Compuware Technology Inc.

Power Supply Specification

Model: CPR-1221-5M1

Revision Histories:

Rev.	Description	Issued Date	Released by
1.0	Revise Format	Jan. 27, 2012	Richard Lee
1.1			
1.2			
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1.4			
1.5			
1.6			
1.7			
1.8			
1.9			

Specification is subject to change without notice

Approved by: ***Checked by:*** ***Prepared by:***

1 Purpose

This specification defines the performance characteristics of a single-phase (3-wire), 1280W single output power supply with wide range input AC capability (90-264VAC/47-63Hz). The power supply shall be designed for parallel operation and with DSP controllers. In the event of a power supply failure, the redundant power supply continues to power the system even under over voltage fault. The power supply shall be designed for “hot swap” exchange must contain the OR-ing isolation MOSFETs for all outputs and shall communicate to external devices through Inter-Integrated (I2C) Circuit protocol. The power supply will have an EEPROM for storing powers supply FRU information, and meet PMBus requirement.

2 AC Input Requirements

The power supply shall incorporate universal power input with active power factor correction, which shall reduce line harmonics in accordance with the EN61000-3-2.

2.1 AC Inlet Connector

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

2.2 AC Input Voltage Specification

The power supply must operate within all specified limits over the following input voltage range. Harmonic distortion of up to 10% THD must not cause the power supply to go out of the specified limits. The power supply shall operate properly at 87 VAC input voltage to guarantee proper design margins.

AC Input Rating

PARAMETER	MIN	RATED	MAX
Voltage	90 Vrms	100 – 240 Vrms	264 Vrms
Frequency	47 Hz	50 / 60 Hz	63 Hz

2.3 Input Under Voltage

The power supply shall contain protection circuitry such that application of an input voltage below the minimum specified in section 2.2 shall not cause damage to the power supply.

2.4 Efficiency

This power supply shall meet 80PLUS Platinum efficiency requirement, the efficiency and power factor should meet or exceed the below requirement.

Efficiency, Power Factor and THD requirement

Load (%)	115Vac			230Vac		
	Max. THD (%)	Min. Power Factor	Min. Efficiency (%)	Max. THD (%)	Min. Power Factor	Min. Efficiency (%)
20	Less than 10%	At least 0.95	At least 83	Less than 10%	At least 0.92	At least 90.2
50	Less than 8%	At least 0.98	At least 91	Less than 5%	At least 0.95	At least 94.2
100	Less than 5%	At least 0.99	At least 89	Less than 5%	At least 0.97	At least 92

2.5 AC Line Fuse

The power supply shall incorporate one input fuse on the LINE side for input over current protection to prevent damage to the power supply and meet product safety requirements. Fuses should be slow blow type or equivalent to prevent nuisance trips. AC inrush current shall not cause the AC line fuse to blow under any conditions. All protection circuits in the power supply shall not cause the AC fuse to blow unless a component in the power supply has failed. This includes DC output load short conditions.

2.6 AC Inrush

The power supply must meet inrush requirements 2.2 for any rated AC voltage, during turn on at any phase of AC voltage, during a single cycle AC dropout condition, during repetitive ON/OFF cycling of AC, and when input power is applied to the power supply any initial current surge or spike of 10ms or less will not exceed 25A peak.

2.7 AC Line Transient Specification

AC line transient conditions shall be defined as “sag” and “surge” conditions. Sag conditions (also referred to as “brownout” conditions) will be defined as the AC line voltage dropping below nominal voltage.

The power supply shall meet the requirements under the following AC line sag and surge conditions.

AC Line Sag Transient Performance

Duration	Sag	Operating AC Voltage	Line Frequency	Performance Criteria
Continuous	10%	Nominal AC Voltage ranges	50/60 Hz	No loss of function or performance
0 to 1 AC cycle	100%	Nominal AC Voltage ranges	50/60 Hz	No loss of function or performance

> 1 AC cycle	>10%	Nominal AC Voltage ranges	50/60 Hz	Loss of function acceptable, self-recoverable

AC Line Surge Transient Performance

Duration	Surge	Operating AC Voltage	Line Frequency	Performance Criteria
Continuous	10%	Nominal AC Voltages	50/60 Hz	No loss of function or performance
0 to 1AC cycle	30%	Mid-point of nominal AC Voltages	50/60 Hz	No loss of function or performance

2.8 AC Line Fast Transient Specification

The power supply shall meet the EN61000-4-5 directive and any additional requirements in IEC1000-45:1995 and the Level 3 requirements for surge-withstand capability, with the following conditions and exceptions:

- These input transients must not cause any out-of-regulation conditions, such as overshoot and undershoot, nor must it cause any nuisance trips of any of the power supply protection circuits.
- The surge-withstand test must not produce damage to the power supply.
- The supply must meet surge-withstand test conditions under maximum and minimum output load conditions.

3 DC Output Specification

3.1 Output regulation Requirements

All outputs must maintain their regulation with the below limits when measured at the output connector point or across the remote sense (if applicable) in any load condition defined in section 3.2

Voltage Regulation Limits

Output	Minimum	Nominal	Maximum	Unit
+12V	11.40	12.0	12.60	**Vdc**
+5Vsb	4.75	5.0	5.25	**Vdc**

There should never be any negative voltage for all outputs and signals during all occasion, including power on and off. During standby (PSON=off), all outputs, except +5VSB, should be below 50mV.

