T E N D E R D O C U M E N T

Supply, installation and commissioning of Solid State Modulator and RF Components

TENDER NO. : **SMR/LMTD/PUR/CP084/2027L/PT**

DUE ON : **11/12/2026**

SAMEER	SOCIETY FOR APPLIED MICROWAVE ELECTRONICS ENGINEERING & RESEARCH IIT CAMPUS, POWAI, MUMBAI 400 076. TEL. : 022-25723030, 25727100 WEB SITE : www.sameer.gov.in E-mail : purchase@sameer.gov.in

Contents

		Page No.
1. Section - I	Instructions for Submitting the Offers	3
2. Section - II	Technical Specifications	6
3. Section - III	Commercial and Other Terms & Conditions	33
4. Section - IV	Format for submitting Price Bid	35
5. Annexure - I	Bid Security Declaration	39
6. Annexure - II	Self Certification for Local Content	40

SECTION – I

INSTRUCTIONS FOR SUBMITTING THE OFFER

1. Tender is to be submitted in a **sealed cover, superscribed with tender No. and due date**. Tender should be addressed to '**The Purchase Officer / Head of the Division, SAMEER, IIT Campus, Powai, Mumbai 400 076**'. Name and Address of the vendor should be mentioned at back side of all covers.

2. Any bidder from a country which shares a land border with India will be eligible to bid in any procurement whether of goods, services or works only if they are registered with the Registration Committee, constituted by the Department of Promotion of Industry and Internal Trade (DPIIT). A valid registration certificate is to be attached. "Bidder from a country which shares a land border with India" means: -

a. An entity incorporated, established or registered in such a country; or
b. A subsidiary of an entity incorporated, established or registered in such a country; or
c. An entity substantially controlled through entities incorporated, established or registered in such a country; or
d. An entity whose beneficial owner is situated in such a country; or
e. An Indian (or other) agent of such an entity; or
f. A natural person who is a citizen of such a country; or
g. A consortium or joint venture where any member of the consortium or joint venture falls under any of the above.

The Successful bidder shall not be allowed to sub-contract works to any contractor from a country which shares a land border with India, unless such contractor is registered with the Registration Committee, constituted by the DPIIT.

3. Purchase Preference (Preference to make in India) : As prescribed in "Public Procurement (Preference to Make in India) order 2017 of GOI, Department of Industrial Policy and Promotion" (OM No. P-45021/2/2017-PP(BE-II dated 15th June 2017 as amended from time to time), purchase preference will be given to the bidder. Necessary certification for local content must be submitted by the prospective bidders strictly as per Annexure I", on their letterhead.

4. PERFORMANCE SECURITY

a. You have to give Performance Security Deposit in the form of an Account Payee Demand Draft / Fixed Deposit Receipt from an Indian commercial bank / Bank Guarantee from an Indian commercial bank / a counter Letter of Credit (LC) from our bankers (in case of foreign order), for **3 %** of Order Value, immediately after receiving the purchase order. Performance Security should remain valid for a period of sixty days beyond the date of all contractual obligations including warranty obligations.

b. Performance Security will be forfeited if the purchase order / contract is not executed as per the terms and conditions mentioned therein.

c. Performance Security Deposit without any interest will be returned only after complete execution of purchase order (including warranty period), as per purchase order 's terms and conditions.

5. **A**. In a tender, either the Indian Agent on behalf of the Principal / OEM (Original Equipment Manufacturer) or Principal/OEM can bid but all cannot bid simultaneously for the same item/product in the same tender.

   B. If an agent submits bid on behalf of the Principal/OEM, the same agent shall not submit a bid on behalf of another Principal/OEM in the same tender for the same item/product.

Failure to adhere to the above conditions will lead to automatic disqualification of bid. Tenders submitted by the Indian agent on behalf of his principal /OEM should be supported with a letter of authority from the Principal/ OEM.

In case the manufacturer does not have an authorised representative in India at the time of submission of the bids and the company appoints a representative later on, SAMEER will only correspond with the manufacturer.

6. Further details concerning 'Technical Bid' and 'Price Bid' are given below :

A. Technical Bid:

- Original manufacturer's technical specification sheet must support details provided in the Technical bid with all the specifications/ relevant technical Literatures/Brochures/Catalogues for the item. Bids received without the printed technical specification sheet/brochures/catalogues for item will be technically disqualified.
- The Technical Bid should not contain any **financial information.**
- The item and accessories quoted must be from original manufacturer and must be first purchased (**No second hand item/sub-item will be accepted**)
- In case the bidder is the authorised representative of a foreign manufacturer/supplier, a certificate from the principal must be included in the technical bid.
- In case of departure or substitution from the particular specification contained in the tender document, please indicate clearly as 'Alternate offer' and should contain sufficient details to show that the alternative would equally serve the purpose. All relevant technical data should be enclosed. In case of equipment, the itemised cost of essential accessories, optional accessories and spares required need to be specified.

- **Technical Bid should contain the following information :**
  a. Technical Specification
  b. SECTION III of Tender Document i.e. Commercial Terms & Conditions duly filled, stamped and signed.
  c. Certification for local content (Annexure I).
  d. A valid registration certificate from DPIIT as per Sr. No. 4 of Section I, if applicable.

Technical Bid without the above information will not be considered.

B. Price Bid:

Price bid shall contain the following information:

a. Quotation for the items (including the price break up for all options and accessories).
b. TAXES, DUTIES AND LEVIES if applicable should be clearly specified.
c. Discount offered on quoted price (considering that SAMEER is an R&D organisation).
d. Total price should be mentioned in both figures and words. Alterations, if any, should be attested / initialled.
e. The bid shall be free of hidden costs / ambiguity.
f. There shall be no overwriting.

