Government of India
Bhabha Atomic Research Centre
Electronics Division

Modular Labs.,
BARC, Trombay,
Mumbai – 400 085.

Ref: BARC/ED/ 2018/63

Date: 23- 01 - 2018.

Sub: Invitation of quotation for Minor Fabrication of External interface unit board

Dear Sir,

1. Quotations are invited for the minor fabrication job as per attached Annexure – B.
2. Bidder shall quote for PCB Artwork, Fabrication, Component procurement, Assembly and Functional Testing of External interface unit board PCB in two iterations
3. Income Tax @ 2% and surcharge on IT as applicable will be deducted from your bill.
4. Taxes shall be quoted separately. Excise duty is NIL. Form AF shall be provided where necessary.
5. The quotations must reach, Head Electronics Division by **16/02/2018** and must be sent in a sealed envelope super scribed with the **above reference number** and due date given above. **PAN nos, and GSTIN/UIN nos. must be mention or else the quotations would be declared invalid.**
6. The address on the envelope should read:
   Quotation for BARC/ED/2018/63 dtd:23/01/2018
   Attn.: **Mr Shiv Kumar**
   To,
   The Head, Electronics Division,
   Bhabha Atomic Research Centre,
   Modular Labs, Trombay, Mumbai 400 085.
7. The bidder shall have to take an insurance policy against any material issued to him by the purchase.
8. The fabrication work shall be subject to inspection by our officer. The finished components shall not be dispatched prior to approval by our engineer, at bidder's works. Necessary inspection facilities should be provided to our engineers during fabrication at bidder's premises.
9. The bidder shall delivery the finished components after approval by our engineer, within **6 month** from the date the firm purchase order issued to the bidder. The finished components and spares shall be delivered by the bidder at **B.A.R.C.**
10. Head Electronics Division, BARC reserves the right to accept/reject any or all quotations without assigning any reason.
11. Enclosed
    - Specifications and Job description as per Annexure – B
    - Confidentiality Clause.

Anita Behere 24/01/2018

(Anita Behere)
OS & Head, Electronics Division

अनिता बेहेरे / ANITA BEHERE
अध्यक्ष, इलैक्ट्रॉनिकी प्रभाग / Head, Electronics Division
भारत सरकार / Government of India
भाभा परमाणु अनुसंधान केंद्र / Bhabha Atomic Research Centre
ट्रॉम्बे, मुंबई / Trombay, Mumbai - 400 085.

Annexure – B:

Table Of Contents

1. Job Description

External interface unit board consists of one PCB that comprises of following major electronic circuit blocks:

1. Battery charger and Battery gauge.
2. EEPROM
3. Bluetooth interface
4. WPC 1.2 compliant wireless power transmitter
5. RF transponder
6. Microcontroller

Following diagram represent simplified block diagram of External interface unit board.