3.2 Output Current Requirements

All outputs must maintain their regulation as section 3.1 when loaded to the following loading combination:

Loading Limits

Output	Minimum	Maximum	Unit	Input VAC
+12V	0.5	83.0	Adc	90 to 140
+12V	0.5	106.7	Adc	180 to 264
+5Vsb	0	4.0 (peak 6A)	Adc	90 to 264

The total output power can not exceed 1280W continuously for 180 to 264VAC input. The total output power can not exceed 1000W continuously for 90 to 140VAC input. Under no load and minimum load condition, the power supply must be able to power on or off successfully.

Note: +5Vsb will be designed to meet 6A load requirement and will be tested with 6A load at production line. However, model label (I/O label) will print 5Vsb max rating with 4A only.

3.3 Output Ripple and Noise

The following output ripple/noise requirements will be met throughout the load ranges specified in section 3.2 and under all input voltage conditions specified in section 2.1.
Ripple and noise are defined as periodic or random signals over the frequency band of 10Hz to 20MHz. Measurements will be made with an oscilloscope set to 20MHz bandwidth limit. Measurement is done by using 10uF Tantalum in parallel with a 0.1uf ceramic capacitor, measured directly at the output connector side (Note: care must be taken when doing measurements such as using the smallest grounding wire.).

Ripple and Noise

Output	Maximum	Unit
+12V	120	**mV**
+5Vsb	50	**mV**

3.4 Output Dynamic Loading

The output voltages shall remain within the limits specified in section 3.1 for the step loading and within the limits specified in section 3.5 for the capacitive loading. The load transient repetition rate shall be tested between 50 Hz and 5 kHz at duty cycles ranging from 10%-90%. The load transient repetition rate is only a test specification. The Δ step load may occur anywhere within the MIN load to the MAX load shown in section 3.2

Transient Load Requirements

Output	Δ Step Load Size	Load Slew Rate	Capacitive Load
+12V	65% of max load	0.5A/uS	2200uF
+5Vsb	25% of max load	0.5A/uS	1uF

3.5 Capacitive Loading

The power supply shall be stable and meet all requirements, except dynamic loading requirements, with the following capacitive loading ranges.

Capacitive Loading Conditions

Output	MIN	MAX	Units
+12 V	10	11,000	**µF**
+5 VSB	1	350	**µF**

4 Redundancy Requirements

4.1 Current Sharing Operation

The power supply shall be designed for active current sharing for 12V main output.
Two or more power supplies will be paralleled in a system. Each power supply must be able to share load to be within +/-20 % share error, measured at 25, 50, 100% of single power supply full load current.

4.2 Output Isolation Oring MOSFET

The 12V output current must pass through an Oring MOSFET to protect the bus voltage against a power supply internal fault.

4.3 Hot Swap

The power supply must be designed with “hot swap” function with or without active AC line cord. After Hot swap I2C address shall be same as host power supply backplane hardware assigned. Host existing working power supply shall not be affected by hot swapping power supply.

5 Controls and Signal

5.1 Timing Requirements

These are the timing requirements for the power supply operation.
The output voltages must rise from 10% to within regulation limits (Tvout_rise) within 10 to 70 ms.

Each output voltage shall reach regulation within 50 ms (Tvout_on) of each other during turn on of the power supply. Each output voltage shall fall out of regulation within 400 ms (Tvout_off) of each other during turn off. Figure 1 and Figure 2 the turn ON and turn OFF timing requirements. In Figure 2, the timing is shown with both AC and PSON# controlling the ON/OFF of the power supply.

Output Voltage Timing

Item	Description	MIN	MAX	Units
Tvout_rise	Output voltage rise time from each main output.	10	70	ms
Tvout_on	All main outputs must be within regulation of each other within this time.		50	ms
T vout_off	All main outputs must leave regulation within this time.		400	ms