7. Tenders/Bids should be dropped in **Tender Box** only.

8. Unsuccessful bidders will **not be formally informed** of the result of their tender.

9. Technical Bid and Price Bid will be opened on the next day of the due date.

10. For any clarification please mail at purchase@sameer.gov.in

SECTION – II

Introduction

SAMEER, R&D laboratory under Govt. of India, has extensive expertise in development of linear accelerators for medical applications like radiation oncology, isotope generation etc.

A standard test facility is being established for reference testing of any accelerator or other related components. The typical operating parameters of Klystron for the facility are Peak Power ≥ 7.5 MW at 2998.5 MHz frequency with RF Pulse width of about 5 to 8 μs. The duration of operation may exceed 12 hours of continuous operation.

For establishing this setup, it is proposed to install a solid-state modulator which which has a high stability on the output pulses for stable operations. A complete, stand-alone system should be quoted as per specifications in the tender.

Scope of the tender

The scope of the tender includes selection of the suitable solid state pulsed modulator along with Klystron and RF components, submission of a design report, obtaining confirmation from SAMEER followed by fabrication, testing and supply of the solid state modulator with all necessary sub-systems including required power supplies, interlocks, control and monitoring systems, pulse transformer with tank, RF digitizer, ion pumps and low lever RF system.

The scope includes acceptance test as per predefined document at factory before dispatch and installation, commissioning and on site at SAMEER. The OEM has to demonstrate desired power at Klystron output as well as linac input port. The responsibility of meeting the essential technical specifications of the overall system rests with the supplier.

Bidder Qualification

Sr	Criteria	Document	Bidder Remarks
1	The bidder shall quote for a complete system, which include various power supplies, interlocks, control and monitoring systems, pulse transformer with tank, RF digitizer, ion pumps, low lever RF system and various cables required for the operation and demonstration of the high stability RF pulses from the Klystron. Incomplete offers will not be considered.	Design document	
2	The bidder shall have past experience of at least five years in design and development of similar solid-state pulse modulators and must have delivered more than 20 such systems to various users around the world.	Proof of operation over past 5 years with list of at installations	
3	At least one system must be of pulse duration ≥ 8 μs and repetition rate more than 300 Hz at high power.	List of installation showing long pulse operation	
4	Brief details of at least two previously executed orders in last three years along with important specifications and user details should be submitted with the quotations.	List of orders in past 3 years	
5	Supply orders for solid state modulators executed in India may be furnished along with technical details.	List of orders in India	
6	Only the Original Equipment Manufacturers (OEMs) or their authorized representatives are eligible to quote.	Authorization Letter	
7	For other OEM components, Integrator must submit letter that support of various OEM's will be provided by integrator to SAMEER by consultations of these OEM's	Self-declaration	

Technical Specifications

List of Components from source to exit

Sr	Components	Details
1.	Stable RF Source with frequency varying option and display on GUI	1
2	RF Amplifier to ensure sufficient input power goes to RF Klystron with LLRF	1
3	Mechanism to measure RF power, Frequency at each stage with display on GUI as well as Digitizer output option	As needed
4	Digital Delay Generator for stable trigger if needed	1
5	RF Klystron as per Table 1	1
6	Electromagnet with power supply for focusing solenoid coil	1
7	Klystron vac-ion pump controller	1
8	Lead shielding for Klystron	1 set
9	High voltage solid state modulator with controls system to operate the Klystron	1
10	ATF or equivalent WR 284 type Dual Direction coupler with flanges at ✓ Klystron exit with input visible via RF Digitizer on GUI ✓ Linac entrance with input visible via RF Digitizer on GUI	2
11	ATF or equivalent make Four port circulator	1
12	ATF or equivalent Ferrite load for port 3 termination	2
13	ATF or equivalent Dry Load for port 4 termination	2
14	RF Arc Detector ✓ between Klystron and circulator ✓ Circulator and Linac entrance	2
15	ATF or equivalent WR 284 type Dual Direction coupler with flanges at	1
16	SF_6 filling nozzle kit	1
17	WR 284 waveguides, E-bends, H-bends as needed	2
18	ATF or equivalent make Water load 45 kW	1
19	Rectangular to Circular convertor	2
20	AFT or equivalent gaskets for connections	24
21	Insulating oil	As required

