PURCHASE SPECIFICATIONS

FOR

SWITCH MODE POWER SUPPLY CARD
(Type no: UISMPS-24d15d5s)

FOR

BHEL BPL-CoMoS
(Composite monitoring system for power transformers)

SPECIFICATION NO.	:	PS407173
REVISION NO.	:	**REV 01**
DATE OF REVISION	:	27/02/2016

PREPARED BY

Anupam Parikh
Design Engineer

APPROVED BY

S. K. Biswas
DGM – CEF

ISSUED BY

CONTROL EQUIPMENT ENGINEERING DIVISION
BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL

PURCHASE SPECIFICATIONS FOR SWITCH MODE POWER SUPPLY CARD

The specification is in two parts namely part-A related to technical requirements of this tender specification and part- B related to commercial requirements of these tender specifications.

Supplier to ensure the following while submitting the bid:

There should be one sealed envelope mentioning enquiry number and opening date on top of envelope. This envelop should consist of two sealed individual envelopes – one for technical bid and another for commercial bid . Enquiry No., opening date and bid type i.e. Technical / Commercial should also be mentioned on each individual envelope.
On tender opening date only technical bid will be opened while commercial bid will only be opened for those parties who would be found technically suitable acceptable by BHEL in line with technical requirement of the specifications .

PART-A (Technical Requirements)

1. GENERAL

This specification covers the requirements of infrastructure, quality of manpower considered essential for quality and reliability of design ,development , manufacturing testing & supply of various high tech Electronics cards//modules involving multilayer PCBs , ASICs , SMT components and digital electronics components.

The supplier should confirm availability of the required infrastructure and manpower in technical bid as given in this specification.

a INFRASTRUCTURE FACILITIES

The supplier should have the following manufacturing facilities:

1. Dust free environment for card assembly.
2. Stencil Printer.
3. Automatic Glue Dispenser
4. High speed component placement machine
   Following features would be preferred:
   - Board size capability - 400 mm x 300 mm min.
   - Placement Range - 0603 to SOIC's , 0402 compatible

5. Dual wave Soldering machine
6. 4 zone Reflow oven

7. Digital / Analog Temperature controlled solder stations.
8. Component lead forming machines.
9. Details of Electrostatic discharge protection
   & ESD procedure adopted to be submitted with offer .
10. Semi-Automatic component insertion machines.

b. TESTING FACILITIES:

The supplier should have the following test facilities:

(a) Digital oscilloscope Dual channel Min.100 MHZ Band width with following advance features would be preferred. .
- Advanced signal processing
- TDR measurement
- Eye pattern analyzer
- Cross talk and ringing analysis

(b) Spectrum analyzer with following features preferably:-
- Electromagnetic Interference Analysis.
- High frequency analysis.
- Harmonic Distortion Measurement.
- AM / FM Measurement

(c) Multi channels / 100 MHZ band width logic analyzer
(d) Multi channels Digital Pattern Generator.
(e) Computer added Functional Testing facilities for electronic card.

c. Qualified Manpower

Supplier should have at least **two** engineering graduate (electronics) who would be responsible for execution of order. Experience in power supply PCB manufacturing using latest state of art technology components like SMT, digital electronics components, ASICS & microcontrollers would be preferred. Technical persons responsible for the execution of the contract should be competent enough to substitute / suggest suitable alternatives for the components which are getting obsolete / not available in the market .

Based on technical bid received from supplier, BHEL may depute their team of engineers for on spot inspection at supplier works for confirmation of infrastructure facilities available with the party before considering them for assigning the contract.

d. Experience

Supplier to confirm at least 2 orders have been executed by them involving latest state of art components as mentioned in the specification. Supplier to submit copies of purchase order /contract of such orders executed in past involving SMT components, microcontroller/DSP , ASIC or SMPS based cards.

e. Willingness for Confidentiality Agreement

Supplier to confirm their willingness for unconditional confidentiality agreement on stamp paper as per the attached **annexure A** to qualify for their consideration in technical scrutiny of tender.

