



MODEL NO. WP507F12

This power supply is a small footprint, AC input power supply. This power supply is capable of supplying 400 watts of output power into 5 DC output voltages.

1.0 INPUT REQUIREMENTS

1.1 AC Input Requirements

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

Table 1-1 Input Rating

Parameter	Min	Nom.	Max	Unit
Vin (Universal)	90	115/230	264	VACrms
Vin Frequency	47	--	63	Hz
lin (115VAC)			8	Arms
lin (230VAC)			4	Arms

1.2 Inrush Current

No damage should occur or component over stressed and input should below 100A half cycle cold start.

1.3 Power Factor

0.95 Typical.

The supply shall have lower than 15% THD over the entire ac voltage range and from 80% dc draw up to max output, with maximum individual current percents as given in IEC 61000-3-4 section 5.1 stage 1. For clarity here, these are given below:

Table 1-2 Total Harmonic Distortion

Harmonic order	Admissible harmonic current I_h/I_1 %
2	4
3	21.6
5	10.7
7	7.2
9	3.8
11	3.1
13	2
15	0.7
17	1.1
19	1.1
Even Harmonics	< than larger of $8/n$ or 0.6



2.0 OUTPUT REQUIREMENTS

2.1 Output Regulation Limits

Table 2-1 Output Voltage Regulation Limits

Parameter	Range	Min	Nom	Max	Unit
+3.3V	±3%	+3.20	+3.3	+3.40	Volts
+5V	±3%	+4.85	+5	+5.15	Volts
+12V	±3%	+11.64	+12	+12.36	Volts
-12V	±5%	-11.40	-12	-12.60	Volts
+5VSB	±5%	+4.75	+5	+5.25	Volts

2.2 DC output ratings

Table 2-2 Maximum Output Loading

Output Voltage	Minimum Current	Maximum Cont. Current	Surge Current
+12V	0.5A	30A	35A
+5V	0.2A	25A	
+3.3V	0A	20A	
-12V	0A	0.8A	
5VSB	0.1A	2A	

Notes:

- (1) +5VSB is a SELV standby voltage that is always present when AC mains voltage is present.
- (2) The maximum continuous average DC output power shall not exceed 400watts.
- (3) The maximum peak DC output power shall not exceed 450watts.
- (4) The maximum combined load on +5V and +3.3V output shall not exceed 120 watts.

2.3 Output Ripple & Noise

Table 2-3 Output Ripple and Noise levels

Output Voltage	Ripple and Noise (p-p)
+12V	120mV
+5V	50mV
+3.3V	50mV



-12V	120mV
5VSB	50mV

2.3.1 Definition

The ripple noise voltage of the output shall be measured at the pins of the output connector when terminated in the load impedance specified in Figure 1. Ripple and noise are measured at the connectors with a 0.1uF ceramic capacitor and A 10uF electrolytic capacitor to simulate system loading. Ripple noise shall be measured under any condition of line voltage, output load, line frequency, operation temperature.

2.3.2 Ripple & Noise voltage test circuit

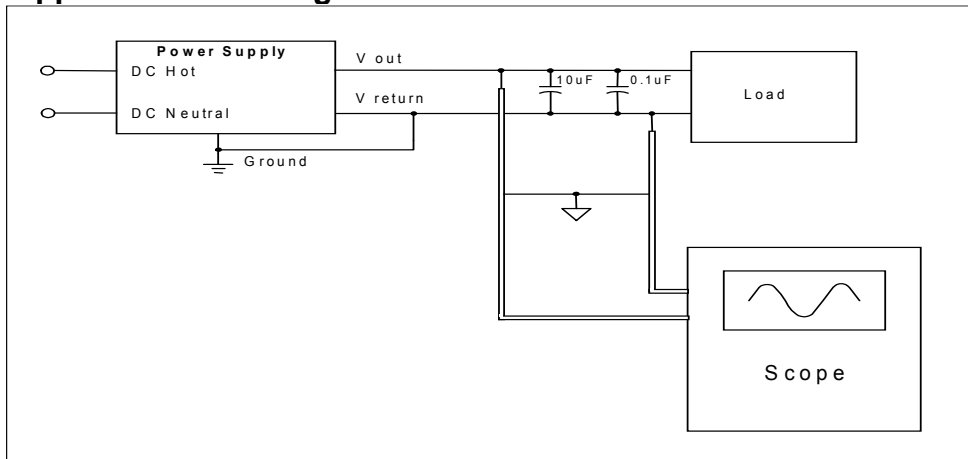


Figure 1. Ripple & Noise voltage test circuit

2.4 Overshoot

Any overshoot at turn on or turn off shall be less 10% of the nominal voltage value, all output shall be within the regulation limit of section 2.1 before issuing the power good signal of section 5.1.