Schematic of the System

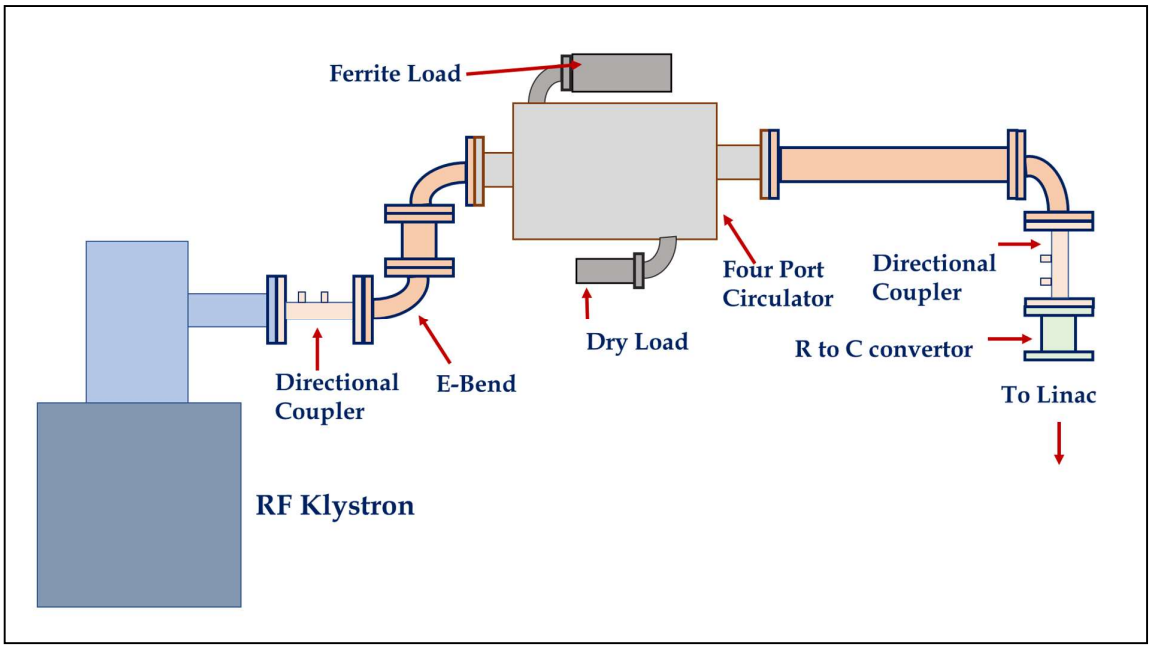


Fig. 1: Schematic of the system from Klystron to Linac

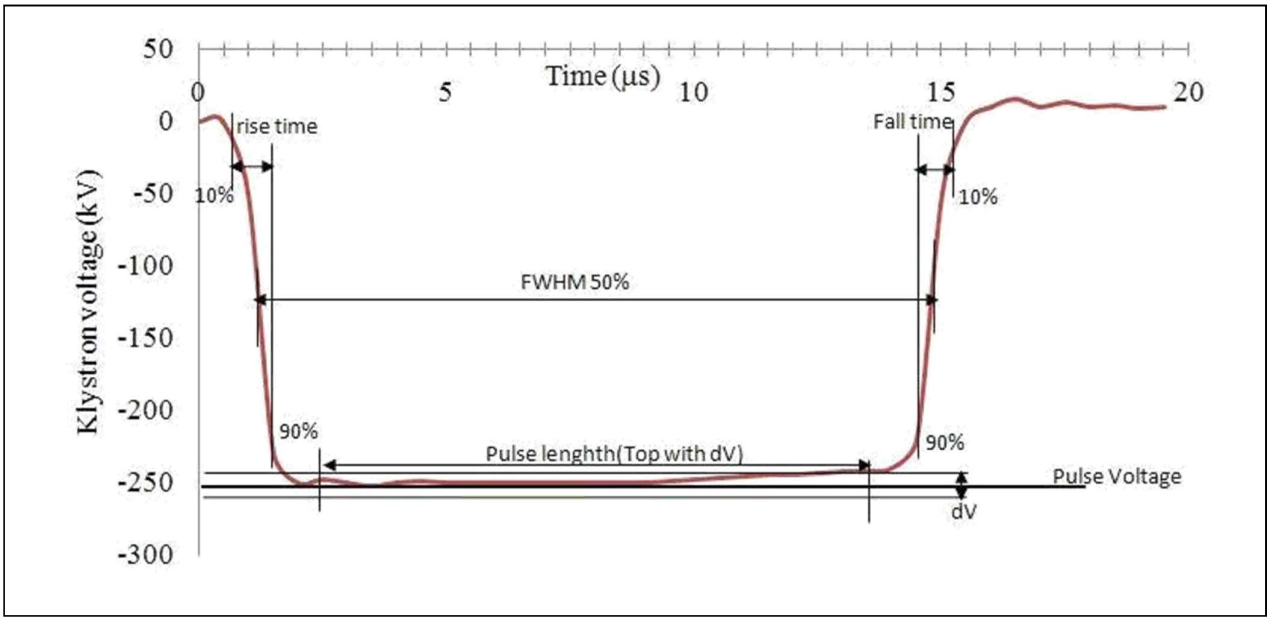


Fig.2: Pulse parameters shape definitions (Voltage ratings are just for indication)

Table 1: Technical Specifications of RF Klystron

Sr.	Parameter	Value	Vendor Specifications
1	Make of Klystron	Canon/ CPI/ Equivalent	
2	Model Number	**To specify**	
3	RF output of Klystron (Peak)	7.5 MW (max)	
4	RF output of Klystron (Average)	10 kW (max)	
5	RF pulse width	5µs at flat-top	
6	Pulse repetition rate (PRF)	>300 Hz	
7	Typical operating frequency	2998.5 ±3 MHz	
8	Output Wave guide	WR284	
9	Average X-ray radiation level at 1 meter. Note: The X-ray shielding should be an integrated part of the assembly.	< 10 µSv/h	
10	Focusing electromagnet power supply parameters	As per Klystron OEM	
11	Ion pump connector on Klystron	As per Klystron OEM Note: In case the connector on Klystron is non-standard, supplier should provide connecting cable with Fischer type on supply end	
12	Ion pump controller	Standard with Fischer type connector. Make: Agilent or Gamma or equivalent.	
13	Klystron Filament output voltage & current	As recommended by OEM of Klystron. Both parameters should be controllable and monitored.	

Solid State Modulator

A suitable solid-state pulsed modulator should be designed for the Klystron chosen as per Table 1. Brief specifications of SSM are as per Table 2. Definition of pulse parameters are as per Fig. 2.

