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Senior Manager,
Project Purchase
ICSR

Ref: ELE/RKG/09/2018
Dated: 04.09.2018

Open Tender No: ELE/RKG/09/2018

Due Date: 26.09.2018, 3:00pm

Dear Sir/Madam,

On behalf of the IIT Madras, IIT Delhi, IIT Kanpur, IISC, Sameer and CEWiT offers are invited for the supply of multiple quantities of the following items and their corresponding accessories.

- ITEM A: Analog Signal Generator
- ITEM B: Vector Signal Generator and Analyzer (Sub 6 GHz)
- ITEM C: Vector Signal Generator and Analyzer (Mmwave)
- ITEM D: Oscilloscope (4 GHz BW)
- ITEM E: Oscilloscope (BW 500 MHz)
- ITEM F: Arbitrary Waveform Generator
- ITEM G: Logic Analyzer
- ITEM H: Real Time Oscilloscope and BERT
- ITEM I: Vector Network Analyzer (Basic)
- ITEM J: Vector Network Analyzer (Advanced)
- ITEM K: 65 GSPS Arbitrary Wave Form Generator
- ITEM L: Vector Signal Analyzer (sub 6GHz)

The vendors may quote for some or all the above items as shown in Table 1. No other combinations are allowed. Quotations for individual components of the above items will not be entertained. For a given item, the vendor should quote for all the components in the item. The detailed terms and conditions are attached.

Table 1: Allowed items for the quotes. The vendor may quote for any of the below items.

ITEM	Up to a possible maximum quantity which may be procured in total by participating institutes.	Quoted (Yes/No)
A (Analog Signal Generator)	4	
B (VSG+ VSA sub 6GHZ)	4	
C (VSG+ VSA Mmwave)	4	
D (Oscilloscope 4GHz)	4	
E (Oscilloscope 500 MHz)	6	
F (AWG)	3	
G (LA)	2	
H (BERT + RTO)	1	
I (VNA Basic)*	2	
J (VNA Advanced)*	2	
K (65GSPS AWG)	1	
L (VSA sub 6GHZ)	1	

* Note: For item I and J, a maximum of 2 units combined (between I and J) may be procured.

Instructions to the Bidder

(i) **Preparation of Bids:** - The tender should be submitted under two-bid system (i.e.) Technical bid and Financial bid in two separate sealed envelopes.

(ii) **Delivery of the tender:** - The tender shall be sent to the below-mentioned addresses either by post or by courier so as to reach the following address before the due date and time specified in our Schedule:

The tender box is kept in the office of the:

Senior Manager,
Project Purchase,
IC&SR Building, 2nd floor,
I.I.T. Madras,
Chennai - 600036

(iii) Pre-Bid meeting – Not needed

(iv) **Opening of the tender:** - A committee duly constituted for this purpose will open the offer/Bids. The technical bids will be opened first and a technical committee, which will decide the suitability of the bid as per our specifications and requirements. Bidders will be invited for opening of the technical bids. In respect of opening of the financial bid, those bidders who are technically qualified only will be called for.

(v) The technical bids will *tentatively* be opened on **26/9/2018 at 3.30PM in the Electrical Engineering dept, IIT Madras.**

(vi) **Prices:** The price quoted must include all packing and delivery charges to the institute(s) and in the format specified in the tender document. The offer/bid should be exclusive of taxes and duties, which will be paid by the purchaser as applicable. **However the percentage of tax & duties should be clearly indicated.**

- i) The price should be quoted without custom duty and GST, since IIT Madras, IIT Delhi, IIT Kanpur, IISC, CEWiT and Sameer are eligible for concessional GST and customs duty.
- ii) In case of import supply, the price should be quoted on CIF basis indicating the mode of shipment and should be applicable to shipping to any of the institutes, i.e., IIT Madras, IIT Delhi, IIT Kanpur, IISC, CEWiT, and Sameer.
- iii) The price may be quoted in USD, Euro and/or INR. The prevailing market exchange rate on the day of bid evaluation will be used to compare bids.