2.5 Efficiency

Power supply efficiency should meet following 4 conditions:

Load	+3.3V(A)	+5V(A)	+12V(A)	-12V(A)	+5Vsb(A)	O/P(W)	Efficiency
1	3	4	18	0	0	250	80%min
2	8	14	16	0	0	290	78%min
3	2	3	5	0	0	82.0	76%min
4	4	12	27	0	0	400	78%min

3.0 PROTECTION

3.1 Over current protection

This power supply shall have current limited to prevent the +3.3V, +5V, +12V outputs from exceeding Table 3-1. If the current limits are exceeded, the power supply shall shutdown and latch off with a 10~30ms delay. The latch will be cleared by recycling the PSON signal or an AC power interruption. The power reset time will be 3 Sec max. to clear latch condition.



Table 3-1 Current Limit

Output Voltage	+5V	+3.3V	+12V
Current Limited Range	30 ~ 42 A	25 ~ 35 A	32 ~ 40 A

3.2 Over voltage protection

In an over voltage fault occurs, the supply will catch all DC output into a shutdown state when +5V & +12V & +3.3V outputs exceed 130% of its maximum value.

3.3 Short circuit

A short on any output shall cause the power supply outputs to decrease to zero. Short circuiting any output to ground, either intermittently or continuously shall not cause any damage to the power supply.

3.4 No load operation

The power supply can be powered up under a zero load condition. All outputs shall stay within regulation while the +12V output is in a zero load condition.

3.5 Output transient response

All outputs of the power supply must remain in regulation (as set forth in section 2.1) when an instantaneous change in load of 50% is applied starting at full load. That is, the load shall vary from 100% to 50% and back, repetitively to check performance. The voltage regulation limits shall be maintained over the input range defined in section 1.1. The power supply shall maintain output voltage regulation when simultaneous 50% load steps are applied to the 12V, 5V, and 3.3V outputs. Such load changes are limited to the maximum as limited by the combined power in section 2.2. The load transient repetition rate shall be tested between 50 Hz and 5 kHz at duty cycles ranging from 10%-90%.

3.6 Output capacitive loading

The power supply should be able to power up and operate under the following capacitive loads.

Table 3-2 Output Capacitive Loading

Output Voltage	Capacitive Load (uF)
+12V	20,000
+5V	10,000
+3.3V	6,000
-12V	350
5VSB	350

3.7 Remote sense

The +5V, +3.3V and +12V outputs have provisions for remote sensing to compensate for up to 30mV, 60mV and 106mV respectively, of cable voltage drops.



3.8 Closed-loop Stability

The power supply should be unconditionally stable under all line/load/transient load conditions including capacitive loads specified in Section 3.6. A minimum of 45 degrees phase margin and 10 dB gain margin is recommended at both maximum and minimum loads.

4.0 POWER SUPPLY SEQUENCING

4.1 Power on timing

The +12VDC and +5VDC output levels must be greater than or equal to the +3.3VDC level at all times during power up and normal operation. The time between the +12VDC or +5 VDC output reaching minimum regulation level and +3.3 VDC reaching its minimum regulation level must be less than or equal to 20 ms.

4.2 Turn on time

Turn on time is defined as the time from when PS_ON# is pulled low to the time that +3.3V, +5V, and +12V outputs are within regulation parameters set in section 2.1. The turn on time shall be less than 500ms ($T1 < 500ms$).

4.3 Rise time

The outputs shall rise from less than or equal to 10% of nominal voltage to within regulation ranges specified in Table 2-1 within 0.1 ms to 20 ms ($0.1ms \leq T2 \leq 20ms$). There must be a smooth, continuous, and monotonic transition of each DC output from 10% to 90% of the final set point within the regulation band while the supply is loaded as specified in 2.2.

4.4 Hold up time

The power supply should maintain output regulation for a minimum of 17ms after loss of input power ($T5 > 17ms$).

4.5 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.

Table 4-1 PS_ON# Signal Characteristics

	Min	Max
V _{IL} , Input Low Voltage	0.0V	0.8V
I _{IL} , Input Low Current (V _{IN} = 0.4V)		-1.6ma
V _{IH} , Input High Voltage (I _{IN} = -200 uA)	2.0V	
V _{IH} , open circuit, (I _{IN} = 0)		5.25V

4.6 Timing diagram

The timing relationships specified throughout section 4.1~4.5 are shown here in Figure 2 is a reference for signal timing for main power connector signals and rails.

$T1 < 500\text{ ms}$, $0.1\text{ ms} \leq T2 \leq 20\text{ ms}$, $100\text{ ms} < T3 < 500\text{ ms}$, $T4 \leq 200\text{ us}$,

$T5 > 17ms$, $T6 > 1ms$.

