

Government of India  
Bhabha Atomic Research Centre  
Electronics Division

Modular Labs.,  
BARC, Trombay,  
Mumbai – 400 085.  
Date: 11 - 01 - 2018.

Ref: BARC/ED/2018/32

Sub: Invitation of quotation for Minor Fabrication of Implantable Pulse Generator (IPG)

Dear Sir,

1. Quotations are invited for the minor fabrication job as per attached Annexure – B.
2. Bidder shall quote for fabrication of these components with material.
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 **31/01/2018**. It must be sent through **SPPED-POST only** in a sealed envelope super-scribed with the **above reference number** and due date as given above. **PAN nos, VAT TIN nos. and CST TIN nos. must be mention or else the quotations would be declared invalid.**
6. The address on the sealed quotation being sent through speed-post should read:  
**Quotation for BARC/ED/                      Due date: 31/01/2018**  
**Attn.: Mr Vineet Sinha**  
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 **3 months** from the date the firm purchase order issued to the bidder. The finished components and the scrap from the free issue material 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 with Confidentiality Clause.

Head, Electronics Division

# Annexure – B

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## 1 Job Description

1. PCB designing, fabrication & assembly of units as per the given block diagram. Total 5 numbers of fully populated & tested PCBs are required for the IPG project.
2. Procurement of all components mentioned in the bill of material supplied with this document. Vendor is required to source genuine components only.
3. Following points may please be noted: -
  - a. Component placement should be done in close interaction with the indenter.
  - b. Final Gerber/Netlist must be verified by the indenter before PCB fabrication.
  - c. Vendor should follow the standard test procedure for testing any individual item, if required.
  - d. Firmware development required for testing of some specific components, if any, needs to be developed by the vendor.
  - e. All the units will be inspected/tested before the final delivery.
4. Payment will be released only on the receipt of all the materials and complete information which will enable BARC to test, develop or update the product in future without any assistance from the vendor.

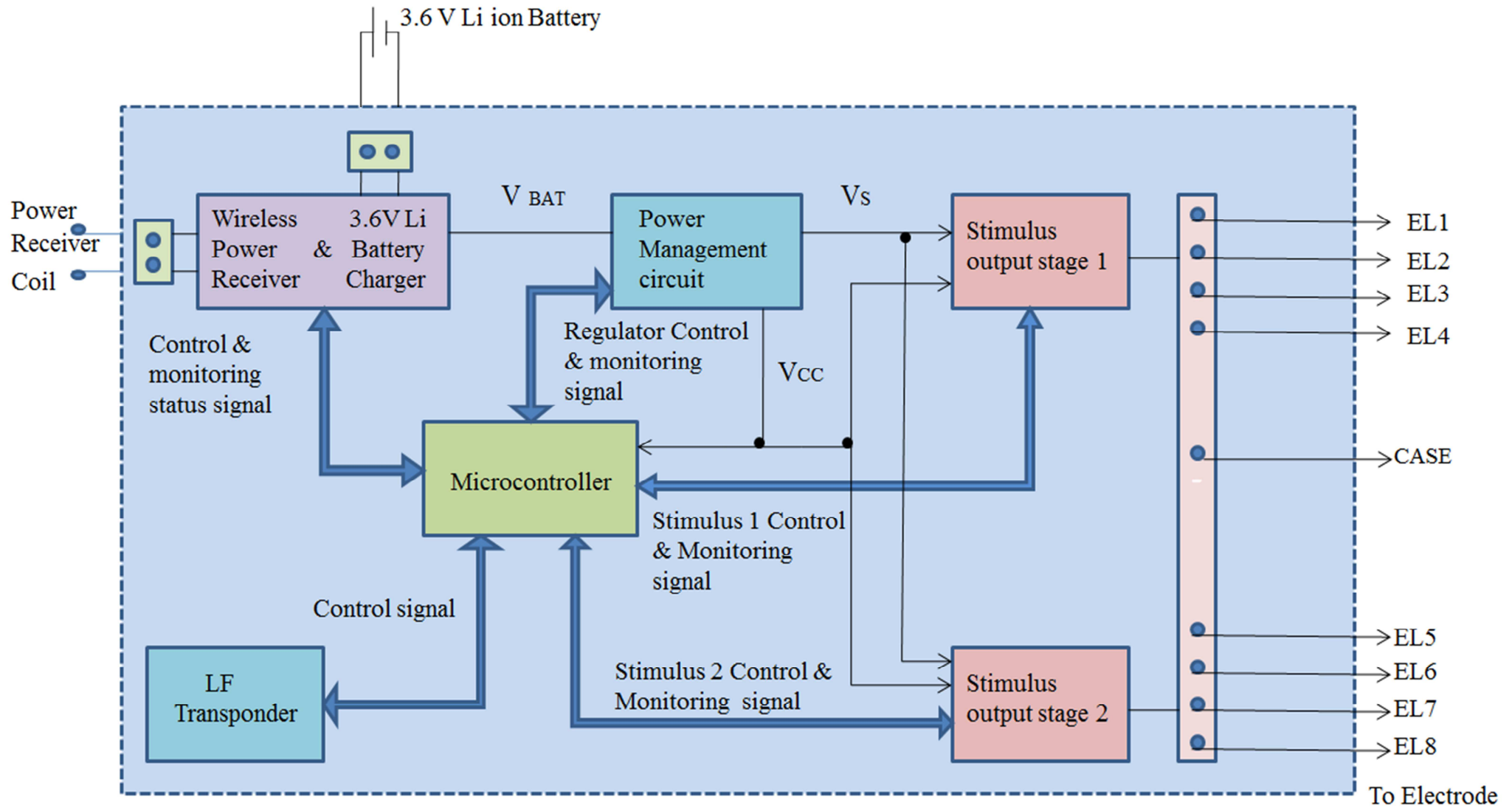
## 2 Technical specification of PCB Layout:-