Table 2: Technical Specifications of Modulator

1	Operational Voltage range	As per Klystron	
2	User Settable (in local and remote mode)		
	a) Coarse setting	5 KV	
	b) Fine Setting	1 KV	
3	Maximum output current	As per Klystron	
4	Flatness of pulse (dV) at nominal operating point including ripple, droop and overshoot	< ±1.5 %	
5	Pulse polarity of modulator	As per Klystron	
6	Pulse Repetition Frequency	As per Klystron	
7	User settable resolution of Repetition Frequency	1 Hz	
8	User settable pulse Flat top width µs in steps of	3 to 5 µs in steps of 0.1 µs	
9	Pulse width including rise time fall time and flat-top (Supplier to specify design rise and fall times in the design report)	10 µs	
10	Pulse width jitter (Supplier to specify in the design report)	< 8 ns	
11	Trigger jitter (Supplier to specify in the design report)	< 16 ns	
11	Pulse-to-pulse Amplitude stability	< 100 ppm	
12	Repeatability	200 ppm	
13	Long term stability	<100 ppm	

Solid State Driver Amplifier (LLRF)

Table 3: Specifications of RF Amplifier

Sr.	Parameter	Value	Vendor Specification	Unit
1.	Frequency	2998.5		MHz
2.	Bandwidth (3 dB)	±50		MHz
3.	Output Power Max	At source end		W or dBm
4.	Output Power Max post Amplifier	As per Klystron input Typically 56dBm		W or dBm
5.	Make of Amplifier	**To specify**		
6.	Model No of Amplifier	**To specify**		

i. The frequency of the RF should be variable with the help of a control signal through Ethernet or RS485 or suitable mechanism.
ii. The supplier should mention the characteristics of the control signals that are required for frequency and phase controlling. This low-level RF signal is to be amplified using a solid-state driver power amplifier.
iii. Driver power amplifier has to be integrated into the rack, within one meter distance from Klystron. The amplifier must deliver sufficient power for the Klystron output power (maximum). There should be a provision to vary the RF output power of the driver in both local and remote mode of operation.
iv. Isolator should be included in the output circuit of the driver amplifier for stable operation.
v. The supplier should also provide necessary calibration sheet corresponding to control signals vs the corresponding parameter.
vi. The trigger pulses required for enabling the RF driver output will be provided by SAMEER team or the supplier can generate from the trigger given to the system for Trigger Enable using Digital Delay Generator so it can be synchronized as per requirement.

Table 4: Specifications High Power RF Circulator

Parameter	Desired Specification	Vendor Specification
Operating Frequency	2998.5 ± 10MHz	
Forward Power	15 MW	
Average Power	≥15 KW	
Reverse Power at any port	100% at any phase	
Number of Ports	4 ports phase shift	
Isolation	≥ 30 dB	
Insertion Loss	< 0.15 dB max	
Return loss	≥ 30 dB	
Flange type	CPR284F with 10 holes	
Waveguide Size	WR 284	
Waveguide Operating Pressure	High Pressure SF_6 , ≥50 psi	
Water Connection	2x ½" hose barb fittings, stainless steel	
Operating Temp	~ 25°C	
Arc Viewport Connector	Arc Viewport Connector 1x FSMA ¼"-36 UNS-2A, male thread	
Gasket Spare	04 nos. Included	

AFT Equivalent: C4-WR284-05-2998-02-25

Table 5: High Power Water Load 1 at Circulator Port 3

Parameter	Desired Specification	Vendor Specification
Operating Frequency	2998.5 ± 10 MHz	
Peak Pulse Power	15 MW	
Average Power	≥30 kW	
Input VSWR	< 1.1	
Return Loss	≥ 30 dB	
Waveguide Size	WR 284	
Flange type	CPR284G	
Waveguide Operating Pressure	High Pressure SF_6 , ≥50 psi	
Power Monitor Port	N-Female	
RF Coupling	1x non-directional coupling probe at input Nominal Coupling: -60 dB	
Operating Temp	In range of 25°C	
Water Connection	2x ½" hose barb fittings, stainless steel	
Gasket	02 nos. Included	

AFT Equivalent: LW-WR284-02-2998-02-25

Table 6: Ferrite Load at Circulator Port 4

Parameter	Desired Specification	Vendor Specification
Operating Frequency	2998.5 ± 10 MHz	
Peak Pulse Power	6 MW	
Average Power	6 KW	
Input VSWR	< 1.1	
Return Loss	≥ 30 dB	
Waveguide Size	WR 284	
Flange type	CPR284G	
Waveguide Operating Pressure	High Pressure SF_6 , ≥50 psi	
Power Monitor Port	N-Female	
RF Coupling	1x non-directional coupling probe at input Nominal Coupling: -60 dB	
Operating Temp	In range of 25°C	
Water Connection	2x ½" hose barb fittings, stainless steel	
Gasket	02 nos. Included	

AFT Equivalent: LF-WR284-02-2927-02-25

Table 7: High Power Water Load at Linac Port

Parameter	Desired Specification	Vendor Specification
Operating Frequency	2998.5 ± 10 MHz	
Peak Pulse Power	15 MW	
Average Power	≥45 KW	
Input VSWR	< 1.1	
Return Loss	≥ 30 dB	
Waveguide Size	WR 284	
Flange type	CPR284G	
Waveguide Operating Pressure	High Pressure SF_6 , ≥50 psi	
Power Monitor Port	N-Female	
RF Coupling	1x non-directional coupling probe at input Nominal Coupling: -60 dB	
Operating Temp	In range of 25°C	
Water Connection	2x ½" hose barb fittings, stainless steel	
Gasket	02 nos. Included	

AFT Equivalent: LW-WR284-02-2998-03-25

Table 8: Specifications of Dual Directional Coupler

Parameter	Desired Specification	Vendor Specification
Frequency	2998.5 MHz	
Bandwidth (1 dB)	± 10 MHz	
Forward Peak Power	20 MW	
Forward Average Power	15 KW	
VSWR	< 1.1	
Return Loss	≥ 30 dB	
Insertion Loss	< 0.05dB	
Gas pressure in Waveguide	SF6 Gas, ≥ 50 psi	
Coupling of Port C1 and C2	-60 ± 1 dB	
Directivity	≥ 27 dB	
RF Coupling	1x non-directional coupling probe at input Nominal Coupling: -60 dB	
RF Flange	1x CPR284F, flat, 10x hole D6.5	
RF Flange	1x CPR284G, grooved, 10x hole D6.5	
RF Coupling Connectors	2x SMA female, 50 Ω	
Dimension	120 mm	
Gasket	02 nos. Included	

