

PURCHASE SPECIFICATIONS
FOR
ELECTRONICS CARDS
&
ENCLOSURE
FOR
GENERIC CONTROLLER




SPECIFICATION NO. : PS150081GP
REVISION NO. : REV 00
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DISTRIBUTION : AS PER REQUIREMENT

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GENERAL SPECIFICATIONS: Electronics cards & enclosure for generic controller

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 envelope 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 like DSP, FPGA, Micro controllers, Microprocessors etc.

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

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.
- (f) Heat chamber for burn-in testing of the electronics cards for various temperature cycles with moisture range control.

c. Qualified Manpower

Supplier should have at least two engineering graduates (electronics) who would be responsible for execution of order. Experience in multilayer 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 (Texas Instrument TMS320F2812 or higher version) / FPGA (Altera Cyclone II or higher version) or ASIC based cards.

Supplier should be thoroughly conversant with the electronics control rack of 3X100 kVA Aux converter.

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. After signing of the confidentiality agreement, supplier is forbidden to participate in other tender outside BHEL for items based on the similar architecture, involving any control/hardware/software module/circuitry developed during execution of this order.

2. SCOPE OF WORK & Technical requirement

1. SCOPE :

This specification applies to the requirement of Electronics cards & enclosure for generic controller.

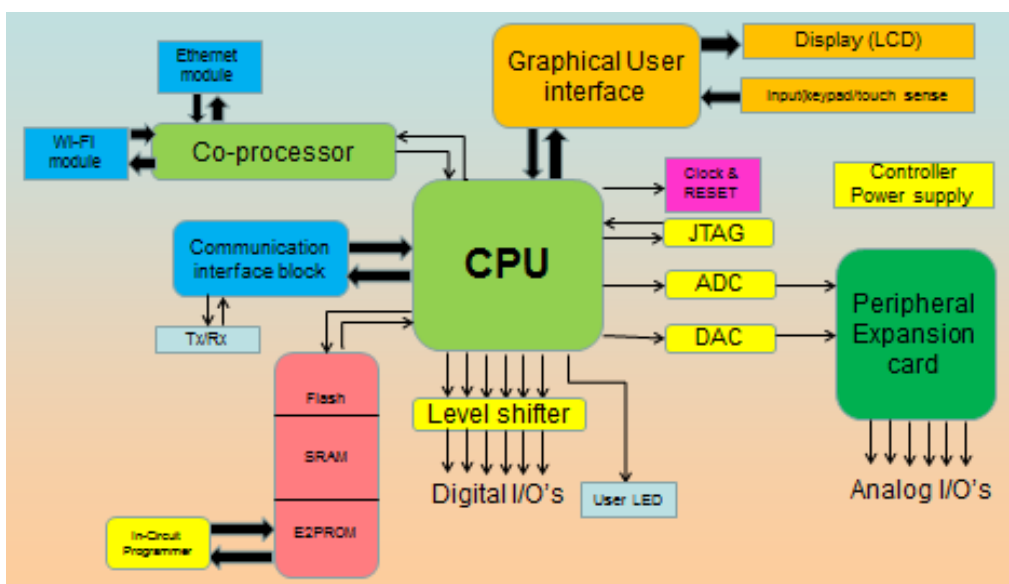
Following items are included in the requirement of this purchase specification for generic controller:

- | | |
|---|-------|
| 1. Processor card | 3 no. |
| 2. Extension card | 3 no. |
| 3. Input/output card | 3 no. |
| 4. Human Machine Interface | 3 no. |
| 5. Power supply card | 3 no. |
| 6. Complete enclosure with EMI/EMC protection | 3 no. |

1.0 PROCESSOR CARD:

| | |
|---------------------|---|
| Processor | floating point DSP + FPGA processor on board |
| DSP | Texas Instruments TMS320F28335 |
| FPGA | Altera Cyclone V |
| Memory | SDRAM-128 MB Flash memory – 256 MB |
| Connectivity | - Ethernet 10/100MB/s with BIST (Built In Self-Test) - MODBUS/PROFIBUS communication port through RS232/Ethernet |
| ADC | 16 bits resolution with 1MHz sample rate; Analog supply range: 2.7V to 5.25V, I/O Supply Range: 1.7 to 5.25V |

Proposed Architecture



Schematic

To be prepared by the supplier in consultation with BHEL.

| | |
|-----------------|--|
| Software | compatible with Windows 7/8 with 32 & 64 bits machine |
| Coding | firmware and application software for DSP and FPGA to be developed by the supplier in consultation with BHEL |
| Testing | The hardware along with the software has to be tested at suppliers end as well as BHEL premises |

2.0 EXTENSION CARD:

This card shall comprise of extension connectors for sensor feedbacks, PWM outputs and control signals with minimum functional and error protection logic.

3.0 INPUT / OUTPUT CARD:

This card shall take care of digital and analog I/O's containing additional circuit for 110V/72V/24V/5V digital signals.

4.0 POWER SUPPLY CARD:

This card/module shall be used for energizing all the control cards of generic controller. Provision for both AC (230V AC) and DC (110V DC) as input shall be incorporated in the card. The output of the card shall be $\pm 24V$ DC, $\pm 15V$ DC and 5V DC. The final rating of the output shall be freezed after the design of the control cards based on the requirements.

5.0 HUMAN MACHINE INTERFACE;

The HMI shall be touch sensitive, android/LINUX/Windows based operating system. It shall have the capability of real time parameterization as well as data & fault monitoring. It shall have the option of MODBUS communication with the processor card.

6.0 COMPLETE ENCLOSURE WITH EMI/EMC PROTECTION:

The enclosure shall be designed to have a back-plane connection PCB connecting all the electronics cards. It shall also have EMI/EMC protection for the electronics cards. The mounting arrangement of the enclosure shall be developed so as to accommodate various requirements.

3. QUALITY OF ELECTRONIC CARD ASSEMBLY:

The module 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.

4. 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 & **fiber optic ports** 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.

5. TRAINING

Supplier shall arrange training for BHEL engineers at BHEL for the DSP, FPGA and GUI used in the card and also the application software developed for the card and the GUI.

6. WARRANTY.

PCB modules 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.

7. Documents to be furnished along with offer

- i) General arrangement drg indicating mounting details, weight and terminations
- ii) Technical data sheet along with the downloadable application software and code for the processor.
- iii) The schematic/PCB layouts of the card to be developed by the supplier in close consultation with BHEL. Supplier to get final schematic of the electronics cards approved from BHEL before going for production.

8. 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.

DELIVERABLES against PI no. 740750022

- | | |
|---|-------|
| 1. Processor card | 3 no. |
| 2. Extension card | 3 no. |
| 3. Input/output card | 3 no. |
| 4. Human Machine Interface | 3 no. |
| 5. Power Supply card | 3 no. |
| 6. Complete enclosure with EMI/EMC protection | 3 no. |