1. Component placement and 4-Layer PCB designing to be done as per the given block diagram in close interaction with the indenter.
2. Approximate PCB size of IPG is expected to be around 70mm X 70mm.
3. Layout precautions as mentioned in datasheet of each of the components are to be taken.
4. Legend is to be clearly visible.

## 3 Technical specification of PCB Fabrication:-

1. Base material: 4-Layer Glass Epoxy FR-4.
2. Base copper thickness: 17 $\mu$ m.
3. *E.N.I.G (Electroless Nickel Immersion Gold)* finish is required.
4. Flying probe/FPT Testing is to be carried out on all of the PCBs.

#### 4 Block Diagram:-



## 5 Bill of Material of IPG

### 5.1 Bill Of Material of Subsystem: Stimulus Output Generator 1

Item Sr. No.	Component Ref	Component value / Description	Component Type	Footprint	Qty.
		<b>Resistors:</b>			
1	R30	51K	SMD RESISTOR	603	1
2	R31,R34	10K	SMD RESISTOR	603	2
3	R32	470E	SMD RESISTOR	603	1
4	R33	470E	SMD RESISTOR	603	1
5	R35	0E	SMD RESISTOR	603	1
6	R36	5.1K	SMD RESISTOR	603	1
7	R37	2.2K	SMD RESISTOR	603	1
8	R38	1.5K	SMD RESISTOR	603	1
9	R39	22E	SMD RESISTOR	603	1
10	R40	1K	SMD RESISTOR	603	1
11	R41	1K	SMD RESISTOR	603	1
12	R42	100K	SMD RESISTOR	603	1
13	R43	1M	SMD RESISTOR	603	1
14	R44	17.6K	SMD RESISTOR	603	1
15	R45	100E	SMD RESISTOR	603	1
16	R46	1M	SMD RESISTOR	603	1
		<b>Capacitors</b>			
17	C48,C52, C50, C51, C57	10uF, 50V, ±10%, X7S	SMD CAPACITOR	805	5
18	C49	22NF, 35V, ±5%, X7R	SMD CAPACITOR	603	1
19	C53,C55,C58	100NF, 10V, ±20%, X7R	SMD CAPACITOR	603	3
20	C54	100PF, 10V, ±5%, COG	SMD CAPACITOR	603	1
21	C56	100NF, 35V, ±20%, X7R	SMD CAPACITOR	603	1
22	C59	10NF, 10V, ±20%, X7R	SMD CAPACITOR	603	1
23	C60	2.2NF, 10V, ±5%, X7R	SMD CAPACITOR	603	1
24	Q2	BSS138	N-MOSFET	SOT-23	1

