REQUEST FOR QUOTATION

MMI:PU:RF:003

BHARAT HEAVY ELECTRICALS LIMITED
Electronics Division
PB No. 2606, Mysore Road Bangalore - 560026
INDIA

RFQ NUMBER:
CKGOT00038

(address for communication) :

(for all correspondence)
Purchase Executive : CHANDRA KANT KUMAR
Phone : 08026989133
Fax :
E-mail: ckgupta@bhel.in

Sl No.	Description	Qty	Unit	Delivery qty	Delivery Date
1	36923502401PS51 MDL 69235PS51B SUB CONTRACT * HSN/SAC : 8542 Certificate as per BHEL Norms **Specification ref no. TS/SA/RM/SPEC/PS/001**	1,000	NO	1,000	

Total Number of Items - 1

Note: Tendered quantity will not be split

TWO PART BID - SUBMIT TECHNICAL AND PRICE BID IN SEPARATE SEALED COVERS

NOTES:
1. This RFQ is governed by:
a) INSTRUCTIONS TO BIDDERS/SELLERS and GENERAL CONDITIONS OF CONTRACT FOR PURCHASE available at **http://edn.bhel.com (RFQ-PO Terms & Conditions)**
b) Any other specific Terms and Conditions mentioned.
2. Bidders / Representatives who would like to be present during opening of offers are required to furnish authorization letter for the same.
* The HSN/SAC no mentioned against the line items in the RFQ are indicative only.

For and On behalf of BHEL.

CHANDRA KANT KUMAR
Sub-Assembly

On Bidder Letter Head

Date:

To,

M/s Bharat Heavy Electricals Ltd.
Electronics Division, Mysore Road,'
Bangalore – 560026

Sub: Model Clause / Certificate as per Annex-III (Tenders) of Restrictions Under Rule 144 (xi) of the General Financial Rules (GFRs) 2017, Dated 23.07.2020.

Ref: BHEL Tender / RFQ / NIT Number ……

I…… [***Write name of Authorized person***]
Authorized signatory for M/s …….. [***Write Company Name***] have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India , we certify that this bidder M/s ……..[**Vendor Name & address**] is not from such a country or , if from such a country [***Tick appropriate option & cut the other one***], has been registered with the competent authority . We hereby certify that we fulfill all requirements in this regard and is eligible to be considered [***attach evidence of valid registration certificate with competent authority***].

For M/s ……

Authorized Signatory
(with company seal & Name)

On Bidder Letter Head

Date:

To,

M/s Bharat Heavy Electricals Ltd.
Electronics Division, Mysore Road,'
Bangalore – 560026

Sub: Model Clause / Certificate as per clause 9 (a) of Revised Public Procurement (Preference to Make in India Order, 2017 of DPIIT dated 13.06.2020.

Ref: BHEL Tender / RFQ / NIT Number ……

I……. (authorized signatory for M/s ……..) a 'Class-I Local Supplier' / 'Class-II Local Supplier' at the time of tender, bidding or solicitation hereby confirm that the item meets the Local Content requirement for 'Class-I Local Supplier' / 'Class-II Local Supplier' (Tick appropriate option & cut the other one) and the Local Content percentage is ……..

The address is as below, where the local content / value addition is made:

[Factory Address]

For M/s ……

Authorized Signatory
(with company seal & Name)

661833/2024/EDN-SA/PPC

TECHNICAL SPECIFICATION FOR ASSEMBLY AND TESTING OF ELECTRONIC MODULES

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Prepared by:	Praveesh, SA Engg	Nidhin, SA PPC	Prabhakaran, SA Prod	Ritu Shree Sahu, SA Test
Approved by:			Mummadi Sudhir, AGM (SA – P, T, PPC & MRC)	

A. **Pre-Qualification Criteria**

1. The vendor shall have experience of Assembly of IPC Class 3 Products.
2. The Vendor shall have IPC Certified professionals for Assembly, Testing and Rework. Relevant Documents to be submitted along with Technical Bid.
3. The Turnover of the Vendor company to be more than 25 Crores in financial Year 2023-24, vendor to submit audited balance sheet of financial year 2023-24. Audited financial reports to be submitted along with Technical Bid.
4. The Vendor should be in the business of assembly of Electronic Modules for at least 1 Year. A declaration to the same effect is to be submitted along with Technical Bid.
5. The Vendor shall be based in and around 150 KMs of Bangalore.
6. An audit of the vendor facility to be conducted by BHEL, if required.
7. BG of approx. Rs. 55,00,000 (Fifty-five lakhs only) to submitted for an assembly order of 1000 nos. of ED69235PS51B. A Declaration of agreement to Submit BG within 14 days from receipt of the work order, is to be submitted along with the technical bid.
8. The Vendor has to be an EMS vendor, having a manufacturing facility of their own with all required capabilities, further outsourcing of any activity is to be done with prior approval of BHEL.

B. **Technical Specification:**

- The electronic modules are to be assembled as per the assembly documents provided. Requirements of assembly capability, inputs required, methodology to be followed and clearance of assembled modules are as given below.

C. **Facilities required for Manufacturing:**

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The Vendor shall have following facilities / capabilities in the assembly shop:

1. Fully Automated SMT Assembly Line
2. To Handle PCBs of sizes upto 510 X 510 MM
3. Pick and Place machine to handle 0402 to 50X50 mm Size components.
4. To handle upto 150 Component types in a Single assembly.
5. To handle components in Reel / Tube and Tray from.
6. Process capability, Cpk of > 1.2
7. Placement accuracy of 30 Microns at 3 Sigma or better
8. Printer accuracy of +/– 20 Microns at six sigma or better
9. Automatic Printer with auto wiper and camera alignment
10. Reflow oven of minimum 8 + 2 Zones.
11. BGA Rework Station
12. 3D AOI.
13. ESD / MSD safe Practices may be strictly followed in all stages of assembly.
14. Other Facilities

- Cold Storage
- Dry Cabinets
- Component Storage facility
- Tracking of Solder paste and Components
- Component Counter
- Vacuum sealing machine.
- PCB Baking oven
- PCB Cleaning machine
- Wave Soldering / Selective Soldering / Robotic Soldering
- Automatic Lacquering Machine
- Component Preparation machine
- Temperature Cycling Chambers
- Test Equipment

D. Inputs to be provided by BHEL for Assembly

1. Reflow and wave profiles will be provided if required.
2. Placement programs via Gerber file / Excel file BOM
3. Stencil Gerber will be provided

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4. Components as per BOM
5. Engineering Documents required for assembly

E. Consumables

- BHEL Approved vendor list with part number for consumables are as below for Solder Paste, Solder Stick, Flux, Solder wire, Silica Gel, IPA and packing box. The same is to be procured by the vendor and used.

Sl.No.	Item	Supplier	Part No
1	Solder Paste	HYBRID METALS PVT. LTD.	AIM-NC254
		SUMITRON EXPORTS PVT. LTD	KESTER-EP256
		COOKSON INDIA LIMITED	COOKSON-OM5100
		BERGEN SYSTEMS PVT. LIMITED	KOKI-SS48M 956-2
		MECTRONICS MARKETING SERVICES	HEREAUS-F352
2	Solder Stick	B T SOLDERS PVT LTD	Sn63:Pb37
		HYBRID METALS PVT. LTD.	Sn63:Pb37
		COOKSON INDIA LIMITED	Sn63:Pb37
		HIFLO SOLDERS PVT. LTD.	Sn63:Pb37
3	Flux	HYBRID METALS PVT. LTD.	PART NO.908 NO CLEAN FLUX
		COOKSON INDIA LIMITED	ALPHA NO CLEAN FLUX RF-800
4	Solder Wire	B T SOLDERS PVT LTD	SN62

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		HYBRID METALS PVT. LTD.	SN62
		COOKSON INDIA LIMITED	SN62
5	IPA	THERMO FISHER SCIENTIFIC INDIA PVT.	IPAELGR
		FINAR CHEMICALS LIMITED	IPAELGR
		SUPRAVENI CHEMICALS PRIVATE LIMITED	IPAELGR
6	Packing Box	FICUS PAX PRIVATE LIMITED	36923560099
		HELIOS PACKAGING	36923560099
		SUPERPACKS BUSINESS SOLUTIONS LLP	36923560099

F. **Material Handling**

1. All Components required for manufacturing as per the BOM has to be collected at BHEL. 3% contingency components will be provided. List of Components is as below;

Sl. No	Code Number	Description	Qty / Module	Qty for 1000 Modules	Unit
1	DV0692349073	FRONT HEAT SINK	1.03	1030	NO
2	PW235PS51A1A	PCB 69235PS51A	1.03	1030	NO
3	DV0692349103	SCREW FLAT HEAD PZ M3X8 ZN	3.09	3090	NO
4	DV0692349111	SCREW FLAT HEAD PZ M3X10 ZN	1.03	1030	NO
5	DV0692349120	NUT M3 ZN	4.12	4120	NO

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6	DV0692350071	INSULATING WASHER 2 RM10	2.06	2060	NO
7	DV0692350080	INSULATOR SLEEVE D3X1	4.12	4120	NO
8	DV0692350098	INSULATOR CERAMIC AIO TO-220	1.03	1030	NO
9	DV0692350110	INSULATOR KOOL-PAD K177	1.03	1030	NO
10	DV0692350101	INSULATOR KOOL-PAD K177	1.03	1030	NO
11	DV0692348930	LIGHT-PIPE FOR LEDS	1.03	1030	NO
12	DV0692348883	IC ANALG SMD VREF 2.5V0.5%TL431 SOT-23-3	3.09	3090	NO
13	DV0692348450	IC ANALOG SMD TEMP SENSOR LM75BIMX-3	1.03	1030	NO
14	DV0692348492	IC ANALOG SMD PWM CONTROLLER LM5026MT	1.03	1030	NO
15	DV0692359435	IC SMD ORING CONTROLLER LM5051	2.06	2060	NO
16	DV0692348468	IC ANALOG SMD LTC3851IGN#TRPBF	1.03	1030	NO
17	DV0692343091	IC ANALOG SMD COMPARATOR LM293D	3.09	3090	NO
18	DV0692348921	OPTOCOUPLER SMD SFH6186-3T	2.06	2060	NO
19	DV0692348484	TRANSISTOR SMD PNP BC807-25 SOT-23	1.03	1030	NO
20	DV0692348476	TRANSISTOR SMD NPN BC817-25 SOT-23	6.18	6180	NO
21	DV0692349162	MOSFET N-CHANNEL 100V TO-220AB THT	1.03	1030	NO
22	DV0692348794	TRANSISTOR MOSFET TO-220 IRL3705ZPBF	2.06	2060	NO
23	DV0692349162	MOSFET N-CHANNEL 100V TO-220AB THT	1.03	1030	NO
24	DV0692348808	MOSFET TO-220 IRF6218PBF	1.03	1030	NO

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25	DV0692348794	TRANSISTOR MOSFET TO-220 IRL3705ZPBF	1.03	1030	NO
26	DV0692349170	MOSFET N-CHANNEL TO-220AB THT	1.03	1030	NO
27	DV0692348700	THERMISTOR NTC B57235-S100-M51	1.03	1030	NO
28	DV0692348875	DIODE SMD BYG22D	3.09	3090	NO
29	DV0692349189	DIODE SMALL SIGN. MINIMELF LL4148 SMD	8.24	8240	NO
30	DV0692348867	DIODE SCHOTTKY MBRS340 SMD	1.03	1030	NO
31	DV0692348760	DIODE DUAL SCHOTTKY RECTIFIER 150V THT	1.03	1030	NO
32	DV0692348859	DIODE DUAL SCHOTTKY 16CTQ100STRRPBF SMD	1.03	1030	NO
33	DV0692348824	ZENER DIODE 9.1V 0.5W SMD BZV55-C9V1	2.06	2060	NO
34	DV0692348816	ZENER DIODE 3.3V 0.5W SMD BZV55-C3V3	1.03	1030	NO
35	DV0692348840	ZENER DIODE 16V 0.5W SMD BZV55-C16	1.03	1030	NO
36	DV0692348832	ZENER DIODE 12V 0.5W SMD BZV55-C12	1.03	1030	NO
37	DV0692352252	LED RED APTD3216EC SMD	1.03	1030	NO
38	DV0692352244	LED GREEN APTD3216SGC SMD	3.09	3090	NO
39	DV0692348697	VARISTOR 68V V68ZT2P	2.06	2060	NO
40	DV0692348433	SWITCH TOGGLE SPDT RIGHT ANGLED	1.03	1030	NO
41	DV0692348581	RESISTOR 8K25 1% 0805 SMD	2.06	2060	NO
42	DV0692348662	RESISTOR 681K 1% 0805 SMD	1.03	1030	NO
43	DV0692348565	RESISTOR 511R 1% 0805 SMD	3.09	3090	NO

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44	DV0692348514	RES CHIP SMD 1206 4R75 1% 0.25W 100PPM	1.03	1030	NO
45	DV0692348654	RESISTOR 332K 1% 0805 SMD	3.09	3090	NO
46	DV0692348590	RESISTOR 30K1 1% 0805 SMD	1.03	1030	NO
47	DV0692348573	RESISTOR 2K43 1% 0805 SMD	2.06	2060	NO
48	DV0692348557	RESISTOR 274R 1% 0805 SMD	2.06	2060	NO
49	DV0692348646	RESISTOR 274K 1% 0805 SMD	1.03	1030	NO
50	DV0692349197	FUSIBLE RES SMD 1206 22R 5% 0.25W 100PPM	1.03	1030	NO
51	DV0692348638	RESISTOR 221K 1% 0805 SMD	2.06	2060	NO
52	DV0692349219	RES MF SMD MINI MELF 200R 1% 0.25W 50PPM	2.06	2060	NO
53	DV0692348530	RES CHIP SMD 1206 182R 1% 0.25W 100PPM	1.03	1030	NO
54	DV0692359451	RES CHIP SMD 1206 8.2K 1% 0.25W 100PPM	2.06	2060	NO
55	DV0692348620	RESISTOR 154K 1% 0805 SMD	3.09	3090	NO
56	DV0692348611	RESISTOR 133K 1% 0805 SMD	2.06	2060	NO
57	DV0692348522	RES CHIP SMD 1206 12R1 1% 0.25W 100PPM	2.06	2060	NO
58	DV0692348603	RESISTOR 120K 1% 0805 SMD	2.06	2060	NO
59	DV0692356770	RES CHIP SMD 1206 0.06R 1% 0.25W 75PPM	1.03	1030	NO
60	DV0692348948	RESISTOR 0R008 1% 2W 2512 SMD	1.03	1030	NO