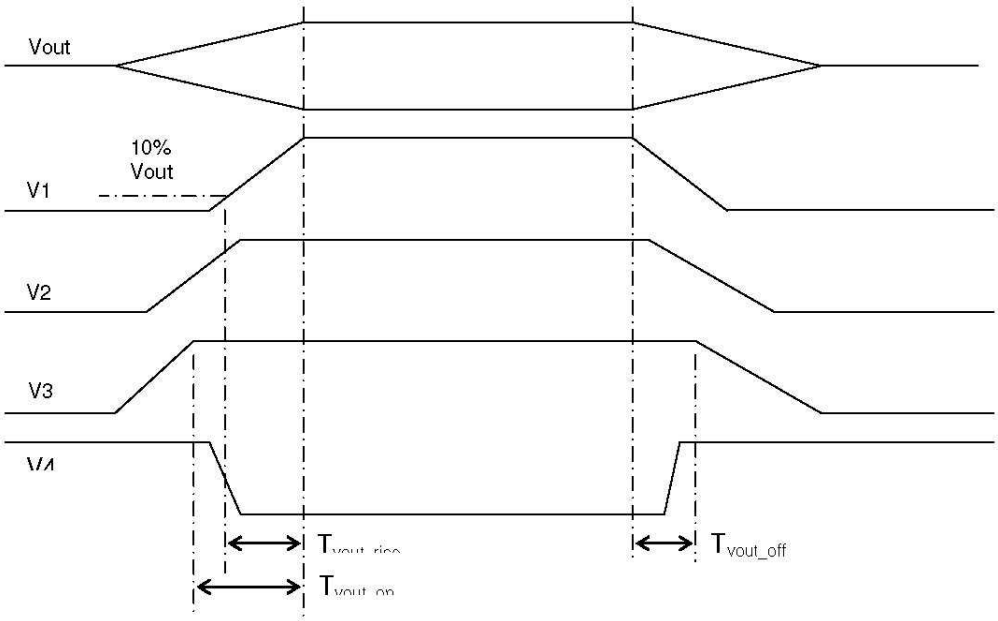


Fig. 1 Output Voltage Timings

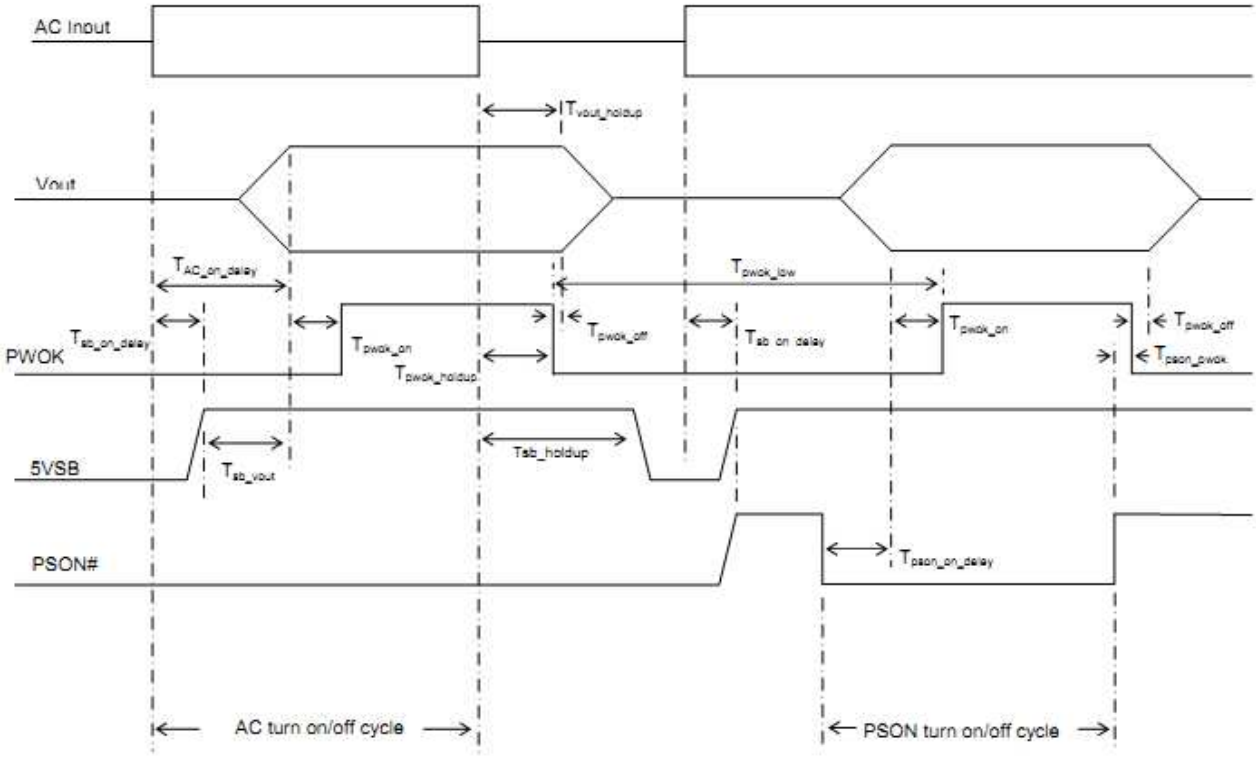


Figure 2: Turn On/Off Timing (Single Power Supply)

Note: PWOK =: DC_Good signal

Figure 2 Turn On/Off Timing (Single Power Supply)

Item	Description	MIN	MAX	Units
Tsb_on_delay	Delay from AC being applied to 5 VSB being within regulation.		1500	ms
T ac_on_delay	Delay from AC being applied to all output voltages being within regulation.		2500	ms
Tvout_holdup	Time all output voltages stay within regulation after loss of AC. Tested at 75% of maximum load and over 100-240VAC input	17		ms
Tdc_good_holdup	Delay from loss of AC to deassertion of DC Good	16		ms
Tpson_on_delay	Delay from PSON# active to output voltages within regulation limits.	5	400	ms