25	Q3	PBSS2515M	NPN TRANSISTOR	SOT-883	1
		<b>ICs</b>			
26	U10	DG1409	PRECISION MULTIPLEXER	QFN-16	1
27	U12,U17,U20	DG413HS	CMOS ANALOG SWITCHES	SOIC-16	3
28	U13	TS3A44159	SPDT ANALOG SWITCH	TSSOP-16	1
29	U15	OPA2835	VFB OPAMP	VSSOP -10	1
30	U18	TLV7021	LOW VOLTAGE COMPARATOR	X2SON-5	1
31	U19	TS5A3159	SPDT ANALOG SWITCH	SOT-23(6)	1
32	U21	ZL70572	SURGE PROTECTOR	SOLDERED_BUMPED_DIE- 8	1
		<b>Connectors</b>			
33	J3	5 pin header	Through hole	5 pin	1

## 5.2 Bill Of Material of Subsystem: Stimulus Output Generator 2

Item Sr. No.	Component Ref	Component value / Description	Component Type	Footprint	Qty.
		<b>Resistors:</b>			
1	R47	51K	SMD RESISTOR	603	1
2	R48,R51	10K	SMD RESISTOR	603	2
3	R49	470E	SMD RESISTOR	603	1
4	R50	470E	SMD RESISTOR	603	1
5	R52	0E	SMD RESISTOR	603	1
6	R53	5.1K	SMD RESISTOR	603	1
7	R54	1.5K	SMD RESISTOR	603	1
8	R55	22E	SMD RESISTOR	603	1
9	R56	1K	SMD RESISTOR	603	1
10	R57	1K	SMD RESISTOR	603	1
11	R58	100E	SMD RESISTOR	603	1
12	R59	1M	SMD RESISTOR	603	1
13	R60	2.2K	SMD RESISTOR	603	1
		<b>Capacitors</b>			

14	C61,C63, C64, C65, C70	10uF, 50V, ±10%, X7S	SMD CAPACITOR	805	5
15	C62	22NF, 35V, ±5%, X7R	SMD CAPACITOR	603	1
16	C66,C68,C71	100NF, 10V, ±20%, X7R	SMD CAPACITOR	603	3
17	C67	100PF, 10V, ±5%, COG	SMD CAPACITOR	603	1
18	C69	100NF, 35V, ±20%, X7R	SMD CAPACITOR	603	1
19	C72	2.2NF, 10V, ±5%, X7R	SMD CAPACITOR	603	1
20	Q4	BSS138	N-MOSFET	SOT-23	1
21	Q5	PBSS2515M	NPN TRANSISTOR	SOT-883	1
		<b>ICs</b>			
22	U11	DG1409	PRECISION MULTIPLEXER	QFN-16	1
23	U22,U23,U26	DG413HS	CMOS ANALOG SWITCHES	SOIC 16	3
24	U14	TS3A44159	SPDT ANALOG SWITCH	TSSOP-16	1
25	U16	OPA2835	VFB OPAMP	VSSOP -10	1
26	U24	TLV7021	LOW VOLTAGE COMPARATOR	X2SON-5	1
27	U25	TS5A3159	SPDT ANALOG SWITCH	SOT-23 (6)	1
28	U27	ZL70572	SURGE PROTECTOR	SOLDERED_BUMPED_DIE- 8	1
		<b>Connectors</b>			
29	J4	5 pin header	Through hole	5 pin	1

