


APPLICATION					REVISION	
DESCRIPTION	DATE	REV	ECO	APPROVED	USED ON	NEXT ASSY
RELEASE FOR PILOT	27APR 2000	3	HP000021	CHRIS SIT	CVN300-96P01A	724885-251
CHANGE PRE PRCO	25MAY 2000	3A	HP000100	CHRIS SIT	CVN300-96P01A	724885-251
RELEASE TO 9A	9Jun 2000	9A	HE000225	CHRIS SIT	CVN300-96P01A	724885-251
RELEASE TO A	3 Aug 2000	A	HE000314	CHRIS SIT	CVN300-96P01A	724885-251
RELEASE TO B	22 Dec 2000	B	10008183		CVN300-96P01A	724885-251
CHANGE P/N TO 7 DIGITS FROM 975200-01	13 Jul 2001	A	10011696	CHRIS SIT	CVN300-96P01A	

	APPROVALS	DATE		
	DRAWN W L YAM	05/16/2001		
	CHECKED ROGER YU	07/01/2001		
MATERIAL :	P.E.MGR. CHRIS SIT	07/19/2001	DESCRIPTION	SIZE
	M.E.MGR. MICHAEL WONG	07/24/2001	Product Specification CVN300-96P01A	A4
FINISH :	QLTY.MGR.		DRAWING NO 9700402-0000	REV A
	RELEASED		SCALE NONE	SHEET 1 OF 22

CVN300 – 96P01A

THIS SPECIFICATION DEFINES
THE REQUIREMENT OF A MULTIPLE OUTPUTS
AC TO DC SWITCHING POWER SUPPLY WITH
UNIVERSAL INPUT CAPABILITY AND
300 WATTS MAXIMUM CONTINUOUS OUTPUT POWER

REVISION HISTORY

REVISION	DESCRIPTION	DATE	PREPARED BY
1	Preliminary	4 February 2000	Chris.Sit
3	Section 1.2 : Change wording current limit protection to short circuit protection. Section 2.2, 2.8, 4.4 & 5.1 : Correct typing error Section 3.6 : Add resistive load as reference for measurement Section 4.1 : Remove 240VA requirement Section 4.2 : Include 240VA requirement Section 7.4 : Remove mechanical shock section Section 7.5 : Add random vibration conditions Section 7.7 : Add CE Mark requirement Section 7.4 to 7.6 : Rearrange section no. Section 6.3: Correct connector P9 pin assignment in Fig.7.	24 March 2000	Roger Yu
9A	Roll revision from 3	6 Jun 2000	Roger Yu
A	Section 7.6: Delete CCIB Change wording for CSA Section 3.2: Add max. cont. 300W and max. combined load on +3.3VDC & +5VDC statements Section 6.2.2:Correct P9's wire gauge	25 Jul 2000	Roger Yu
A	Change P/N to 7 digits from 975200-01, Section 7.6: Change CSA to cUL mark.	16 May 2001	W L YAM

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1.0 INTRODUCTION

1.1 SCOPE

The scope of this document is limited to the requirements of a standard power supply intended for entry-level server that requires a single power supply. Its design leverage comes from the ATX style power supply with universal input capability, remote on/off, auxiliary standby output and electrical characteristics per Table 1.

1.2 SUPPLY OVERVIEW

Table 1. Power Supply Overview

Form factor		Standard ATX (150x140x86 mm)	
Output power		300 watts maximum continuous	
Efficiency		70% at full load	
Power factor		Greater than 0.95 at full load	
Operating temperature		0 to 50 deg.C	
Fan control		Variable speed fan control	
Fan monitoring		Fan speed monitoring signal	
Over voltage protection		Latch mode on +3.3V, +5V and +12V	
Short circuit protection		Latch mode on all outputs	
Output voltage	Regulation	Min. current (A)	Max. current (A)
+3.3V	+/- 4%	0.5	16
+5V	+/- 4%	3	26
+12V	+/- 4%	0.75	10
-12V	+/- 10%	0	0.5
+5VSB	+/- 5%	0	0.8

2.0 ELECTRICAL INPUT CHARACTERISTICS

2.1 OPERATING INPUT RANGE

The power supply will operate over the entire input range as described below, no range switching or line range selection will be required.