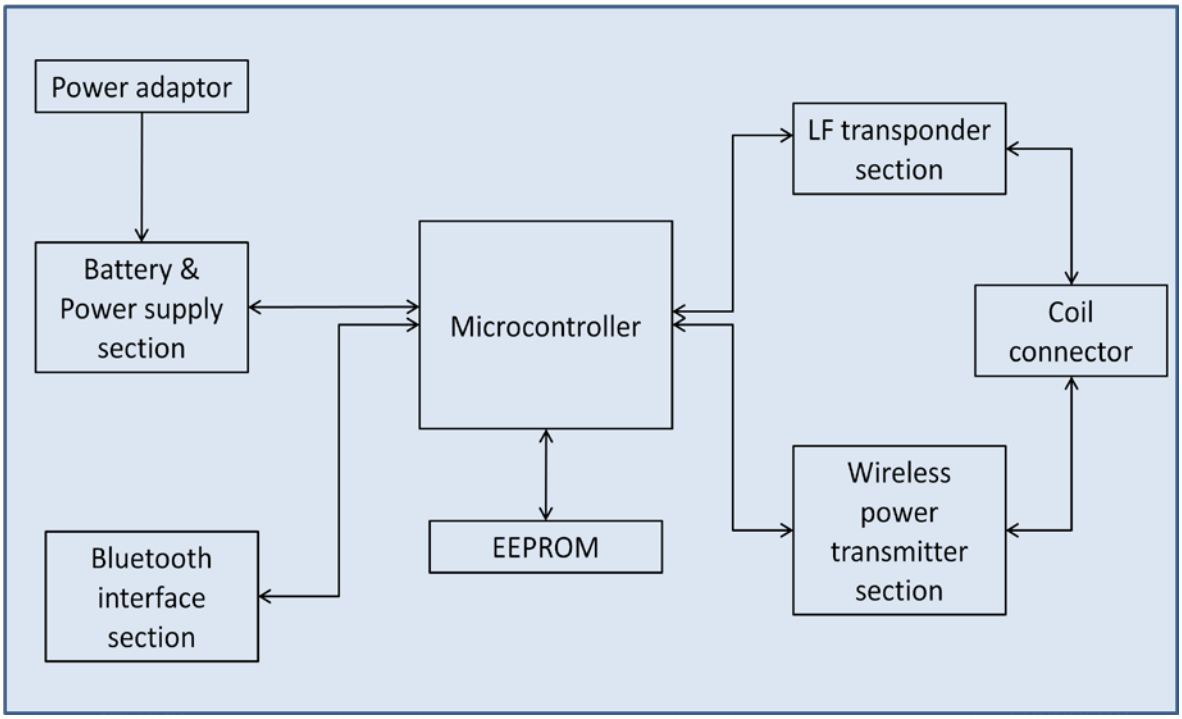

Figure 1Simplified Block diagram of External interface unit board

Following paragraphs describe the jobs to be carried out for the External interface unit board:

1.a. PCB artwork design and fabrication

- The artwork/ layout design for the External interface unit board PCB shall be carried out from the circuit schematic and Bill of Material (BOM) provided with the work order. The circuit comprise mainly of fine pitch SMD components, which requires very careful PCB artwork design.

- It shall be a 4 layer densely populated PCB with estimated area of PCB about 100 cm2,which may vary by up-to 20 percent depending on actual layout and placement.

- Component placement and board layout (4-Layer PCB designing) shall be carried out by the vendor in close interaction with the indenter. This exercise may go through several iterations before getting finalized and approved by the indenter. Vendor shall take into consideration the layout suggestions as mentioned in the datasheet of I.C.'s as well as provided by the indenter from time to time..

- Artwork shall be done using automated tools such as Cadence Allegro or any other. In the artwork,the vendor shall routesignal nets;ground & power supply planes shall be provided strictly as per the guidelines provided by the indenter. Inner layers may also be used for signal and power routing.

- PCB artwork design and fabrication will be carried out in two phases. In the first phase 2 boards shall be designed, fabricated and tested. Depending upon the outcome of results of first phase, remaining 3 boards shall be designed, fabricated and tested. Vendor shallcarryout the required changes in the artworkduring the second phase as per the suggestions of indenter.

- Since this is high quality job to be completed in stipulated time, the vendor is required to have prior experience of having done such job of carrying out PCB layout design having similar or better pitch and components sizes. The vendor needs to provide the reference for such jobs done earlier which shall be verified by the indenter before placing the order.

- The PCB shall be fabricated from a reputed manufacture using standard FR4 material. The PCBs are to be subjected to qualification tests such as FPT.

1.b. Components procurement

All the required componentsshall be purchased by the vendor as per the bill of material provided by indenter. All the components shall meet the grade, voltage, current, frequency and footprint requirements. One set of test modules, which may be required for preliminary testing,shall be purchased by vendor. These test modulesshall be supplied to indenter as spares, after completion of work.

1.c. Assembly of External interface unit PCB

Assembly of each External interface unit board shall be carried out by vendor with soldering guidelines provided in respective component datasheets and as per the sequence provided by the vendor. Assembly procedure shall meet the applicable industrial standards. Assembly shall be carried out in two phases. Two boards shall be assembled in first phase and three boards in second phase.

1.d. Functional testing of assembled board

Functional testing of each assembled External interface unit board shall be carried out by vendor according to test plan and procedure provided by indenter. The testing shall be carried out in close interaction with indenter. Only fully functional boards shall be accepted for supply.