### 5.3 Bill Of Material of Subsystem: IPG Power Management

Item Sr. No.	Component Ref	Component value / Description	Component Type	Footprint	Qty.
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<b>Resistors:</b>					
1	R1,R8	330K	SMD RESISTOR	603	2
2	R2	2E	SMD RESISTOR	603	1
3	R3	680K	SMD RESISTOR	603	1
4	R4	220K	SMD RESISTOR	603	1
5	R5	100K	SMD RESISTOR	603	1
6	R6	1MEG	SMD RESISTOR	603	1
7	R7	100K	SMD RESISTOR	603	1
8	R8	330K	SMD RESISTOR	603	1
9	R9	100K	SMD RESISTOR	603	1
10	R10	100K	SMD RESISTOR	603	1
11	R11	390E	SMD RESISTOR	603	1
12	R12	1K	SMD RESISTOR	603	1
13	R13	220K	SMD RESISTOR	603	1
14	R14	47K	SMD RESISTOR	603	1
15	R63	10K	SMD RESISTOR	603	1
16	R64	100K	SMD RESISTOR	603	1
<b>Capacitors</b>					
17	C1,C3,C10, C12	100NF, 10V, ±20%, X7R	SMD CAPACITOR	603	4
18	C2	2.2uF, 10V, ±20%, X5R	SMD CAPACITOR	603	1
19	C4	4.7uF, 10V, ±10%, X5R	SMD CAPACITOR	603	1
20	C5	22pF, 50V, ±5%, NPO	SMD CAPACITOR	603	1
21	C6	100NF, 35V, ±10%, X5R	SMD CAPACITOR	603	1
22	C7	2.2uF, 35V, ±10%, X5R	SMD CAPACITOR	603	1
23	C8,C9	10uF, 10V, ±20%, X5R	SMD CAPACITOR	603	2
24	C11	1uF, 10V, ±20%, X5R	SMD CAPACITOR	603	1
25	C13	47pF, 25V, ±5%, NPO	SMD CAPACITOR	603	1
26	C14	10uF, 10V, ±20%, X5R	SMD CAPACITOR	603	1
<b>Inductors</b>					
27	L1	1uH, ±20%, 800mA	SMD INDUCTOR	1210	1
28	L2	4.7uH, ±20%, 650mA	SMD INDUCTOR	1210	1
<b>Diodes / Transistors</b>					
29	D1	CRS10I30A	Schottkey Rectifier	S-FLAT	1
30	D2	MM3Z3V3T1G	3.3V ZENER DIODE	SOD323	1
31	D3	BAS716	LOW LEAKAGE DIODE	SOD523	1
32	D4	BAT30F3	SCHOTTKEY DIODE	FLIP-CHIP	1
33	Q1	NTS4001NT1G	N-CH MOSFET	SC-70	1



		Integrated circuits			
34	U1	TPS22946		DSBGA-6	1
35	U2	MAX9938F		5 SOT23	1
36	U3	TPS61045		VSON-8	1
37	U4	TPS61098		WSO-6	1
38	U5	DG604E		TSSOP-14	1
		Switches			
39	S1	PRX+2463	MAGNETIC REED SWITCH	SMD	1
40	D5	MSMP14A (Vishay)	Transzorb	Micro SMP	1