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61	DV0692330681	RES SMT 332R .1W 100PPM 1% 0805	1.03	1030	NO
62	DV0692349227	RES MF SMD MINI MELF 100R 1% 0.25W 50PPM	4.12	4120	NO
63	DV0692305653	RES CHIP SMD 4.75K 1% 0.1W 100PPM 0805	6.18	6180	NO
64	DV0692306390	RES CHIP SMD 27.4K 1% 0.1W 100PPM 0805	2.06	2060	NO
65	DV0692300902	RES CHIP SMD 18.2K 1% 0.1W 100PPM	2.06	2060	NO
66	DV0692347623	RES CHIP SMD 1206 4K7 1% 0.25W 100PPM	1.03	1030	NO
67	DV0692347542	RES CHIP SMD 1206 47R 1% 0.25W 100PPM	3.09	3090	NO
68	DV0692347615	RES CHIP SMD 1206 2K2 1% 0.25W 100PPM	1.03	1030	NO
69	DV0692347593	RES CHIP SMD 1206 1K 1% 0.25W 100PPM	3.09	3090	NO
70	DV0692347534	RES CHIP SMD 1206 10R 1% 0.25W 100PPM	1.03	1030	NO
71	DV0692343725	RES CHIP SMD 0805 6K8 1% 0.125W 100PPM	1.03	1030	NO
72	DV0692343768	RES CHIP SMD 0805 3K0 1% 0.125W 100PPM	1.03	1030	NO
73	DV0692343598	RES CHIP SMD 0805 2K2 1% 0.125W 100PPM	11.33	11330	NO
74	DV0692343539	RES CHIP SMD 0805 22R 1% 0.125W 100PPM	2.06	2060	NO
75	DV0692343652	RES CHIP SMD 0805 22K 1% 0.125W 100PPM	1.03	1030	NO
76	DV0692343695	RES CHIP SMD 0805 20K 1% 0.125W 100PPM	1.03	1030	NO
77	DV0692344411	RES CHIP SMD 0805 1R 1% 0.125W 250PPM	2.06	2060	NO

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78	DV0692343415	RES CHIP SMD 0805 1M 1% 0.125W 100PPM	1.03	1030	NO
79	DV0692343717	RES CHIP SMD 0805 1K5 1% 0.125W 100PPM	1.03	1030	NO
80	DV0692343580	RES CHIP SMD 0805 1K 1% 0.125W 100PPM	2.06	2060	NO
81	DV0692343520	RES CHIP SMD 0805 10R 1% 0.125W 100PPM	3.09	3090	NO
82	DV0692343628	RES CHIP SMD 0805 10K 1% 0.125W 100PPM	9.27	9270	NO
83	DV0692344365	RES CHIP SMD 0805 100K 1% 0.125W 100PPM	2.06	2060	NO
84	DV0692343504	RES CHIP SMD 0805 0R00 0.125W	2.06	2060	NO
85	DV0692348735	CAP SMD 470pF 50V NP0 0805 5%	1.03	1030	NO
86	DV0692348743	CAP SMD 2.2nF 50V X7R 0805 10%	1.03	1030	NO
87	DV0692348751	CAP SMD 10nF 50V X7R 0805 10%	1.03	1030	NO
88	DV0692348719	CAP ELECTROLYTIC 2200uF 16V EEUFM1C222	6.18	6180	NO
89	DV0692348727	CAP ELECTROLYTIC 1000uF 35V EEUFM1V102	4.12	4120	NO
90	DV0692346147	CAP CER X7R 100NF 10% 50V 0805 SMD	11.33	11330	NO
91	DV0692341242	CAP CER 1NF 5% 50V 30PPM C0G 0805 SMD	5.15	5150	NO
92	DV0692350020	CAP 100PF 5% 50V NP0 0805 SMD	2.06	2060	NO
93	DV0692350039	CAP 8.2NF 5% 250V 1206 NP0 SMD	3.09	3090	NO
94	DV0692348980	CAP 680pF 500V X7R 1206 10% SMD	1.03	1030	NO

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95	DV0692349022	CAP 4.7uF 50V X7R 1812 10% SMD	3.09	3090	NO
96	DV0692348956	CAP 22nF 50V X7R 0805 10% SMD	2.06	2060	NO
97	DV0692348972	CAP 220pF 500V NP0 1206 5% SMD	2.06	2060	NO
98	DV0692348964	CAP 2.2nF 500V X7R 1206 10% SMD	4.12	4120	NO
99	DV0692349014	CAP 1uF 50V Y5V 1210 20% SMD	5.15	5150	NO
100	DV0692350047	CAP 1NF 10% 500V X7R 1206 SMD	1.03	1030	NO
101	DV0692349006	CAP 10uF 16V Y5V +80/-20% SMD	3.09	3090	NO
102	DV0692349030	CAP 10nF 630V X7R 1206 10% SMD	7.21	7210	NO
103	DV0692348999	CAP 100pF 500V NP0 1206 5% SMD	4.12	4120	NO
104	DV0692349049	CAP 100nF 630V X7R 1812 10% SMD	3.09	3090	NO
105	DV0692348441	FUSE SMD 10A 0451010.MRL	1.03	1030	NO
107	DV0692350055	INDUCTOR 4uH, 9A	1.03	1030	NO
108	DV0692349057	TRANSFORMER CURRENT SENSE SMD P8207NLT	1.03	1030	NO
109	DV0692349065	CHOKE COMMON MODE 1mH 6A WE-CMB	1.03	1030	NO
110	DV0692350004	Transformer for IPSP	1.03	1030	NO
111	DV0692350012	Inductor for IPSP	1.03	1030	NO
112	DV0692348425	CONNECTOR DUAL ROW R ANGLED 15-24-9144	1.03	1030	NO
113	DV0692350160	LIGHTPIPE 1 FOLD DISP FOR SMD LED	1.03	1030	NO
114	DV0692350152	CHOKE FERRITE 7uH 7A -10 +30%	1.03	1030	NO
115	DV0692349090	CASING IPSP	1.03	1030	NO
116	DV0692349081	HEAT SINK - IPSP	1.03	1030	NO

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117	DV0692350003	SCREW CSK ST2.9X9.5 SELF TAP ST DIN7982C	10.3	10300	NO
118	DV0692351273	SCREW M2.5X4 PHILIP ST DIN7985A	5.15	5150	NO
119	DV0692356720	THERMAL PASTE P12	0.002	2	ML
120	DV0692356738	GLUE PASTE RTV	0.002	2	ML
121	CN9088281025	WASHER SPRING A 3.2	4.12	4120	NO
122	DV0692353011	GRAPHIC PANEL (IPSP)	1.03	1030	NO
123	DV0692357548	TYPE LABEL (M80) 69235PS51B - IPSP	1.03	1030	NO
125	DV0692353356	TYPE LABEL (LICENSEE)	1.03	1030	NO
127	DV0692353089	DIODE SWITCHING TS4148RY 0805 SMD	1.03	1030	NO
128	DV0692348840	ZENER DIODE 16V 0.5W SMD BZV55-C16	1.03	1030	NO
129	DV0692350069	CAP CER 2.2MF 50V X7R 1206 10% SMD	1.03	1030	NO

2. SMD Components will be given in standard packaging, where the component collected will be more than the required components, extra components after completion of the job to be returned with proper packaging (Vacuum sealing of MSL Components) and account at BHEL. Counting and Sealing of Components at vendor's place is to be witnessed and certified by a BHEL personnel.
3. Finished product has to be delivered at BHEL with due closure of gate pass.
4. Test jig, if provided by BHEL, to be returned after assembly is over and modules are accepted at BHEL.

G. Inspection at vendor place

- BHEL may depute Inspector at vendor works for witness of process at different stages.
- Modules after testing with all test certificate are to be offered for inspection at the vendor's place. BHEL personnel will visit vendors place for inspection and may witness sample testing of the modules. Modules to be dispatched to BHEL, only after clearance from BHEL Personnel.

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H. Testing

- Testing is to be done as per document reference DDC8330-D201832-3 (Production Test Specification,) ED 085 00 99 (Thermal Cycling) and DDC8330 HV-test instructions.
- Mounting bases and test jig required for Testing will be provided by BHEL, which is to be returned back to BHEL on completion of the order.
- Suggested List of Test Instruments Required:

Type of Instrument	Make	Model No.
DMM	Agilent 6.5 DMM	34410A
Power Supply	Delta Electronika	30V 10A
Electronic Load Rheostat	HP	6060A 9ohms 12A
DMM	Handheld	4750D
Test Jig	Testing Interface	

I. Suggested Assembly process of PS51B

- Collection of Materials from BHEL, EDN, Bangalore
- Bottom Side SMD Assembly with Glue and Inspection
- Top Side SMD Assembly with Paste and Inspection
- TH components mounting
- Wave soldering of TH and Bot side SMD Components
- Inspection
- Thermal Cycling
- Testing as per the test procedure including HV Test
- Labelling at different Stages (No. of Stickers: 4)
- Application of Silicone adhesive at required locations
- Box Assembly of Module
- Delivery of Modules and remaining components at BHEL, EDN, Bangalore.
- The assembly of module should comply with IPC class 3 requirements.

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Prepared by:	Praveesh, SA Engg	Nidhin, SA PPC	Prabhakaran, SA Prod	Ritu Shree Sahu, SA Test
Approved by:	Mummadi Sudhir, AGM (SA – P, T, PPC & MRC)			

J. **Records**

1. Vendor to maintain details of consumables batch number, expiry date, profiles used during assembly.
2. Records of AOI to be shared in soft media.
3. Functional Test report of each module to be provided.
4. Thermal Cycle report to be provided.

K. **Packaging of Finished Product**

- The individual finished product has to be packed in ESD safe covers and then it has to be packed in ESD safe boxes to ensure safety of modules. Procurement of Packing materials is in vendor's scope.

L. **Handling Troubleshooting / Rework**

- Modules not getting pass on the functional test at BHEL, troubleshooting to be carried out by the vendor's personnel at BHEL.
- Any defect arising out of improper soldering, wrong assembly, defective components has to be attended at BHEL works by certified operators of Vendor.

M. **Sample Lot / Bulk Production**

- A sample lot of 10 nos. of modules to be assembled, tested and delivered to BHEL for functional test at BHEL.
- Bulk production of remaining modules are to be taken up only after clearance of the sample lot by BHEL.

N. **Acceptance criteria**

1. Visual Inspection: Boards will be inspected for assembly as per BOM on receipt at BHEL, if required.
2. Boards will be checked for any physical damage
3. Boards will be tested as per the test procedures

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4. The module will be deemed accepted, if BHEL observes that the failure is attributable to the material provided by BHEL and rework is not possible.
5. If the failure is attributable to workmanship / process / handling of the vendor and rework is not possible, the material cost of such modules will be deducted from the running bill or bank guarantee. Material Cost of each module is Rs. 5002.
6. Functional Testing of modules will be repeated at BHEL.
7. Final acceptance clearance will be given only after passing of all the test parameters as per the Test Instruction.

Annexure A :

All relevant documents required for the execution are given in Annexure A. The information contained in Annexure A are COPY RIGHT AND CONFIDENTIAL. The information in the document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in anyway detrimental to the interest of the company.