Parameter	Min.	Nom.	Max.	Unit
Input line voltage Vac	90	115/230	264	Vrms
Vac frequency	47	50/60	63	Hz
Line current at 90 Vrms	/	5	/	Arms
Line current at 264 Vrms	/	3	/	Arms

2.2 AC LINE FUSE

The power supply will incorporate AC line fusing acceptable for all safety agency requirements. Power supply under nominal operating conditions shall not cause the fuse to blow unless a component in the supply has failed. This includes AC inrush current during start up and DC output load short circuit conditions.

2.3 AC INRUSH CURRENT LIMITING

Repetitive on/off cycling of the AC input voltage would not damage the power supply or cause the line fuse to blow. AC inrush current shall not exceed 65A peak at turn on under any output loading conditions when tested with worst case for the rated line input voltage.

2.4 AC LINE DROPOUT

Applying an input voltage below the minimum specified in Section 2.1 shall not damage the power supply unit.

If the input to the power supply is interrupted for longer than the hold up time, the supply must not latch itself off in such a way that it cannot power up normally when input is restored.

2.5 HOLD UP TIME

The power supply unit shall sustain no loss of performance during a minimum of one cycle dropout or 20 msec. of AC input voltage at maximum output load as specified in Section 3.2, the PW-OK signal shall remain valid during the hold up period.

2.6 POWER FACTOR CORRECTION

The power supply unit shall comply with line harmonics requirement in accordance with the EN61000-3-2 and JEIDA MITI standards. The input power factor must be greater than 0.95 over all input voltages at maximum output loading

2.7 EFFICIENCY

The power supply will have a minimum efficiency of 70% at maximum loading conditions under any line input within the limits specified in Section 2.1.

2.8 INPUT LINE TRANSIENT

All output voltages will meet performance criteria listed when subjected to input power line disturbances as defined below. The power supply will be loaded to 50% of the maximum load condition as specified in Section 3.2 except for the dropout tests where loading will be 100%.

Table 2. AC Line Sag Transient Performance

Line Voltage Vrms	Line Frequency Hz	SAG %	Duration msec	Performance Criteria
230	50	15	15 min.	No loss of function
230	50	30	20	No loss of function
230	50	50	100	No loss of function
90	60	11	500	No loss of function
180	50	11	500	No loss of function
115	60	100	20	No loss of function

Table 3. AC Line DropOut Performance

Line Voltage Vrms	Line Frequency Hz	DropOut %	Duration msec	Performance criteria
115	60	100	500	Self-recoverable
230	50	100	500	Self-recoverable

Table 4. AC Line Surge Transient Performance

Line Voltage Vrms	Line Frequency Hz	Surge %	Duration msec	Performance criteria
240	50	30	10	No loss of function
264	50	11	500	No loss of function
132	60	11	500	No loss of function

3.0 ELECTRICAL OUTPUT CHARACTERISTICS

3.1 OUTPUT REGULATION

The DC output voltages shall be subjected to the conditions described in Section 2.1 within their respective load range as defined in Section 3.2. Under these conditions, the output voltage levels will remain within regulation limits as defined below when measured at the point of load (or at the remote sense points if available).

Parameter	Tolerance	Min.	Nom.	Max.	Unit
+3.3V	+/- 4%	+3.17	+3.30	+3.43	V
+5V	+/- 4%	+4.80	+5.00	+5.20	V
+12V	+/- 4%	+11.52	+12.00	+12.48	V
-12V	+/- 10%	-10.80	-12.00	-13.20	V
+5VSB	+/- 5%	+4.75	+5.00	+5.25	V

3.2 OUTPUT CURRENT RATING

The power supply shall regulate within their specified limits over the following load ranges.

Load Range: Minimum Loading

Parameter	Min.	Nom.	Max.	Unit
+3.3V	0.5	/	3	A
+5V	3	/	12	A
+12V	0.75	/	5	A
-12V	0	/	0.5	A
+5VSB	0	/	0.8	A

Load Range: Maximum +3.3V Loading

Parameter	Min.	Nom.	Max.	Unit
+3.3V	0.5	/	16	A
+5V	8	/	22	A
+12V	3	/	10	A
-12V	0	/	0.5	A
+5VSB	0	/	0.8	A

Load Range: Maximum +5V Loading

Parameter	Min.	Nom.	Max.	Unit
+3.3V	0.5	/	11	A
+5V	8	/	26	A
+12V	4	/	10	A
-12V	0	/	0.5	A
+5VSB	0	/	0.8	A

1. Maximum continuous total DC output power should not exceed 300 Watts.
2. Maximum continuous combined load on +3.3VDC and +5VDC outputs shall not exceed 167Watts.

