supply must be capable of 16Amps peak for 10 seconds. A +/-10% tolerance is permissible. Output voltage is measured at the load and of the output cable.

Note2: Noise bandwidth is from DC to 20MHz. Add 0.1uF/10uF Capacitor at output connector terminals for Ripple And Noise measurement.

Note3: Regulation tolerance shall include temperature change, warm up drift and dynamic load.

Note4: Combined Total Power From +3.3V And +5V Rails Shall Not Exceed 210W.

Note5: The Total Output Power Shall Not Exceed 400W.

### 3.2 Overshoot

Any output overshoot at TURN-ON shall not exceed 10%(+5V/+12V output) and 10%(-5V/-12V output) of nominal voltage value.

### 3.3 Efficiency

60% Mini. @ -48Vdc

## 4.0 Time Sequence

### 4.1 Hold-Up Time

Unit shall continue to supply regulated DC outputs and power good signal for at least 10ms Milliseconds at -48Vdc full load after a loss of DC input voltage which shall be represented by a short circuit at the DC input. See Fig.1.

### 4.2 Power Good Signal

When the power supply is turned off 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 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 input 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 delay greater than 100ms but less than 500ms. See Fig. 1.

#### 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.

#### CONDITION

$I_{OH} = -140\mu A$  Min.

$I_{OL} = 2.8mA$  Min.

#### LIMITS

$V_{OH} = 2.7V$  Min..

$V_{OL} = 0.4V$  Min.

### 4.3 +5V Volt and Power Good Output Rise Time

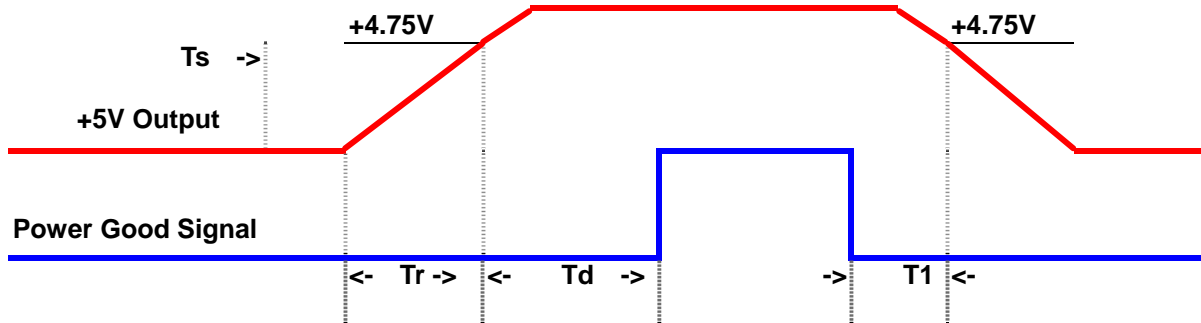
#### 4.3.1 +5 Volt Output Rise Time

The +5V output shall have a turn-on rise time  $T_r$  of less than 100ms under all

load conditions. Rise time is measured between 0.0 and 4.75V.

The +5V output shall not vary from a smooth curve by more than  $0.5V_{p-p}$  during turn-on and turn-off. See fig.1.

#### 4.3.2. Power Good Output Rise



Note:  $T_r \leq 100$  ms,  $T_1 \geq 1$  ms,  $T_d = 100 - 500$  ms.

Fig.1

#### 4.4 Start-Up timing

All output shall be stable and in regulation in less than 2.0 second under all load and line condition. Start-up time  $T_s$  is measured between the DC turn-on and 4.75V on +5V See Fig. 1.

#### 4.5 Dynamic Load Response Time

Transient response is measured by switching the output load from 80 to 100 to 80 percent of its full value at a frequency of 100Hz and 50% duty cycle, step load change is  $0.5A/\mu s$ , The magnitude  $V_r$  is less than  $\pm 5\%$  of +5V and +12V output, the recovery time  $T_r$  is less than 1mS.

