

Our E-Tender Notice No. IPR/TN/ET/F/19-20/32 dated 18<sup>th</sup> October, 2019 for Supply of W-Band Trans-Receiver Subsystem alongwith Mandatory Spares i.e. 2 Nos. of Mixer and 1 No. of IF LNA and all required standard accessories as per the details mentioned in technical specification sheets of our tender documents - 1 System.

## SECTION - C

### TECHNICAL SPECIFICATIONS OF STORES AND DRAWINGS.

#### **Technical Specifications of Supply of W-Band Trans-Receiver Subsystem alongwith Mandatory Spares i.e. 2 Nos. of Mixer and 1 No. of IF LNA and all required standard accessories – 1 System**

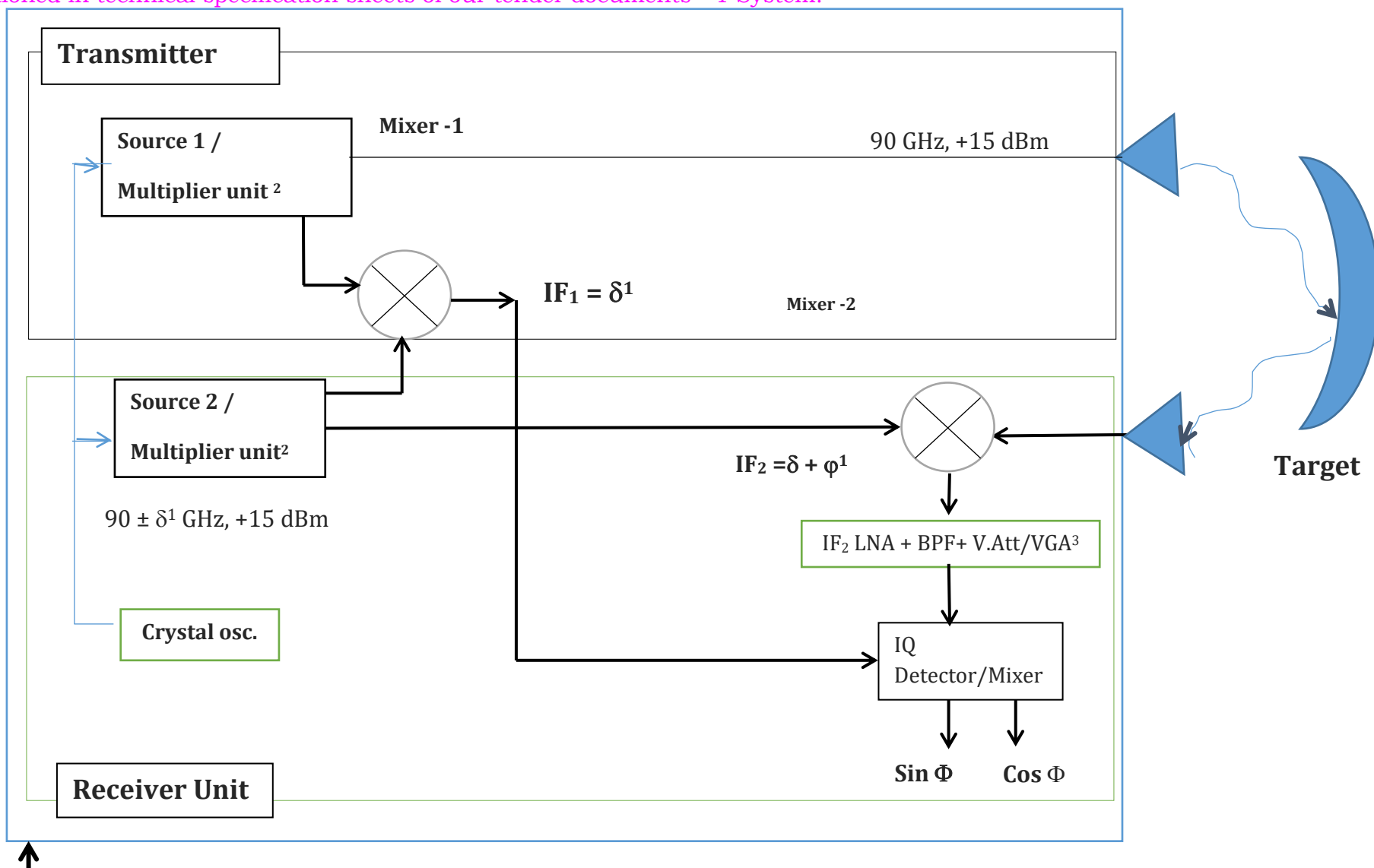
##### “W-band Trans-receiver subsystem”