AFT Equivalent: DC-WR284-2998-60-60

Table 9: Specifications E-Bend

Parameter	Desired Specification	Vendor Specification
E-bend	90^{o}	
Arc radius	~ 60 to 100 mm	
Frequency	2998.5 MHz	
Bandwidth (1 dB)	± 10 MHz	
Forward Peak Power	15 MW	
Forward Average Power	15 KW	
VSWR	< 1.1	
Return Loss	≥ 30 dB	
Insertion Loss	< 0.05dB	
Gas pressure in Waveguide	SF_6 Gas, ≥ 50 psi	
RF Flange	1x CPR284F, flat, 10x hole D6.5	
RF Flange	1x CPR284G, grooved, 10x hole D6.5	
Dimension	120 mm	
Gasket	02 nos. Included	

Table 10: Specifications H-Bend

Parameter	Desired Specification	Vendor Specification
H-bend	90^{o}	
Arc radius	~ 75 to 100 mm	
Frequency	2998.5 MHz	
Bandwidth (1 dB)	± 10 MHz	
Forward Peak Power	15 MW	
Forward Average Power	15 KW	
VSWR	< 1.1	
Return Loss	≥ 30 dB	
Insertion Loss	< 0.05dB	
Gas pressure in Waveguide	SF6 Gas, ≥ 50 psi	
RF Flange	1x CPR284F, flat, 10x hole D6.5	
RF Flange	1x CPR284G, grooved, 10x hole D6.5	
Dimension	120 mm	
Gasket	02 nos. Included	

Table 11: Brief specifications of Waveguide 1

Parameter	Desired Specification	Vendor Specification
Insertion loss @ 2998.5 MHz	≤ 0.01 dB/ft.	
VSWR	≤ 1.4	
Forward Peak Power	15 MW	
Forward Average Power	15 KW	
RF Flange	1x CPR284F, flat, 10x hole D6.5	
RF Flange	1x CPR284G, grooved, 10x hole D6.5	
Waveguide Type	WR284, OFHC Copper	
Gas pressure in Waveguide	SF_6 Gas, ≥ 50 psi	
Arc Viewport Connector	Arc Viewport Connector 1x FSMA ¼"-36 UNS-2A, male thread	
Dimension	100 mm flange to flange	
Gasket	02 nos. Included	

Table 12: Brief specifications of Waveguide 2

Parameter	Desired Value	Vendor Specification
Insertion loss @ 2998.5 MHz	≤ 0.01 dB/ft.	
VSWR	≤ 1.4	
Forward Peak Power	15 MW	
Forward Average Power	15 KW	
RF Flange	1x CPR284F, flat, 10x hole D6.5	
RF Flange	1x CPR284G, grooved, 10x hole D6.5	
Waveguide Type	WR284, OFHC Copper	
Gas pressure in Waveguide	SF_6 Gas, ≥ 50 psi	
Dimension	1000 mm flange to flange	
Gasket	02 nos. Included	

Table 13: Brief specifications of Flexible Rectangular Waveguide to Circular Convertor

Parameter	Desired Value	Vendor Specification
Frequency	2998.5 MHz ± 150 MHz	
VSWR	< 1.06:1 Typical	
Peak Power	10 MW	
Average Power	15 KW	
Choke Flange	Choke Flange Standard with Silver plating with 8 holes ¼ -20 UNC or M6 through	
Waveguide Flange	CPRF Standard SS316L flat, 10 hole	
Waveguide Type	Flexible	
SF_6 Pressure	3 Bar absolute	
Gasket	As per circular groove	

Notes for Design of the Pulse Modulator

OEM must submit a detail design report to match the output pulse parameters specified in Table 2 after placement of Purchase Order. The report shall contain details of:

1	Topology Diagram	The topology of the system and design details of the different sub-systems of the modulator.
2	Power	Supplier shall specify requirement of three phase power.
3	Pulse Parameters	Full details of pulse parameters as per design, which include rise time, fall time, FWHM, base width, flat top, jitter and other parameters
4	Cooling design	Cooling requirement and design of the cooling circuit/system, if required, for operation at rated parameters. All details like coolant proposed to be used, flow rate, pressure drop, connector details etc. should be mentioned by the Supplier in the design report
5	Pulse Transformer housing and Oil	Pulse transformer and oil proposed to be employed, with details of the recommended oil, quantity of oil required and applicable standard for the oil should be specified. Please note that the transformer oil proposed to be used by SAMEER has a break-down voltage of 60 kV (rms) /2.5mm after filtration. This may please be considered in the design. For reference please note that we use oil of Indian Standard Grade IS 335:1993.
6	Safety precautions	Details of safety precautions in the pulse transformer tank, if any, for fire hazard, over heating of oil, build-up of pressure, etc. be mentioned
7	Trigger	Trigger' pulse for pulse generation from 10-50 μs. Please note that SAMEER will provide TTL signals only for triggering/gating.
8	List and details of all power supplies	All power supplies, controls, interlocks and protection circuits. Details shall include specifications, layout and schematic with proposed dimensions and weight. The protection circuit should ensure that maximum energy dumped in the load in the event of arcing or any other malfunctioning should be sustained.
9	Test procedure	Test procedure to be employed during acceptance testing of all output pulse parameters discussed in point as per Table 1 and 2. The test procedure for estimation of energy dumped in the load in the event of an arc shall also be specified by the supplier in the design report.
10	EMI protection	Details of measures taken to minimize EMI and line current should be included in the design report.