(vii) **Terms of Delivery**: The item(s) should be delivered to the respective institutes based on the purchase order(s). In case of the import supply, the items should be delivered at the cost of the supplier to the institute(s). The installation/commissioning should be completed as specified in the tender

(viii) The participating institutes reserve the full right to accept / reject the tender at any stage without assigning any reason.

- i) The participating institutes also reserve the right to purchase none or only a subset of the items (as shown in Table 1) without assigning any reason.
- ii) The actual quantities ordered may differ based on the requirement at the placement of order.

Yours sincerely,

V. Sathyanarayanan

Important Conditions of the tender

1. The due date for the submission of the tender is **26.09.2018, 3:00pm**

2. The offers / bids should be submitted in a two bids system, i.e., Technical bid and Financial bid.

    a. The technical bid should consist of all technical details / specifications only for the equipment combinations provided in Table 1 that the vendor is bidding for.
        i. The vendors may quote for some or all the above items as shown in Table 1.
            a. No other combinations are allowed.
            b. Quotations for individual/partial components of the above items will not be entertained.
        ii. There should be a single technical bid for the items provided in Table 1 that the vendor is bidding for.
            a. The sub-components (if any) for each item should be explicitly provided.
            b. The items (along with their sub-components) in the bid should clearly be demarcated.
        iii. The cover page of the technical compliance should contain Table I and the corresponding items that the vendor is bidding for should be marked using the fourth column (Quoted Yes/No).
        iv. Any quoted item has to be self contained and operable with respect to accessories, equipment, software required, i.e., there can be no sharing of accessories, equipment, software between items of the same type or between different item types.
        v. For each quoted item, there should be a compliance table based on the equipment specifications provided in the tender. Each of the quoted item will be examined for technical compliance independently of the other items.
            a. For each technical specification of the compliance table, there should be an explicit reference (page no, paragraph, line no) in the data sheet.
            b. In the corresponding data sheet, the particular line should be highlighted.
            c. The committee reserves the right to disqualify a technical bid if such explicit information is not provided and the information is not easily accessible.
        vi. The EMD in the form of account payee DD in favor of "Registrar I.I.T. Madras" should be included in the technical bid and NOT in the financial bid. The vendor bid for a particular item will be disqualified if the EMD

payment for that particular item is not present. The EMD's (total for an item irrespective of the quantity) for the items are provided below. Separate EMD' DDs should be included for the different items being quoted.

a. Any offer not accompanied with the EMD shall be rejected summarily as non-responsive. EMD should remain valid for a period of 45 days beyond the final bid validity period.
b. The EMD of the unsuccessful bidders shall be returned within 30 days of the end of the bid validity period. The same shall be forfeited, if the tenderers withdraw their offer after the opening during the bid validity period. The Institute shall not be liable for payment of any interest on EMD. EMD is exempted for Micro and Small Enterprises (MSE) as defined in MSE Procurement Policy issued by Department of Micro, Small and Medium Enterprises (MSME) or registered with the Central Purchase Organization or with IIT Madras as on the date of submission of bids.

Table 2: EMD for an item.

Item	Total EMD (in INR)
A (Analog Signal Generator)	1,00,000
B (VSG+ VSA sub 6GHZ)	2,50,000
C (VSG+ VSA Mmwave)	5,50,000
D (Oscilloscope 4GHz)	100,000
E (Oscilloscope 500 MHz)	50,000
F (AWG)	1,50,000
G (LA)	1,00,000
H (BERT + RTO)	10,00 ,000
I (VNA Basic)	1,50,000
J (VNA Advanced)	3,00,000
K (65 GSPS AWG)	1,50,000
L (VSA Sub 6GHZ)	1,00,000

b. The Financial bid should indicate the item-wise price for each item and it should contain all Commercial Terms and Conditions including Taxes, transportation, packing & forwarding, installation, guarantee, payment terms, pricing terms etc. There should be a **separate financial bid** for each of the items provided in Table 1 that the vendor is bidding for:
   i. The price should be quoted as below and must include all packing and delivery charges to the department's. The offer/bid should be exclusive of taxes and duties, which will be paid by the purchaser as applicable. **However the percentage of tax & duties should be clearly indicated.**

a. The price should be quoted without custom duty and GST, since IIT Madras, IIT Delhi, IIT Kanpur, IISC, CEWiT and Sameer are eligible for concessional GST and customs duty.
b. In case of import supply, the price should be quoted on CIF basis indicating the mode of shipment and should be applicable to shipping to any of the institutes, i.e., IIT Madras, IIT Delhi, IIT Kanpur, IISC, CEWiT, and Sameer.
c. The price may be quoted in USD, Euro and/or INR. The prevailing market exchange rate on the day of bid evaluation will be used to compare bids.