#### 5.0 Protection

##### 5.1 Over Power Protection

This power supply shut down all DC output when 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 20ms of the occurrence of the overload.

##### CONDITION

Nominal input

##### LIMITS

When output power is over 120% to 160%

## 5.2 Over Voltage Protection

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

### 5.2.1 +5VDC

#### CONDITION

All operating

#### LIMITS

Max.6.8Vdc

### 5.2.2 +3.3VDC

#### CONDITION

All operating

#### LIMITS

Max.4.30Vdc

### 5.2.3 +12VDC

#### CONDITION

All operating

#### LIMITS

Max.15Vdc

## 5.3 Short Circuit Protection

A short circuit placed on any output shall cause no damage to this unit. The power supply shall be shut down.

## 5.4 No Load Operation

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

## 6.0 System Interface Signal

### 6.1 Power System Fault Signal

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

If one of the power supply unit shut down, the power fault signal could be generated. This signal shall be high level for normal operation; Low level for fault conditions.

### 6.2 Alarm Beeping Sound



The alarm system monitors the power supply failure and provides alarm to indicate the status of the power supply. By checking the LED on the power supply, end users will be able to locate the defective power unit. The alarm system will give a beeping sound to indicate the power supply failure until that particular power unit is replaced.

Beeping sound could be suspended before the failure power supply unit replaced.

## 7.0 Physical Characteristics

### 7.1 Size

See Figure2

### 7.2 Mounting Requirements

See Figure2

### 7.3 Cooling

Fans: NIDEC { D08T-12PG (ME) } or DELTA {AF0812SH-(R00)}

## 8.0 Connections

### 8.1 DC Output Wire List

<u>Connector</u>	<u>Output</u>	<u>Wire Color</u>	<u>Wire Size</u>
P1-1	+3.3V	Brown	18 AWG
P1-1-1	+3.3V Sense	Brown	22 AWG
P1-2	+3.3V	Brown	18 AWG
P1-3	COM	Black	18 AWG
P1-4	+5V	Red	18 AWG
P1-5	COM	Black	18 AWG
P1-6	+5V	Red	18 AWG
P1-7	COM	Black	18 AWG
P1-8	POK	Orange	22 AWG
P1-9	+5VSB	Purple	22 AWG
P1-10	+12V	Yellow	18 AWG
P1-11	+3.3V	Brown	18 AWG
P1-12	-12V	Blue	20 AWG

P1-13	COM	Block	18 AWG
P1-14	PS-ON	Green	20 AWG
P1-15	COM	Block	18 AWG
P1-16	COM	Block	18 AWG
P1-17	COM	Block	18 AWG
P1-18	-5V	White	20 AWG
P1-19	+5V	Red	18 AWG
P1-20	+5V	Red	18 AWG

<u>Connector</u>	<u>Output</u>	<u>Wire Color</u>	<u>Wire Size</u>
P2~P8-1	+12V	Yellow	18 AWG
P2~P8-2	COM	Block	18 AWG
P2~P8-3	COM	Block	18 AWG
P2~P8-4	+5V	Red	18 AWG

<u>Connector</u>	<u>Output</u>	<u>Wire Color</u>	<u>Wire Size</u>
P9-1	+12V	Yellow	20 AWG
P9-2	COM	Block	20 AWG
P9-3	COM	Block	20 AWG
P9-4	+5V	Red	20 AWG

## 8.2 DC Input

Termail Block 3PIN.

## 9.0 Environmemtal

### 9.1 Temperatue

#### 9.1.1 Operating

50 to 122 °F(10 to 50°C).Derate Linearly to 50% at 70°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 10,000feet.

### **9.3.2 Non-Operating**

Sea Level to 40,000 feet.

## **9.4 Shock**

### **9.4.1 Operating**

The power supply shall exhibit no signs of damage or degradation of performance when subjected to a shock of 5g's for 11 ms, with 1 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 signs of damage or degradation of performance when subjected to a shock of 30g's for 11 ms, with 1 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 500Hz 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 voltage shall remain within specification.