3.3 REMOTE SENSING

The power supply uses remote sensing wires on the +5V and +12V outputs to achieve regulation at the P1 connector, these wires are to be crimped into P1 at the output connector. The remote sense pin for +3.3V is located at the P13 connector as defined in Section 6.2.2

If the remote sense connection is lost to any of these outputs, the internal resistive feedback of the power supply will maintain the output level and prevent over voltage trip.

3.4 OUTPUT RIPPLE AND NOISE

Ripple and noise are defined as periodic or random signal over a frequency of 0 to 20MHz bandwidth. A resistive load shall be used as a reference for this measurement. The output shall be bypassed by a 0.1uF ceramic capacitor in parallel with a 10uF electrolytic capacitor at the point of load.

Parameter	Min.	Nom.	Max.	Unit
+3.3V	/	/	50	mVp-p
+5V	/	/	50	mVp-p
+12V	/	/	120	mVp-p
-12V	/	/	120	mVp-p
+5VSB	/	/	50	mVp-p

3.5 TRANSIENT RESPONSE

The following transient loads are to be applied to the respective output at nominal AC input line voltages as described in Section 2.1. The output voltages will remain within regulation limits as specified in Section 3.1 for the load steps defined below. The load slew rates will not be greater than 0.2 A/usec, bound by repetition rates of 50 Hz to 10 kHz.

Parameter	Max. Load Step (A)	Slew Rate (A/usec)
+3.3V	3.2	0.2
+5V	5.2	0.2
+12V	5.0	0.2

3.6 POWER TIMING

Output voltages must reach their nominal settings within 1.5 seconds after power on. The output voltage then must rise from 10% to within regulation limits in a maximum of 70 msec as measured at full load on each output. Resistive load shall be used as a reference for this measurement.

The rise time of +3.3V and +5V must track in such a way that the difference does not exceed 2.25V at any time during turn on.

The +3.3V, +5V and +12V shall reach regulation within 100 msec of each other.

3.7 CAPACITANCE LOADS

The power supply shall be capable of powering up and operating normally with the following capacitance simultaneously present on the respective voltage output.

Parameter	Min.	Nom.	Max.	Unit
+3.3V	/	/	10,000	uF
+5V	/	/	29,000	uF
+12V	/	/	5000	uF
-12V	/	/	350	uF

4.0 PROTECTION

The power supply unit shall automatically shutdown in a latch off mode under the conditions described below.

4.1 OUTPUT SHORT CIRCUIT

The power supply unit shall limit and protect itself such that a short from output to return shall not result in any damages to the power supply under the input conditions specified in Section 2.1. An output short circuit is defined as any output impedance of less than 0.1 ohm.

Upon removal of any short circuit fault, the power supply shall recover to its normal operation after power cycling per Section 4.4.

The +5VSB output must be capable of being shorted indefinitely. The power supply will shut down upon a short circuit of the +5VSB and will recover automatically once the short circuit fault is removed.

4.2 OVER CURRENT LIMIT

The power supply must adhere to the 240VA limits as defined in the regulatory document, CSA C22.2 No.234, Level 3.

Over current is a fault defined as a 10 A/sec current ramp, starting from full load applied to each individual output. The power supply unit will eventually latch off when the output load reaches a predefined level as described below for references.

Parameter	Min.	Nom.	Max.	Unit
+3.3V	/	/	30	A
+5V	/	/	40	A
+12V	/	/	17	A

4.3 OUTPUT OVER VOLTAGE

The power supply shall shutdown in a latch off mode in response to an output over voltage as defined below

Parameter	Min.	Nom.	Max.	Unit
+3.3V	3.8	/	4.5	V
+5V	5.6	/	6.5	V
+12V	13	/	14.5	V

4.4 RESET AFTER SHUTDOWN

If the power supply latches into a shutdown mode due to a fault on its main outputs, the power supply will return to its normal operation only after the fault has been removed and the power supply goes through a power cycling.