<b>A. Introduction / Application</b>		
<ul style="list-style-type: none"> <li>IPR requires a millimetre wave (W-band) trans-receiver subsystem that shall be used for density fluctuation measurements in tokamak plasma.</li> <li>The W-band trans-receiver subsystem shall have an operating frequency of 90 GHz and an output power of +15 dBm and their associated power supplies and peripheral subassemblies.</li> </ul>		
<b>B. Specifications for the subsystem</b>		
Sr. No.	Parameter	Specification
1)	Transmitter Frequency (GHz)	90
2)	Transmitter Power (dBm)	+15
3)	Receiver Frequency (GHz)	90 ± δ
	δ (Any fixed frequency within, MHz)	100 to 600
4)	Phi (deg)	0 to 180 ° or better
5)	Antenna gain (dB)	23 or better
6)	Low noise amplifier gain (dB)	≥ 20
7)	Low noise amplifier Noise figure (dB)	6 or better
8)	Continuous Variable attenuation / Gain control (dB)	≥ 30
9)	Band pass filter centre frequency (MHz)	600
10)	Receiver Noise Figure (Without RF LNA, dB)	9 or better
11)	Output signal (I/Q)	1 V <sub>pp</sub> @ 50ohm
12)	IQ Frequency (Any fixed frequency within)	≥100 KHz
13)	Output Connectors at the IQ detector	SMA (F) / BNC
14)	Warranty/Guaranty	1 year (min)
15)	<b>Mandatory Spares</b>	<b>1 MIXER -2 *</b> (Qty : 02 No's) <b>2 IF LNA *</b> (Qty : 01 No's) *Ref. to circuit Layout attached.
16)	Standard Accessories	Vendor should quote for all the accessories i.e., microwave/RF components, inter-connecting waveguides and cables required for system assembly, operation, testing and maintenance.
17)	Enclosure	The complete system should be enclosed in a 19” rack mountable metal enclosure with provision for connecting a grounding cable so as to avoid interference to the system from external noise sources.

Our E-Tender Notice No. IPR/TN/ET/F/19-20/32 dated 18<sup>th</sup> October, 2019 for Supply of W-Band Trans-Receiver Subsystem alongwith Mandatory Spares i.e. 2 Nos. of Mixer and 1 No. of IF LNA and all required standard accessories as per the details mentioned in technical specification sheets of our tender documents - 1 System.

18)	Indicators	The instrument subsystem (its assemblies) should be self-contained and incorporate indicators or status output signals
19)	<p><b>POWER SUPPLIES</b></p> <ul style="list-style-type: none"> <li>The complete subsystem must operate on 230 V AC.</li> <li>No other power supplies must be required to operate the subsystem i.e. All the necessary DC power supplies required for the operation of all the active components of the system like Oscillators, Amplifier, LNAs, Multipliers, Quartz oscillators etc. must be included.</li> </ul>	
20)	<p><b>DOCUMENTS REQUIRED</b> along with the sub system:</p> <ul style="list-style-type: none"> <li>Complete specifications of the Oscillators, Crystal oscillator, amplifiers, multipliers, attenuators, balanced mixer, SSB mixer, IQ mixer, LNAs etc. along with all the original datasheets should be provided.</li> <li>The vendor should provide the “<b>Detailed Installation Guide and Operational Manual</b>” along with the product.</li> </ul>	
<p><b>C. Schedule</b></p> <ol style="list-style-type: none"> <li>Vendor should submit the design/drawing details within 1 month from PO received.</li> <li>IPR will give the comments/acceptance of the drawing within 15 days after receiving it from the vendor.</li> <li>After the acceptance of drawing from IPR, vendor can start the fabrication.</li> <li>The delivery of the system should be within 8 months from the date of approval of drawing.</li> </ol>		
<p><b>D. Pre-despatch tests (before despatch for approval)</b></p> <ol style="list-style-type: none"> <li>The vendor has to submit the following test reports to IPR once they complete the work of system assembly, integration and characterization. <b>Based on these test reports, IPR shall issue a dispatch clearance letter.</b></li> <li>The report has to have the following tests</li> </ol>		
<b>Sr. No.</b>	<b>Parameter</b>	<b>Specification</b>
1	System Output Frequencies a) Source 1 b) Source 2 c) $\delta$ (Any fixed frequency within)	90 GHz 90 $\pm\delta$ GHz 100 to 600 MHz
2	System Output Power a) Source 1 b) Source 2	+ 15 dBm + 15 dBm
<p><b>E. Acceptance tests at IPR.</b></p> <ol style="list-style-type: none"> <li>IPR representative shall perform the following measurements to verify the specifications as mentioned below:</li> </ol>		
<b>Sr. No.</b>	<b>Parameter</b>	<b>Specification</b>
1	System Output Frequencies a) Source 1 b) Source 2 c) $\delta$ (Any fixed frequency within)	90 GHz 90 $\pm\delta$ GHz 100 to 600 MHz
2	System Output Power a) Source 1 b) Source 2	+ 15 dBm + 15 dBm
<ol style="list-style-type: none"> <li>System shall be accepted only after above mentioned specifications are met.</li> </ol>		
<p><b>c) Warranty</b></p> <ul style="list-style-type: none"> <li>Minimum one year from the date of acceptance.</li> </ul>		
<p><b>d) Packing Instruction:</b></p> <ul style="list-style-type: none"> <li>Proper packing should be done for the shifting of instrument from vendor/factory site to IPR.</li> </ul>		

