	INDIAN INSTITUTE OF TECHNOLOGY BOMBAY **MATERIALS MANAGEMENT DIVISION** **Powai, Mumbai 400076.**

Ref No. (PR No.1000052640) **(Rfx No.) 6100002702**

IC Characterization Equipment (RF).

Sr. No	Item Description	Detailed Technical Specification	Technical Compliance (Yes / No)	Additional Information (if any)
1	**Vector Network Analyzer [Quantity – 1]**			
1	Frequency range	9 KHz (or lower) to 13 GHz (or higher) with support for future upgradation to higher frequency		
2	Test Ports	(a) 2 (50 W Impedance, VSWR < 2.1) (b) Appropriate ruggedized port saver / port protector must be provided for each port. (c) If test ports are N-port or 3.5 mm, appropriate precision-SMA adaptors/port-protectors and DC-block must be provided. (d) Torque wrenches for SMA standard must be provided.		

3	System Dynamic Range (1 MHz to 13 GHz)	> 120 dB, all ports		
4	Test Port Noise Floor (10 MHz to 13 GHz)	Normalized to 1 Hz IF BW: Lower than -120 dBm		
5	Output Power Range (10 MHz to 13 GHz)	-40 dBm (or lower) to 5 dBm (or higher)		
6	Receiver Phase Noise	Lower than -101 dBc/Hz at 10 KHz offset (@1 GHz)		
7	Damage Input Power Level	≥ +27dBm Or ± 35 VDC		
8	Power Resolution	0.01 dB		
9	Frequency Resolution	1 Hz		
10	Trace Noise Magnitude (dB rms) (10 MHz to 13 GHz)	Lower than 0.005 dB rms		
11	Trace Noise Phase (degree rms) (10 MHz to 13 GHz)	Lower than 0.05 degree rms		
12	Calibration Kits	Mechanical calibration kits with male and female connectors (for specified number of ports, up to maximum frequency) should be provided.		
13	External Reference Input	10 MHz or better		
14	Accessories	(a) Instrument dust cover should also be provided. (b) Rubber caps for all the connectors.		
15	Firmware updates	Should be provided free-of-cost during the equipment lifetime		
16	Power	Mains input 230 V AC, 50 Hz (nominal). Provide Indian standard mains cord		

17	EMC	Should be complied with all the necessary EMC standards		
18	Interfaces	LAN, GPIB, USB.		
19	Instrument type	Bench top Instrument with internal PC and Windows 10 or better		
20	Display	8 inches or more Color display & provision for external display connection through DP and VGA Port.		
21	Warranty	1 Year standard. At least one free-of-cost post-installation standard calibration should be done within 3 years duration.		
22	Manuals	programming manual, Operating Manual & Service Manuals [Softcopy and/ or hardcopy]		
23	Calibration certificate	Certificate with Test Data should be provided.		
2.	**Signal Analyzer [Quantity – 1]**			
1	Frequency range	10 MHz (or lower) to 13 GHz (or higher) with support for future upgradation to higher frequency.		
2	No. of sweep points	100,000 or better		
3	Aging Rate:	$\pm 1 \times 10^{-6}$/ year or better		
4	Temp characteristics	$\pm 2 \times 10^{-6}$ or better (20°C to 30°C)		
5	a) Analysis BW	25 MHz or better		
	b) Resolution Bandwidth:	1 Hz to 8 MHz (or higher)		
	c) Video Bandwidth:	1 Hz to 50 MHz (or higher)		
6	Phase Noise (@ 1 GHz)	10 kHz Offset: Lower than –105 dBc/Hz 100 kHz Offset: Lower than -114 dBc/ Hz		

		1 MHz Offset: Lower than –133 dBc/Hz		
7	TOI (Third Order Intercept) of Instrument (without Preamp) (100 MHz to 13 GHz)	up to maximum frequency: +12 dBm or better		
8	Detector	Normal, Positive Peak, Negative Peak, sample, RMS, Average		
9	Pre-amplifier	Frequency range up to maximum frequency		
10	Trigger	Free run, Video, External, periodic time		
11	DANL	(At 10 GHz): Lower than –158 dBm (Pre-amplifier ON)		
12	Test Port	(a) Appropriate ruggedized port saver / port protector must be provided for each port. (b) If test ports are N-port, N-port to precision-SMA adaptors and DC-block must be provided. (c) Torque wrenches for SMA standard must be provided.		
13	Maximum Safe Input Level	+30 dBm (1 W) or better		
14	External Reference Input	10 MHz or better		
15	Reference Output	10 MHz or better		
16	Phase Noise Measurement	Ability to perform phase noise (close-in and far-out) analysis of free-running frequency sources and signal jitter analysis		
17	Noise Figure Measurement	Measurement method of Y Factor with Noise Source should be available till upper frequency.		
18	Noise Source	ENR: 15 dB or better, VSWR : up to 1.6		

		Necessary adapters should be provided for precision-SMA compatibility.		
19	Accessories	(a) Instrument dust cover should also be provided. (b) Rubber caps for all the connectors.		
20	Firmware updates	Should be provided free-of-cost during the equipment lifetime		
21	Operating Temperature Range	Operating: 0° to +50°C		
22	Power	Mains input 230 V AC, 50 Hz (nominal). Provide Indian standard mains cord		
23	EMC	Should be complied with all the necessary EMC standards		
24	Interfaces	LAN, GPIB, USB, External monitor: DVI-D or DisplayPort or HDMI		
25	Instrument type	Bench top Instrument with internal PC and Windows 10 or better		
26	Display	8 inches or more Color display		
27	Manuals	Programming manual, Operating Manual & Service Manuals [Softcopy and/ or hardcopy]		
28	Calibration certificate	Calibration Certificate with Test Data should be provided.		
29	Warranty	1-year warranty for the entire setup. At least one free-of-cost post-installation standard calibration should be done within 3 years duration.		
3.	**Signal Generator [Quantity – 1]**			
1	Frequency range	10 kHz (or lower) to 13 GHz (or higher)		
2	Output Power Level Range	-20 dBm (or lower) to 17 dBm (or higher)		
3	Output Power level accuracy	Within ±1.0 dB or better		