ii. For an item that the vendor is quoting, the financial bid for that item should contain an explicit cover sheet with an **appropriate row from the below table (Table 3) for which the financial bid pertains to.**

Table 3: Financial Bid Format and Consolidated Requirements

Item	Up to a Possible Maximum Quantity which may be procured in Total by Participating Institutes (A)	Cost Quoted (excluding taxes and duties) for Maximum Quantity which may be procured in USD/Euro/ INR (B)	Cost per unit in USD / Euro / INR C = (B/A)
A (Analog Signal Generator)	4	0	0
B (VSG+ VSA sub 6GHZ)	4	0	0
C (VSG+ VSA Mmwave)	4	0	0
D (Oscilloscope 4GHz)	4	0	0
E (Oscilloscope 500 MHz)	6	0	0
F (AWG)	3	0	0
G (LA)	2	0	0
H (BERT + RTO)	1		
I (VNA Basic)*	2	0	0
J (VNA Advanced)*	2	0	0
K (65GSPS AWG)	1	0	0
L (VSA sub 6GHZ)	1	0	0

* Note: For item I and J, a maximum of 2 units combined (between I and J) may be procured. Column B is input by the vendor. E.g USD 100,000 or Euro 75,000 or INR 1,000,000. Column C is derived.

Procedure for submitting Financial Bid

For example, if the vendor is quoting for Item D, **then the financial bid for item D should contain a cover sheet which should state FINANCIAL BID FOR ITEM D and the envelope in which the financial bid for Item D has been provided should be marked with the heading "Financial Bid for ITEM D Only". The Envelope should contain the following Pricing Sheet signed by the authorized signatory of the organization.**

Item	Up to a Possible Maximum Quantity which may be procured in Total by Participating Institutes (A)	Cost Quoted (excluding taxes and duties) for Maximum Quantity which may be procured in USD/Euro/ INR (B)	Cost per unit in USD / Euro / INR C = (B/A)
D (Oscilloscope 4GHz)	4	XXXXX	YYYYY

The highlighted entries are mandatory and should be present.

iii. The financial bid for an item along with its cover sheet should be put in in a separate envelope and sealed. The envelope should explicitly mention (written on the left side) the item for which the price bid is for. The envelope (Financial bid + cover letter) for the item will be opened only if the item meets the Technical Specification.

iv. All the sealed envelopes should be put in a bigger cover which should mention "**Consolidated Financial Bid for ELE/RKG/09/2018".** This cover has to be sealed properly.

3. The final L1 for an item will be based on the cost per-unit (Column C) arrived in the Financial Bid for the item. The Institute(s) will place their order(s) for the item at the L1 price for the item as determined above.
4. The institute reserves the right to negotiate for each item with the L1 vendor(s) determined as appropriate.
5. The possible solutions that are in the market being offered by various vendors are complex and pertain to different technologies which might meet the required specifications in different ways. In order to avoid vendor lock in, and also have a possibility of exploring the different technological solutions (that meet the technical specifications provided below), the final order may be split among both the L1 and L2 vendors for each item based on the technical merits, if the L2 vendor agrees to price match the L1 price for that particular item.

6. However, the L1 vendor for an item will be assured the following minimum quantities for that particular item based on the total orders (across the participating institutes for this tender) for the item in consideration.

Total quantity	Assured minimum quantity for L1
1	1
2	2
3	2
4	3
5	3
6	4
7	5

7. **Performance Security:-** The successful bidder should submit Performance Security for an amount of 5% of the value of the Purchase Order within 21 days from the date of the receipt of the purchase order. The Performance Security may be furnished in the form of an Account Payee DD, FD Receipt from the commercial bank, Bank Guarantee from any nationalized bank of India.