Our E-Tender Notice No. IPR/TN/ET/F/19-20/32 dated 18<sup>th</sup> October, 20019 for Supply of W-Band Trans-Receiver Subsystem alongwith Mandatory Spares i.e. 2 Nos. of Mixer and 1 No. of IF LNA and all required standard accessories as per the details mentioned in technical specification sheets of our tender documents - 1 System.



**\*Note:**

- 1-  $\delta = 100$  to  $600$  MHz(fixed),  $\phi = 0$  to  $180^\circ$  or better
- 2- The source could be free running oscillators/ DRO or PLDRO's with multiplier units etc.
- 3- The IF LNA, BPF and variable attenuator or VGA specifications shall depend on the parameters of the chosen RF circuit.
4. If mixer1 takes the signals before multiplication then the IF1 must be multiplied accordingly in order to drive the IQ detector.

Our E-Tender Notice No. IPR/TN/ET/F/19-20/32 dated 18<sup>th</sup> October, 2019 for Supply of W-Band Trans-Receiver Subsystem alongwith Mandatory Spares i.e. 2 Nos. of Mixer and 1 No. of IF LNA and all required standard accessories as per the details mentioned in technical specification sheets of our tender documents - 1 System.

Our E-Tender Notice No. IPR/TN/ET/F/19-20/32 dated 18<sup>th</sup> October, 2019 for Supply of W-Band Trans-Receiver Subsystem alongwith Mandatory Spares i.e. 2 Nos. of Mixer and 1 No. of IF LNA and all required standard accessories as per the details mentioned in technical specification sheets of our tender documents - 1 System.

## Compliance Sheet

### Compliance Statement for Supply of W-Band Trans-Receiver Subsystem alongwith Mandatory Spares i.e. 2 Nos. of Mixer and 1 No. of IF LNA and all required standard accessories – 1 System.

**Bidder must submit compliance statement dully filled with exact technical values of each specifications (Not with OK, CONFIRM, COMPLY, ACCEPTABLE) alongwith official seal and signature with their offer.**

Sr. No.	Parameter	Specification	Vendor Specification
1	Transmitter Frequency (GHz)	90	
2	Transmitter Power (dBm)	+15	
3	Receiver Frequency (GHz) $\delta$ (Any fixed frequency within, MHz)	90 $\pm$ $\delta$	
		100 to 600	
4	Phi (deg)	0 to 180 ° or better	
5	Antenna gain (dB)	23 or better	
6	Low noise amplifier gain (dB)	$\geq$ 20	
7	Low noise amplifier Noise figure (dB)	6 or better	
8	Continuous Variable attenuation / Gain control (dB)	$\geq$ 30	
9	Band pass filter centre frequency (MHz)	600	
10	Receiver Noise Figure (Without RF LNA, dB)	9 or better	
11	Output signal (I/Q)	1 Vpp @ 50ohm	
12	IQ Frequency (Any fixed frequency within)	$\geq$ 100 KHz	
13	Output Connectors at the IQ detector	SMA (F) / BNC	
14	Warranty/Guaranty	1 year (min)	
15	<b>Mandatory Spares</b>	<b>1. MIXER -2 *</b> (Qty : 02 No's)	
		<b>2. IF LNA *</b> (Qty : 01 No's)	
		*Ref. to circuit Layout attached.	
16	Standard Accessories	Vendor should quote for all the accessories i.e., microwave/RF components, inter-connecting waveguides and cables required for system assembly, operation, testing and maintenance.	