A power cycling is defined as:

1. Removing AC input power for a minimum of 1 second, or
2. De-asserting PS-ON signal for a minimum of 1 second

5.0 POWER CONTROL SIGNALS

5.1 REMOTE ON / OFF CONTROL (PS-ON)

The PS-ON signal is required to remotely turn on or off the power supply unit. This is an active low signal that enables the DC output (+3.3V, +5V, +12V, -12V) power rails.

Provision for de-bouncing will be included in the PS-ON circuitry to prevent the power supply unit from oscillating on and off at start up. This signal shall be held at 5Vdc by a 1k ohm resistor internally pull up to the +5VSB output.

PS-ON Signal Characteristic		Min.	Max.	Unit
Input low voltage	ViL	/	0.8	V
Input low current (at Vin=0.4V)	IiL	/	-1.6	mA
Input high voltage (at Iin= -200uA)	ViH	2.0	/	V
Open circuit (at Iin=0)	ViH	/	5.25	V

5.2 STANDBY VOLTAGE (+5VSB)

+5VSB refers to a standby voltage that is used to bias circuits requiring power during the powered-down state of all power rails. It is also required for the implementation of PS-ON and other system circuits that must stay powered when the system is turned off.

Following the removal of AC power, the +5VSB output will remain at its steady state value until such time as it begins to decrease in voltage. The decrease will be monotonic in nature dropping to 0.5 volts. There will be no other perturbations of this voltage at or following removal of AC power.

5.3 POWER GOOD SIGNAL (PW-OK)

This is a power good signal and is asserted high internally by the power supply unit to indicate that all outputs are within their respective regulation limits. When this signal is asserted high, the power supply operates within the specification limits as defined in section 3.0. The start of the PW-OK delay time is inhibited as long as any power supply output is in current limit.

Before any output falls below regulation limit, (or when AC power has been removed for a time greater than the hold up time as discussed in section 2.5) so that the power supply operation is no longer guaranteed, PW-OK is then de-asserted to a low state. The PW-OK signal also provides a minimum of 1 msec warning before any output drops out of regulation.

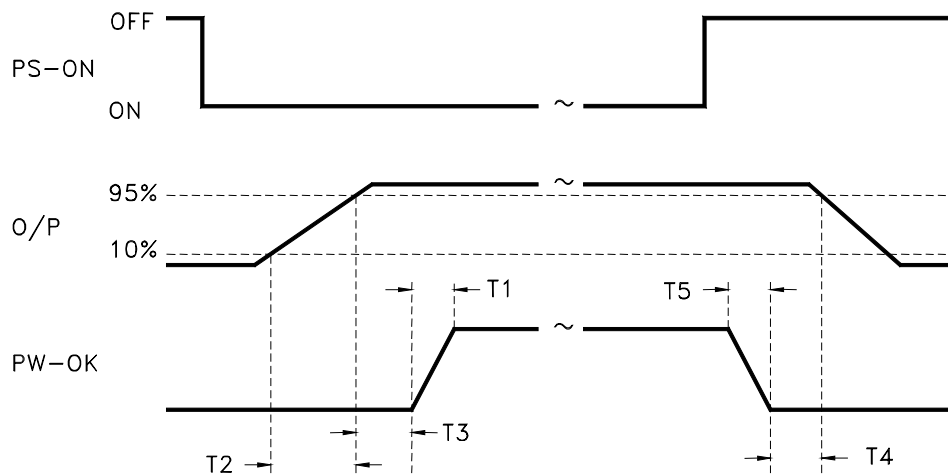


Table 5. PW-OK Signal Characteristics

Signal type	Open collector, TTL compatible
Logic level low	<0.4V while sinking 4mA
Logic level high	3.5V min.
High state output impedance	1k ohm from output to com
PW-OK delay time	100 msec < T3 < 1500 msec
PW-OK rise time	T1 < 300 usec
PW-OK fall time	T5 < 300 usec
Power down warning	T4 > 1 msec
Output ramp rate	5 msec < T2 < 70 msec
Delay from AC loss to PW-OK low	> 20 msec
Delay from AC loss to o/p out of regulation	> 21 msec
PW-OK pull-up resistor	1k ohm to +5V

5.4 FAN CONTROL SIGNAL (FanC)

The FanC signal is a fan speed and shut down control signal. The implementation of this signal allows the system to request control of the power supply fan from full speed to off by a variable voltage from 12 Vdc to 0 on this pin.