   Performance Security in the form of Bank Guarantee:- In case the successful bidder wishes to submit Performance Security in the form of Bank Guarantee, the Bank Guarantee should be routed through the Beneficiary Bank to the end user bank. Otherwise, the Indian Agent of the foreign vendor has to submit a Bank Guarantee from a Nationalized Bank of India.

   The Bank Guarantee should remain valid for a period of sixty days beyond the date of completion of all contractual obligations of the supplier including the warranty obligations.

8. If an Indian agent is involved, the following documents must be enclosed:
   Foreign principal's proforma invoice indicating the commission payable to the Indian Agent and nature of after-sales service to be rendered by the Indian Agent.
   - Copy of the agency agreement with the foreign principal and the precise relationship between them and their mutual interest in the business.
   - The enlistment of the Indian agent with GEM under the Compulsory Registration Scheme of Ministry of Finance.

9. The offer/bids should be sent only for a machine that is available in the market and supplied to a number of customers. A list of customers with details must accompany the quotations. Quotations for a prototype machine will not be accepted.

10. A catalogue of the quoted model duly signed by the principals must accompany the quotation in the Technical bid. No prices should ever be included in the Technical bid.

11. Compliance or Confirmation report with reference to the specifications and other terms & conditions should also be obtained from the principal.

12. **Validity:** Validity of Quotation for all the items should be a minimum of 90 days from the due date of tender.

13. **Delivery Schedule**: The item should be supplied to the various institutes (Departments) as per the issued Purchase Order(s). In case of import supply, the item should be delivered at the cost of the supplier to our Institution. The delivery should be completed within 60 days from the date of Purchase Order for most standard items and 90 days for export clearance items (has to be explicitly be mentioned in the quotation with a supporting letter). In case there is any deviation in the delivery schedule beyond 30 days, liquidated damages clause will be enforced or penalty for the delayed supply period will be levied.

    If there is delay, the penalty will be @1% per week of delay subject to a max of 10% of the value of purchase order. If the delay is more than 5 weeks (over the delivery schedule), the PO would be cancelled and liquidated damages will be enforced.

14. **Risk Purchase Clause**:- In the event of failure of supply of the item/equipment within the stipulated delivery schedule, the purchaser has all the right to purchase the item/equipment from other sources on the total risk of the supplier under risk purchase clause.
15. **Payment**:- No Advance payment will be made for Indigenous purchase. However 90% Payment against Delivery and 10% after installation are agreed to wherever the installation is involved. In case of import supplies the payment will be made only through 100% Letter of Credit i.e. (90% payment will be released against shipping documents and 10% after successful installation wherever the installation is being done).
16. **Advance Payment:-** No advance payment is generally admissible. In case of specific percentage of advance payment is required, the Foreign Vendor has to submit a Bank Guarantee equal to the amount of advance payment and it should be routed through the Beneficiary Bank to the end user Bank. Otherwise, the Indian Agent of the foreign vendor has to submit a Bank Guarantee through a Nationalized Bank of India.
17. **On-site Installation**: - The equipment or machinery has to be installed or commissioned by the successful bidder within 15 to 20 days from the date of receipt of the item at the appropriate institute.
18. **Warranty/Guarantee**: - The offer should clearly specify the warranty or guarantee period for the machinery/equipment complying to the attached document. Any extended warranty offered for the same has to be mentioned separately. (for more details please refer our Technical Specifications).

19. **Late offer**: - The offers received after the due date and time will not be considered. The Institute shall not be responsible for the late receipt of Tender on account of Postal, Courier or any other delay.

20. **Acceptance and Rejection** :The participating institutes reserve the full right to accept / reject the tender at any stage without assigning any reason.
    a. The participating institutes also reserve the right to purchase none or only a subset of the items (as shown in Table 1) without assigning any reason.
    b. The actual quantities ordered may differ based on the requirement at the placement of order without assigning any reason.
21. Do not quote the optional items or additional items unless otherwise mentioned in the Tender documents / Specifications.