Tsb_vout	Delay from 5 VSB being in regulation to O/Ps being in regulation at AC turn on.	50	500	ms
Tpson_dc_good	Delay from PSON# deactive to DC Good being deasserted.		50	ms
Tdc_good _on	Delay from output voltages within regulation limits to DC Good asserted at turn on.	100	1000	ms
Tdc_good _off	Delay from DC Good deasserted to output voltages dropping out of regulation limits.	1		ms
Tsb_vout	Delay from 5 VSB being in regulation to O/Ps being in regulation at AC turn on.	50	1000	ms
Tsb_holdup	Time 5VSB output voltage stays within regulation after loss of AC.	70		ms
Tsb_Vout_rise	The rising time for +5VSB start up to be in regulation	1	20	ms

5.2 PS_ON

The PSONsignal is required to remotely turn on/off the power supply. PSON is an active low signal that turns on the +12 V power rail. When this signal is not pulled low by the system, or left open, the outputs (except the +5 Vsb) turn off. This signal is pulled to a standby voltage by a pull-up resistor internal to the power supply.

PSON Signal Characteristic

Signal Type		Accepts an open collector/drain input from the system. Pull-up to VSB located in power supply.	
PSON# = Low		ON	
PSON# = Open or High		OFF	
		MIN	**MAX**
Logic level low (power supply ON)		0 V	1.0 V
Logic level high (power supply OFF)		2.0 V	5.25 V
Source current, Vpson = low			4 mA
Power up delay:	**Tpson_on_delay**	5 ms	400 ms
PWOK delay:	**Tpson_pwok**		50 ms

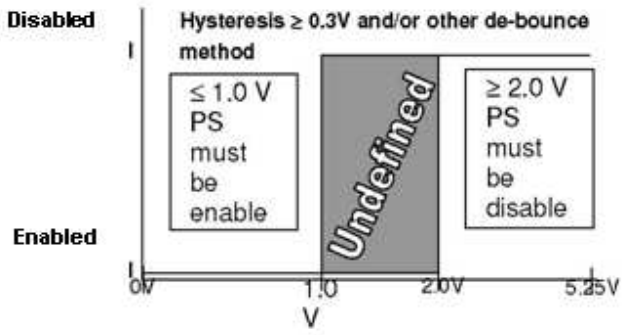


Fig.3 Logic level definition

5.3 PWOK(Power OK)

PWOK is a power OK signal and will be pulled HIGH by the power supply to indicate that all the outputs are within the regulation limits of the power supply. When any output voltage falls below regulation limits or when AC power has been removed for a time sufficiently long so that power supply operation is no longer guaranteed, PWOK will be de-asserted to a LOW state. For a representation of the timing characteristics of PWOK, The start of the PWOK delay time shall be inhibited as long as any power supply output is in current limit.

PWOK Signal Characteristics

Signal Type	+12V TTL Compatible output signal	
PWOK = High	Power OK	
PWOK = Low	Power not OK	
	MIN	MAX
Logic level low, Isink = 4mA		0.4 V
Logic level high, Isource = 200µA	11.0 V	12.6 V
PWOK delay: T_{pwok_on}	100 ms	1000 ms
PWOK rise and fall time		100 µs
Power down delay: T_{pwok_off}	1 ms	

5.4 AC Warning

Noted on PMBus standard.

5.5 LED Indicator

A green/amber double color Light Emitting Diode (LED) shall be mounted as indicated in mechanical drawing and shall indicate the status of the DC GOOD signal with green color. The

LED shall continue to glow under normal operation of the power supply. If this LED is blinking or not lit or in amber color, the power supply is not operating properly.
During protection mode, the LED should be off.
When protection is cleared, the LED should go back to the original intended status.
When the unit is in standby with AC is present, the LED should be amber.
When the unit is in standby with no AC is present, the LED should be off.
When the unit is turned on properly, the LED is green.

6. I²C and PMBus™ standard.

This power supports both I2C function and PMbus. With different addressing, the user should able to use either I2C FRU or PMbus commands.

I2C Signal Connector Pin Definition

Pin	Signal	24 AWG Color
1	SMBus Clock	White/Green Stripe
2	SMBus Data	White/Yellow Stripe
3	SMBAlert	Red
4	No connect	
5	No connect	

6.1 I2C

Slave address will be 0x70 (default), 0x72, 0x74, 0x76
There is an Internal Area in FRU that is used and defined by vendor (us). Therefore,
We use it for health monitoring. It is located in second block (offset 0x08),
Offset 0x09: Temperature,
Offset 0x0A: Fan 1 speed,
Offset 0x0B: Fan 2 speed,
Offset 0x0C: Power Status,
Offset 0x0D: Temperature High Limit,
Offset 0x0E: Fan 1 speed Low Limit,
Offset 0x0F: Fan 2 speed Low Limit.
Offset 0x16: Firmware Version (for example, revision 2.1 would be 0x21).
Offset 0x10-0x15 and 0x17: reserved for future use.
Power Status: bit0 =1 -> GOOD, bit0 = 0 -> Failed
Fan Speed formula: RPM = (1/0.262) *(Fan Pulse Count * 60 /2)

User want to retrieve the FRU data, must follow FRU spec.
Power supply I2C operation shall not latch system I2C bus for over certain time period needed for normal operation. Power supply I2C shall have auto reset function in case of waiting for clock pulse over a reasonable time period.

