



**SPECIFICATIONS FOR DESIGN, DEVELOPMENT
ASSEMBLY & TESTING OF**

FOC/Ethernet coupler module (FECM 0502)

**Specification No. : PS407303
Revision No. : Rev 01
Date : 11.07.2018**

	Name:	Designation	Signature:
Prepared By:	Ankur Saxena	Dy Manager-Design	
Approved By	S.K.Biswas	AGM	

CONTROL EQUIPMENT ENGINEERING DIVISION

Issue	Description
0	Concept release, original version
1	Block diagram updated.

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 this 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 tehcnical 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 , Micro controllers , Micro processors 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.

c. Qualified Manpower

Supplier should have engineering graduate (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 .

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

BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL



copies of purchase order /contract of such orders executed in past involving SMT components, microcontroller/DSP or ASIC based cards .

e. Willingness for Confidentiality Agreement

Supplier to confirm their willingness for unconditional confidentiality agreement on stamp paper stating that “ Any information received from BHEL against the order(if placed) would not be shared with any other party in part or in full without written permission from BHEL Bhopal. Moreover , we agree the documents generated during the process of execution would be the property of BHEL and shall be provided to BHEL free of charge. We also agree that parts developed/manufactured against the order will not be offered/supply to any other party without written permission from BHEL Bhopal” . to qualify for their consideration in technical scrutiny of tender.

2. SCOPE OF WORK & Technical requirement

A. SCOPE OF WORK:

Context : This specification applies to requirement of a FOC/Ethernet coupler module (FECM 0502) for outdoor cubicle of CMS (Composite Monitoring system for Power transformers) . The module should be capable of taking inputs from various transformer monitoring devices and transmit it to primary and secondary side Bus coupler card of IOD rack (inside outdoor cubicle of CMS) through inbuilt managed Ethernet switch & VF 61 processor card. The module should support communication over both FOC as well Ethernet ports.

It shall have a Managed Ethernet switch card snapped on baseboard. The Managed Ethernet switch will have 12 ports. The baseboard consist of circuitry for FOC to Ethernet converter (for all the 6 Ethernet ports) and LED's indication for communication status (like active & link)

VF 61 processor card shall interact with Ethernet switch. It is required to transmit data to primary and secondary side of rack that have same IP address. The interfacing of VF61 with IOD rack shall be on RS232 ports.

Through this module, various transformer monitoring devices like DGA,PC, FOTC etc, will be connected to CMS system through FOC or Ethernet , and their data will be transferred to both primary and secondary side of IOD. The data shall ultimately be transferred to indoor cubicle through existing Modbus over FOC.

The FECM module should have a protective Aluminum enclosure with clear visibility for LED's.

BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL



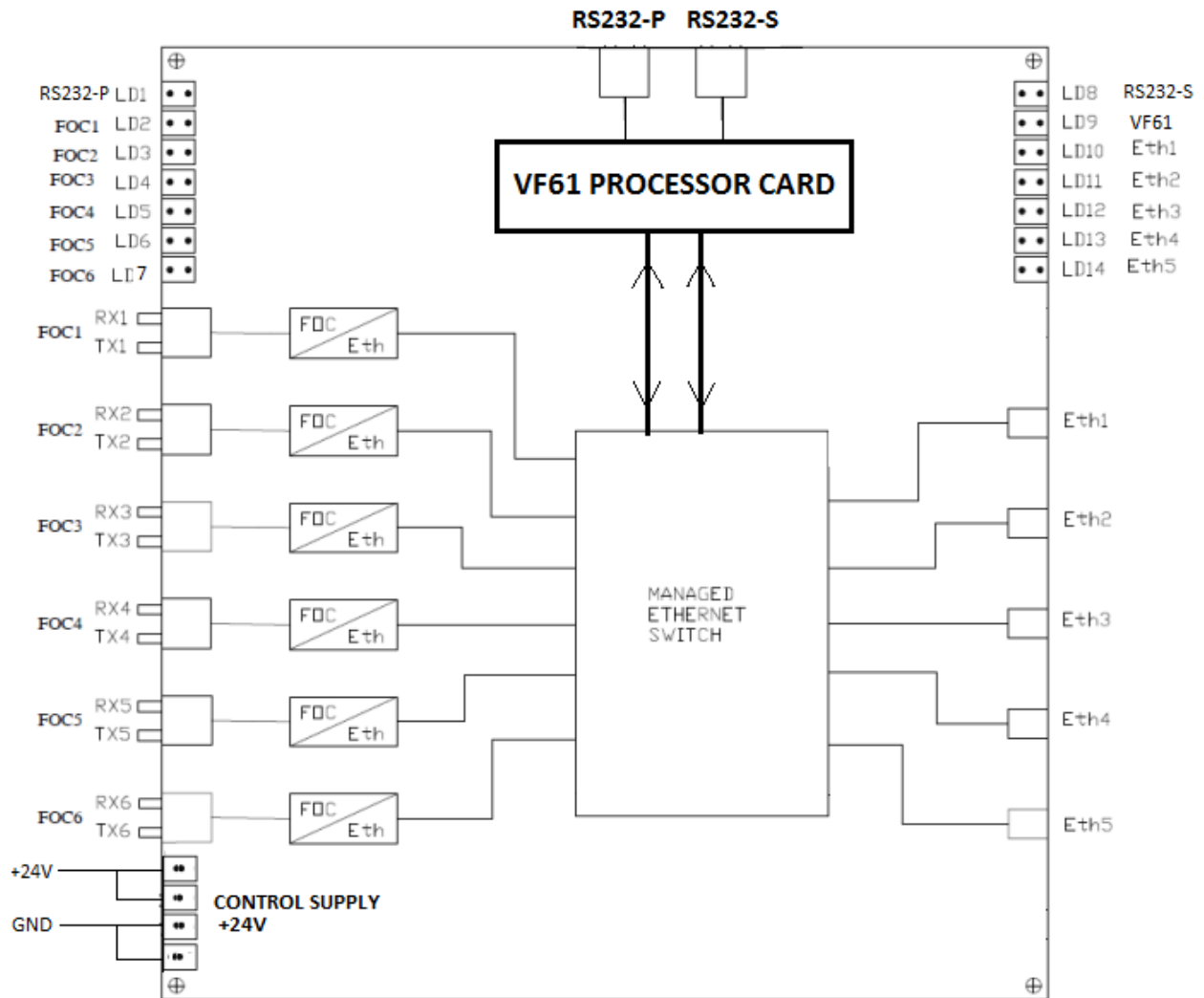
Supplier is responsible for interfacing of FECM module with IOD rack with necessary software code development .