### **9.5.2 Non-Operating**

The power supply shall be subjected to a vibration test consisting of a 10 to 300Hz 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 Acoustic Noise**

The power supply shall be tested in accordance with the ANSIS12.10-1985 standard specification. The “A” weighted overall sound pressure level as well as individual octave band levels from 63Hz to 16,000Hz is measured with the noise meter placed 1 meter from the nearest vertical surface of center of fan installed in power supply.

CONDITION

-24Vdc Input, full load of +5V  
0.5A of +12V

LIMITS

Acoustic noise is 40db 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:

- (1) FCC part 15, Subpart B, Class B computing device.
- (2) CISPR22 (EN55022) Class B
- (3) VCCI Class 2.

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

**10.2 Safety Standard**

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

- (1) UL 1950 (Information Processing / Business equipment).
- (2) CUL
- (3) TUV Certification to IEC950 1 edition with Amendment #1, #2, and EN60950
- (4) CE Certificate & Test Report.

## 11.0 Reliability

### 11.1 Mean Time Between Failure(MTBF)

Using MIL217E the calculated MTBF=50,000 hours at 25°C

### 11.2 Warranty

Two(2) years manufacture's warranty.

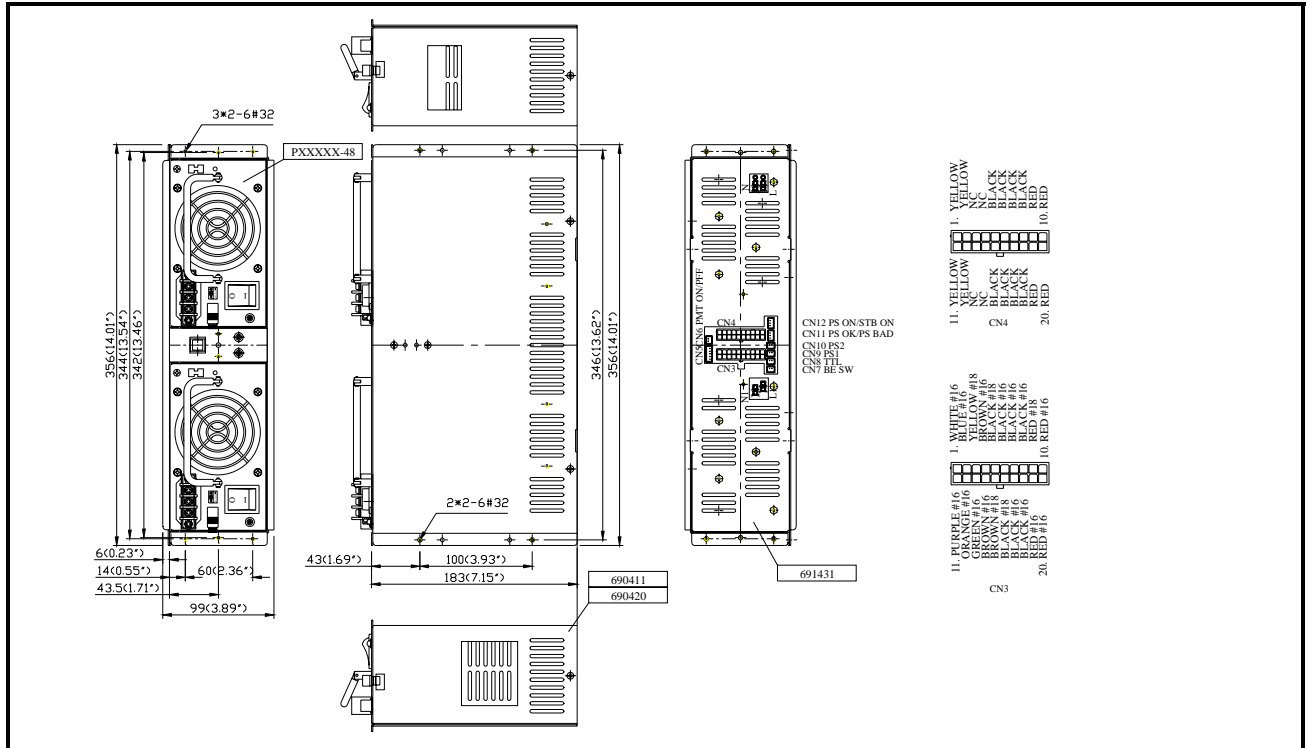
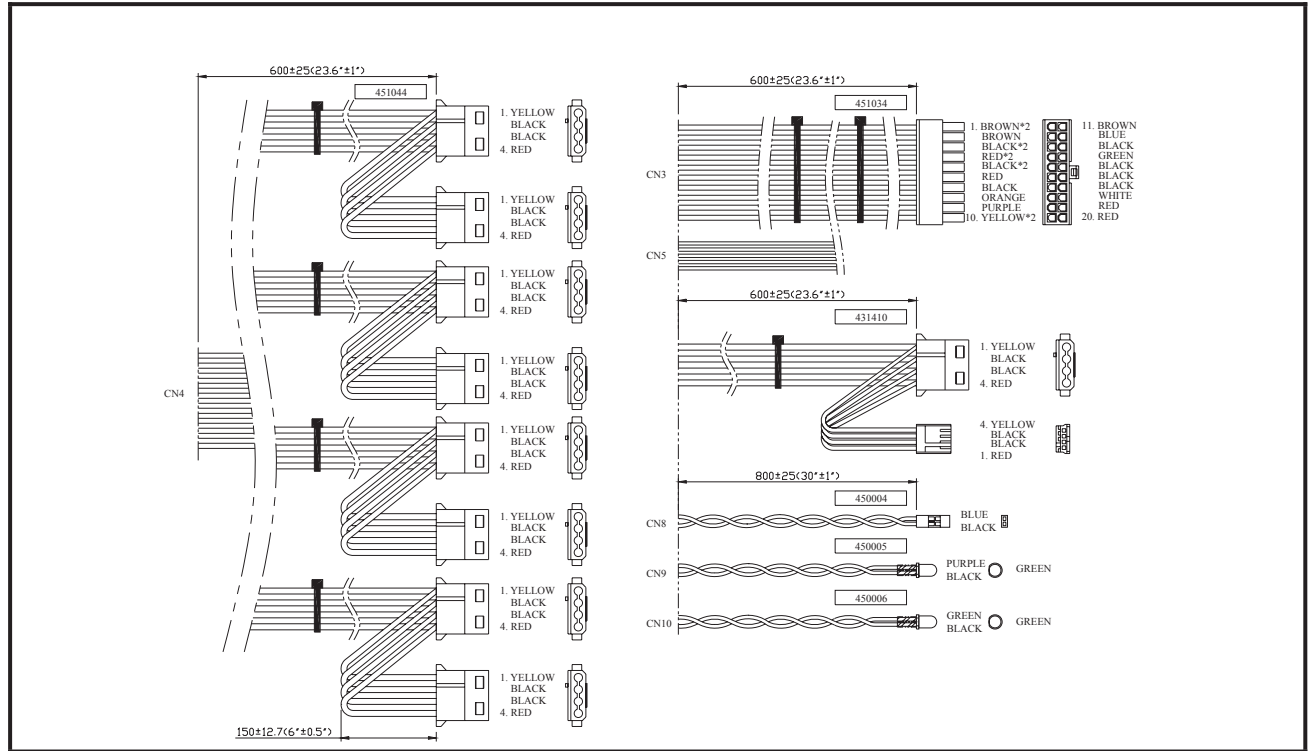


Figure2



Note:Dc Output Cable can Optional.