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Annexure A

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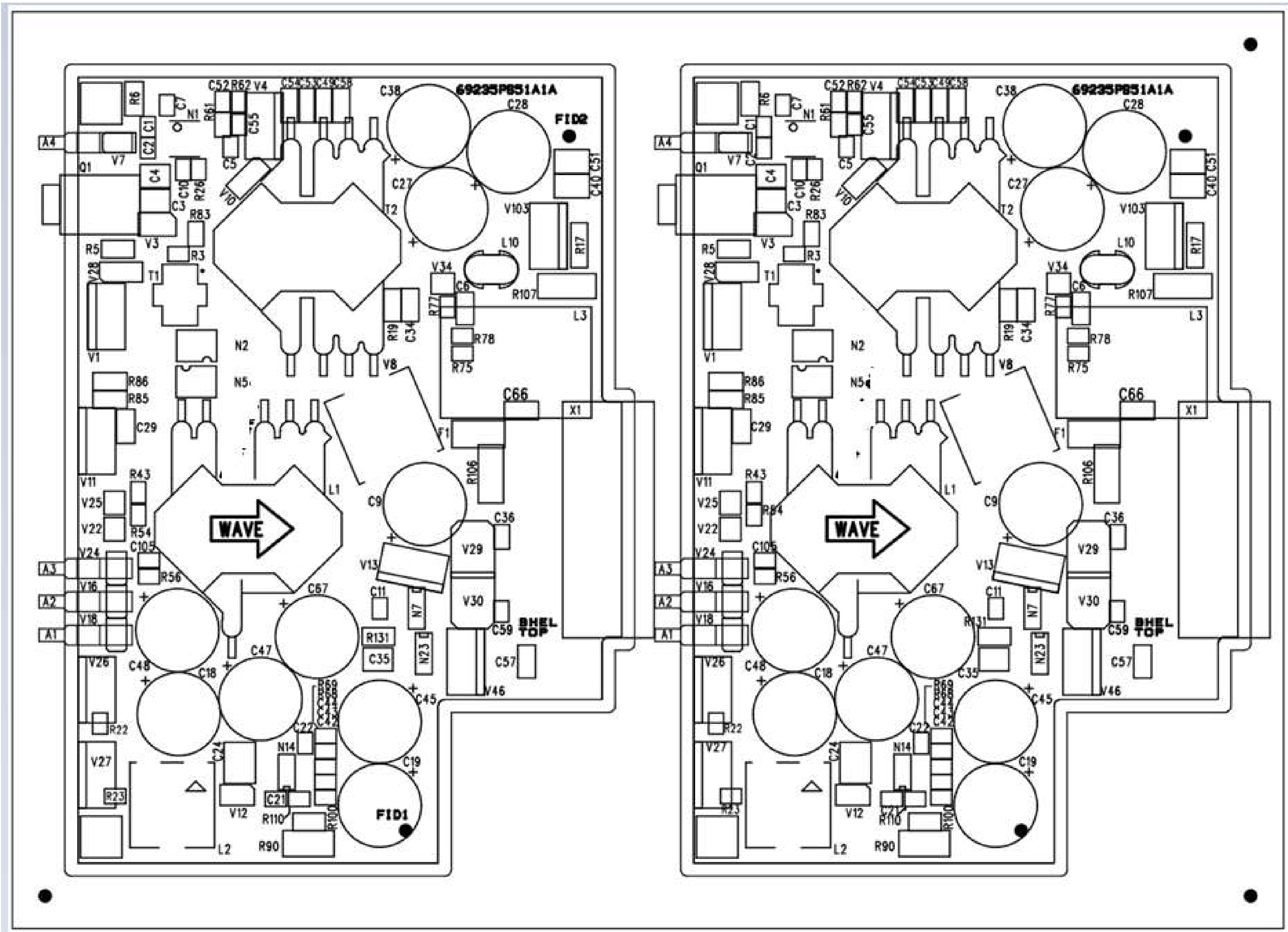
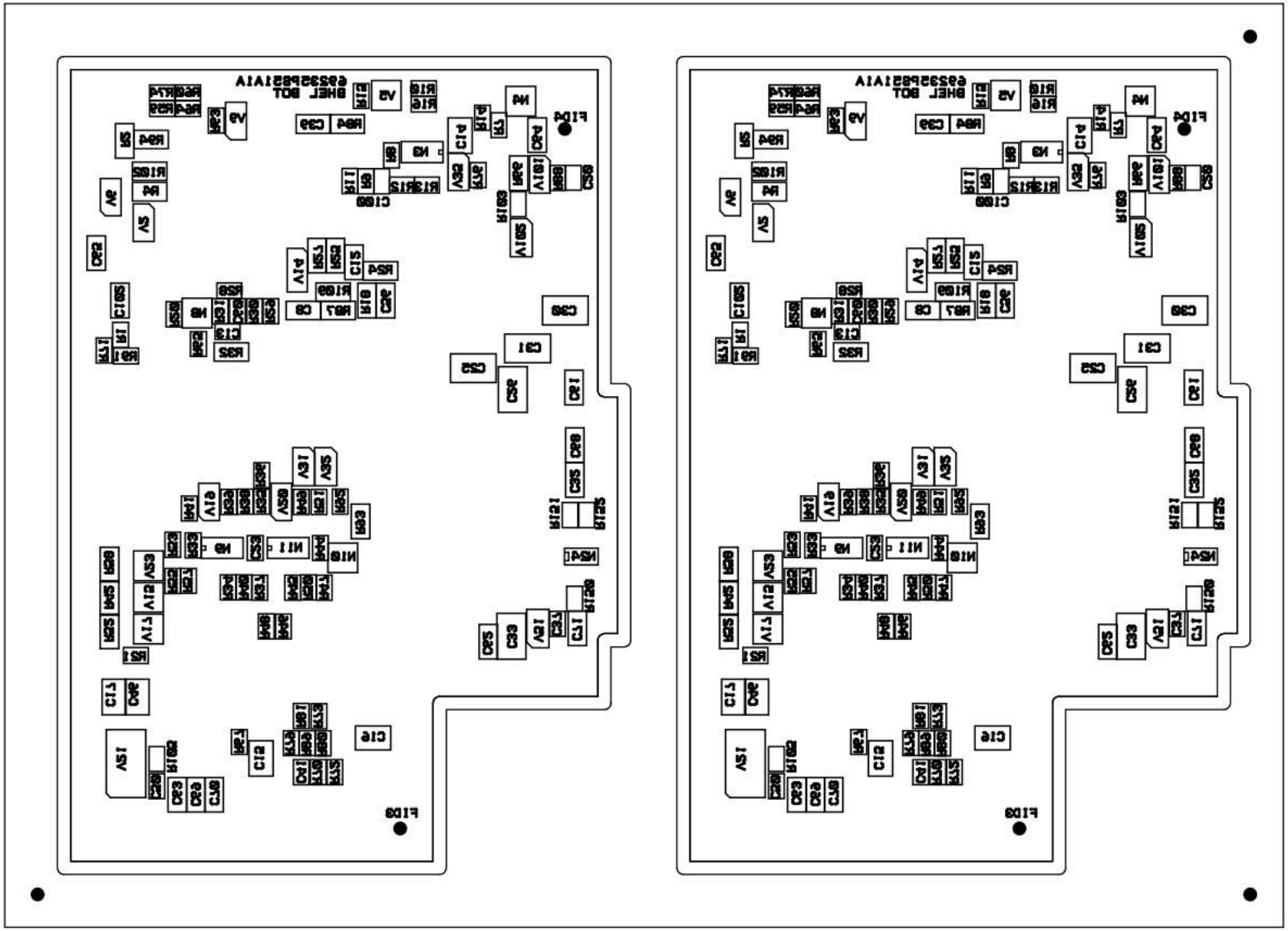

69235P851A1A
WAVE
FID1
FID2
BHEL TOP
X1
C66
L3
T2
T1
N2
L1
L2

661846/2024/EDN-SA/PPC



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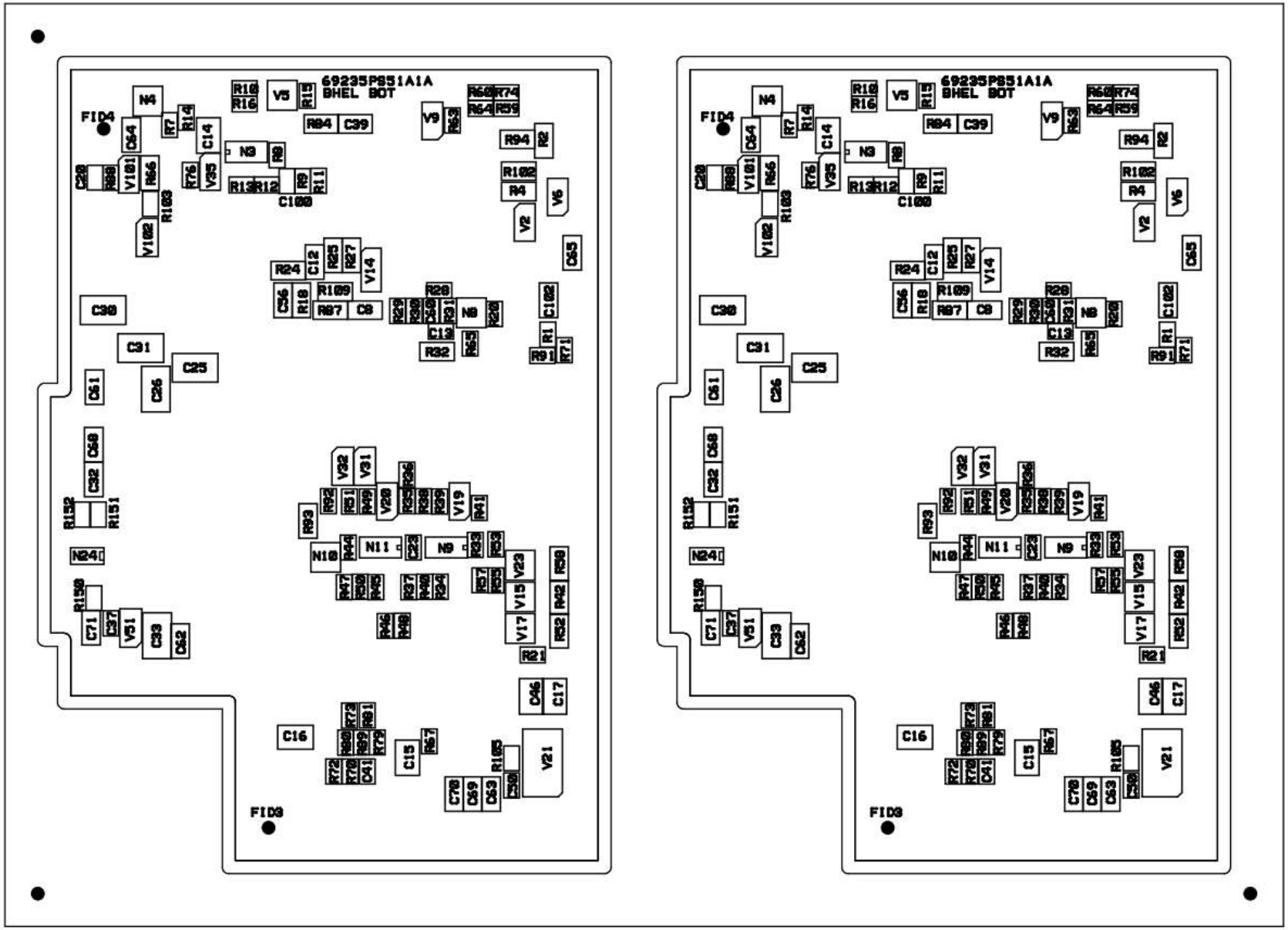

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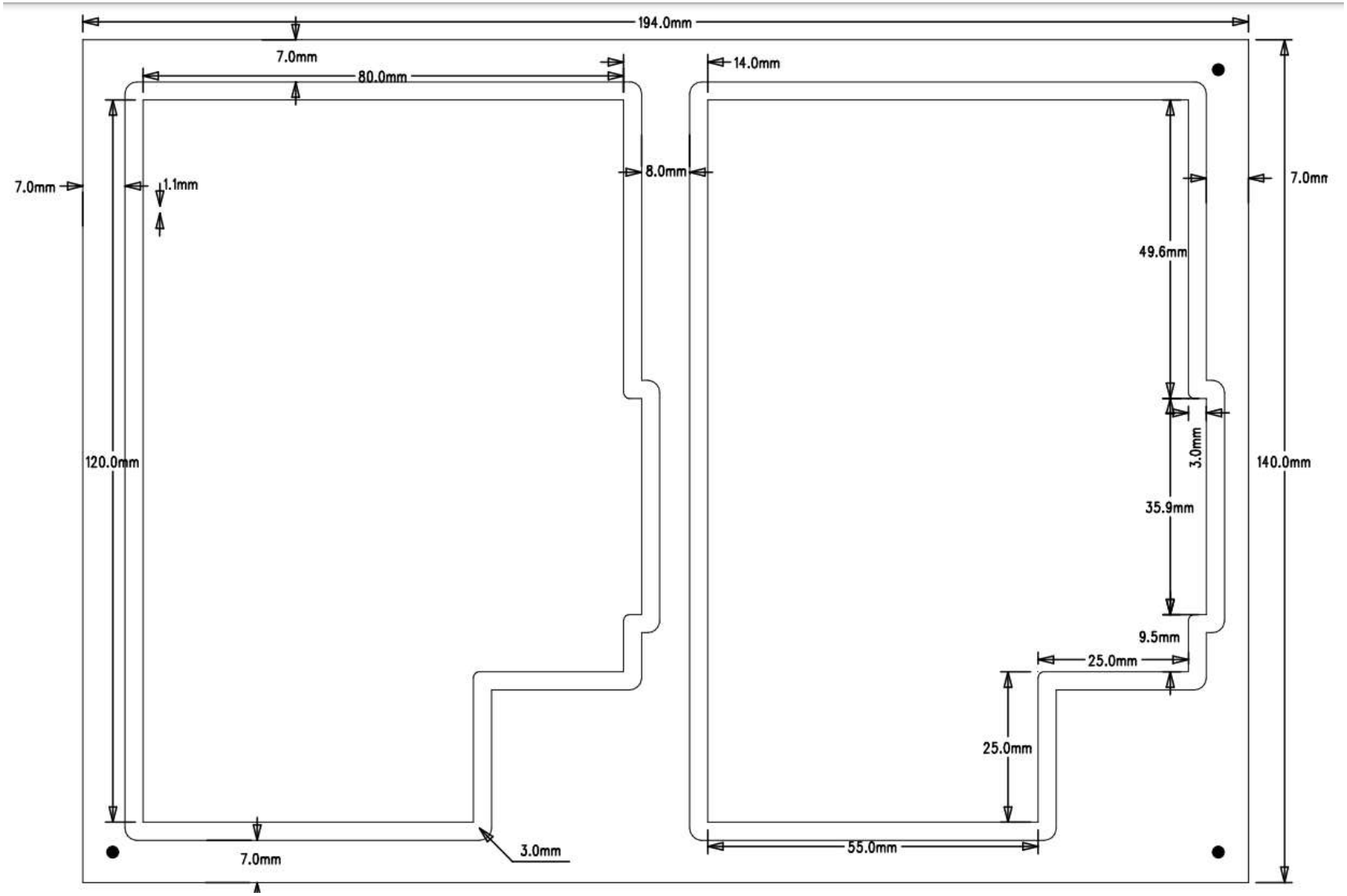