Material Code: BP9048108896

Block Schematic: Successful bidder to develop detail schematic /Gerber files in close collaboration with BHEL and take approval from BHEL before proceeding for manufacturing.

FOC connectors to be used are Avago make ST connectors type: HFBR-2412TZ (Receiver) & HFBR-1414TZ (Transmitter)

Control supply of 24V DC through 5.08mm pitch screw terminals (Suggested RS part no 189-5865)



2. Mechanical Parameters. The FECM module should have a protective Aluminum enclosure with clear visibility for LED's & access to ports. Supplier to submit drawing of the proposed final assembly for BHEL approval before starting manufacturing of the module

B. QUALITY OF ELECTRONIC CARD ASSEMBLY:

The module shall be used in power plants near HV area, 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.

The PCB shall be UL certified and all connectors should be gold plated.

C. FITTINGS OF CARDS & MECHANICAL ASSEMBLY:

As quality of soldering is predominant in performance of the individual electronics card, final assembly are crucial for reliable functioning of the modules. Supplier must ensure use of proper size of hardware and insulating fixing material. All hardware are of stainless steel. Each fixing screw must contain proper plain washer & spring washer.

D. 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.

E. TESTING & TEST REPORTS:

The test schedule calls for testing of individual cards and complete assembly. Each module should comply 100% with the test parameters as per the test schedule. Test result shall be generated and compiled for every module with each cards.



3. DOCUMENTS TO BE SUBMITTED TO BHEL FOR APPROVAL .

While executing the PO, supplier shall submit to BHEL and take approval for the following documents for each of the modules mentioned in the enquiry.

1. PCB Layout .
2. Gerber file & print out for every layer.

4. 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

5. INSPECTION

At BHEL Bhopal.

6. Document to be submitted with technical Bid

Following document duly filled must be submitted by the bidder party as annexure to their **technical bid** (to be kept in separate sealed envelope) . **Otherwise bid will be technically rejected.**

BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL



A. Infrastructure details

SNo.	Description/Equipment	Make / details #
1	Dust Free environment for card assembly	Area to be specified with temperature & humidity information.
2	Automatic Glue Dispenser	
3	High speed component placement machine	
4	Dual wave Soldering machine	
5	4 zone Reflow oven	
6	Digital / Analog Temperature controlled solder stations	
7	Component lead forming machine	
8	Details of Electrostatic discharge protection & ESD procedure adopted .	
9	Semi Automatic component insertion machines	
10	Digital sampling oscilloscope Dual channel Min.100 MHZ Band width .	
11	Digitizing oscilloscope with Min.100MHz band width	
12	Multi channel Spectrum analyzer	-
13	Multi channels , 100 MHZ band width logic analyzer	
14	Multi channels Digital Pattern Generator.	
15	Multi channel temperature scanner.	
16	Computer aided Functional Testing facilities for electronic card.	

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 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 to be kept in separate sealed envelope.