Table 14: Specifications and details of Water Cooling Manifold

Sr	Parameter	Vendor Specification
1	Water cooling Manifold is needed for Klystron, Solenoid, Window, Circulator, Load, Coupler, Solid state amplifier etc	
2	All the connectors should be standard and both Male-Female part should be provided for each connector.	
3	Appropriate flow switches should be used to monitor and control the flow rate. The set points should be configurable	
4	Temperature monitor should be provided to ensure temperature at various locations	
5	All parameters are viewed as well as settable from GuI	
6	Appropriate interlocks provided	

Table 15: Specifications and details of Gas pressure Manifold

Sr	Parameter	Vendor Specification
1	The pressure of SF_6 may be ≥ 50 psi	
2	Suitable manifold should be provided with gas inlet port	
3	All the connectors should be standard and both Male-Female part should be provided for each connector	
4	Analog as well as digital read out is provided	
5	Needle valve is provided	
6	System interlock provided for low or high pressure	

Table 16: Control and Monitoring System

Sr	Detail	Vendor Specification
1	**Input signals to be provided by SAMEER** Trigger signal	
	Local and Remote Mode Operation	
2	All functions listed below should be functional in local or mode with display on the modulator panel and in remote mode via TCP/IP and RS 485 modbus protocol.	
3	Status read-back and display of interlocks for safe operation of the Pulse Modulator, including interlocks for ion pump current, modulator door, klystron filament heating, water flow, electromagnet current, maximum reverse voltage, output over voltage, input under voltage, input over voltage, input single phasing and arcing.	
4	This should have provision for fault latching with reset.	
5	ON/OFF control and status, setting and read-back for all power supplies and other essential parameters.	
6	Setting of limits of important operational parameters to protect against accidental exceeding of rated parameters.	
7	Setting of pulse width and PRF as per point and other input components	
8	Hardware interface for HV enable/ Trigger Enable with proper isolation.	
	Notes for Control System	
9	SAMEER will provide potential free contacts for the external interlocks, which includes cooling water flow, Emergency Scram, Klystron Room Smoke Detector, etc. A list of interlocks as per Table -9 shall be included by the supplier in the design report with five extra channels provided for future implementation.	
10	Remote operations shall be possible via TCP/IP and RS 485 modbus using a PC/Laptop. The software / application required for remote operation of the Pulse Modulator to be loaded on any PC should be provided on a media.	
11	Protocol for TCP/IP and RS 485 modbus	

	should clearly list all the commands/their response, error codes /messages and recommended actions. The device IP should be configurable and factory settings should be made available. Communications using Windows socket on Windows 32/64 bit platform with multiple connections is required.	
12	Monitoring points as **per Table 17** should be provided. Supplier may provide more monitoring points if required.	
13	RF Digitizer to be provided	

Table 17: List of monitoring parameters

Sr.	Parameters	Vendor Remark
1	Local Mode Monitoring	
2	Remote Mode Monitoring	
3	Forward output power	
4	Reflected output power	
5	VSWR	
6	Klystron drive power	
7	Filament (Heater) Voltage & Current	
8	Beam Voltage & Current	
9	Remote / Local Selection	
10	Status Display for Auto / Manual	
11	Ion controller current	
12	Water pressure	
13	Water flow rate	
14	Water temperature	
15	Electromagnet current and voltage	
16	Frequency	
17	Phase	
18	Power	
19	Voltage	
20	Temperature	

Table 18: Safety and Protection

Sr	Detail	Vendor Specification
1	Provision should be made for a 'Switch' to be enabled before opening the panels for maintenance or trouble shooting. All capacitors should get discharged on enabling of this safety switch.	
2	Adequate protection shall be provided by the Supplier against corona / discharge	
3	All panels, chassis and other such metal points should be individually connected to ground	
4	Interlocks mentioned in the Table 9 below should be provided. Supplier may include more interlocks if necessary	

Table 19: List of Interlocks

Sr	**Interlocks**	
1	Vacuum	
2	Modulator door	
3	Klystron filament warm up time	
4	Water Pressure/Flow rate	
5	Electromagnet current	
6	Filament Under/Over Voltage	
7	Over Voltage & Current	
8	Input under voltage	
9	Input over voltage	
10	Input single phasing	
11	Maximum reverse voltage	

12	High reflected power	
13	VSWR	
14	Klystron Over Temp	
15	Insufficient cooling	
16	RF Arcing	
17	HV arcing	
18	Five extra interlocks	
19	Short circuit	
20	Open circuit	
21	SF_6 pressure	
22	Water pressure / Flow rate	
23	Water Temperature	
24	Grounding of all panels and chasis	

Table 20: Miscellaneous

Sr	Description	Vendor Remark
1	**Warranty** The system shall carry a warranty for trouble-free operation for a period of one and half years from shipment or one year from installation and acceptance at the Purchaser's site, whichever is earlier.	
2	The supplier may quote separately as an option for extended warranty period of one/two years.	
3	The supplier shall warranty delivery of spares for a minimum period of five years from installation/commissioning at SAMEER.	
4	**AC Mains** Three phase, 415V ± 10%, 50 Hz ± 3%	
5	**Ambient conditions** Temperature: 5 – 45 degree Celsius Relative Humidity: 10 – 90%, Non condensing	
6	**Documentation** The Supplier shall provide a detailed design report in English at the time of delivery.	
7	The Supplier shall provide a detailed Manual in English with sections on Operation of the Modulator, Troubleshooting & Maintenance.	
8	**Packing / Transportation / Shipment** Packing should be able to withstand direct exposure to rains, and to shocks and jerks during transportation. The crate for transportation should have shock/ tilt indicators. All packing crates should have provision for lifting using a standard width fork-lift/Pallet truck. Position for insertion of forks should clearly be marked. Prominent markings should be made on the packing to clearly indicate the sensitive nature of the equipment.	
9	**Desired delivery schedule** Within 6 to 8 months from receipt and acceptance of the Purchase Order by the supplier	