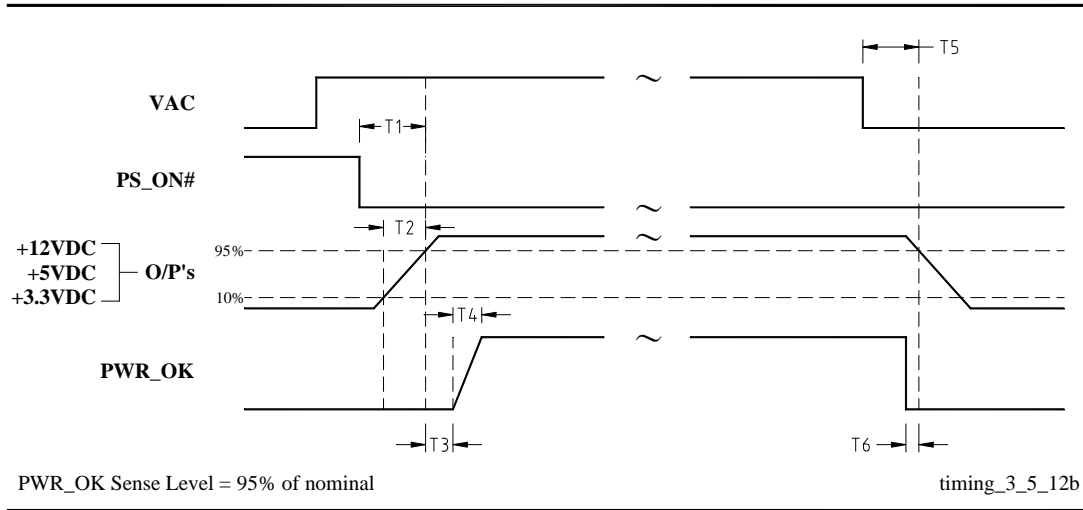


Figure 2. Power Supply Timing Diagram

5.0 SIGNAL REQUIREMENTS

5.1 Power Good Signal (see Figure 2)

At the power on, the power good signal shall have a turn on delay of at least 100 ms but not greater than 500 ms after the output voltage have reached their respective minimum sense levels. The power good signal shall have a rise time measured (from 10% to 90%) of less than 200 microseconds. At turn off, the power good signal shall go to a down level at least 1 ms before any voltage falls below the regulation limits described in section 2.1.

Table 5-1 PWR_OK signal characteristics

Signal type	TTL compatible
Logic level low	< 0.4 V while sinking 4ma
Logic level high	Between 2.4 and 5V while sourcing 200 uA
High state output impedance	1K ohm from output to common
PWR_OK delay	100 ms < T3 < 500 ms
PWR_OK Risetime	T4 ≤ 200us
Input loss to PWR_OK hold up time	T5 ≥ 17 ms
Power Down warning	T6 ≥ 1 ms

6.0 ENVIRONMENT

6.1 Operation

Temperature	0 to 50DEG.C
Relative Humidity	10 to 85% , non-condensing



6.2 Shipping and Storage

Temperature	-20 to 70DEG.C
Relative Humidity	5 to 95% , non-condensing

6.3 Altitude

Operating	10,000FT max
Storage	50,000FT max

6.4 Cooling

The power supply shall provide forced air cooling with a 40mm internal cooling fan.

6.5 Shock and Vibration

6.5.1 Shock non-operating

30G trapezoidal wave, 11 ms.

Half sine wave pulse in both directions on three mutually perpendicular axes.

6.5.2 Vibration non-operating

0.01G per Hz at 5 Hz, sloping to 0.02G per Hz at 20 Hz and maintaining 0.02 per Hz from 20Hz to 500Hz. The duration shall be 10 minutes per axis for all three axes.