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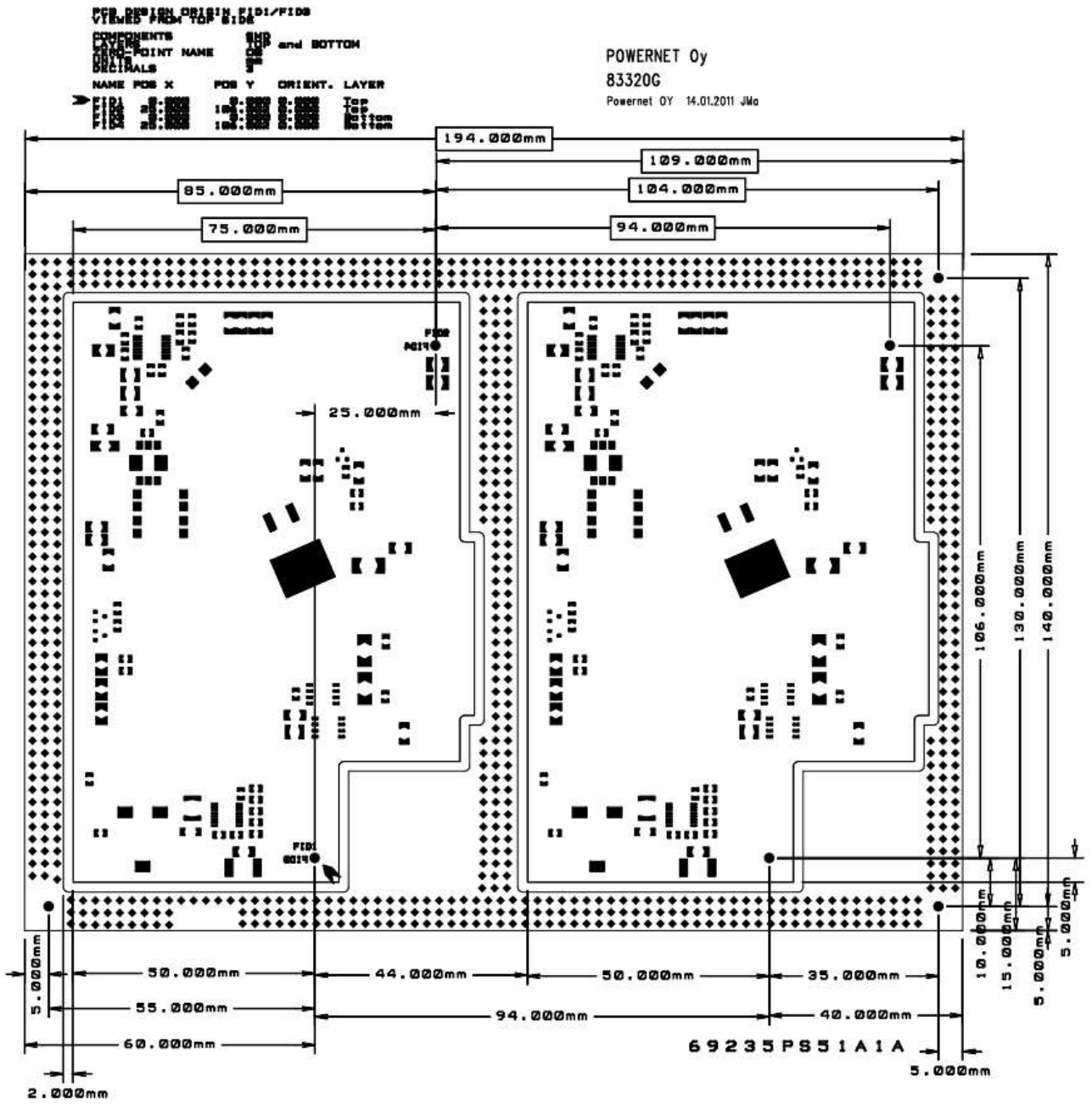

Co-ordinarte Data :

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FID3	0	0	0	FID	BOT
FID4	25.001	106.002	0	FID	BOT
C01	39.299	107.401	90	SMD	TOP
C02	39.299	104.201	90	SMD	TOP
C03	38.199	96.151	0	SMD	TOP
C04	38.199	99.901	0	SMD	TOP
C05	26.699	104.401	90	SMD	TOP
C06	9.101	79.701	90	SMD	TOP
C07	36.399	110.701	90	SMD	TOP
C08	14.649	78.501	0	SMD	BOT
C09	2.941	49.801	0	THT	TOP
C10	33.899	100.901	90	SMD	TOP
C11	3.899	33.901	90	SMD	TOP
C12	6.999	85.801	90	SMD	BOT
C13	26.199	75.301	0	SMD	BOT
C14	9.101	105.001	0	SMD	BOT
C15	21.099	10.601	90	SMD	BOT
C16	4.099	13.701	0	SMD	BOT
C17	43.399	19.901	90	SMD	BOT
C18	34.599	17.761	90	THT	TOP
C19	3.939	3.801	0	THT	TOP
C20	26.301	98.601	90	SMD	BOT
C21	19.799	4.801	0	SMD	TOP
C22	15.299	13.301	90	SMD	TOP
C23	21.999	42.501	90	SMD	BOT
C24	25.299	10.301	90	SMD	TOP
C25	11.101	69.751	0	SMD	BOT
C26	17.101	66.501	90	SMD	BOT
C27	6.241	94.901	0	THT	TOP
C28	15.741	103.601	0	THT	TOP
C29	42.699	61.701	90	SMD	TOP
C30	25.101	78.501	0	SMD	BOT
C31	19.351	72.751	0	SMD	BOT
C32	26.501	52.801	90	SMD	BOT
C33	16.901	29.101	90	SMD	BOT
C34	0.701	80.201	90	SMD	TOP
C35	4.199	26.101	0	SMD	TOP
C36	14.701	44.801	90	SMD	TOP
C37	23.901	31.001	90	SMD	BOT
C38	3.541	107.501	0	THT	TOP
C39	13.149	106.751	0	SMD	BOT
C40	25.401	98.401	0	SMD	TOP
C41	14.999	8.501	90	SMD	BOT
C42	12.199	5.001	0	SMD	TOP
C43	12.199	7.401	0	SMD	TOP

C44	12.199	9.701	0	SMD	TOP
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C46	39.899	19.901	90	SMD	BOT
C47	22.099	20.061	90	THT	TOP
C48	34.799	30.561	90	THT	TOP
C49	12.499	110.701	90	SMD	TOP
C50	36.899	6.401	90	SMD	BOT
C51	25.401	102.101	0	SMD	TOP
C52	27.899	111.251	90	SMD	TOP
C53	15.099	110.701	90	SMD	TOP
C54	17.599	110.701	90	SMD	TOP
C55	25.399	107.751	90	SMD	TOP
C56	2.199	80.001	90	SMD	BOT
C57	18.501	25.801	90	SMD	TOP
C58	9.899	110.701	90	SMD	TOP
C59	14.601	33.401	90	SMD	TOP
C60	24.699	78.401	90	SMD	BOT
C61	26.401	66.801	90	SMD	BOT
C62	13.401	28.301	90	SMD	BOT
C63	33.799	5.101	90	SMD	BOT
C64	20.801	105.101	90	SMD	BOT
C65	46.099	87.201	90	SMD	BOT
C66	17.701	64.101	0	SMD	TOP
C67	13.499	29.561	90	THT	TOP
C68	26.501	58.101	90	SMD	BOT
C69	30.999	5.101	90	SMD	BOT
C70	28.199	5.101	90	SMD	BOT
C71	26.901	30.301	90	SMD	BOT
C100	2.799	98.101	90	SMD	BOT
C102	42.499	80.001	90	SMD	BOT
C105	39.149	41.251	0	SMD	TOP
F01	11.101	60.501	0	SMD	TOP
L01	23.999	46.001	0	THT	TOP
L02	35.604	3.871	0	SMD	TOP
L03	19.551	71.451	0	THT	TOP
L10	13.101	85.628	90	THT	TOP
N01	33.699	105.601	0	SMD	TOP
N02	31.899	74.001	0	SMD	TOP
N03	3.346	102.508	0	SMD	BOT
N04	18.301	110.201	0	SMD	BOT
N05	31.899	68.501	0	SMD	TOP
N07	1.707	33.896	90	SMD	TOP
N08	30.799	78.101	0	SMD	BOT
N09	26.835	42.493	0	SMD	BOT
N10	8.699	41.001	0	SMD	BOT
N11	16.835	42.493	0	SMD	BOT
N14	18.164	8.923	90	SMD	TOP
N23	2.807	26.996	90	SMD	TOP
N24	27.66	41.201	0	SMD	BOT
Q01	44.039	95.541	0	THT	TOP

R001	42.399	74.801	90	SMD	BOT
R002	41.799	104.201	90	SMD	BOT
R003	34.649	88.001	0	SMD	TOP
R004	37.999	96.501	0	SMD	BOT
R005	43.899	88.751	0	SMD	TOP
R006	41.399	111.701	90	SMD	TOP
R007	15.001	106.601	90	SMD	BOT
R008	1.299	102.001	90	SMD	BOT
R009	5.199	98.101	90	SMD	BOT
R010	3.601	112.101	0	SMD	BOT
R011	7.599	98.101	90	SMD	BOT
R012	0.301	97.501	0	SMD	BOT
R013	4.101	97.501	0	SMD	BOT
R014	12.501	107.701	90	SMD	BOT
R015	5.899	111.001	90	SMD	BOT
R016	3.601	109.801	0	SMD	BOT
R017	26.501	89.341	90	THT	TOP
R018	4.999	80.001	90	SMD	BOT
R019	1.999	80.201	90	SMD	TOP
R020	34.299	77.901	90	SMD	BOT
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R022	46.599	16.301	90	SMD	TOP
R023	44.299	5.201	0	SMD	TOP
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R030	22.099	78.401	90	SMD	BOT
R031	27.299	78.401	90	SMD	BOT
R032	25.599	72.201	0	SMD	BOT
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R037	21.299	36.501	90	SMD	BOT
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R059	36.099	109.101	0	SMD	BOT
R060	32.199	111.501	0	SMD	BOT
R061	27.899	107.751	90	SMD	TOP
R062	25.399	111.251	90	SMD	TOP
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R065	30.599	73.401	90	SMD	BOT
R066	18.001	99.301	90	SMD	BOT
R067	24.399	13.101	90	SMD	BOT
R068	12.199	12.101	0	SMD	TOP
R069	12.199	14.401	0	SMD	TOP
R070	12.399	8.501	90	SMD	BOT
R071	44.899	72.401	90	SMD	BOT
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R077	6.401	79.901	90	SMD	TOP
R078	8.701	75.501	0	SMD	TOP
R079	16.499	12.901	90	SMD	BOT
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R083	31.999	91.101	90	SMD	TOP
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R086	45.099	68.501	0	SMD	TOP
R087	9.399	78.501	0	SMD	BOT
R088	23.901	98.601	90	SMD	BOT
R089	14.099	12.901	90	SMD	BOT
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R091	41.599	71.601	0	SMD	BOT
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R093	5.999	46.501	90	SMD	BOT
R094	37.799	104.401	0	SMD	BOT
R100	14.699	1.301	0	SMD	TOP
R102	37.999	96.601	0	SMD	BOT
R103	17.901	94.601	90	SMD	BOT
R105	36.899	10.501	90	SMD	BOT
R106	13.036	54.441	90	THT	TOP
R107	24.641	83.116	0	THT	TOP
R109	10.149	81.301	0	SMD	BOT

R110	16.199	4.801	0	SMD	TOP
R131	4.099	29.601	0	SMD	TOP
R150	26.501	34.801	90	SMD	BOT
R151	25.801	47.501	90	SMD	BOT
R152	28.301	47.501	90	SMD	BOT
T01	34.399	81.751	0	SMD	TOP
T02	14.999	89.101	0	THT	TOP
V001	45.299	78.461	90	THT	TOP
V002	38.899	91.801	90	SMD	BOT
V003	37.899	92.501	0	SMD	TOP
V004	21.899	107.541	90	THT	TOP
V005	2.099	111.101	0	SMD	BOT
V006	43.899	95.701	90	SMD	BOT
V007	43.699	105.001	0	SMD	TOP
V008	5.874	65.626	45	SMD	TOP
V009	24.899	107.251	0	SMD	BOT
V010	23.999	99.701	45	SMD	TOP
V011	46.799	59.461	90	THT	TOP
V012	25.699	5.401	0	SMD	TOP
V013	1.191	40.399	0	THT	TOP
V014	15.599	84.601	90	SMD	BOT
V015	38.199	35.001	90	SMD	BOT
V016	44.099	34.921	90	SMD	TOP
V017	38.199	30.201	90	SMD	BOT
V018	44.099	29.841	90	SMD	TOP
V019	28.999	49.501	90	SMD	BOT
V020	17.999	49.501	90	SMD	BOT
V021	41.599	9.801	90	SMD	BOT
V022	44.424	46.001	90	SMD	TOP
V023	38.199	39.801	90	SMD	BOT
V024	44.099	40.001	90	SMD	TOP
V025	44.424	50.001	90	SMD	TOP
V026	46.799	21.461	90	THT	TOP
V027	46.799	8.461	90	THT	TOP
V028	43.399	85.251	0	SMD	TOP
V029	10.276	42.901	90	SMD	TOP
V030	10.326	35.101	90	SMD	TOP
V031	14.599	54.801	90	SMD	BOT
V032	11.299	54.801	90	SMD	BOT
V034	5.701	83.476	0	SMD	TOP
V035	8.851	99.501	90	SMD	BOT
V046	8.901	25.741	90	THT	TOP
V051	20.901	30.301	90	SMD	BOT
V101	21.201	99.101	90	SMD	BOT
V102	18.401	89.501	90	SMD	BOT
V103	21.501	90.741	90	THT	TOP
X01	20.035	47.428	90	THT	TOP