6.2 PMBus

The PMbus firmware version of the power supply shall follow the

1. PMBus Power System Management Specification Part I – General Requirements, Transport and Electrical Interface.
2. PMBus Power System Management Specification Part II – Command Language

The device in the power supply shall be compatible with both SMBus 2.0 'high power' specification for I^2C V_{dd} based power and drive (for Vdd = 3.3V). This bus shall operate at 3.3V but be tolerant of 5V signaling.
One pin is the Serial Clock [SCL] (PSM Clock). The second pin is used for Serial Data [SDA] (PSM Data). Both pins are bi-directional, open drain signals, and are used to form a serial bus.
The circuits inside the power supply shall derive their power from the standby output.
The device shall support SMBus clock-low timeout (Ttimeout). This capability requires the device to abort any transaction and drop off the bus if it detects the clock being held low for >40ms, and be able to respond to new transactions 10ms later.
The device must recognize SMBus START and STOP conditions on ANY clock interval. (These are requirements of the SMBus specifications, but are often missed in first-time hardware designs.)
The device must not hang due to 'runt clocks', 'runt data', or other out-of-spec bus timing. This is defined as signals, logic-level glitches, setup, or hold times that are shorter than the minimums specified by the SMBus specification. The device is not required to operate normally, but must return to normal operation once 'in spec' clock and data timing is again received. Note if the device 'misses' a clock from the master due to noise or other bus errors, the device must continue to accept 'in spec' clocks and re-synch with the master on the next START or STOP condition.

6.2.1 Addressing

The power supply PMbus device address locations are shown below. For redundant systems there are up to 2 signals to set the address location of the power supply once it is install in the system: A1, A0. For no-redundant systems the power supply device address location should be 78h.

System addressing Address1 (A1) /Address0 (A0)	0/0	0/1	1/0	1/1
Power supply PMBus™ device	78h	7Ah	7Ch	7Eh

Note: Non-redundant power supplies will use the 0/0 address location, 78h.

6.2.2 Command

The following PMBus commands shall be supported for the purpose of monitoring currents, voltages, and power. All data should use the linear data format as documented in PMbus spec.

PMBus command	Description
READ_IIN	RMS input current in amps (note; not used on power distribution boards)
READ_VIN	RMS input voltage in volts(note; not used on power distribution boards)
READ PIN	AC input power in watts (note; not used on power distribution boards)
READ_VOUT	DC 12V output voltage in volts, the format is set by the VOUT_MODE command.
READ_IOUT	DC 12V output current in amps.
READ_POUT	DC output power in watts.
VOUT_MODE	Command to report the output voltage formatting for the READ_VOUT command.
STATUS_BYTE	Command to report the On/off status of the power supply.
READ_TEMPERATURE	Read airflow inlet temperature

6.2.3 Manufacturer Specific Commands:

Offset 0xD0-0xDE is used to represent the unit model serial number. Data represented in byte format.

These bytes are read/write capable through I2C

Below serial number is for example only:

	Serial number	
Offset	character	Hex
D0	P	
D1	1	
D2	2	
D3	2	
D4	1	
D5	M	
D6	Y	

D7	W	
D8	W	
D9	R	
DA	M	
DB	S	
DC	S	
DD	S	
DE	S	

Offset 0xE0 – 0xEB is used to represent the model number, data represented in byte format. These bytes are read/write capable through I2C.

	Item number	
Offset	character	Hex
E0	C	
E1	P	
E2	R	
E3	1	
E4	2	
E5	2	
E6	1	
E7	-	
E8	5	
E9	M	
EA	1	
EB	-	

Additional information bytes for FRU backward compatibility. These bytes are read/write capable.

Offset 0xF0-0xF5 is used to represent the unit revision number. Revision begins with Rev 1.0. Data is represented in byte format. These bytes are read/write capable using I2C.

	Revision	
Offset	character	Hex
F0	R	
F1	E	
F2	V	
F3	1	
F4	.	
F5	0	

6.2.4 Sensor Sampling

The sensor registers inside the power supply for monitoring input/output power, current, and

voltage shall meet the following minimum requirements. Register refresh rate is the frequency the sensor register gets updated with a new measurement value.
Register refresh rate ≥ 10Hz

6.2.5 Sensor Averaging

The sensor registers for monitoring input/output power, current, and voltage shall contained averaged data, not instantaneous peak data. This may be achieved in two ways; an arithmetic average or a low pass filter. An exponential moving average shall not be used. The power supply shall refresh the sensor data at a rate no slower than the averaging duration.

READ_PIN, shall be an average value over a 2 second interval.
READ_IIN and READ_VIN shall be an RMS value over a 2 second interval.

All data response from PMbus command, except STATUS_BYTE and manufacturer specific commands, are represented in linear format as defined in PMBus spec part 2.

STATUS_BYTE: Please refer to PMbus.

Offset 0x78		
Bit #	7	Not used, default=0
	6	Device is off due to PSON or for any reason (ex. Protection)=1, else 0
	5	Output OVP=1, else 0
	4	Output OCP=1, else 0
	3	Vin under voltage=1, else 0
	2	OTP=1; else 0
	1	Not used, default=0
	0	none of the above (Power is good and turned on)=1, else=0

6.2.6 Accuracy

The sensor commands shall meet the following accuracy requirements.