22. **Disputes and Jurisdiction**: -

    1. **Settlement of Disputes:** Any dispute, controversy or claim arising out of or in connection with this PO including any question regarding its existence, validity, breach or termination, shall in the first instance be attempted to be resolved amicably by both the Parties. If attempts for such amicable resolution fails or no decision is reached within 30 days whichever is earlier, then such disputes shall be settled by arbitration in accordance with the Arbitration and Conciliation Act, 1996. Unless the Parties agree on a sole arbitrator, within 30 days from the receipt of a written request by one Party from the other Party to so agree, the arbitral panel shall comprise of three arbitrators. In that event, the supplier will nominate one arbitrator and the Project Coordinator of IITM shall nominate one arbitrator. The Dean IC&SR will nominate the Presiding Arbitrator of the arbitral tribunal. The arbitration proceedings shall be carried out in English language. The cost of arbitration and fees of the arbitrator(s) shall be shared equally by the Parties. The seat of arbitration shall be at IC&SR IIT Madras, Chennai.

    2. **The Applicable Law:** This Purchase Order shall be construed, interpreted and governed by the Laws of India, Court at Chennai shall have exclusive jurisdiction subject to the arbitration clause.

23. All Amendments, time extension, clarifications etc., will be uploaded on the website only and will not be published in newspapers. Bidders should regularly visit the above website to keep themselves updated. No extension in the bid due date/ time shall be considered on account of delay in receipt of any document by mail.

Acknowledgement:- It is hereby acknowledged that the tenderer has gone through all the conditions mentioned above and agrees to abide by them.

SIGNATURE OF TENDERER
ALONG WITH SEAL OF THE
COMPANY WITH DATE

Technical Specifications

Terms & Conditions Applicable to all Items

1) Any accessories, equipment, software required for an item should be self-contained, i.e., there can be no sharing of accessories, equipment, software between different item types or between items of the same type.
2) Only OEMs will be permitted to submit the offer. Any offer from dealers/distributors/traders will be disqualified.
3) Vendor should have operated in India (have an office and a service center) for the last 5 years and should have supplied equipment to reputed institutes and labs in India. Evidence for the same should be provided.
4) Vendor should share details of similar equipment supplied to reputed institutes, labs in India with the contact details of the users. User satisfaction reports may be sought directly by the committee and a vendor might be disqualified based on the report.
5) Vendor should have repair and calibration lab in India ensuring timely services for repairs in future.
6) The Local Calibration/service Facility should be NABL or ISO9001 accredited, Vendor shall submit the NABL Accreditation Certificate (or the ISO9001 Accreditation Certificate) at the time of bidding.
7) All equipment should work with Indian power supplies, 240V and 50 Hz. Appropriate power connectors should be provided.
8) The quoted product should be supported in for the next six years, i.e. in the next 6 years , the product should be serviceable, repairable, spare parts be available and technical support can be provided by the vendor. A letter authenticated by the OEM company for the same should be provided for each item (and sub-equipment) quoted by the vendor.
9) Free firmware/software upgrades on the product features purchased for three years.
10) Vendor should quote 3-year warranty or as specified in the equipment list, whichever is higher.
11) If vendor desires partial shipment, it will be permitted.

ITEM A: Analog Signal Generator

Parameters	**Specifications**
Frequency range	1MHz to 40GHz
	Should be a single box solution. No external mixers or other external RF components allowed.
Resolution of setting	0.01Hz
Frequency sweep modes	
Operating modes	List, Sweep
Sweep range	For complete frequency range
Internal time base reference oscillator	
Aging rate	± 1 x 10^-6/year
Temperature effect on stability	± 2 x 10^-6
Source impedance	50 ohm
Output Level	10 MHz < f ≤ 50 MHz –120 dBm to +9 dBm 50 MHz < f ≤ 40 GHz –120 dBm to +8 dBm
Step width	<= 0.01 dB
Operating modes	List, Sweep
Sweep range	For complete output range
Phase noise @ 10KHz offset	≤ -132 dBc/Hz at 1 GHz ≤ -109 dBc/Hz at 20 GHz ≤ -103 dBc/Hz at 40 GHz
Interface	USB, LAN
Connector	2.92/2.4mm, 50 ohm
AC Power Supply	220 to 240 V, 50 Hz
Warranty	3-years
Accessories to be supplied:	Following RF adaptors to be provided (1 nos. each): 2.4 mm (m) to 2.92 mm (m) 2.4 mm (m) to 2.92 mm (f) 2.4 mm (f) to 2.92 mm (m) 2.4 mm (f) to 2.92 mm (f)
Product will be supported in the market for:	Next 6 years (Till Jan 01 2025)