No. of Solder Points

SMD Solder Points BOT	609

SMD Solder Points TOP	419
TH Solder Points	186

DRG. No. 3 692 35 02401

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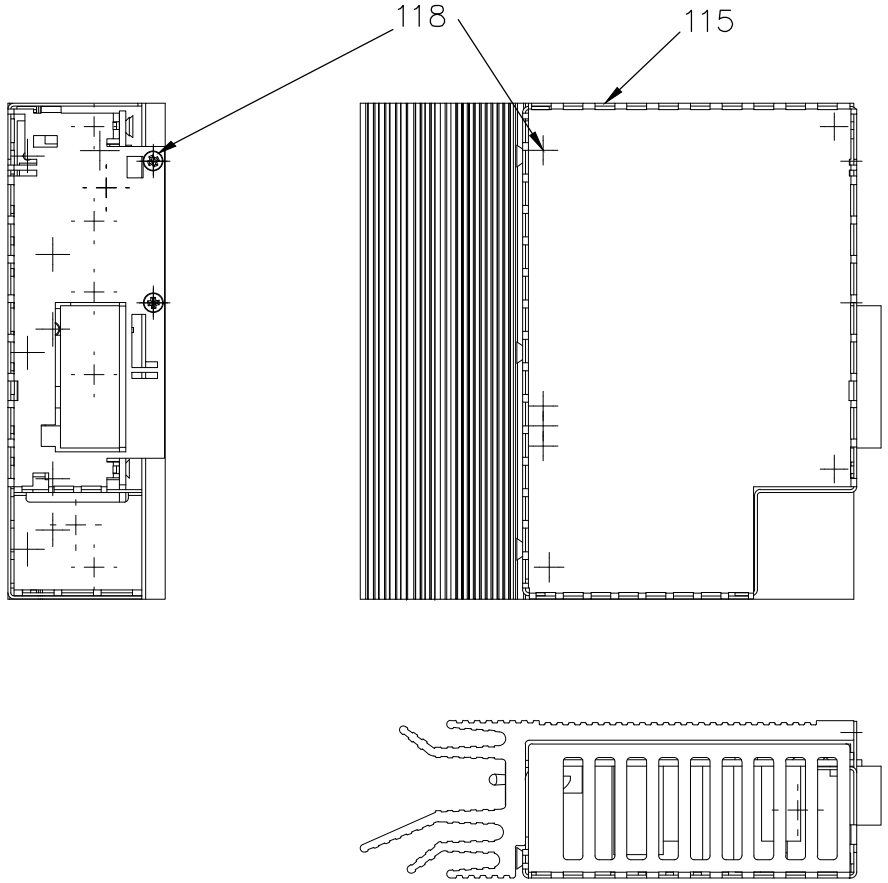

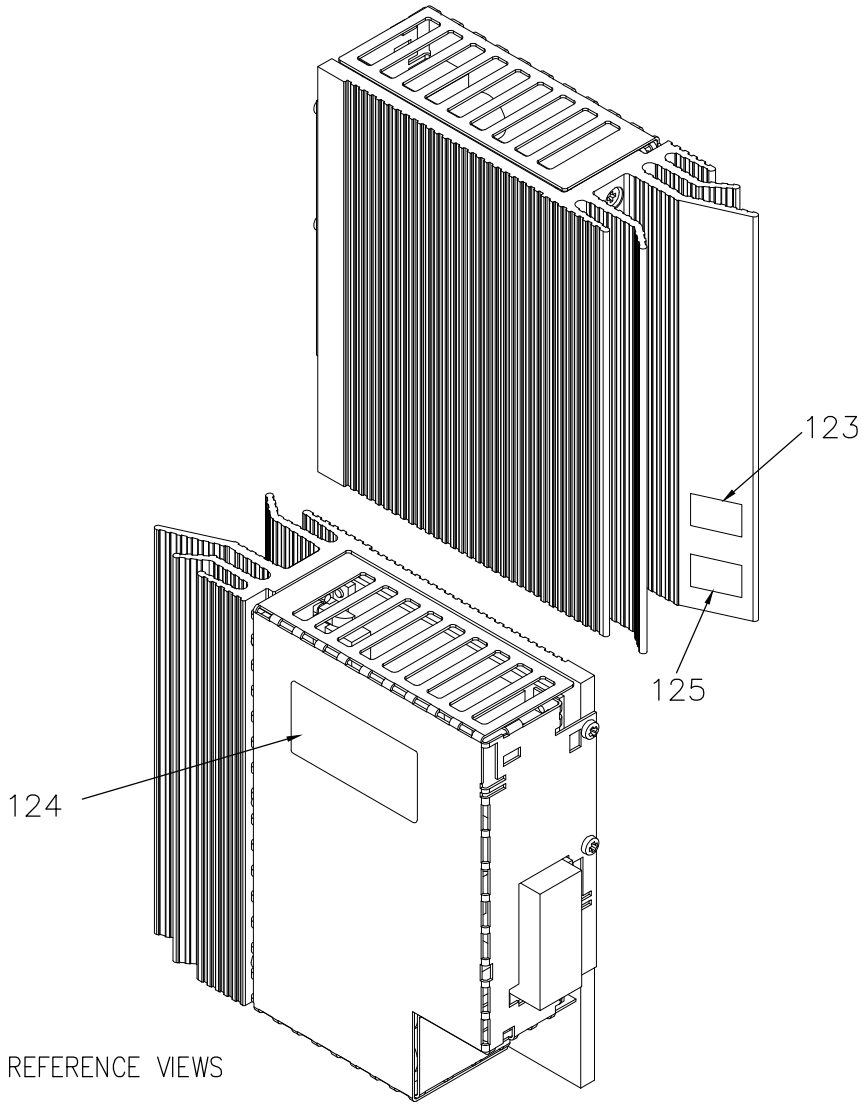

REFERENCE VIEWS

NOTE : 1. REFER BOM : CL69235PS51A00
2. REFER ASSY INSTRUCTIONS : AI69235PS51A

PRODUCT : Metso DNA – 69235PS51A / IPSP
CUSTOMER:

REV.	DATE	
		ALTERED
		CHECKED
		APPROVED
01	28.03.14	ALTERED MARUTI G
		CHECKED IMRAN
		APPROVED SUMA BT

GENERALLY REVISED

	NAME	SIGN	DATE
DRAWN	MARUTI G	Sd/–	07.11.2011
CHECKED	SUMA BT	Sd/–	07.11.2011
APPROVED	SUDHA	Sd/–	07.11.2011

DEPT. SAE | CODE 406

BHEL

BHARAT HEAVY ELECTRICALS LIMITED.
ELECTRONICS DIVISION, BANGALORE

CARD CODE (SCALE=NTS)

TITLE:
MAIN ASSY OF POWER SUPPLY (IPSP) MODULE

No. OF SHEETS 02
SHEET No. 01

WBS No.

DRG. No. 3 692 35 02401

REV 01

REF. DRG. No. AD–D201139

SIGN. & DATE

INVENTORY No.

FORM No. A3–03

A3 SIZE

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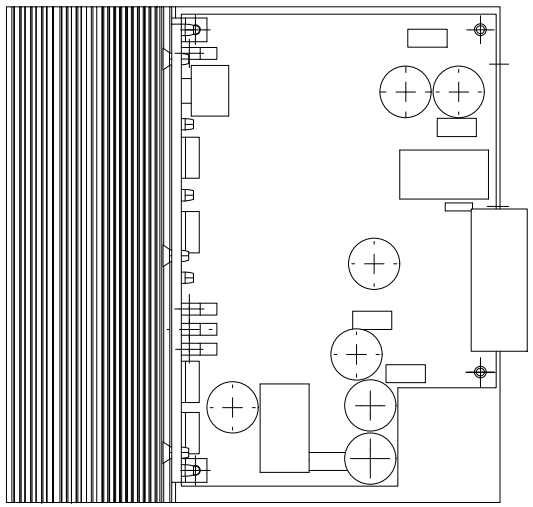
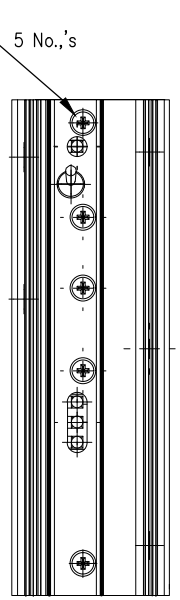
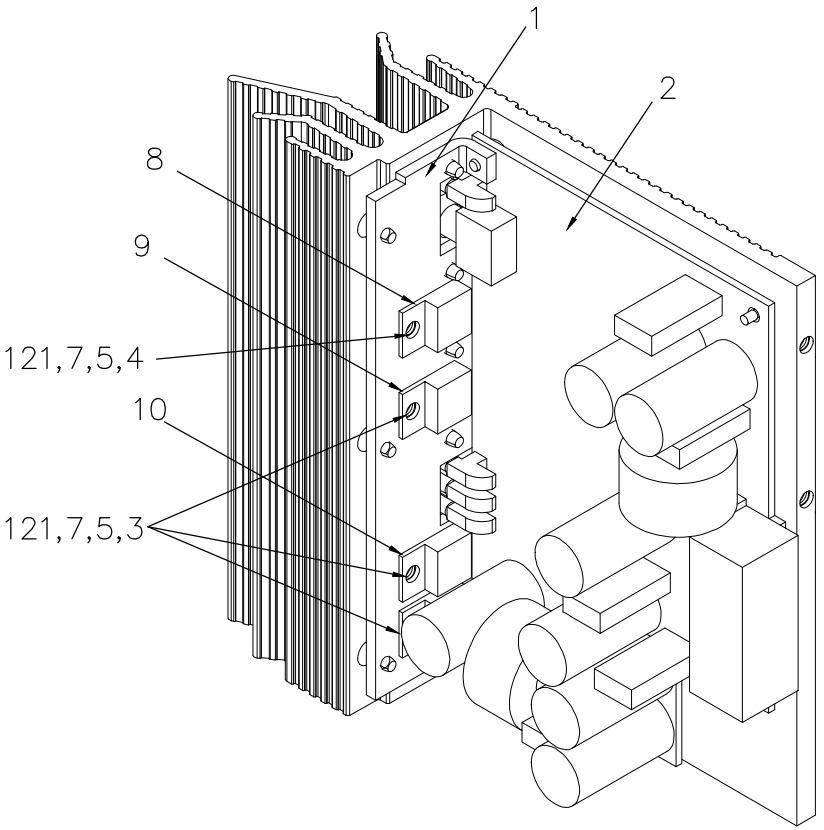
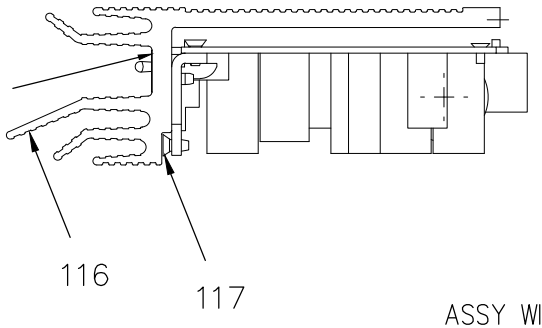




VIEW WITHOUT
GRAPHICS PANEL



VIEW WITHOUT CASE ASSY



ASSY WITHOUT COVER

REF. DRG. No. AD-D201139

SIGN. & DATE

INVENTORY No.

PRODUCT : Metso DNA – 69235PS51A / IPSP
CUSTOMER:

REV.	DATE	ALTERED / CHECKED / APPROVED
01	28.03.14	ALTERED MARUTI G / CHECKED IMRAN / APPROVED SUMA BT

GENERALLY REVISED

	NAME	SIGN	DATE
DRAWN	MARUTI G	Sd/–	07.11.2011
CHECKED	SUMA BT	Sd/–	07.11.2011
APPROVED	SUDHA	Sd/–	07.11.2011

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BHARAT HEAVY ELECTRICALS LIMITED.
ELECTRONICS DIVISION, BANGALORE

CARD CODE (SCALE=NTS)

TITLE:
MAIN ASSY OF POWER SUPPLY (IPSP) MODULE

No. OF SHEETS 02
SHEET No. 02

WBS No.

DRG. No. 3 692 35 02401

REV 01

FORM No. A3-03

A3 SIZE

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. No. 3 692 35 06201

661846/2024/EDN-SA/PPC

31

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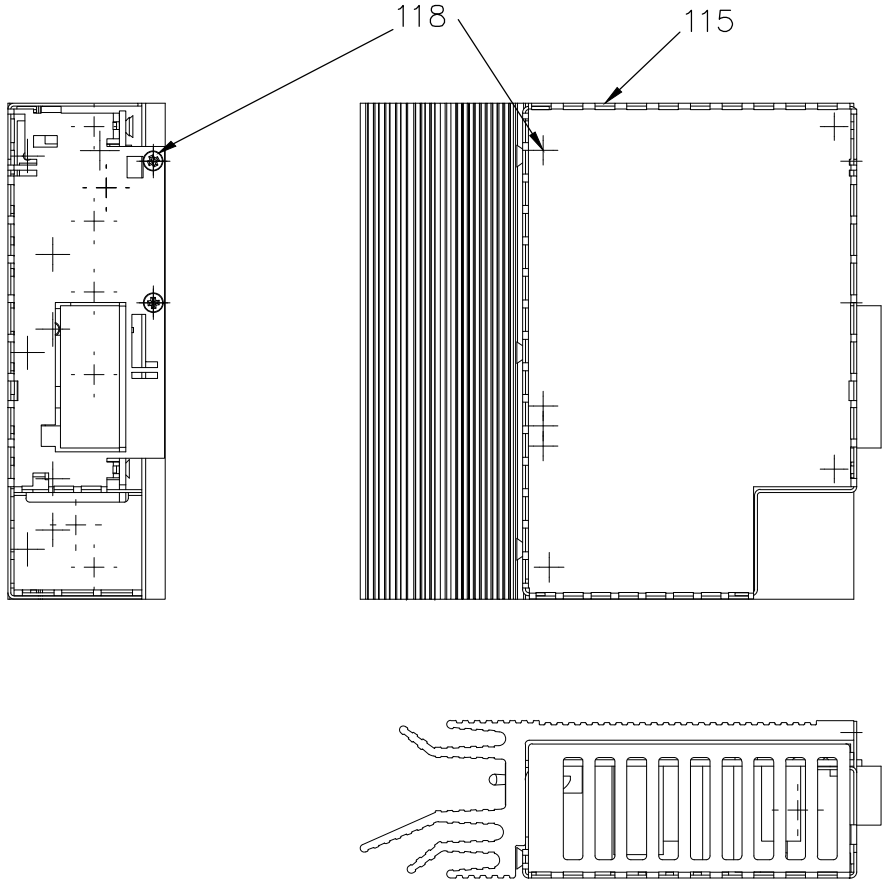