- ❑ If a voltage level of 1 volt or less is sensed by the power supply at this pin, the fan is requested to shut down.
- ❑ If a voltage level of 10.5 volts or higher is being supplied to this pin, the fan is requested to operate at high speed.
- ❑ If a voltage level of between 2 to 3 volts is being supplied to this pin, the fan is requested to operate at low speed.

The fan control in the power supply may be implemented so that it allows variable speed operation of the fan, depending on the voltage level supplied to the FanC pin.

In case of over temperature conditions, the power supply unit is designed with the ability to override the FanC operation.

5.5 FAN MONITOR SIGNAL (FanM)

The FanM signal is an open collector; two pulse per revolution tachometer signal from the power supply fan. The signal stops cycling during a rotor lock state: the level is either high or low. This signal allows the system to monitor the power supply for fan speed or failures

6.0 MECHANICAL REQUIREMENTS

6.1 MECHANICAL OUTLINE

The chassis for this entry-level power supply is designed using the PS/2 type form factor, refer to Figure 6 below.

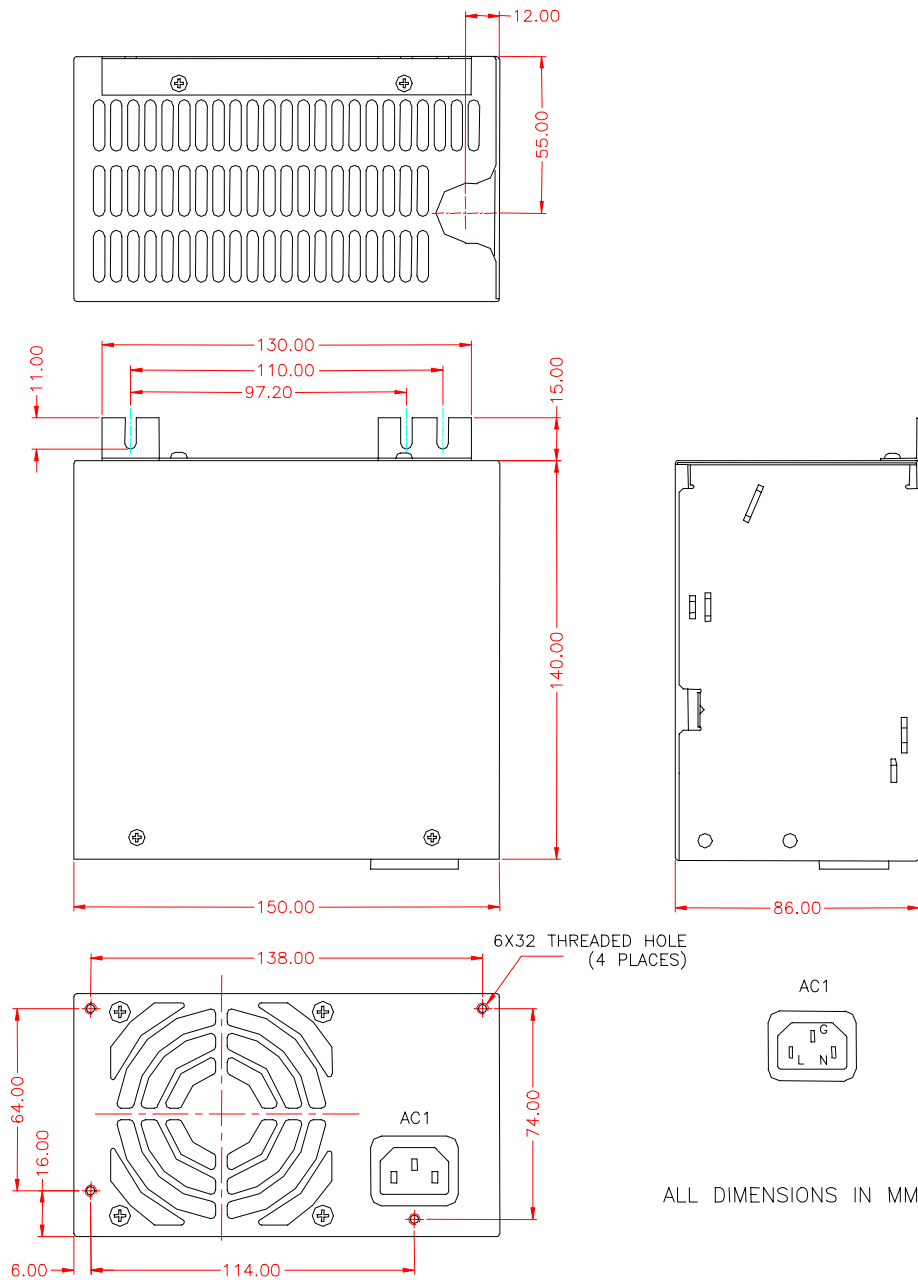


Figure 6. Power Supply Enclosure

6.2 ELECTRICAL INTERFACE

6.2.1 AC INLET

The AC input connector is an IEC 320 C-14 power inlet rated for 15A / 250VA.