ITEM B: Vector Signal Generator and Analyzer (Sub 6 GHz)

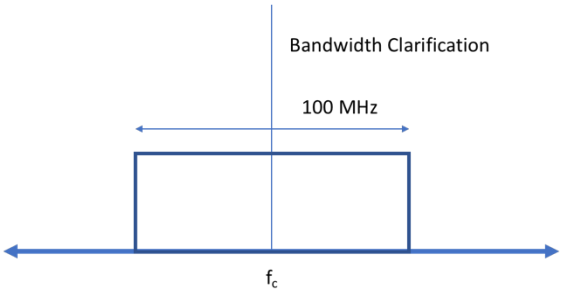

*Figure 1: **Clarification of the term bandwidth. The instrument should be able to generate (or analyse appropriately) this RF signal. Here f_c represents the centre frequency.***

Vector Signal Generator (Sub 6 GHz)

Parameter	**Specification**
	Should be a single box solution. No external RF mixers/components are allowed.
Frequency range	100kHz to 6 GHz
Bandwidth (See Figure 1)	>=100 MHz
Resolution	0.01 Hz
Aging rate	< ± 1 x 10e-6/year
Output Power range	10 MHz to 6 GHz -120dBm to +15dBm
Harmonics @ Level <= 4 dBm	<-25dBc
SSB Phase noise @ 20KHz offset from carrier	1 GHz < –122dBc 2 GHz <-120 dBc 6 GHz < -110 dBc
Vector Modulation capabilities	Modulation Types: 16QAM, 32QAM, 64QAM, 128QAM,256QAM Complete LTE Signal Generation as per 3GPP rel. 14 TDD/FDD, NB IOT, uplink and downlink Pseudo-random patterns: PN9, PN11, PN15, PN20, PN23 Multi-carrier Modulation, Generic OFDM

	ARB Baseband Generation capabilities with BW >= 100 MHz from files. Complete 5g NR Uplink and Downlink as per the 38 series > = release 15.0.0. for both TDD/FDD Free upgrades of the above software one year If the above software is in PC, then we require >= 5 licenses
Memory	Memory 1Gsa
Symbol rate (See Figure 1)	1 KHz to 100 MHz (Should be able to generate at least a 100MHz signal).
IQ adjustments	I/Q offset: ± 10%
	I/Q gain balance: ± 1dB
Power Supply	230V AC, 50Hz
External I/Q analog output (Differential)	Should be available
External I/Q analog Input (Single ended)	Should be available
Display	Integrated display to configure RF parameters/settings and waveforms
Accessories to be supplied:	Should match to the output connector of the equipment. a. Type N male to 3.5mm male adapter (1no) b. Type N male to 3.5mm female adapter (1no)
Connectivity	Should be able to connect and operate it through LAN
Warranty	3 Years
Product will be supported in the market for:	Next 6 years (Till Jan 01 2025)

Vector Signal Analyser (Sub 6GHz)

Parameter	**Specification**
	Should be a single box solutions. No external RF mixers/components are allowed.
Frequency range	10 Hz to 6 GHz
Resolution BW	1Hz to 8 MHz
Analysis BW (See Figure 1)	>= 100 MHz
Displayed Average Noise Level (DANL) for greater than 1 Mhz	Better than -150 dBm
SSB Phase Noise @ 1GHz	Better than -100dBc/Hz @ 1KHz offset Or equivalently