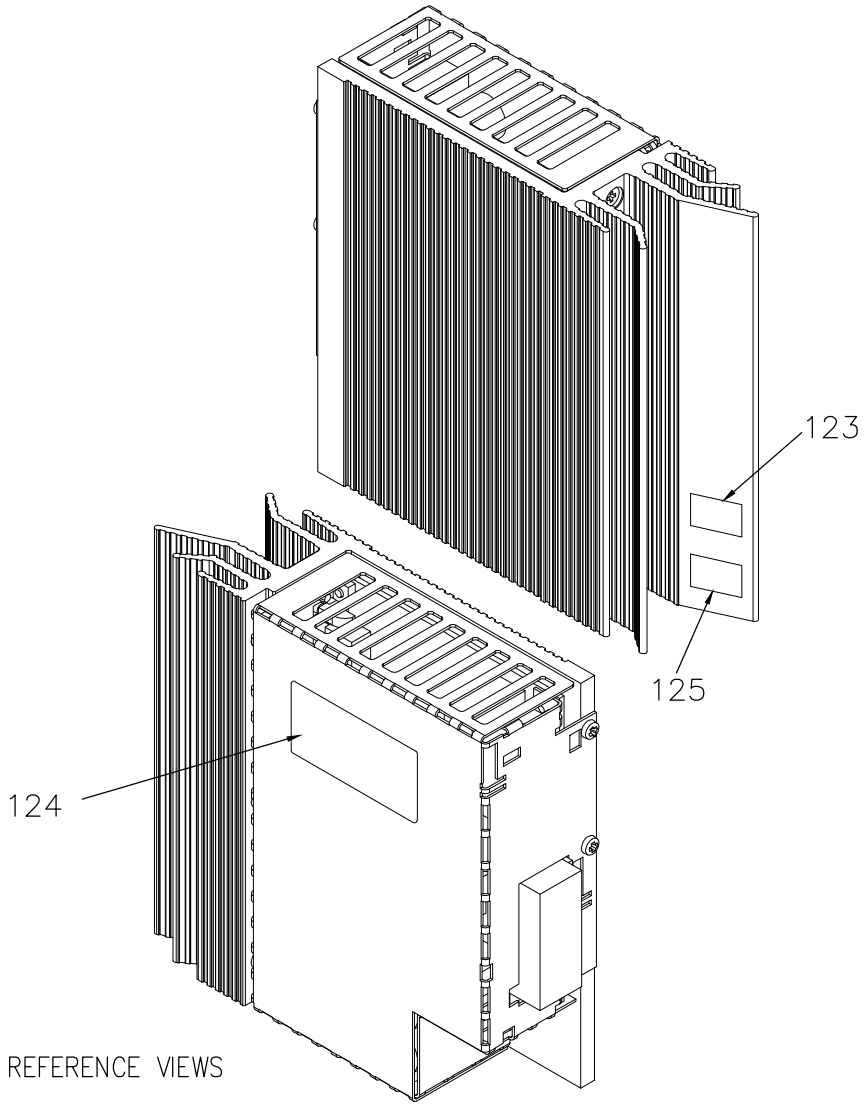

REFERENCE VIEWS

NOTE : 1. REFER BOM : CL69235PS51B00

2. REFER ASSY INSTRUCTIONS : AI69235PS51B

PRODUCT : Metso DNA – 69235PS51B / IPSP

CUSTOMER:

REV.	DATE	ALTERED / CHECKED / APPROVED	REV.	DATE	ALTERED / CHECKED / APPROVED

	NAME	SIGN	DATE
DRAWN	MARUTI G	Sd/–	28.03.2014
CHECKED	IMRAN	Sd/–	28.03.2014
APPROVED	SUMA BT	Sd/–	28.03.2014

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TITLE:
MAIN ASSY OF POWER SUPPLY (IPSP) MODULE

No. OF SHEETS 02

SHEET No. 01

WBS No.

DRG. No. 3 692 35 06201

REV 00

REF. DRG. No. AD–D201139

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FORM No. A3–03

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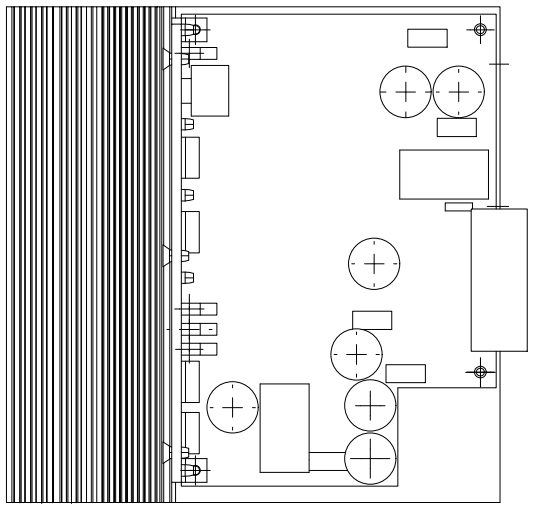
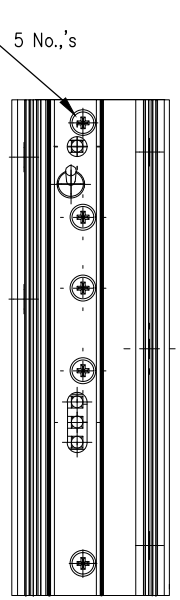
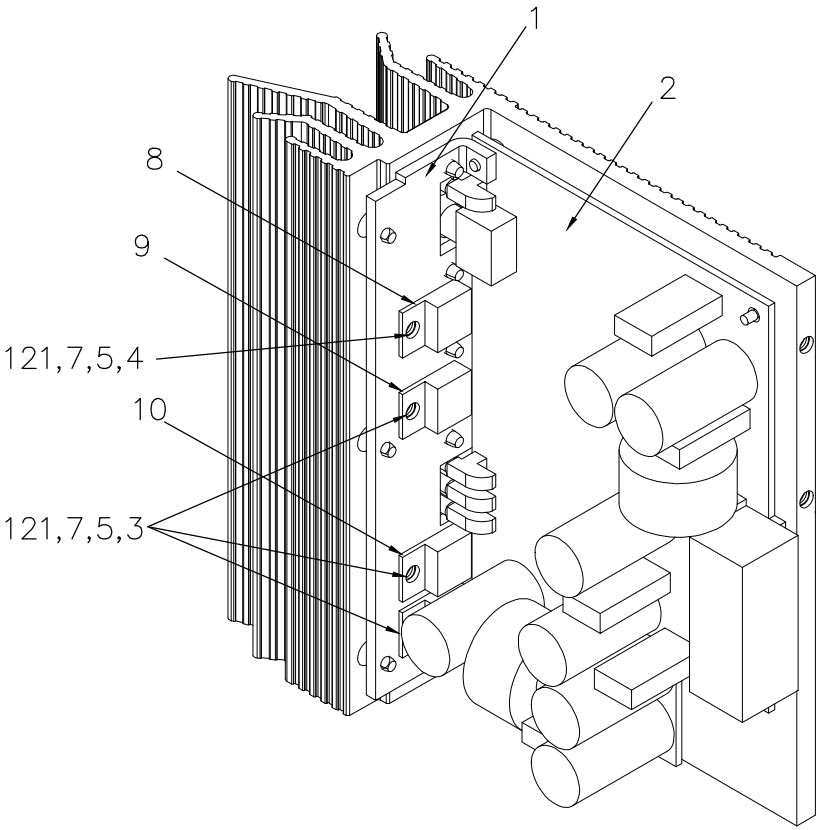




VIEW WITHOUT
GRAPHICS PANEL



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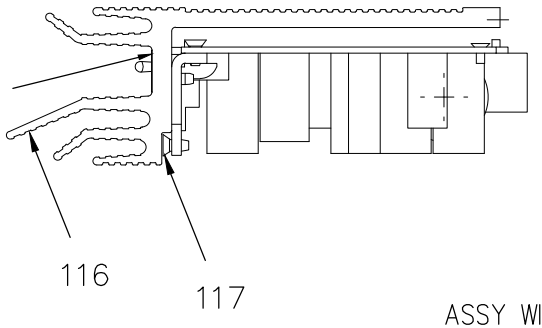

ASSY WITHOUT COVER

REF. DRG. No. AD-D201139

SIGN. & DATE

INVENTORY No.

PRODUCT : Metso DNA – 69235PS51B / IPSP
CUSTOMER:

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	NAME	SIGN	DATE
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CHECKED	IMRAN	Sd/–	28.03.2014
APPROVED	SUMA BT	Sd/–	28.03.2014

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ELECTRONICS DIVISION, BANGALORE

CARD CODE (SCALE=NTS)

TITLE:
MAIN ASSY OF POWER SUPPLY (IPSP) MODULE

No. OF SHEETS 02
SHEET No. 02

WBS No.

DRG. No. 3 692 35 06201

REV 00

DDC8330-D201832-3
Production Test Specification

Created by: JDa

Issue	Date	Description of Change	Ref CR	Approved
8330-0.4	15/01/2010	1st Draft	-	
8330-1	27/05/2010			JSe
8330-3	24/5/2011	Parameter change / minor update		JDa

TABLE OF CONTENTS

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1 GENERAL

Purpose of this document is to describe production test requirements for series DDC8330.

2 REFERENCES TO OTHER DOCUMENTS

Document	Reference	Notes
Test Plan for production	DDC8330-D201832-3 Test spec.doc	
Parts list	n/a	
Product functional description	n/a	
Schematics drawing	83310G.sch	
PCB layout	83320G.pcb	
Drill plot for test pads	n/a	

2.1 DESCRIPTION OF TERMS

Signal or Symbol	Description
DUT	Device under test
Flying probe	Special tester where are few moving nail probes
FCT	Functional test
ICT	In-circuit test
AOI	Automatic optical inspection
Screening	Same as burn in or ageing
HV test	High voltage isolation test
Interposer	Tester interface with connectors
Fixture	Tester interface with bed of nails
Test station	Including computer and test rack (in FCT)

3 GENERAL REQUIREMENTS

3.1 PRODUCTION TEST REQUIREMENTS FOR MODULE

Test phase	Needed for proto series	Needed for 0- series	Needed for final product	Testing time target	Notes
ICT	No	No	No		
Flying probe	No	No	No		
Optical test	No	No	No		
X-ray	No	No	No		
Visual test	Yes	Yes	Yes		
Screening	No	No	No		
HV test	No	No	No		
FCT	Yes	Yes	Yes		

3.2 PRODUCTION TEST REQUIREMENTS FOR ASSEMBLED PRODUCT

Test phase	Needed for proto series	Needed for 0-series	Needed for final product	Testing time target	Notes
Visual test	Yes	Yes	Yes		
Functional test	Yes	Yes	Yes		
Screening	No	No	No		
HV test	No	Yes	Yes		

4 MANUFACTURING PROCESS AND TESTING PHASES

4.1 Module test

1. Reference to “DDC8330 led test .doc”.

2. Set 24VDC to input leads.
3. Set power switch on, green led near switch should be on and two leds on right side in a three led group are also green.
4. Power switch off, green led near switch should stay on, three led group should fade off.

NOTE

Use proper tools and safety covers.

4.2 HV test

1. Reference to “DDC8330 HV-test.doc”.
2. Test voltage 500VDC (Insulation resistance) 3. Test should be done with appropriate test leads.
4. Insulation will be tested between primary and secondary, chassis is connected to secondary.
5. Insulation resistance should be over 999Mohms or infinite(∞), regarding to test instrument.

CAUTION

High voltage.

NOTE

Use proper tools and safety covers.

4.3 Final test (FCT)

Minimum requirements for final test station:

- DC power supply 30VDC 20A 600W • Electronic load 2Ch. 300W/ch.
- DMM
- One signal relay control
- One AD measure channel.