			20% of max load	**50% of max load**	**100% of max load**
READ_IIN			+/-5%	+/-5%	+/-5%
READ_PIN			+/-5%	+/-5%	+/-5%

READ_IOUT			+/-5%	+/-5%	+/-5%
READ_POUT			+/-5%	+/-5%	+/-5%
READ_VIN		+/- 5% over full range			
READ_VOUT		+/- 5% over full range			
READ_TEMPERATURE		Required: +/-5 ºC			

7 Protection Circuits

Protection circuits inside the power supply shall cause only the power supply's main outputs to shutdown If the power supply latches off due to a protection circuit tripping, an AC cycle OFF for 15 seconds and a PSON cycle HIGH for 1 second shall be able to reset the power supply.

7.1 Over Current Protection

The power supply shall have current limit to prevent +12 V outputs from exceeding the values shown in below table. If the +12V current limits are exceeded the power supply shall shutdown and latch off. The latch will be cleared by toggling the PSON signal or by an AC power interruption. The power supply shall not be damaged from repeated power cycling in this condition. +5 VSB shall be protected under over current or shorted conditions so that no damage can occur to the power supply. All outputs shall be protected so that no damage occurs to the power supply under a shorted output condition.

Over Current Protection

Voltage	Over Current Limit (Iout limit)
+12 V	110% minimum; 130% maximum
+5Vsb	110% minimum;130% maximum

7.2 240VA Protection

Not applicable

7.3 Over Voltage Protection

The power supply over voltage protection shall be locally sensed. 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. Below table contains the over voltage limits. The values are measured at the output of the power supply's connectors. The voltage shall never exceed the maximum levels when measured at the power pins of the power supply connector during any single point of fail. The voltage shall never trip any lower than the minimum levels when measured at the power pins of the power supply connector.

Over Voltage Limits

Output Voltage	MIN (V)	MAX (V)
+12 V	13.3	14.5
+5 VSB	5.7	6.5

7.4 Over Thermal Protection

The power supply over thermal protection shall be locally sensed. The power supply shall shutdown and latch off after an over required temperature condition occurs. This latch shall be cleared by toggling the PSON signal or by an AC power interruption. The over thermal limits that power supply which components contain required maximum temperature. The temperature shall never exceed the maximum levels when measured at the individual component.

7.5 Short Circuit Protection

+12V outputs shall be protected and into latch off mode so that no damage occurs to the power supply under a shorted output condition. This latch shall be cleared by toggling the PSON signal or by an AC power interruption. +5Vsb should be protected and into hiccup mode. No damage occurs to the power supply under a shorted output condition, and should be output normally after shorted output released.

+5Vsb outputs shall be protected and into hiccup mode so that no damage occurs to the power supply under a shorted output condition. No damage occurs to the power supply under a shorted output condition, and should be output normally after shorted output released.

8. Fan Speed Control

When AC plug in, Fans will be on and have minimum speed to cooling power supply to keep normal operating temperature. The power supply will have internally controlled PWM fans. The PWM fans will be thermal controlled by microcontroller. Note that speed transition should be non-linear to reduce perceived noise from fan.
Fan control speed rule is shown in the attached file below.


PWM Fan Control
Design Guideline 0.1.

9. Mechanical

All dimensions are in mm unit.

W: 76 +/-0.5
L: 360+/-0.5
H: 40.25+/-0.5 (Front, AC inlet side), H39.5+/-0.5 (back, gold finger side)

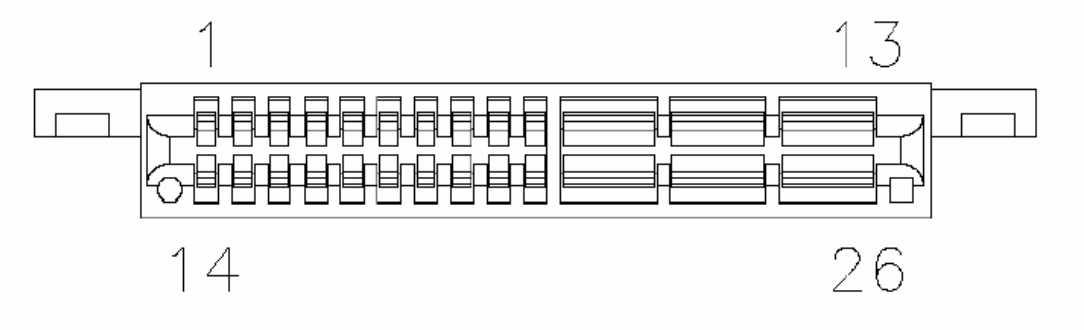
10. Output Connector and Dimension

The power supply will provide a card edge connector compatible with the backplane. See power supply mechanical drawing for dimensions. The power supply connector is a 6 blade (3 pair) and 20 pins (10 pair) edge connection type from Tyco Electronics, Mfr P/N 1489958-1 or FCI P/N 10034908 connector.