	Better than -112 dBc/Hz @10KHz offset
Vector Signal Analysis capabilities	Multi-domain measurements: Time and Frequency (spectrum) measurements. Demodulate standard waveforms for at least the Analysis BW Capability to demodulate the Digital modulated signals: 16QAM, 32QAM, 64QAM, 128QAM,256QAM. Filter types: Raised cosine, square-root raised cosine, user defined Demodulate Multi-carrier Modulation, Generic OFDM Demodulate 5G NR signals uplink and downlink for both TDD/FDD and display and other important measurements. LTE TDD/FDD Signal Analysis as per 3GPP rel. 14 uplink and downlink and NB-IOT EVM measurement (for data and reference signals) and demodulation and decoding of UL and DL channels/signals for 5G NR, LTE FDD/TDD for Rel 14 for both uplink and downlink. If the above software is in PC, then we require >= 5 licenses
Memory	200 MSa
5G NR Analysis (Inbuilt)	5g NR as per the 38 series > = release 15.0.0.
Display and CPU (Integrated)	Integrated color display screen for performing signal analysis Built-in CPU with Win 7/10 OS
Power Supply	230V AC, 50Hz
Accessories to be supplied:	a. Type N male to 3.5mm male adapter (1no) b. Type N male to 3.5mm female adapter (1no) c. DC Block
Warranty	3 years
Pre-Amplifier	Yes
Product will be supported in the market for:	Next 6 years (Till Jan 01 2025)

1. The above sub 6GHz VSA and VSG should be interworking with each other, i.e.,
    a. LTE/5G NR signals that are generated by the VSG should be decoded by the VSA.
    b. The VSA and VSG should be from the same manufacturer.
2. VSA and **VSG should be two separate physical instruments** and should not share any common hardware and should work independently of each other at different locations simultaneously.

ITEM C: Vector Signal Generator and Analyzer (Mmwave)

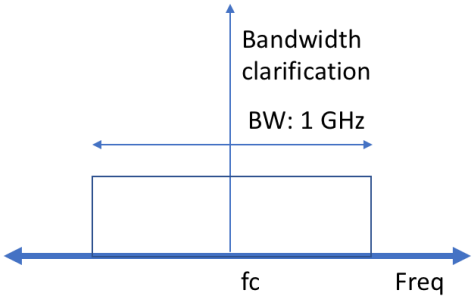

Figure 2: ***Clarification of the term bandwidth. The instrument should be able to generate (or analyse appropriately) this RF signal. Here fc represents the centre frequency.***

Vector signal generator (MMwave)

Parameter	**Specification**
Frequency range	250KHz to 40GHz
Bandwidth (See Figure 2).	>= 1 GHz
Resolution	0.01 Hz
Aging rate	< ± 1 x 10e-6/year
Output Power range	10 MHz to 40 GHz
	-120dBm to +12dBm
Harmonics	100MHz to 4 GHz: ≤-30dBc
	>=4 GHz to 20GHz: ≤- 55dBc F > 20 to 40 GHz: –45 dBc (typ)
SSB Phase noise @ 20KHz offset from carrier	f = 1 GHz ≤ –130 dBc/Hz
	2GHz to 20GHz: ≤ -104dBc/Hz
	>=20GHz to 40GHz: ≤ -96dBc/Hz

Vector Modulation capabilities	Modulation Types: 16QAM, 32QAM, 64QAM, 128QAM,256QAM LTE Signal Generation as per 3GPP rel. 14 TDD/FDD, uplink and downlink 5g NR as per the 38 series > = release 15.0.0. for uplink and downlink for both TDD and FDD Multi-carrier Modulation, Generic OFDM ARB Baseband Generation capabilities with BW >= 1GHz from files. Free upgrades for one year If the above software is in PC, then we require >= 5 licenses
Memory	>= 1GSa
IQ adjustments	I & Q offsets: ± 10%
	I/Q gain balance: ± 1dB
	I/Q quadrature skew: ± 10deg range
External I/Q analog output (diff)	Should be available
External I/Q analog input (diff)	Should be available
Power Supply	230V AC, 50Hz
Warranty	3 years
Interface	Lan, USB
Accessories to be supplied: a. 2.4mm female to 2.92mm male adapter (1no) b. 2.4mm female to 2.92mm female adapter (1no)	Or appropriate connectors as per the output.
Cables	20 cm : 2 cables (with appropriate connectors) 50 cm: 2 cables (with appropriate connectors)
Product will be supported in the market for:	Next 6 years (Till Jan 01 2025)

Vector signal analyser (MMwave)