List of Components to be quoted separately

Sr	Components	Qty
1.	Klystron tube, Focusing solenoid coil, pulse transformer with oil tank, klystron socket, filament power supply	1
2.	Electromagnet power supply for focusing solenoid coil	1
3.	High voltage solid state modulator with controls system	1
4.	Klystron vac-ion pump controller	1
5.	Suitable four port circulator	1
6.	Suitable water load for termination of four port circulator	2
7	X-Ray shielding of Klystron	1
8	RF Driver (LLRF)	2
9	RF Arc Detector	2
10	Insulating oil	As required

Sr	Components	Details
1.	Stable RF Source with Frequency varying option and display on GUI as well as SSM unit	1
2	RF Amplifier to ensure sufficient input power goes to RF Klystron with LLRF	1
3	Mechanism to measure RF power, Frequency at each stage with display on GUI as well as Digitizer output option	As needed
4	Digital Delay Generator for stable trigger if needed	1
5	RF Klystron as per Table 1	1
6	Electromagnet with power supply for focusing solenoid coil	1
7	Klystron vac-ion pump controller	1
8	Lead shielding for Klystron	1 set
9	High voltage solid state modulator with controls system to operate the Klystron	1
10	ATF or equivalent WR 284 type Dual Direction coupler with flanges at ✓ Klystron exit with input visible via RF Digitizer on GuI ✓ Linac entrance with input visible via RF Digitizer on GuI	2
11	ATF or equivalent make Four port circulator	1
12	ATF or equivalent Ferrite load for port 3 termination	2
13	ATF or equivalent Dry Load for port 4 termination	2
14	RF Arc Detector ✓ between Klystron and circulator ✓ Circulator and Linac entrance	2
15	ATF or equivalent WR 284 type Dual Direction coupler with flanges at	1

16	SF_6 filling nozzle kit	1
17	WR 284 waveguides, E-bends, H-bends as needed	2
18	ATF or equivalent make Water load 45 kW	1
19	Rectangular to Circular convertor	2
20	AFT or equivalent gaskets for connections	24
21	Insulating oil	As required

SECTION – III

Commercial & Other Terms and Conditions

Vendor to state Complied / Not Complied – Deviations if any in the REMARKS column

Sr.	DESCRIPTION	ESSENTIAL CONDITIONS	REMARKS
a.	PRICES	**a. For Import Order :Prices** quoted should be on **FCA** (**nearest Intl. Airport at shipper's country**) , Name of the Airport should be mentioned clearly. **b. For Local Order : Prices** should include delivery charges up to **SAMEER's Stores**. Any additional charges, taxes and levies should be clearly mentioned. In the event of a Purchase Order, it will be the responsibility of the supplier to pay whatever charges are payable to different agencies in their country. The purchaser will not pay any charges other than the agreed price as per the contract.	
b.	TAXES , DUTIES AND LEVIES APPLICABLE	(Existing applicable rates should be mentioned)	
		1.	
		2.	
		3.	
c.	PACKING	All the items should be packed in suitable boxes, crated and protected from damages during the transit till it deliver to destination.	
d.	FREIGHT AND INSURANCE	a. For Local Order : To be arranged by supplier. All the items shall be delivered to Stores Officer, SAMEER, IIT Campus, Powai, Mumbai after obtaining a shipping release in the appropriate pro-forma from the purchaser. The Vendor shall be fully responsible for the safe delivery of all the items from and to SAMEER Powai and shall satisfy the purchaser that adequate measures have been taken for the same. b. For Import Order : Will be arranged by SAMEER from FCA International Airport	

Vendor's Signature: Seal:

e.	MODE OF DELIVERY	a. For Local Order : By road b. For Import Order : By Air	
f.	DELIVERY SCHEDULE	**To specify**	
g.	WARRANTY	**1 year or more**	
h.	PAYMENT TERMS	a. For Import order: 90 % against Irrevocable Letter of Credit or Sight Draft and balance 10 % through wire transfer after acceptance of material at SAMEER. b. For Local order: 75 % after delivery followed by inspection balance 25 % against Test, Installation & acceptance (whichever is applicable) of material / consignment, at SAMEER.	
i.	PERFORMANCE SECUIRTY	The successful bidder has to give Security Deposit in the form of an Account Payee Demand Draft / Fixed Deposit Receipt from an Indian commercial bank / Bank Guarantee from an Indian commercial bank / a counter Letter of Credit (LC) from our bankers (in case of foreign order), for **3 %** of Order Value, immediately after receiving the purchase order. Performance Security should remain valid for a period of sixty days beyond the date of all contractual obligations including warranty obligations.	
j.	VALIDITY OF QUOTATION	90 DAYS MIN FROM THE DUE DATE.	
k.	ANY OTHER CHARGES APPLICABLE	SUPPLIER TO SPECIFY	
l.	EXEMPTION FOR CUSTOM DUTY AND EXCISE DUTY	SAMEER is registered with Department of Scientific and Industrial Research (DSIR) for the purpose of availing **custom duty exemption** in terms of Government of India Notification No. 51/96-customs amended to 24/2007-customs dated 1st March 2007. {approx. 5.50 % duty (5 % Basic + 10% Social welfare surcharge) + IGST is applicable under his notification} and **central excise duty exemption** in terms of Government Notification no. 10/97-central excise amended to 16/2007-central excise dated 1st March 2007.	
m.	SHARING LAND BORDER WITH INDIA	a. Yes / No b. If Yes, whether necessary valid registration certificate is attached along with Technical bid.	
n.	JURISDICTION	MUMBAI	

Vendor's Signature: Seal:

SECTION – IV

Format for Price Bid (in INR)

IMPORTANT

Vendor is required to submit the price bid in the given format on their LETTER HEAD.
One copy of the price bid without the financial figure should be enclosed along with the Technical Bid.