6.2.2 OUTPUT CONNECTORS

The following tables provide the components detail on color codes and pin out configuration on the various connectors used on the output harness.

Main Power connector P1: 24 Pin Molex 39-01-2240 or equivalent

PIN	Signal	18 AWG color	PIN	Signal	18 AWG color
1	+3.3V	Orange	13	+3.3V	Orange
2	+3.3V	Orange	14	-12V	Blue
3	COM	Black	15	COM	Black
4	+5V	Red	16	PS-ON	Green
5	COM	Black	17	COM	Black
6	+5V	Red	18	COM	Black
7	COM	Black	19	COM	Black
8	PW-OK	Gray	20	N.C.	
9	+5VSB	Purple	21	+5V	Red
10	+12V	Yellow	22	+5V	Red
11	+12V	Yellow	23	+5V	Red
12	+3.3V	Orange	24	COM	Black

The maximum current for each pin in P1 is 6A

Peripheral Power connectors P2 to P8, P11, P12: Amp 1-480424-0 or equivalent

PIN	Signal	18 AWG color
1	+12V	Yellow
2	COM	Black
3	COM	Black
4	+5V	Red

Floppy Power connectors P9: Amp 171822-4 or equivalent

PIN	Signal	22 AWG color
1	+5V	Red
2	COM	Black
3	COM	Black
4	+12V	Yellow

Auxiliary Power connector P13: 10 Pin Molex 39-01-2100 or equivalent

PIN	Signal	24 AWG color	PIN	Signal	24 AWG color
1	FanM	White	6	N.C.	
2	FanC	Blue	7	N.C.	
3	+3.3V remote sense	Orange	8	N.C.	
4	N.C.		9	N.C.	
5	N.C.		10	N.C.	

ATX Auxiliary Power connector P10: 6 Pin Molex 90331-0010 or equivalent

PIN	Signal	18 AWG color
1	COM	Black
2	COM	Black
3	COM	Black
4	+3.3V	Orange
5	+3.3V	Orange
6	+5V	Red