Pin	Description
X1-1	0V
X1-2	PE
X1-3	I2C bus (scl)
X1-4	I2C bus (sda)
X1-5	DGND / AGND
X1-6	DGND / AGND
X1-7	+5V out
X1-8	+28V in
X1-9	+28V Field
X1-10	Fault output (open collector, ref DGND)
X1-11	+24V out
X1-12	DGND / AGND
X1-13	DGND / AGND
X1-14	DGND / AGND

4.3.1 Final test sequence descriptions

Sequence ID		1	**Report** PASS/FAIL						
Name		Start up voltage							
Sub ID	**Interface**	**Signal name**	**Sub report**	**Action**	**Value**			**QTY**	**NOTE!**
					MIN	**MAX**	**NOM**		
1	X1-11	Load +24V-line	Value	Write			1	A	CC-mode
2	X1-7	Load +5.3V-line	Value	Write			1	A	CC-mode
3	X1-8	Input voltage	Value	Write			18.5	VDC	
4	X1-9	Field-signal	Value	Write			18.5	VDC	
5		Start up time	Value	Read		2500		ms	
6	X1-11	Output +24V	Value	Read		5		VDC	
7	X1-8	Input voltage	Value	Write			21.5	VDC	
8	X1-9	Field-signal	Value	Write			21.5	VDC	
9		Start up time	Value	Read		2500		ms	
10	X1-11	Output +24V	Value	Read	5			VDC	

Sequence ID		2	**Report** PASS/FAIL						
Name		Shut down voltage							
Sub ID	**Interface**	**Signal name**	**Sub report**	**Action**	**Value**			**QTY**	**NOTE!**
					MIN	**MAX**	**NOM**		
1	X1-8	Input voltage	Value	Write			24	VDC	
2	X1-9	Field-signal	Value	Write			24	VDC	
3	X1-11	Load +24V-line	Value	Write			1	A	CC-mode
4	X1-7	Load +5.3V-line	Value	Write			1	A	CC-mode
5	X1-8	Input voltage	Value	Write			21.3	VDC	

6	X1-9	Field-signal	Value	Write			21.3	VDC	
7		Shut down time	Value	Read		4500		ms	
8	X1-11	Output voltage +24V	Value	Read	5			VDC	
9	X1-8	Input voltage	Value	Write			18	VDC	
10	X1-9	Field-signal	Value	Write			18	VDC	
11		Shut down time	Value	Read		4500		ms	
12	X1-11	Output voltage +24V	Value	Read		5		VDC	

Sequence ID		3	**Report** PASS/FAIL						
Name		Output voltage measure							
Sub ID	**Interface**	**Signal name**	**Sub report**	**Action**	**Value**			**QTY**	**NOTE!**
					MIN	**MAX**	**NOM**		
1	X1-11	Load +24V-line	Value	Write			0	A	CC-mode
2	X1-7	Load +5.3V-line	Value	Write			0	A	CC-mode
3	X1-8	Input voltage	Value	Write			24	VDC	
4	X1-9	Field-signal	Value	Write			24	VDC	
5		Delay	Value	Read			2500	ms	
6	X1-11	Output voltage +24V	Value	Read	23.5	24.5	24	VDC	
7	X1-7	Output voltage +5.3V	Value	Read	5.15	5.4	5.3	VDC	
8	X1-8	Input voltage	Value	Write			28	VDC	
9	X1-9	Field-signal	Value	Write			28	VDC	
10		Delay	Value	Read			2500	ms	
11	X1-11	Output voltage +24V	Value	Read	23.5	24.5	24	VDC	
12	X1-7	Output voltage +5.3V	Value	Read	5.15	5.4	5.3	VDC	
13	X1-11	Load +24V-line	Value	Write			1	A	CC-mode
14	X1-7	Load +5.3V-line	Value	Write			4	A	CC-mode
15	X1-8	Input voltage	Value	Write			24	VDC	
16	X1-9	Field-signal	Value	Write			24	VDC	
17		Delay	Value	Read			2500	ms	
18	X1-11	Output voltage +24V	Value	Read	23.5	24.5	24	VDC	
19	X1-7	Output voltage +5.3V	Value	Read	5.15	5.4	5.3	VDC	
20	X1-8	Input voltage	Value	Write			28	VDC	
21	X1-9	Field-signal	Value	Write			28	VDC	
22		Delay	Value	Read			2500	ms	
23	X1-11	Output voltage +24V	Value	Read	23.5	24.5	24	VDC	
24	X1-7	Output voltage +5.3V	Value	Read	5.15	5.4	5.3	VDC	
25	X1-11	Load +24V-line	Value	Write			2	A	CC-mode
26	X1-7	Load +5.3V-line	Value	Write			8	A	CC-mode
27	X1-8	Input voltage	Value	Write			24	VDC	
28	X1-9	Field-signal	Value	Write			24	VDC	
29		Delay	Value	Read			2500	ms	
30	X1-11	Output voltage +24V	Value	Read	23.5	24.5	24	VDC	
31	X1-7	Output voltage +5.3V	Value	Read	5.15	5.4	5.3	VDC	
32	X1-8	Input voltage	Value	Write			28	VDC	
33	X1-9	Field-signal	Value	Write			28	VDC	
34		Delay	Value	Read			2500	ms	
35	X1-11	Output voltage +24V	Value	Read	23.5	24.5	24	VDC	
36	X1-7	Output voltage +5.3V	Value	Read	5.15	5.4	5.3	VDC	

Sequence ID		4	Report PASS/FAIL						
Name		Ripple voltage							
Sub ID	Interface	Signal name	Sub report	Action	Value			QTY	NOTE!
					MIN	MAX	NOM		
1	X1-11	Load +24V-line	Value	Write			1	A	CC-mode
2	X1-7	Load +5,3V-line	Value	Write			4	A	CC-mode
3	X1-8	Input voltage	Value	Write			24	VDC	
4	X1-9	Field-signal	Value	Write			24	VDC	
5	X1-11	Ripple voltage +24V	Value	Read		10		mVAC	
6	X1-7	Ripple voltage +5.3V	Value	Read		20		mVAC	
7	X1-11	Load +24V-line	Value	Write			2	A	CC-mode
8	X1-7	Load +5,3V-line	Value	Write			8	A	CC-mode
9	X1-8	Input voltage	Value	Write			24	VDC	
10	X1-9	Field-signal	Value	Write			24	VDC	
11	X1-11	Ripple voltage +24V	Value	Read		10		mVAC	
12	X1-7	Ripple voltage +5.3V	Value	Read		20		mVAC	

Sequence ID		5	Report PASS/FAIL						
Name		Efficiency							
Sub ID	Interface	Signal name	Sub report	Action	Value			QTY	NOTE!
					MIN	MAX	NOM		
1	X1-11	Load +24V-line	Value	Write			1	A	CC-mode
2	X1-7	Load +5.3V-line	Value	Write			4	A	CC-mode
3	X1-8	Input voltage	Value	Write			24	VDC	
4	X1-9	Field-signal	Value	Write			24	VDC	
5		Efficiency	Value	Read	85			%	
6	X1-11	Load +24V-line	Value	Write			2	A	CC-mode
7	X1-7	Load +5.3V-line	Value	Write			8	A	CC-mode
8	X1-8	Input voltage	Value	Write			24	VDC	
9	X1-9	Field-signal	Value	Write			24	VDC	
10		Efficiency	Value	Read	85			%	

Sequence ID		6	Report PASS/FAIL						
Name		Short circuit current							
Sub ID	Interface	Signal name	Sub report	Action	Value			QTY	NOTE!
					MIN	MAX	NOM		
1	X1-8	Input voltage	Value	Write			24	VDC	
2	X1-9	Field-signal	Value	Write			24	VDC	
3	X1-11	Load +24V-line	Value	Write			Short	A	CC-mode
4	X1-7	Load +5.3V-line	Value	Write			Short	A	CC-mode
5		Delay	Value	Write			1500	ms	
6	X1-11	Output +24V	Value	Read	4	11.5		ADC	
7	X1-7	Output +5.3V	Value	Read	4.8	10		ADC	

Sequence ID		7	Report PASS/FAIL						
Name		Current limit (CV-mode)							
Sub ID	Interface	Signal name	Sub report	Action	Value			QTY	NOTE!
					MIN	MAX	NOM		
1	X1-8	Input voltage	Value	Write			24	VDC	

2	X1-9	Field-signal	Value	Write			24	VDC	
3	X1-11	Load +24V-line	Value	Write			23	VDC	CV-mode
4	X1-7	Load +5.3V-line	Value	Write			5	VDC	CV-mode
5	X1-11	Output +24V	Value	Read	2	4.8		ADC	
6	X1-7	Output +5.3V	Value	Read	8	10		ADC	

Sequence ID		8	**Report** PASS/FAIL						
Name		Signal test							
Sub ID	**Interface**	**Signal name**	**Sub report**	**Action**	**Value**			**QTY**	**NOTE!**
					MIN	**MAX**	**NOM**		
1	X1-8	Input voltage	Value	Write			24	VDC	
2		Delay	Value	Read			2500	ms	
3	X1-10	Fault-signal	Value	Read	0	1	0.1	VDC	“0” when flt active
2	X1-11	Output +24V	Value	Read		5		VDC	
3	X1-9	Field-signal	Value	Write			24	VDC	
4		Delay	Value	Read			2500	ms	
5	X1-10	Fault-signal	Value	Read	4	5.5	5.3	VDC	“0” when flt active
6	X1-11	Output +24V	Value	Read	23	25		VDC	

4.4 Burn-In (Screening)

Not used/needed for this product.

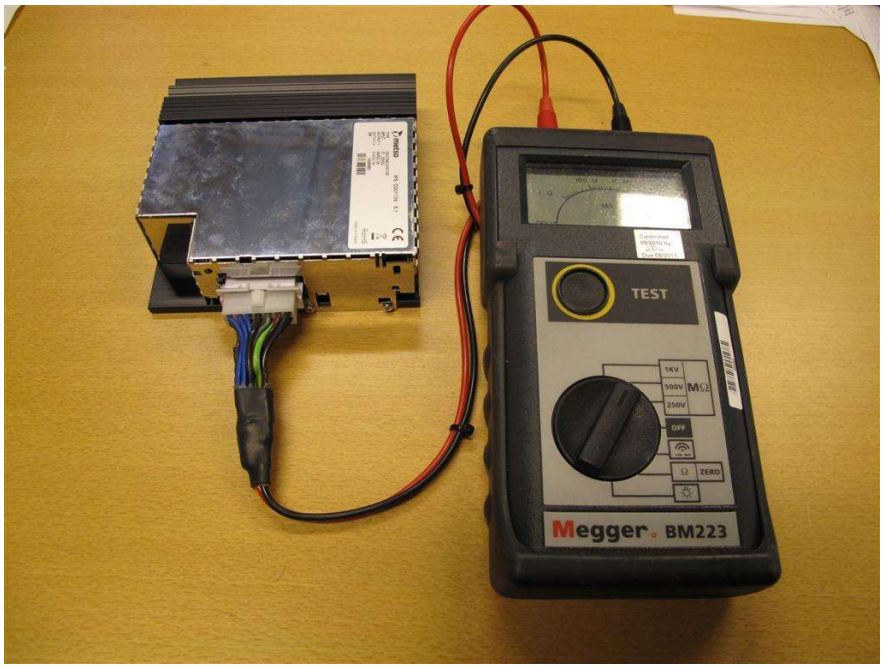
DDC8330 High Voltage test (Insulation resistance).

Instruments needed:

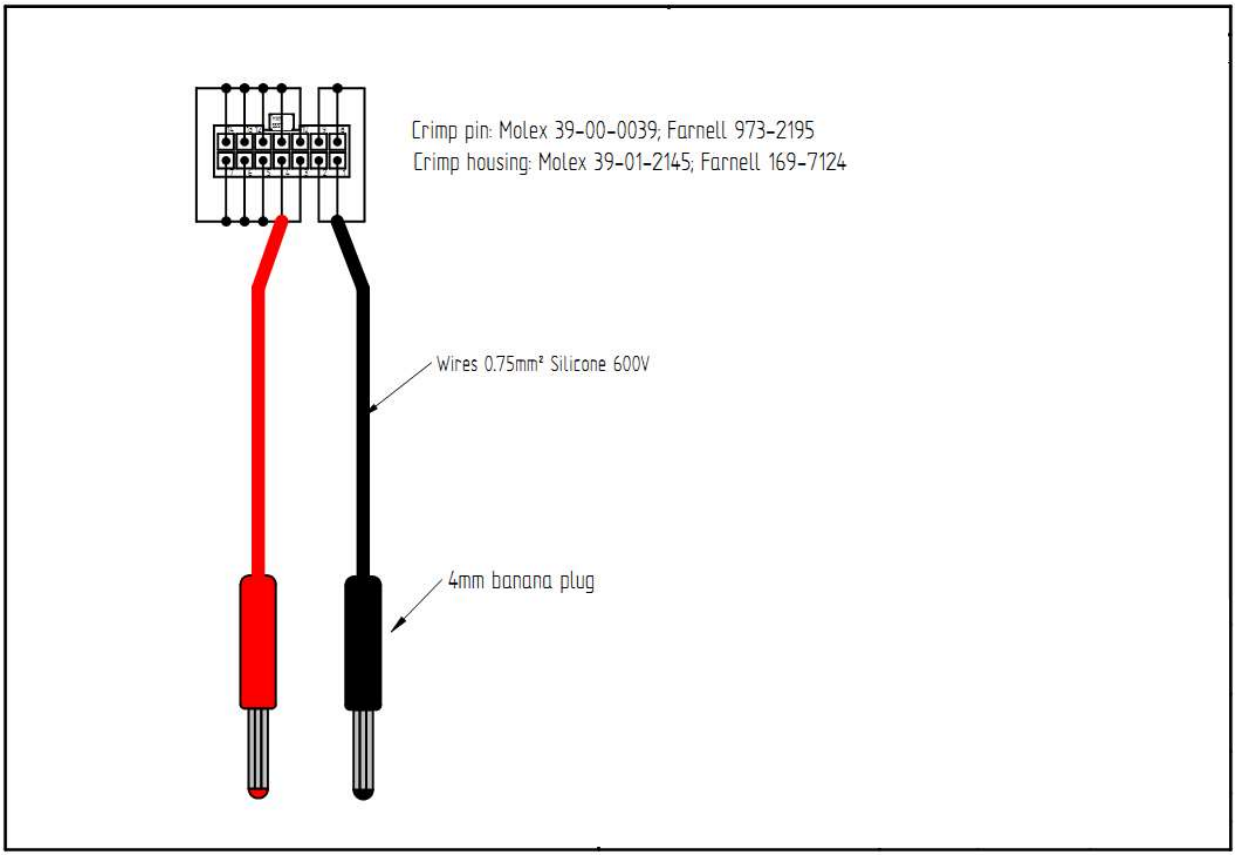
1. Insulation resistance meter with 500VDC measure
2. DDC8330 insulation resistance test leads

Specifications:

1. Test voltage 500VDC
2. Typical insulation resistance >999MΩ or infinity ∞
3. Minimum insulation resistance 50MΩ



Picture 1: DDC8330 Insulation resistance test



Picture 2 DDC8330 Insulation test rig

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	ELECTRONICS DIVISION	REV NO 02
A4 - 15		

REVISION HISTORY SHEET

REV NO	DATE	NATURE OF CHANGE	REASONS	PREPARED BY	APPROVED BY
00	28/08/92	Supersedes CN29009	-	AV,MRV	NJ
01	06/09/97	REAFFIRMATION	-	CCR,MRV	NS
02	28/11/02	REAFFIRMATION	-	CCR	NS

APPROVED :
N.SRIDHARAN

PREPARED :	ISSUED :	DATE :
CCR	STDS GROUP	28/11/02

	PLANT STANDARD	ED 085 00 99
BHEL		
	ELECTRONICS DIVISION	REV NO 02
A4 - 13		
		PAGE 1 OF 3

ENVIRONMENTAL TESTING PROCEDURE-RAPID TEMPERATURE CYCLING TEST

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1.0 SCOPE:
To determine the ability of electronic components or equipment to withstand rapid changes of temperature in air such as may occur during storage, transportation and use.