2. SCOPE OF WORK & Technical requirement

1. **SCOPE** :

This specification applies to the preliminary requirement of SWITCH MODE POWER SUPPLY CARD.

2. CONTEXT:

This document specifies a Switch Mode Type Power Supply card. This card is intended to be used in a rack type enclosure with fixed dimensions. The input to the card shall be 230V AC +25%/-20% and 172V to 268V DC. Same input connector shall be used for AC and DC inputs provided on the front plate of the card. This card shall have multiple outputs which shall be connected to a common backplane through a press-fit type EURO connector at the end of the card. A shielding PCB with ground plane is required to be provided on the top of the card connecting all the heat sinks of the switches to the ground.

A pre-charging circuit for smooth charging of the input capacitor is to be provided at the input with smooth switching over logic.

A simplified block schematic of the card can be found in Figure 1.

3. ELECTRICAL PARAMETERS

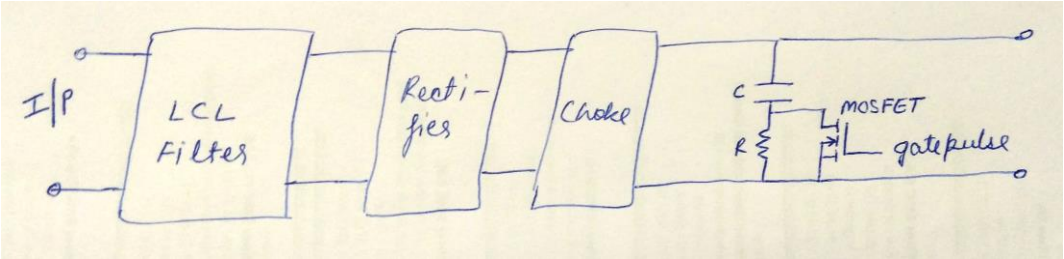
Input Voltage (suitable for both AC as well DC input)
AC: 230V AC +25%/-20%
DC: 172V to 268V DC

Output parameters:

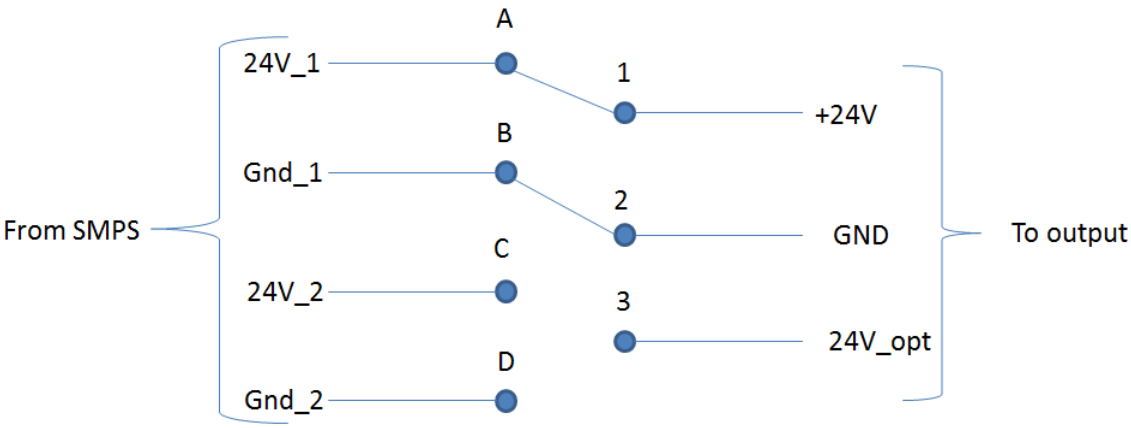
Voltage	Current	Acceptable Voltage ripple
24 V ± 2.5%	3.5 A	150 mV
-24V ± 2.5%	3.5 A	150 mV
15 V ± 2.5%	2 A	100 mV
-15 V ± 2.5%	2 A	100 mV
5 V ± 1.5%	6 A	75 mV

Input EMC Filter	LCL type
Input Protection	fuse & surge suppresor
Input Rectification	The input rectifier should be rated for 1000V and 25Amps
Input Choke	L on both +ve and –ve line

Input capacitor	Shoud be rated for 450V or more
Pre-Charge Ckt	MOSFET based/relay based (dedicated topology to be implemented to limit the inrush current by 10 – 12 Amps.)