6.3 OUTPUT HARNESS DETAILS

The DC output harness connectors and lengths are shown in Figure 7

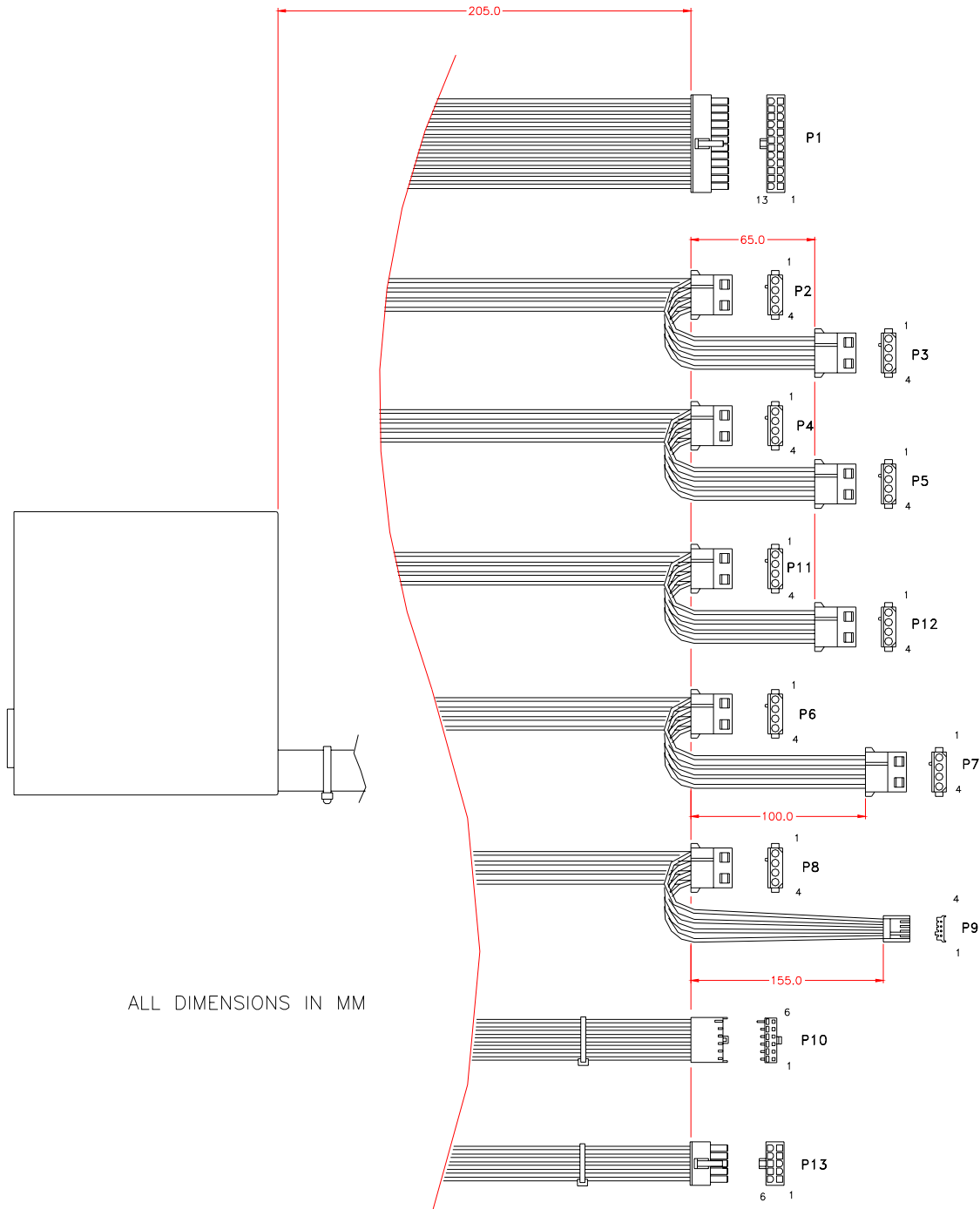


Figure 7. Output Harness

7.0 ENVIRONMENTAL REQUIREMENTS

The power supply unit shall be capable of withstanding the following:

7.1 TEMPERATURE RANGE

Parameter	Min.	Nom.	Max.	Unit
Storage	-10	/	85	Deg.C
Operating	0	/	50	Deg.C

7.2 RELATIVE HUMIDITY (NON – CONDENSING)

Parameter	Min.	Nom.	Max.	Unit
Non–operating	5	/	95	%
Operating	5	/	85	%

7.3 ALTITUDE

Parameter	Min.	Nom.	Max.	Unit
Non–operating	/	/	10,000	Ft
Operating	/	/	5000	Ft

7.4 MECHANICAL VIBRATION

Power supply unit shall be properly mounted in its intended enclosure for the followings:

Random Vibration

Non – operating : 0.01 g²/Hz at 5 Hz, sloping to 0.02 g²/Hz at 20 Hz,
And maintaining 0.02 g²/Hz from 20 Hz to 500 Hz.
The area under the PSD curve is 3.13 grms. The
Duration shall be 10 minutes per axis for all three
axes.

7.5 MEAN-TIME-BETWEEN-FAILURE

The power supply unit shall have a minimum MTBF of continuous operation of 50,000 hours at 50 degree Celsius and 100% loading or 100,000 hours demonstrated at 50 degree Celsius and 100% loading as calculated by MIL-HDBK-217F

7.6 REGULATORY COMPLIANCE

Based upon the intended marketing and use of the product, the power supply unit shall comply with the following requirements:

UL1950/CAN/CSA-C22.2 No.950-95. Approved to UL/cUL.
VDE0805/EN60950/IEC950. Issued by VDE, TUV, or other recognised test agency.
CISPR 22 Class B
FCC Class B
CE Mark