2.0 REFERENCE STANDARD:
Guidance has been taken from IEC Standard 68-2-14, Test N, Change of Temperature, in preparing this testing procedure.

3.0 GENERAL DESCRIPTION:
The test object is exposed to rapid changes of temperature in the air by alternate exposure, in two Chambers, one for the low temperature and the other for the high temperature. The low temperature shall be -25 Deg C and the high +70 Deg C.The test object shall be subjected to five cycles of such exposure.

4.0 TEST CHAMBER:
The test chamber shall be capable of maintaining its inside temperature to within ñ3 Deg C of the temperature specified for the test.The temperature within the Chamber shall be monitored by a thermometer suitably located within its working space.

5.0 TESTING PROCEDURE:
5.1 Carry out the following checks on the test object as per its relevant test instruction:
(a) Visual
(b) Mechanical

5.2 Expose the test object to five cycles of rapid changes in temperature as per the scheme shown below:

FIGURE-1

(a) Use two Chambers to conduct this test.

REVISIONS:	APPROVED: N.SRIDHARAN.		
	PREPARED: AV,MRV.	ISSUED: STDS.GROUP.	DATE: 28-08-92.

(b) Maintain the temperature of the Chamber at -25 Deg C and the other at +70 Deg C.

(c) Introduce the test object first into the Chamber whose temperature is at -25 Deg C and keep it for 30 minutes.

(d) Remove the test object from the cold Chamber and transfer it to hot chamber at 70 Deg C and keep it there for 30 minutes.

(e) Step c&d constitute one cycle. Repeat the test for five cycles.

(f) The test object shall not be electrically energised during exposure to low and high temperatures.

(g) The time for the transfer of the test object from one chamber to the other shall not exceed three minutes.

5.3 At the end of five cycles of exposure examine the test object visually for any deformation, decolouration, etc., and record them.

5.4 Put a suitable mark on the test object as identification for having undergone the rapid temperature cycling test.

5.5 Repeat the test given in clause 5.1 and conduct tests as per relevant Test Instructions.

5.6 GUIDELINES FOR ROUTINE TEST :
This test shall be conducted as per the guidelines given below:
a) Number of samples : 100%
b) Test Agency : PCB Testing
c) Criteria for PASS/FAIL: The object shall be deemed to have passed the test if it meets the requirements of this Standard. Object, if repairable, can be repaired if any deficiency is observed. Defective components shall be replaced only by components that have also been subjected to rapid temperature cycling test.

6.0 TEST RECORDS:
PCB Testing Group shall generate and maintain the details of the tests carried out as per clauses 5.1, 5.3, 5.4 and 5.5

7.0 TEST REPORT:
Shall be made by the PCB Testing Group.

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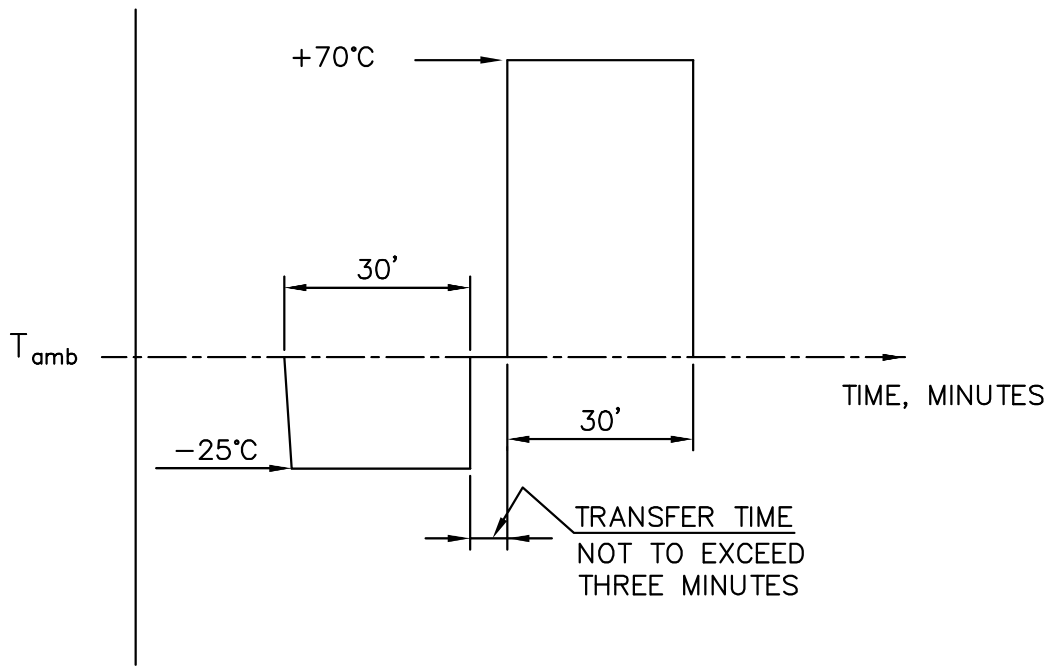

FIGURE–1

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Special commercial conditions of Contract (SCC)

Tender department: SA MM, EDN, BHEL, BANGALORE			RFQ/NIT/Enquiry no.	CKGOT00038
		Bidder Name:		
Tender floated through NIC e-Procurement system Website - https://eprocurebhel.co.in/nicgep/app . Vendor to submit offer only though NIC e-Procurement system.				
SCC to be read along with Instructions to Bidders (document reference: BHELEDN:ITB-SHOP: Rev 03), General Conditions of Contract (document reference: BHELEDN:GCC-SHOP: Rev 01)				

Sr. No	DESCRIPTION	Details	Bidder's Response	Remarks if any
1	Price Basis	The quoted prices will be firm till supply completion of the tendered quantity.		
2	Terms of Delivery	DDL, BHEL EDN, Bangalore (Free delivery to EDN/BHEL Bangalore including packing & forwarding charges)		
3	Delivery Period	For 10 nos. samples: ……8 weeks…….. from the date of issue of Purchase order by BHEL. For Balance quantity: ……15 weeks…….. from the date of issue of Purchase order by BHEL. Date of receipt of material at BHEL EDN will be treated as delivery for purpose of penalty calculation. BHEL will inspect within 1 week from the date of receipt of Inspection call from supplier. Clearance for sample lot will be given by BHEL within 2 weeks from the date of receipt of sample at BHEL-EDN.		
4	Payment Term	100% direct payment with 45 days credit from the date of receipt of material at BHEL Stores		
5	Evalution of L1 vendor	All the items of tender shall be considered as single package for evaluation and ordering		
6	GeM Seller id	Mention the Government E-marketplace (GeM) Seller id. The same is mandatory for placing Purchase order by BHEL.		
7	Penalty for delay in delivery	Penalty of 0.5% per week at the basic price of the good for undelivered quantity of supply portion, subject to a maximum of 10%. Date of receipt of material at BHEL EDN Stores will be treated as date of delivery for purpose of penalty calculation		
8	Loading towards Penalty for delay in delivery	For any deviation in penalty term, the offer will be liable for loading as per ITB.		
9	Other terms & conditions	For detailed Terms and Conditions, kindly refer to the following: Instructions to Bidders (document reference: BHELEDN:ITB-SHOP: Rev 03) and General Conditions of Contract (document reference: BHELEDN:GCC-SHOP: Rev 01) attached with this tender		
10	Validity	Quotation should remain valid for a period of 90 days from the due date.		
11	Reverse Auction	Reverse Auction is not applicable for tender		
12	Declaration for GFR 2017 Rule 144(Xi)	Decleration to be uploaded (Format attached)		
13	Declaration for Make in India	Decleration to be uploaded (Format attached)		
14	Declaration	The bidder declares that they will not enter into any illegal or undisclosed agreement of understanding, whether formal or informal with other bidder(s). This applies in particular to prices, specifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process. In case, the Bidder is found having indulged in above activities, suitable action shall be taken by BHEL as per extent policies/guidelines.		
15	Warranty	18 months from the date of supply.		
16	Bank Guarantee	a. L1 Vendor to provide Bank Guarantee for INR 55 lacs within 14 days from the date of placement of Purchase order. b. Materials will be issued by BHEL only after submission of Bank Guarantee by the Supplier and Supplier to collect the materials within 7 days of intimation by BHEL		
17	No Deviation	We hereby confirm that all the terms & conditions of tender are accepted without any deviation . Any additional commercial term or deviation in commercial term mentioned anywhere else shall be ignored and not be considered for evaluation		
18	Documents for bill processing	Complete set of despatch documents (original + 1 photocopy set) as per Purchase Order shall be submitted to Purchase Officer directly on below address for bill processing - If documents are Digitally Signed by Authorized Signatory, submission of Hard copy of document is not required. However digitally signed soft copy of complete set of documents to be sent to below email IDs, …… Depending upon the PO, despatch documents may include one or more documents from the following: 1. Invoice for payment (original) 2. Invoice for payment (extra copy) 3. Warranty certificate 4. Copy of UDYAM certificate for considering MSE, if applicable 5. Copy of First Inspection call letter along with TC if Pre-shipment inspection is applicable The precise list of despatch documents needed for the PO will be specified in the Purchase Order. One set of Invoice, Packing List and L/R or AWB shall be e-mailed immediately to BHEL-EDN after despatch.		
	Note -			

(1) Any tender condition does not prohibit any bidder to submit their offer along with clause wise deviation from the specification/commercial terms of tender. Changes, if any, in technical specification / Scope/commercial term etc shall be informed to participating bidders only.

(2) Any additional commercial term or deviation in commercial term, if sought by vendor, should be clearly brought out in this commercial bid document. Any additional commercial term or deviation in commercial term mentioned anywhere else shall be ignored and not be considered for evaluation

(3) Any technical or commercial clarification for this tender can be raised within **one week** of floating tender. No clarification will be entertained by BHEL after given cutoff date.

(4) The evaluation currency for this tender shall be INR.

(5) For the purpose of availment of GST amount as Input Tax Credit (ITC), time limits are mentioned and as of now it is September of the subsequent Financial Year. If complete set of invoice and other supporting billign document required as per PO is not submitted to concerned Purchase Officer at leat 45 days prior to this cut-off date, BHEL will not be able to avail Input Tax Credit and hence corresponding GST amount will not be paid to the vendor / contractor.

(6) FOR THIS PROCUREMENT, PUBLIC PROCUREMENT (PREFERENCE TO MAKE IN INDIA), Order 2017 dated 15.06.2017 & 28.05.2018 and subsequent Orders issued by the respective Nodal Ministry shall be applicable even if issued after issue of this NIT but before finalization of contract/PO against this NIT. In the event of any Nodal Ministry prescribing higher or lower percentage of purchase preference and/or local content in respect of this procurement, same shall be applicable

(7) PURCHASE PREFERENCE FOR MSE VENDORS:

MSE vendors quoting within a price band of L1 + 15% shall be allowed to supply up to 25% of the requirement against this tender provided i. The MSE vendor matches the L1 price. ii. L1 price is from a non MSE vendor. iii. L1 price will be offered to the vendor nearest to L1 in terms of price ranking (L2 - nearest to L1). In case of non-acceptance by the MSE vendor (L2), next ranking MSE vendor will be offered who is within the L1 + 15% band (if L3 is also within 15% band). iv. 3% of the 25% will be earmarked for women owned MSEs. v. 25% of the 25% (i.e., 6.25% of the total enquired quantity) will be earmarked for SC/ST owned MSE firms provided conditions as mentioned in (1) & (2) are fulfilled. vi. In case where no SC/ST category firms are meeting the conditions mentioned in (1) and (2) or have not participated in the tender, the 6.25% of earmarked quantity for SC/ST owned MSE firms will be distributed among the other eligible MSE vendors who have participated in the tender. vii. Tendered quantity will not be split. In case after the bid opening it is seen that no MSE has become L1, then BHEL would counter offer the L1 prices to MSE bidders within the +15% band of L1 and will be awarded for complete supply of total tendered value to MSE considering the spirit of the Policy for enhancing Govt. Procurement from MSEs.

(8) Conflict of interest

"A bidder shall not have conflict of interest with other bidders. Such conflict of interest can lead to anti-competitive practices to the detriment of Procuring Entity's interests. The bidder found to have a conflict of interest shall be disqualified. A bidder may be considered to have a conflict of interest with one or more parties in this bidding process, if:

a) they have controlling partner (s) in common; or

b) they receive or have received any direct or indirect subsidy/ financial stake from any of them; or

c) they have the same legal representative/agent for purposes of this bid; or

d) they have relationship with each other, directly or through common third parties, that puts them in a position to have access to information about or influence on the bid of another Bidder, · or

e) Bidder participates in more than one bid in this bidding process. Participation by a Bidder in more than one Bid will result in the disqualification of all bids in which the parties are involved. However, this does not limit the inclusion of the components/ sub-assembly/ Assemblies from. one bidding manufacturer in more than one bid; or

f) In cases of agents quoting in offshore procurements, on behalf of their principal manufacturers, one agent cannot represent two manufacturers or quote on their behalf in a particular tender enquiry. One manufacturer can also authorise only one agent/dealer. There can be only one bid from the following:

1. The principal manufacturer directly or through one Indian agent on his behalf; and

2. Indian/foreign agent on behalf of only one principal, or

g) A Bidder or any of its affiliates participated as a consultant in the preparation of the design or

technical specifications of the contract that is the subject of the Bid, · or

h) In case of a holding company having more than one independently manufacturing units, or more than one unit having common business ownership/management, only one unit should quote. Similar restrictions would apply to closely related sister companies. Bidders must proactively declare such sister/ common business/ management units in same/ similar line of business. "