Pre-Charge Control Ckt	suitable control ckt to be implemented for controling the precharge realy/MOSFET. Supplier to submit the schematic to BHEL for approval pripor to implementation.
Output Filter	LC Type
Output Ground	Common for all the outputs
Provision in -24V ckt	Following arrangement should be provided in -24V output connection such that same can be used as +24V if required by changing the jumper/link setting as shown.



Configuration A : 24V_opt = -24V

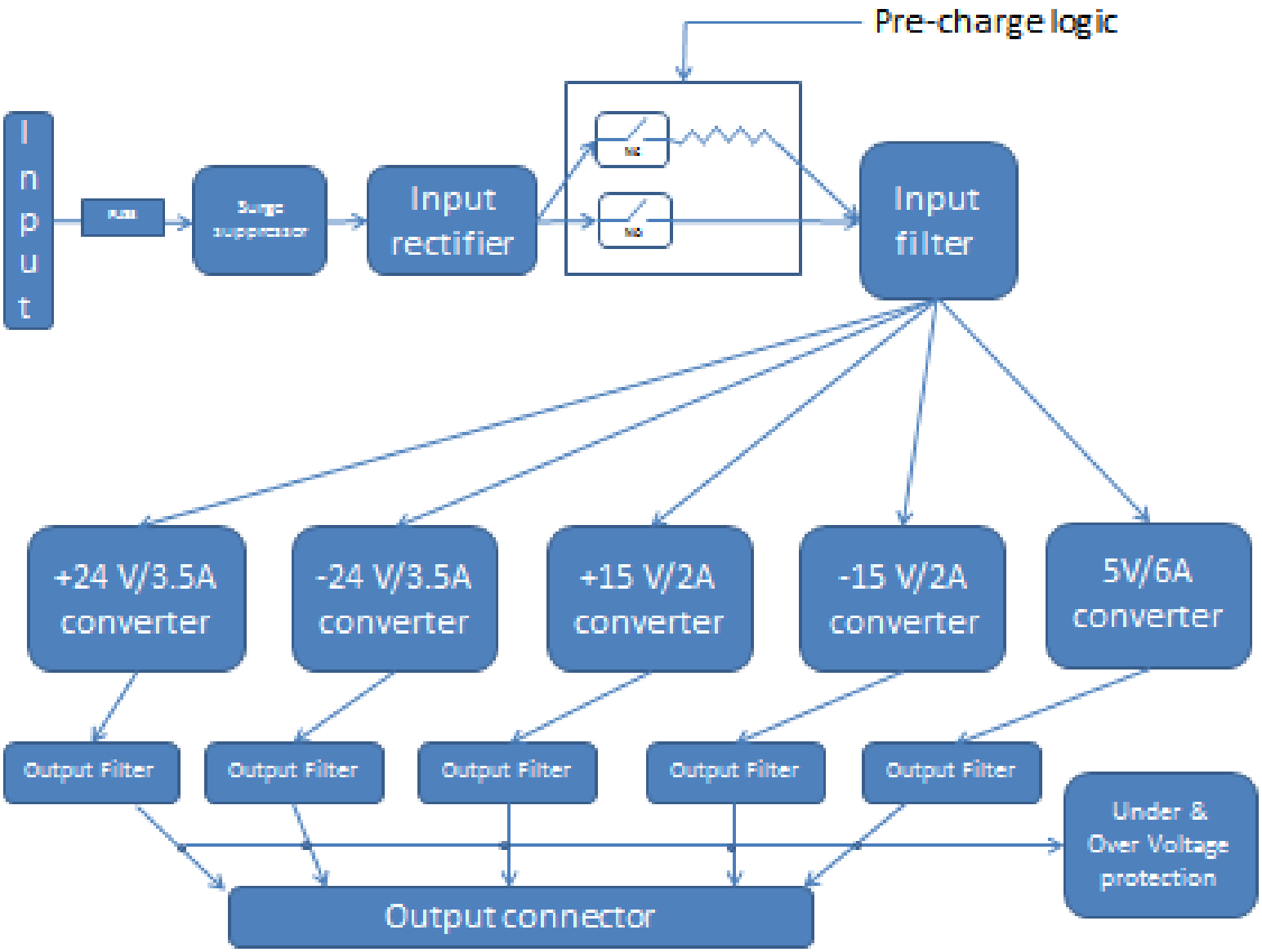
- Short C & 2
- Short D & 3

Configuration B : 24V_opt = +24V

- Short C & 3
- Short D & 2

Protection	1. Short circuit protection pulse-wise 2. Output Over Voltage and Under Voltage protection 3. Input polarity protection 4. bleeding capacitor for input capacitor

Features	1. Fully Integrated soft start for minimum sterss/overshoot of output 2. Frequency jittering for reduction in EMI 3. Regulation to zero load without dummy loading 4. Hysteretic thermal shutdown for automatic fault recovery 5. Switching frequency of the order of 100 to 200 kHz 6. Efficiency above 85%
Indications on front plate	1. AC input LED 2. DC input LED 3. LEDs for individual output 4. System OK LED (blinking)