2. Technical requirements

Following are the technical requirements for each job:

2.a. PCB artwork design and fabrication

a. Estimated size of PCB is 100cm^2. There may be a variation of 20% based on actual layout and placement.

b. PCB artwork is to be done using automated tools such as Cadence Allegro or any other.

c. Component placement and board circuit layout (4-Layer PCB designing) shall be carried out by the vendor in close interaction with the indenter. This exercise may go through several iterations before getting finalized and approved by the indenter.

d. The PCB shall be designed and fabricated using the mixed analog/High speed digital design guidelines as per IPC standard guidelines.

e. The circuit contains mainly fine pitch SMD I.C's, vendor shall take necessary precaution's and layout considerations applicable for routing.Minimum Drill size shall be used to reduce the PCB size.

f. All the digital traces have to be routed as per the guidelines of shielding requirements; power planes and tracks should meet the guidelines as set by the applicable standards.

g. Layout precautions as mentioned in datasheet of each of the componentsshall be taken care of by the vendor while carrying out the layout design.

h. Layout precautions provided by the indented must be strictly adhered by the vendor.

i. Legend must be clearly visible on the silk screen.

j. Circuit guarding and impedance matching shall be required on the traces. Provision of thermal pads for cooling, power/ground pouring and stitching shall be done on the PCB.

k. The detailed design shall be optimized for performance and power consumption.

l. Total quantity required is 5 boards. Work will be carried out in 2 iterations. First iteration will be delivery of 2 boards fully wired and tested, if there is any issue observed in design at first stage, modifications in the design shall be incorporated. Remaining 3 boards shall be redesigned, wired and tested before delivery.

2.b. Component procurement and assembly

a. Vendor shall procure components as per the final bill of material provided by indenter. All the components shall be procured from reputed suppliers such as element14, mouser etc.

b. All the components should be of Industrial grade with matched or better voltage, current and tolerance rating as per the final bill of material.

c. All passive components such as capacitors, resistors, inductors etc required for the detailed design shall meet voltage, current, size and frequency requirements.

d. Evaluation module for RF transmission and Wireless power transfer with MSP-FET programmer for microcontroller to be purchased by vendor. These evaluation modules and programmer have to be supplied to BARC after testing as spares. (Part no. Mentioned in Bill of material section)

e. The PCB shall be fabricated from a reputed manufacture using standard FR4 material.

f. Fabricated PCB should be subjected to qualification tests such as FPT etc.

g. Design mainly consists of fine pitch SMD components; vender shall employ necessary precautions and state of art soldering technique while assembling.

h. The correct and clean assembling of all the electronic components shall be ensured. Any board with improper assembly may be rejected by indenter.

2.c. Functional testing of assembled External interface unit board

a. Each assembled board shallbe tested for functionality by the vendor, before delivery, to ensure correct layout design, fabrication and assembly.

b. Only fully functional boards shall be accepted for supply. Any faulty board shall be replaced by a fully functional board.

c. Functional testing of assembled PCB shall be completed by vendor according to test plan and procedure provided by indenter. Testing shall be performed in close interaction with indenter. All the test results shall be provided by vendor to the indenter.

d. Functional testing will incorporate:

   i. Successful programming of microcontroller through JTAG using MSP430 programmer.

   ii. Bluetooth communication link to check the communication link as per the code provided.

   iii. LF transponder link establishment as per the code provided.

   iv. Wireless power transfer to wireless power receiver evaluation module as per given procedure/code.

e. Basic software codes shall be provided by indenter for carrying out functional testing by the vendor.

f. Testing of assembled External interface unit boards shall be carried out separately for each phase of PCB layout design, fabrication and assembly; i.e. 2 boards in first phase and 3 boards in second phase.

3. Bill of Material of for External interface unit board

Following table propose the bill of material for the proposed module.