Sr	DESCRIPTION	QUANTITY	RATE IN INR	PRICE IN INR
1	Klystron tube with solenoid and vac-ion pump controller	1		
2	Solid State Modulator with Pulse Transformer Tank, RF Digitizer and all assemblies and control system	1		
3	Suitable Four port circulator	1		
4	15 KW Water Load at Port 3	1		
5	5 KW Ferrite Load at Port 4	1		
6	60 KW Water Load at Port 2	1		
7	Dual Directional Coupler	2		
8	RF Amplifier	1		
9	RF Arc Detector with optical cables and window	2		
10	E-bends	04		
11	H-bends	04		
12	1m long waveguides	04		
13	100 mm long waveguide	08		
14	Flexible Rectangular to Circular Convertor	02		
	OTHER CHARGES, if any			
	TAXES AND DUTIES APPLICABLE ON ITEMS			

	I			
	II			
	III			
	IV			
	FREIGHT: from Vendor's manufacturing facility to SAMEER Kharghar.			
	INSURANCE			
	ADDITIONAL CHARGES IF ANY			
	TOTAL AMOUNT			
	TOTAL AMOUNT (IN WORDS)			
Vendor's Signature: Seal:				

Format for Price Bid (in Foreign currency)

IMPORTANT

Vendor is required to submit the price bid in the given format on their LETTER HEAD.

One copy of the price bid without the financial figure should be enclosed along with the Technical Bid.

Sr	DESCRIPTION	QUANTITY	RATE IN (Name of currency)	PRICE IN (Name of currency)
1	Klystron tube with solenoid and vac-ion pump controller	1		
2	Solid State Modulator with Pulse Transformer Tank, RF Digitizer and all assemblies and control system	1		
3	Suitable Four port circulator	1		
4	15 KW Water Load at Port 3	1		
5	5 KW Ferrite Load at Port 4	1		
6	60 KW Water Load at Port 2	1		
7	Dual Directional Coupler	2		
8	RF Amplifier	1		
9	RF Arc Detector with optical cables and window	2		
10	E-bends	04		
11	H-bends	04		
12	1m long waveguides	04		
13	100 mm long waveguide	08		
14	Flexible Rectangular to Circular Convertor	02		
	OTHER CHARGES, if any			

	TAXES AND DUTIES APPLICABLE ON ITEMS			
	I			
	II			
	III			
	IV			
	FREIGHT: from Vendor's manufacturing facility to SAMEER Kharghar.			
	INSURANCE			
	ADDITIONAL CHARGES IF ANY			
	TOTAL AMOUNT			
	TOTAL AMOUNT (IN WORDS)			

Vendor's Signature: Seal:

Annexure - I

Bid Security Declaration

Dated:

To,
The Registrar,
Society for Applied Microwave Electronics Engineering and Research
IIT Campus, Powai,
Mumbai 400076

Sir,

I, the undersigned, declare that:

1. I am duly authorized to submit bid and undertakings in response to your tender No._____

2. I understand that the bidders are required to submit Bid Security of the prescribed amount, while submitting bids in response to tender enquiries of the Society for Applied Microwave Electronics Engineering and Research (SAMEER).

3. As an alternative to the Bid Security, I hereby declare that my firm, which is submitting the current bid, will be suspended for the period of time specified in the request for bid document or for a period of three years if no such period of time is specified in the request for bid document, from being eligible to submit bids for contracts with SAMEER,

i. if we withdraw or modify the bid during the period of validity (including the extended period of validity) **or**
ii. If we fail to sign the contract, or to submit the performance security before the deadline prescribed in the request for bid document or in the communication sent by SAMEER.

Signature with seal:

Name: _____

Designation _____

Name of the firm _____

Place _____

Annexure - II

Self Certification for Local Content

(Should be on the letter head of the bidder)

*We [name of manufacturer] hereby confirm in respect of quoted item(s) that Local Content is equal to or more than 50% and we come under 'Class-I Local Supplier' Category. Being 'Class-I Local Supplier', we are eligible for Purchase Preference in accordance with Department of Promotion of Industry and Internal Trade's Order No.P45021/2/2017-PP (B.E.-II) dated 15.06.2017 , as modified, vide the said Department's orders No. P-45021/2/2017-PP(BE-II) dated 28/05/2018, No. P-45021/2/2017-PP(BE-II) dated 29/05/2019 and No. P-45021/2/2017-PP(BE-II) dated 04/06/2020

OR

*We [name of manufacturer] hereby confirm in respect of quoted items(s) that Local Content is more than 20% but less than 50% and we come under 'Class-II Local Supplier' Category, as per the said order of Department of Promotion of Indusry and Internal Trade

OR

*We [name of manufacturer] hereby confirm in respect of quoted items(s) that Local Content is less than or equal to 20% and we come under 'Non Local Supplier' Category.

The details of the location (s) at which the local value addition made is /are as under:

1……

2……

3……

*Strike out whichever is not applicable

Date: Seal & Signature of the Bidder

NOTE :-

1 Bidder should submit Self-certification that the item offered meets the minimum local content (as above) giving details of the location(s) at which the local value addition is made in case the bidder wishes to avail the benefits under the make in India policy, if applicable.

2. In cases of procurement for a value in excess of Rs. 10 crores, the local supplier shall be required to provide a certificate from the statutory auditor or cost auditor of the company (in the case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of local content to avail the benefits under the make in India policy, if applicable.

3. The orders quoted above are available on our website (https://www.sameer.gov.in/tenders.asp#page).