Power and Signal Connection

Description	Pin Number	I/O	Active	Pin Length
Ishare	1		Analog	Standard
A1 (address)	2	I/O	High/Low	Standard
A2 (address)	3	I/O	High/Low	Standard
I2C SCL	4	I/O	High/Low	Standard
I2C SDA	5	I/O	High/Low	Standard
PS ON/OFF	6	I	Low	Short (by 1mm)
Spare	7			
DC GOOD	8	O	High	Standard
+12V	9		Power Pin	Standard
+12V	10		Power Pin	Standard
+12V	11		Power Pin	Standard
+12V	12		Power Pin	Standard
+12V	13		Power Pin	Standard
RS GND	14		Analog	Standard
Spare	15			
12V RS GND	16		Analog	Standard
Fan Control	17	I	High	Standard
DC Return	18		Power Pin	Standard
5Vsb CO	19		Power Pin	Standard
5Vsb CO	20		Power Pin	Standard
DC Return	21		Power Pin	Standard
DC Return	22		Power Pin	Standard
DC Return	23		Power Pin	Standard
DC Return	24		Power Pin	Standard
DC Return	25		Power Pin	Standard
DC Return	26		Power Pin	Standard

.**Note:** The signal pins on the power supply connector will be gold plated to 30 microns.



11. MTBF and Quality Data

The power supply shall have a minimum MTBF at continuous operation of 1) 100,000 hours at 100% load and 25 degree C, as calculated b Bellcore RPP, or 2) 150,000 hours demonstrated at 100% load and 25 degree C.

12. Safety

12.1 Dielectric Strength Testing (Hi-pot)

All units must pass a 1500VAC line to ground/chassis Hi-Pot test in production lines. The voltage must be maintained at that level for a minimum of 3 seconds without failure.

12.2 Ground Continuity Testing

All units must pass a ground continuity test with less 0.1 Ohm from the ground (third wire) input pin to the chassis.

12.3 Agency Requirements

The power supply must comply with all regulatory requirements for its intended geographical market as computer server of Information Technology Equipment.

The power supply must meet all regulatory requirements for the intended market at the time of manufacturing. This power supply shall have below certificates for ITE category:

1. UL
2. C-UL
3. TUV
4. CCC
5. CB
6. CISPR Class B

7. FCC Class B
8. RoHS (Full ROHS lead free 6/6)
9. BSMI
10. Effciency 80Plus Platinum Single Output

The power supply, when installed in the system, shall meet immunity requirements specified in EN55024.
Specific tests are to be EN61000-4-2, -3, -4, -5, -6, -8, and -11. The power supply must maintain normal performance within specified limits. Conformance must be designated with the European Union CE Marking. Specific immunity level requirements are left to customer requirements.

13. Environmental Requirements

13.1 Temperature

The power supply shall operate within all specified limits over T_{op} temperature range. All airflow shall pass through the power supply and not over the exterior surfaces of the power supply.

Thermal Requirements				
Item	**Description**	**MIN**	**MAX**	**Units**
T_{op}	Operating temperature range	0	50	Degree C
T_{non-op}	Non-operating temperature range	-10	60	Degree C

The power supply must meet UL enclosure requirements for temperature rise limits. All sides of the power supply, with exception to the air exhaust side, must be classified as “Handle, Knobs, grips, etc. held for short periods of time only.

13.2 Humidity:

Operating : 20% to 90% RH
Storage : 5% to 95% RH

13.3 Altitude:

Operating: to 10,000 feet (3,023 meters)
Non-operating: to 35,000 feet (10,580 meters)

13.4 Shock and Vibration

Mechanical Shock

The device will withstand the following imposed conditions without electrical or mechanical failure:

- Non-operating Square Wave Shock: 40G, Square wave at 200in/sec (508cm/sec); on all six sides
- Non-operating Half Sine Shock: Half Sine pulse for 70in/sec (178cm/sec) for 2ms; on all sides except top
- Operating Half Sine Shock: Half Sine pulse for 40in/sec (102cm/sec) for 2ms; on all sides except top

Vibration

- Operating: Sinusoidal vibration, 0.5G (0-peak) acceleration. 5-500Hz, sweep at 1/2 octave/min from low to high frequency, and then from high to low. Thirty minute dwell at all resonant points, where resonance is defined as those exciting frequencies at which the device under test experiences excursions two times larger than non-resonant excursions.
- Plane of vibration to be along three mutually perpendicular axis.
- Non-operating: Sinusoidal vibration, 1.0G (0-peak) acceleration. 5-500Hz, sweep at 1/2 octave/min from low to high frequency, and then from high to low. Thirty minute dwell at all resonant points, where resonance is defined as those exciting frequencies at which the device under test experiences excursions two times larger than non-resonant excursions.