Our E-Tender Notice No. IPR/TN/ET/F/19-20/32 dated 18<sup>th</sup> October, 2019 for Supply of W-Band Trans-Receiver Subsystem alongwith Mandatory Spares i.e. 2 Nos. of Mixer and 1 No. of IF LNA and all required standard accessories as per the details mentioned in technical specification sheets of our tender documents - 1 System.

17	Enclosure	The complete system should be enclosed in a 19” rack mountable metal enclosure with provision for connecting a grounding cable so as to avoid interference to the system from external noise sources.	
18	Indicators	The instrument subsystem (its assemblies) should be self-contained and incorporate indicators or status output signals	
19	<b>POWER SUPPLIES</b>	<ul style="list-style-type: none"> <li>The complete subsystem must operate on 230 V AC.</li> <li>No other power supplies must be required to operate the subsystem i.e. All the necessary DC power supplies required for the operation of all the active components of the system like Oscillators, Amplifier, LNAs, Multipliers, Quartz oscillators etc. must be included.</li> </ul>	
20	<b>DOCUMENTS REQUIRED</b> (along with the sub system)	<ul style="list-style-type: none"> <li>Complete specifications of the Oscillators, Crystal oscillator, amplifiers, multipliers, attenuators, balanced mixer, SSB mixer, IQ mixer, LNAs etc. along with all the original datasheets should be provided.</li> <li>The vendor should provide the <b>“Detailed Installation Guide and Operational Manual”</b> along with the product.</li> </ul>	
21	<b>Schedule</b>	<ol style="list-style-type: none"> <li>Vendor should submit the design/drawing details within 1 month from PO received.</li> <li>IPR will give the comments/acceptance of the drawing within 15 days after receiving it from the vendor.</li> <li>After the acceptance of drawing from IPR, vendor can start the fabrication.</li> </ol> <ul style="list-style-type: none"> <li><b>The delivery of the system should be within 8 months from the date of approval of drawing.</b></li> </ul>	
22	<b>Pre-despatch tests (before despatch for approval)</b>	<ul style="list-style-type: none"> <li>The vendor has to submit the following test reports to IPR once</li> </ul>	

Our E-Tender Notice No. IPR/TN/ET/F/19-20/32 dated 18<sup>th</sup> October, 2019 for Supply of W-Band Trans-Receiver Subsystem alongwith Mandatory Spares i.e. 2 Nos. of Mixer and 1 No. of IF LNA and all required standard accessories as per the details mentioned in technical specification sheets of our tender documents - 1 System.

		they complete the work of system assembly, integration and characterization. <ul style="list-style-type: none"> <li>Based on these test reports, IPR shall issue a dispatch clearance letter.</li> </ul> The report has to have the following tests	
Sr. No.	Parameter	Specification	
1.	System Output Frequencies a) Source 1 b) Source 2 c) $\delta$ (Any fixed frequency within)	90 GHz 90 $\pm\delta$ GHz 100 to 600 MHz	
2.	System Output Power a) Source 1 b) Source 2	+ 15 dBm + 15 dBm	
23.	<b>Acceptance tests at IPR.</b>	IPR representative shall perform the following measurements to verify the specifications as mentioned below:	
Sr. No.	Parameter	Specification	
1	System Output Frequencies a) Source 1 b) Source 2 c) $\delta$ (Any fixed frequency within)	90 GHz 90 $\pm\delta$ GHz 100 to 600 MHz	
2	System Output Power a) Source 1 b) Source 2	+ 15 dBm + 15 dBm	
	<ul style="list-style-type: none"> <li>System shall be accepted only after above mentioned specifications are met.</li> </ul>		
24	<b>Warranty</b>	Minimum <u>one year</u> from the date of acceptance.	
25	<b>Packing Instruction:</b>	Proper packing should be done for the shifting of instrument from vendor/factory site to IPR.	

**Authorised Signatory**

**Official Seal**

**Date :-**