#### 5.4 Bill Of Material of Subsystem: Wireless Charger

Item Sr. No.	Component Ref	Component value / Description	Component Type	Footprint	Qty.
		Resistor			
1	R15,R24	47.5K/50V/(1/16)W/ 1%	SMD	603	2
2	R16	3K/50V/(1/16)W/ 1%	SMD	603	1
3	R17,R19	20K/50V/(1/16)W /1%	SMD	603	2
4	R18	196/50V/(1/16)W/ 1%	SMD	603	1
5	R20	15K/50V/(1/16)W /1%	SMD	603	1
6	R21	47K/50V/(1/16)W /1%	SMD	603	1
7	R22	18K/50V/(1/16)W /1%	SMD	603	1
8	R23	12K/50V/(1/16)W /1%	SMD	603	1
9	R25,R26	10K/50V/(1/16)W /1%	SMD	603	2
		Capacitor			
10	C15,C16	68nF/50V/X7R/10%	SMD	603	2
11	C17	47nF/50V/X7R/10%	SMD	603	1
12	C18	1800pF/50V/X7R/10%	SMD	603	1
13	C19,C20	0.01uF/50V/X7R/10%	SMD	603	2
14	C21,C30	0.47uF/50V/X5R/10%	SMD	603	2
15	C22,C29	0.022uF/50V//X7R/10%	SMD	603	2
16	C23	100pF/50V/COG/5%	SMD	603	1
17	C24,C26	10uF/25V/X5R/10%	SMD	805	2
18	C25	56nF/50V/X7R/10%	SMD	603	1

19	C27	0.1uF/50V/X7R/10%	SMD	603	1
20	C28,C31	4.7uF/25V/X5R/10%	SMD	603	2
		<b>COIL</b>			
21	L3	WE760308201	Refer datasheet of WE760308201 for land pattern.		1
		<b>INTEGRATED CIRCUIT</b>			
22	U6	BQ51003YFPR	SMD	28DSBGA	1
23	U7	BQ24232RGTR	SMD	16VQFN	1
		<b>Connectors</b>			
24	J1	2 pin header	Through hole	2 pin	1

## 5.5 Bill Of Material of Subsystem: LF Transponder

Item Sr. No.	Component Ref	Component value / Description	Component Type	Footprint	Qty.
		<b>Resistor</b>			
1	R27	1M, 5%	SMD RES	603	1
2	R61	1M, 5%	SMD RES	603	1
		<b>Capacitor</b>			
3	C32,C33	100nF, 10V, 10%, X7R	SMD CAP	603	1
4	C34,C36	220 pF, 50V, 1%, NPO	SMD CAP	603	2
5	C35	220nF, 16V, 5%, X7R	SMD CAP	603	1
		<b>COIL</b>			
6	L4	14.8mH, 3%	SMD COIL, Z-Transponder coil	SMD	1
		<b>INTEGRATED CIRCUIT</b>			
7	U8	TMS37157	134.2KHz LF Transponder	QFN16	1

## 5.6 Bill Of Material of Subsystem: Microcontroller

Item Sr. No.	Component Ref	Component value / Description	Component Type	Footprint	Qty.
		<b>Resistors:</b>			

1	R28	1.1MEG, 1%, 25V, 50mW, 0201	RES SMD 1.1M OHM 1% 1/20W 0201	603	1
2	R29	2.2MEG, 1%, 25V, 50mW, 0201	Thick Film Resistors - SMD	603	2
3	R62	10K, 1%, 0201	SMD	603	1
<b>Capacitors:</b>					
3	C37, C42, C47	4.7μF, 20%, 10V, X5R	CAP CER 4.7UF 10V X5R 0402	603	3
4	C38, C40, C43, C41, C45, C46	0.1μF, 10%, 10V, X5R	CAP CER 0.1UF 10V X5R 0201	603	6
5	C39	1μF, 20%, 10V, X5R	CAP CER 1UF 10V X5R 0201	603	1
6	C44	0.01μF, 10%, 10V, X5R	CAP CER 0.01UF 10V X5R 0201	603	1
<b>Integrated Circuits:</b>					
7	U9	ATSAML21J18B-UUT	ARM Microcontrollers - MCU ARM Cortex-M0+ 256KBFlash 40KB SRAM	64-pin TQFP	1
<b>Connectors</b>					
8	J2	5 pin header	Through hole	5 pin	1

## 6 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, sub contractor, consultant, adviser or the employees of a contractor will invite penal consequences under the aforesaid legislation.