Thermal Shock

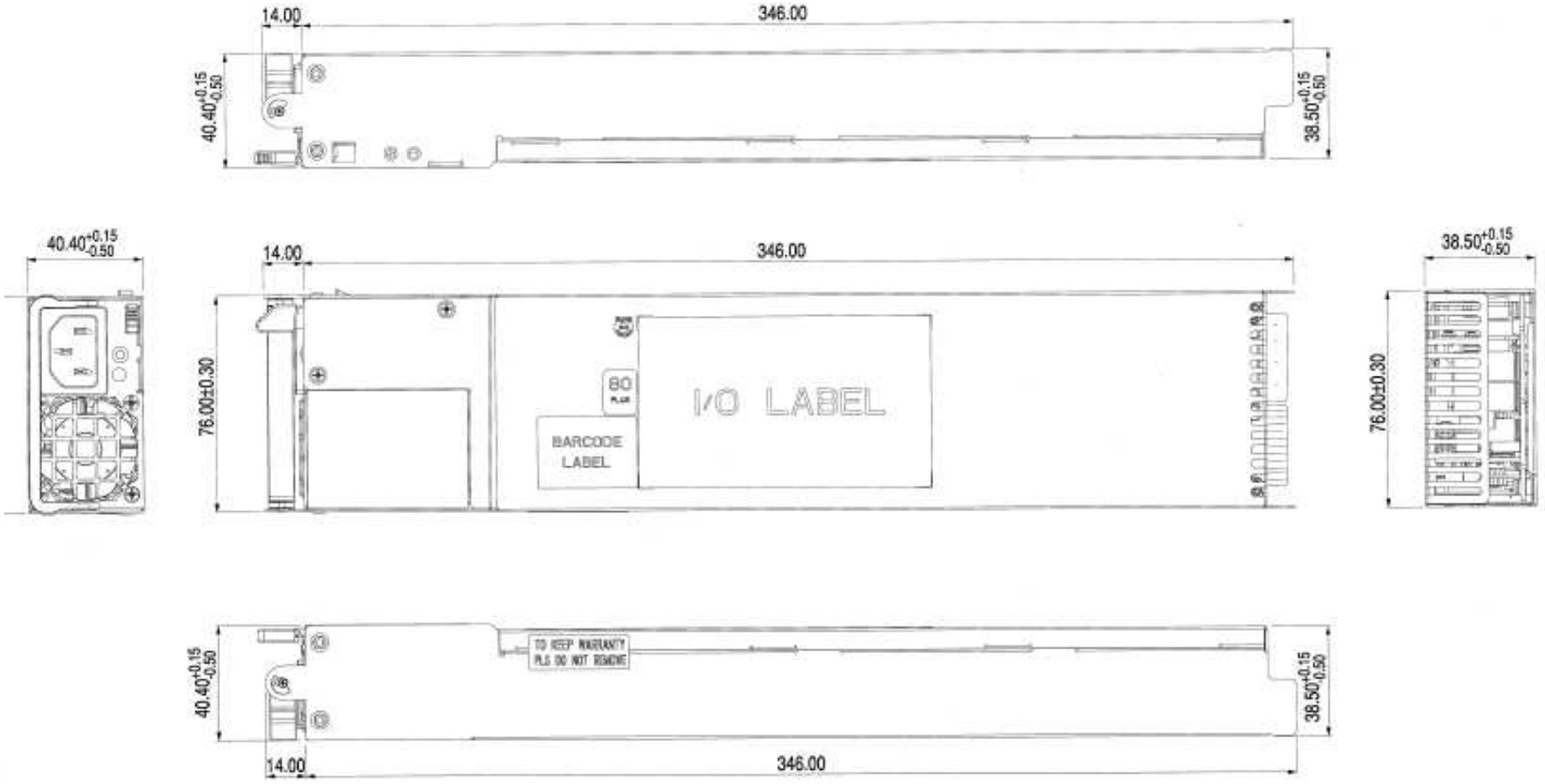
Non-operating: -40 (+/-5) to +70 (+/-5) degrees Celsius, transition time not to exceed 5 minutes. Duration of exposure to temperature extremes will be 20 minutes.

14. Serial number:

CPR-1221-5M1: P12215M1YWWRMSSSS

REV.	Description	Modify By	Modify Date	Amendment basis ECR NO.
A	Release	C.K.	2011.11.28	-
B	-	-	-	-
C	-	-	-	-
D	-	-	-	-

DIMENSIONS PER CNS.
NOT SHOWN ON DRAWING SHALL REFER TO A GENERAL TOLERANCE.
D EDGES MUST HANDLING REQUIREMENTS SPECIFIED IN UL 1439.
AND INTERIOR SURFACE OF HOLES TO BE FREE OF OIL,NICKS,BURRS AND RESIDUE.
IENTS AND THEIR MANUFACTURING PROCESS SHALL BE FULL RoHS .
TH SYMBOL "( )" ARE CRITICAL,MUST BE INSPECTED EVERY SHIPMENT.



COMPUWARE	COMPUWARE TECHNOLOGY CO.,LTD.								
Model: CPR-1221-5M1(PWS-1K28P-1R)			Drawing No.: CPR-1221-5M1(V1.0)						
Title: OUTLINE DRAWING			Part No.: CPR-1221-5M1(V1.0)						
CTO	Approved	Reviewed	Drawing	Material	Finish	Unit	Scale	Version	TOLERANCE Length (mm)
			C.K.Chiang 2011.11.28	-	-	mm	Free	-	15Down ±0.30; 16~50 ±0.15; 51~100 ±0.20; 101~300 ±0.30; 301~400 ±0.40; Angle ±1.0°