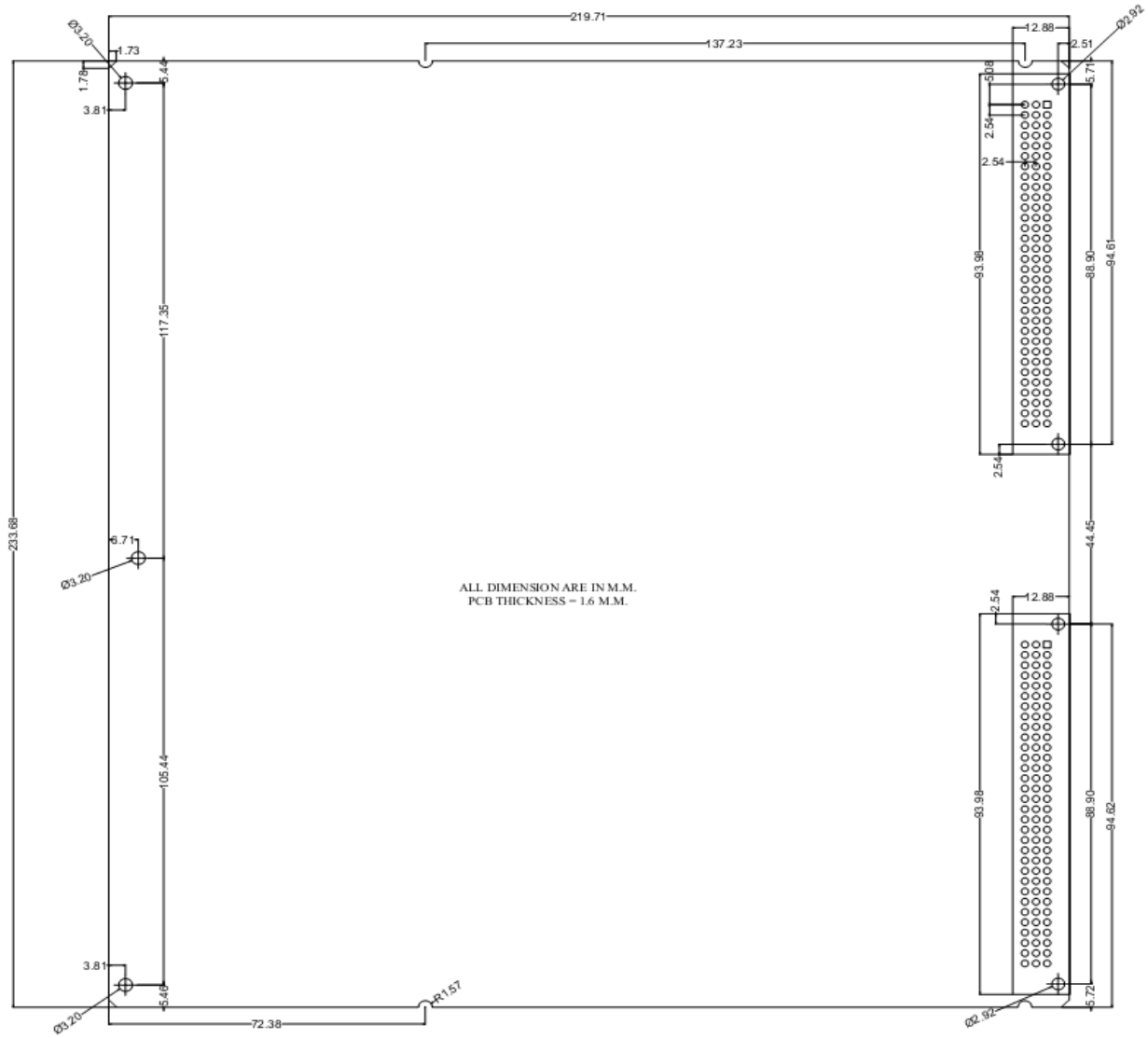
BLOCK SCHEMATIC

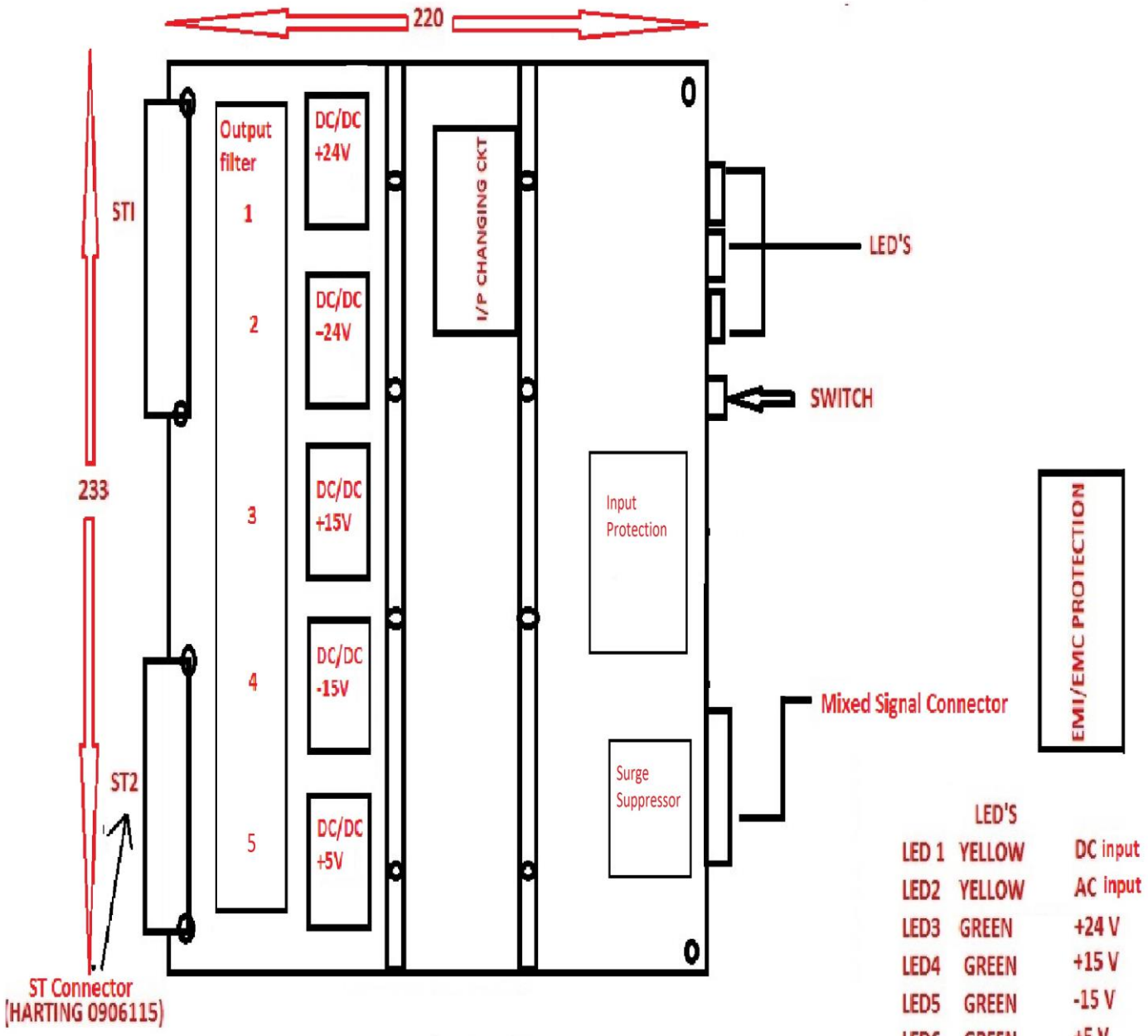
4. THERMAL PARAMETERS

Ambient temperature	60ºC
Operating temperature	85ºC
Storage temperature	60ºC
Relative humidity	95 ± 3% @ 0 to 55ºC (continuous)