S. No.	Description	Manufacturer part no.	Qty/board
1.	Li-Ion Battery Charger and Power-Path Management	BQ24072T	1
2.	Stand-Alone ModelGauge m5 Fuel Gauge	MAX17201G+T0E	1
3.	7-A Fully-Integrated Synchronous Boost Converters	TPS610891	2
4.	256-Tap, Nonvolatile, SPI-Interface, Digital Potentiometers	MAX5422ETA+T	1
5.	3.3V Low-Dropout Linear Regulator	TPS79533DCQ	2
6.	1-Mbit serial SPI bus EEPROM	M95M01-DFMN6TP	1
7.	Class 2 Bluetooth Module	RN42	1
8.	2-A, 28-V Input, Step-Down DC-DC Converter	TPS54231D	1
9.	Low-Dropout Regulator	TLV70450DBVT	1
10.	Transponder Base Station	TMS3705AIDRG4	1
11.	4-Bit Bidirectional Voltage-Level Translator	TXS0104EDR	1
12.	Dual 4-A High Speed Low-Side MOSFET Drivers	UCC27424D	1
13.	High-Side Current Sensor for Wireless Charging	BQ500100DCK	1
14.	NexFET Power Stage	BQ500101DPCR	3
15.	WPC 1.2 Wireless Power Transmitter Manager with 15W Power Delivery	BQ501210	1
16.	Dual SPDT/2:1 Multiplexer	ADG836L	1
17.	16 MHz ULP Microcontroller – 128 KB FRAM, 2KB SRAM, 83 IO, ADC12, LCD, AES, Scan IF	MSP430FR6989	1
18.	Dual Channel Push Button Controller with Configurable Delay and Reset Pulse	TPS3421EGDRY	1
19.	Single Channel Push Button Controller with Configurable Delay and Reset Pulse	TPS3422EGDRY	2
20.	MICRO CRYSTAL – MS3V-T1R 32.768KHZ 7.0PF +/-20PPM	MS3V-T1R	1
21.	CER RESONATOR 4.00MHZ SMD	CSTCR4M00G15L99	2
22.	DC Power Supply connector	RAPC712X	1
23.	Zener Diode 6.2V 500mW ±5%	1N821-1	1
24.	Zener Diode 3.3V	BZT55B3V3	4
25.	Surface Mount Schottky Power Rectifier	MBR0540T1G	1
26.	EMITTER IR 880NM 50MA RADIAL	F5G1	1
27.	Dual Series Schottky Barrier Diodes	BAT54SWT1G	3
28.	ESD Suppressors / TVS Diodes 15Vr 1500W 61.5A 5% BiDirectional	SMAJ15CA	2
28.	Indication LEDs –SMD	SML-LXT0805GW-TR	12
29.	2A SMD FUSE	0468002.NRHF	2
30.	1A SMD FUSE	0468001.NRHF	2

31.	Li-Ion battery(commercial) 3.7V/4Ahr		
32.	Discrete Components (Resistors, Capacitors, Inductors, Ferrite beads and Zener diodes etc.)	Standard components to be used as per given in Final Schematic and Bill of material	--
33.	Switch, SPST, PB momentary, sealed washable	KT11P2JM34LFS	4
34.	Coil connector		
35.	Evaluation module for LF- communication	EZ430-TMS37157	1 for 5 PCB
36.	Evaluation module for wireless power transfer.	BQ51003EVM	1 for 5 PCB
37.	MSP microcontroller programmer	MSP-FET	1 for 5 PCB

4. Confidentiality Clause:

a) No party shall disclose any information to any third party concerning the matters under this contract generally. In particular, any information identified as "Proprietary" in nature by the disclosing party shall be kept strictly confidential by the receiving party and shall not be disclosed to any third party without the prior written consent of the original disclosing party.

b) Any contravention of the above mentioned provisions by any contractor, sub-contractor, consultant, adviser or the employees of a contractor will invite penal consequences under the aforesaid legislation.

c) The contractor or subcontractor, consultant, adviser or the employees engaged by the contractor shall not use BARC's name for any publicity purpose through any public media like Press, Radio, T.V. or internet without the prior written approval of BARC.

Restricted information categories under section 18 of the Atomic Energy Act, 1962 and "Official Secrets" under section 5 of the official secret act, 1923: Any contravention of the above mentioned provisions by any contractor, subcontractor, consultant, adviser or the employees of a contractor will invite penal consequences under the aforesaid legislation.