4	Frequency Resolution	≤0.001 Hz		
5	Power Resolution	≤0.01 dB		
6	Spectral Performance: Harmonics @+10dBm or higher	(a) Lower than -45 dBc (@100 MHz) (b) Lower than-52 dBc (@13GHz)		
7	Spectral Performance: Non-Harmonics	Lower than -58 dBc		
8	Phase Noise at 20 kHz Offset (@ 1 GHz)	Lower than –125 dBc/Hz		
9	Phase Noise at 20 kHz Offset (@ 3 GHz)	Lower than –116 dBc/Hz		
10	Phase Noise at 20 kHz Offset (@ 10 GHz)	Lower than –108 dBc/Hz		
11	Internal Reference Oscillator: Time base Aging	Aging Rate: ≤ ± 5 x 10^{-7}/year		
12	Test Port	(a) 50 W Impedance, VSWR < 2.0 (b) Appropriate ruggedized port saver / port protector must be provided for each port. (c) If test ports are N-port, N-port to precision-SMA adaptors and DC-block must be provided. (d) Torque wrenches for SMA standard must be provided.		
13	External Reference Input	10 MHz or better		
14	Reference Output	10 MHz or better		
15	Accessories	(a) Instrument dust cover should also be provided. (b) Rubber caps for all the connectors.		

16	Firmware updates	Should be provided free-of-cost during the equipment lifetime		
17	Operating Temperature Range	Operating: 0° to +50°C		
18	Power	Mains input 220-240 V AC, 50 Hz (nominal). Provide Indian standard mains cord		
19	Interfaces	Remote control interface using GPIB, USB and/ or LAN		
20	Instrument type	Bench top Instrument		
21	Manuals	Programming manual, Operating Manual & Service Manuals [Softcopy and/ or hardcopy]		
22	Calibration certificate	Calibration Certificate with Test Data should be provided.		
23	Warranty	1-year standard warranty. At least one free-of-cost post-installation standard calibration should be done within 3 years duration.		

SECTION- A (Features and Specifications of the equipment to be purchased)

- Please note that the equipment and accessories have to be supplied and installed at IIT Bombay by the same tenderer to ensure guaranteed operation, technical support/service during warranty period and after-sales calibration/ repairs/ maintenance.
- All the necessary consumables, tools/ accessories of the equipment should be supplied at the time of delivery and should be available in India for future maintenance/ procurement.

SECTION – B (Additional requirements from the prospective supplier)

1) Tenderers should provide:

a) Complete technical specifications, make, model of each equipment, necessary parts and accessories of the equipment as mentioned in the tender document.

b) Soft copy of the technical brochures and website reference of the same must be included in the bid.

c) A local service/ maintenance center with the availability of the spares in India. A declaration from the manufacturer stating that the service support/ spares will be made available for the equipment for

at least 5 years from the date of installation.

d) A copy of the Authorization Certificate issued by the Original Equipment Manufacturer (OEM). The certificate must be up-to-date. A letter in the official letterhead of the OEM declaring the Indian supplier as their authorized agency to bid containing the official Tender enquiry number must be included with the technical bid.

2) The tenderer should have a minimum 03 (three) years of experience in supplying and successful **installation of the equipment of similar specifications and should provide references (installation sites) from premier Institutes in India or abroad (preferably [not mandatory] Government Organizations in India).**

3) The tenderer should provide at least 3 nos. of soft copies of PO (not older than 3 years) of similar or higher specification supplied within India (at least ONE from premier Government Institution or Government organization or PSU in India).

4) A duly signed detailed User List (at least 3 nos.) with the concerned person's valid contact details in India where the instrument is still in the operational condition must be provided.

5) A duly signed separate compliance sheet of the specification (at every point) mentioned in the technical part (Section-A of the Technical Specification) along with the deviation (if any). **This compliance sheet will not be considered as the technical specification of the instrument.**

6) Each bidder has to mandatorily quote for all the items as mentioned in the tender document. **Partial Submission of bid is not permitted. Bidders should apply for all items and accessories.**

7) Only New Equipment is to be Quoted (No Quote for Refurbished equipment). All the equipment should be supplied with the necessary accessories, starter-kit to start using the equipment.

8) During technical evaluation of the bids, if required then the vendor will have to give offline demonstration of the quoted model with all the options and accessories required to meet the tender specifications, with the prior intimation. Demonstration of instruments doesn't guarantee Purchase Order (PO).

9) Tenderers should state categorically whether they have fully trained technical staff with certification from OEM for installation/ training of the equipment. Free-of-cost, on-site satisfactory installation/ commissioning and handover of the equipment should be completed within 7-days from the date of receipt of the material at the Institute premises or within the time as may be extended by IIT Bombay.

10) After-sales service support for repair/ replacement of non-functional parts should be available in India (including all services under warranty).

11) Manufacturer should have NABL Accredited Service and Calibration Centre in India to provide service during warranty period and after-sales. The manufacturer should provide the certificate for the genuineness of the warranty and service centers in India. **At least one more free-of-cost off-site standard factory calibration should be done post-installation/ demonstration within initial 3 years duration.**

12) Warranty will commence from the date of the satisfactory installation of the equipment and the tenderer should give the warranty declaration.