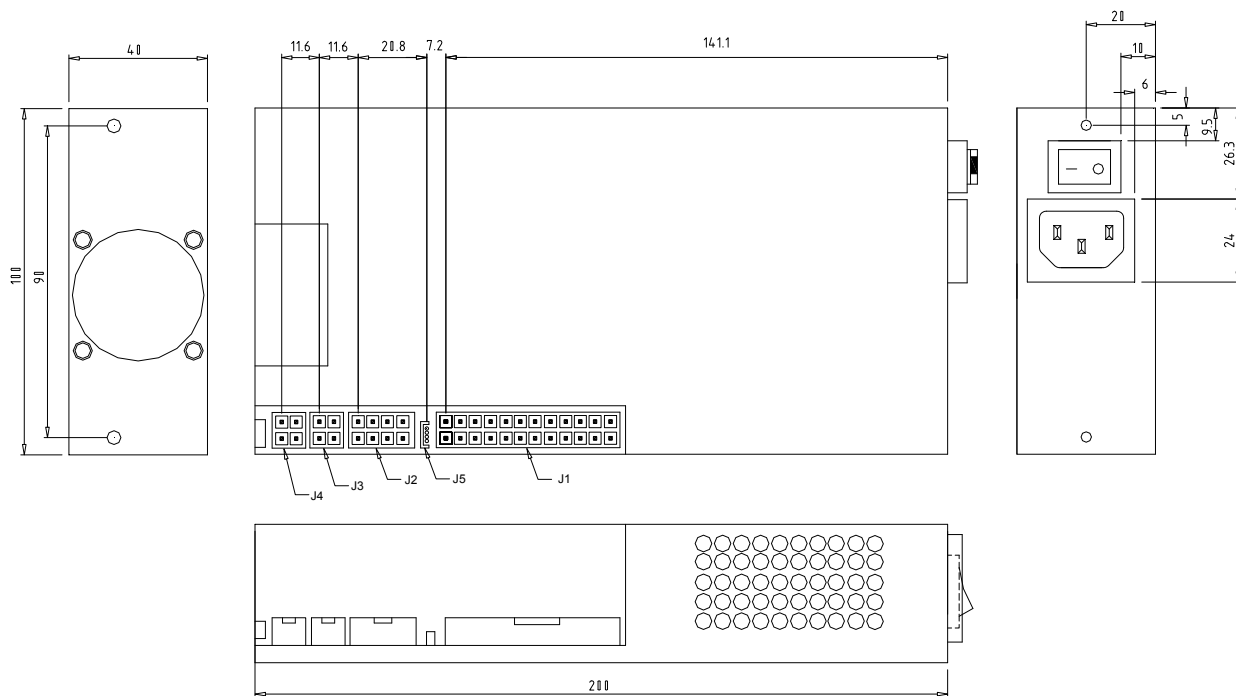
6.5.3 Thermal shock non-operating

-20DEG.C to +70DEG.C, 50 cycles, transition time not to exceed 5 minutes, duration of exposure to temperature extremes shall be 30 minutes.

7.0 Mechaanical Requirements

7.1 Outline

Figure 3 Power Supply Outline Drawing



Note: The back-plane bracket fit screw length limit to 6.5mm max.



7.2 Input connector

Input power is through standard IEC320 / C14 15A/250V(UL/cUL), 10A/250V(VDE) connector.

7.3 Output connectors

Output is through five connectors. The first is J1 (**Molex 39-28-1243 or equivalent**)

Table 7-1 J1 Pin Assignments

Pin	Function	Pin	Function
1	+3.3V	13	+3.3V
2	+3.3V	14	-12V
3	GND	15	GND
4	+5V	16	PS_ON
5	GND	17	GND
6	+5V	18	GND
7	GND	19	GND
8	PWR_OK	20	N.C.
9	+5VSB	21	+5V
10	+12V	22	+5V
11	+12V	23	+5V
12	+3.3V	24	GND

The second connector, J2 (**Molex 39-28-1083 or equivalent**)

Table 7-2 J2 Pin Assignments

Pin	Function
1	GND
2	GND
3	GND
4	GND
5	+12V
6	+12V
7	+12V
8	+12V

Both J3 and J4 are **Molex 39-28-1043 or equivalent**.



Table 7-3 J3 Pin Assignments

Pin	Function
1	+12V
2	GND
3	+5V
4	GND

Table 7-4 J4 Pin Assignments

Pin	Function
1	+12V
2	GND
3	+5V
4	GND

J5 is Amp 173981-4 or equivalent.

Table 7-5 J5 Pin Assignments

Pin	Function
1	+5VSNS
2	+3.3VSNS
3	+12VSNS
4	GND SNS

8.0 SAFETY Requirments

8.1 Underwriters Laboratory (UL) recognition.

The power supply must be certified to UL 60950-1.

8.2 Canadian Standards Association (CSA) approval.

The power supply must be certified to CSA C22.2 NO.60950-1.

8.3 The power supply must be certified to EN60950-1.

8.4 The power supply must be bear the German Bauart Mark from TUV or VDE.

9.0 ELECTROMAGNITIC COMPATIBILITY (EMC)



9.1 IEC 801-2 ESD (IEC 61000-4-2)

9.2 IEC 801-3 Radiated electrical field requirement (IEC 61000-4-3)

9.3 IEC 801-4 BURST (IEC 61000-4-4)

9.4 IEC 801-5 Surge Voltages.

9.5 EN55022 Class A , Radio interference (CISPR 22).

9.6 FCC Part 15, Subpart J Class A , 115VAC operation.

10.0 RELIABILITY

Mean Time Between Failures (MTBF) :

The MTBF of the power supply can be calculated with the Part-Stress Analysis method of Bellcore using the quality factors listed in Bellcore.

10.1 A target calculated MTBF of the power supply is greater than 500,000 hours under the following condition: 120Vac Input , Full rated load , 25°C ambient .

10.2 A target calculated MTBF of the power supply is greater than 150,000 hours under the following condition: 120Vac Input , Full rated load , 50°C ambient .