5. MECHANICAL PARAMETERS

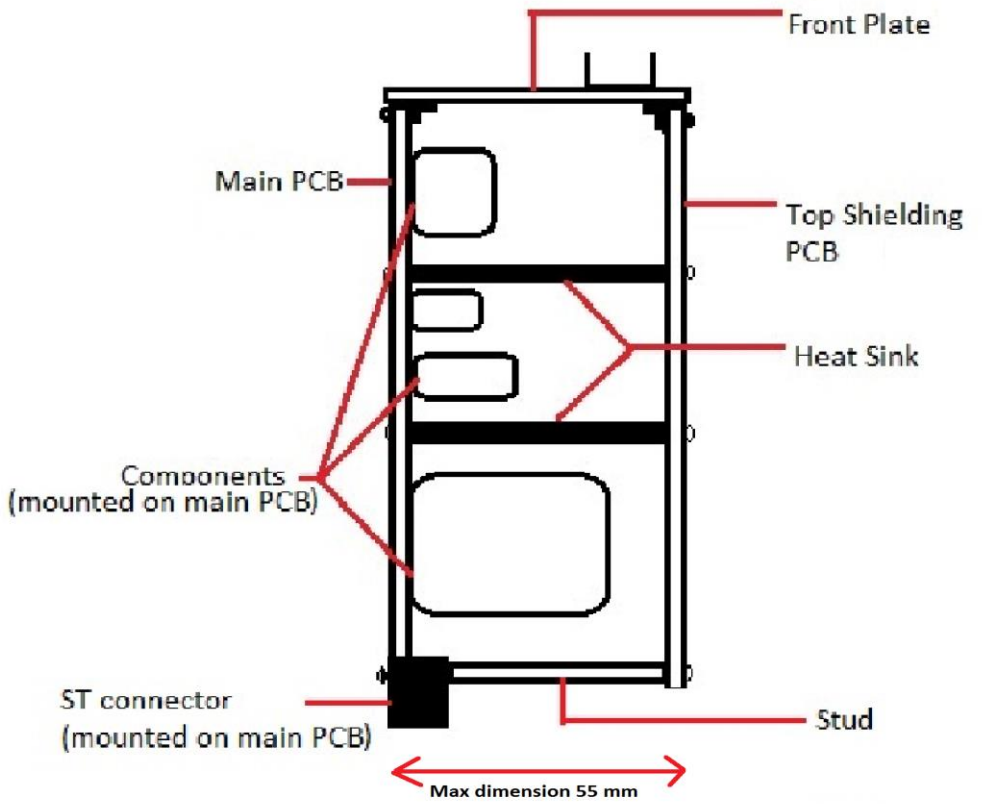
Dimensions & Layout



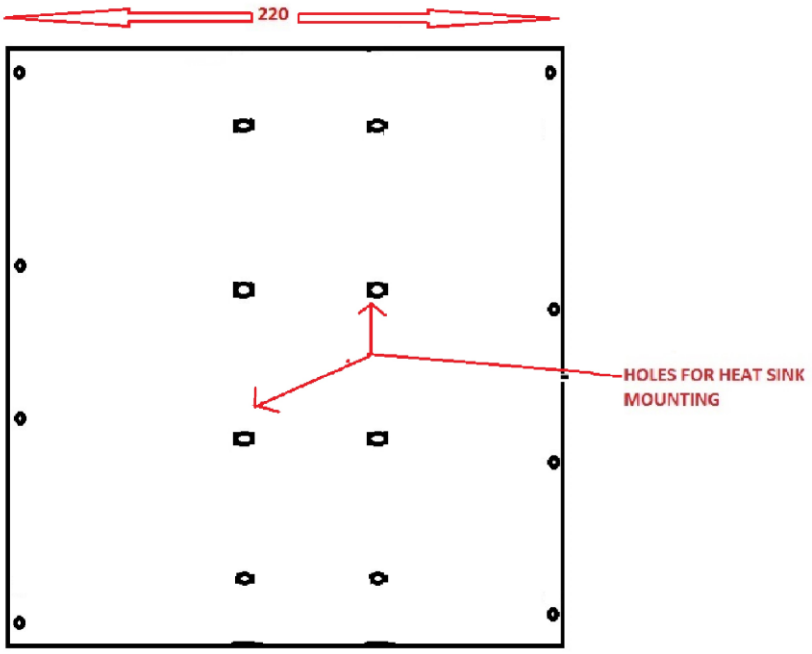


Main PCB (Top view)

LAYOUT OF POWER SUPPLY PCB



Complete Assembly (Side view)



TOP SHEILDING PCB (TOP VIEW)

6. Design with IEC Compliance

Shock and vibration	As per IEC 61373
EMI / EMC	As per IEC 61000
Environment	As per IEC 60571

Final list of tests to be provided to the supplier after the initial design.

7. RELIABILITY, AVAILABILITY, MAINTAINABILITY AND SAFETY

Service Life	25 years
Period of Operation without corrective maintenance	2000 hrs
Running hours (full life)	150000 hrs
Failure in time rate	to be calculated precisely by supplier and provide to BHEL

8. SCHEMATIC

The schematic/PCB layouts of the card to be developed by the supplier in close consultation with BHEL. Gerber and final Schematic to be provided to BHEL for approval before production.

9. QUALITY OF ELECTRONIC CARD ASSEMBLY:

The card shall be used in traction, Industrial & oil rigs application, the quality of the assembly , soldering, handling of the components & assembled cards(EMI/EMC), sourcing of semiconductor components are of vital importance. Therefore, each of the above should be carefully monitored and sources of the components must be from OEM/reputed international firms who adhere to strict quality norm.

To improve, maintain Quality, and highest level of reliability, it is essential to generate statistical data of any failure during testing and also after burn in, rework done. So that improvement in the assembly and process can analyzed. Supplier should provide the statistical report to BHEL.

10. CONFORMAL COATING OF THE PCB'S:

Conformal coating is very essential for long life and trouble free operation in dusty and hazardous environment. The conformal coating should be in line with ABB document, It is recommended multiple layers of coating is applied on each PCB's and proper time delay between two layers of coating is followed.

CAUTION:

1. Before applying coating, the PCB's should be tested in all respect.
2. All contacts for connectors and test points must be protected thoroughly by providing suitable cover on it. This cover only be opened after the coating is dried up.
3. Standard EMI/EMC protective norms must be followed during the entire process.

11. WARRANTY.

SMPS cards along with all the components mounted thereon shall be guaranteed for 30 months from the date of supply or 24 months from date of commissioning whichever is earlier.

12. Documents required along with consignment

i) User manual 6 copies

PART-B (COMMERCIAL REQUIREMENTS)

Bidder to submit commercial bid including details of scope of work , basis for scope of work and necessary price breakup for scope defined in 2 A/I & 2A/II of this specification and as BHEL enquiry calls for. Bid should also contain delivery time and payment terms, warranty offered for bidder's scope of work etc.

The commercial bid has to be kept in separate sealed envelope.