Parameter	**Specification**
Frequency range	1MHz to 50GHz
Resolution BW	1 Hz to 8 MHz
Analysis BW (See Figure 2)	>= 1GHz

Displayed Average Noise Level (DANL)	DANL with Preamplifier ON: 100 kHz to 1 MHz: –157 dBm, (-159dBm typ.) 1 MHz to 13GHz: –161 dBm, (-162dBm typ.) 13 to 26.5 GHz: –158 dBm, (-161dBm typ.) 26.5 to 40 GHz: –152 dBm, (-156dBm typ.)
SSB Phase Nosie @ 1GHz with 1KHz offset from carrier	–125 dBc/ Hz
Phase noise @ 1GHz with 10 kHz offset from carrier	-134 dBc/Hz
Vector Signal Analysis capabilities	Multi-domain measurements: Time and Frequency (spectrum) measurements. Demodulate standard waveforms for at least the Analysis BW Capability to demodulate the Digital modulated signals: 16QAM, 32QAM, 64QAM, 128QAM,256QAM Filter types: Raised cosine, square-root raised cosine, user defined Demodulate Multi-carrier Modulation, Generic OFDM Demodulate 5G NR signals uplink and downlink for both TDD/FDD and display and other important measurements. LTE TDD/FDD Signal Analysis as per 3GPP rel. 14 uplink and downlink. EVM (For the data and the reference signals), Spectral flatness measurement, ACLR, In-band emissions, Carrier leakage, SEM measurements, for uplink and downlink signals compatible with 3GPP 5GNR and LTE release 14. If the above software is in PC, then we require >= 5 licenses
5G NR Analysis capability	Should comply to 3GPP TS 38 series v15.0.0 or higher
Interface	USB, GPIB & LAN

Accessories to be supplied:	a. 2.4mm female to 2.92mm male adapter (1no) b. 2.4mm female to 2.92mm female adapter (1no) c. DC Block (50GHz)
Display	Can be Internal or external Display
Power Supply	230V AC, 50Hz
Warranty	3 years
Pre-Amplifier	Yes
Cables	20 cm : 2 cables (with appropriate connectors to the instrument) 50 cm: 2 cables (with appropriate connectors to the instrument)
Product will be supported in the market for:	Next 6 years (Till Jan 01 2025)

1. The above mmWave VSA and VSG should be interworking with each other, i.e.,
    a. The LTE/5G NR signals that are generated by the VSG should be decoded by the VSA.
    b. The VSA and VSG should be from the same manufacturer.
2. VSA and VSG should **be two separate physical instruments** and should not share any common hardware and should work independently of each other at different locations simultaneously.

ITEM D: Oscilloscope (4 GHz BW)

Analog Channels Specification	**Specifications**
Analog HW Bandwidth (-3 dB)@ 50 Ω	4 GHz
Input channels	4 Analog Channels
Channel-to-Channel isolation	20 dB or better
Vertical Resolution	8 bits
Effective Number of bits (ENOB) at 4 GHz Bandwidth	≥7 bits
Time Base Accuracy	≤ ±0.2 ppm
Rise time(10 % to 90%) @ 50 Ω	≤ 110 ps
Input Sensitivity @ 50 Ω	7mV/div to 500 mV/div or better
Max Input Voltage @ 50 Ω	5 V(RMS)
Acquisition System	
Real Time Sample rate	Max.10 GSa/s on all 4 Channels or better Max.20 GSa/s on 2 Channels or better
Segmented Mode	Max Realtime waveform acquisition rate is >300,000 waveforms/sec.
BW Limit Selections	20 MHz, 200 MHz, 800--1000 MHZ (any BW between is fine) and full BW.
Memory depth	>=200Mpts on Four Channels
Acquisition Modes	Real time, Segmented (or other equivalent) mode
Time Base	
Time base Range	25 ps/div to 50s/div or better
Trigger System	
Smallest detectable glitch width	Better than 2 ns
Sweep Modes	Auto, Normal, Single,
Trigger Sources	Ch1,Ch2,Ch3,Ch4
Trigger Modes	Edge,Glitch,Width,Runt,Window,Timeout and Zone/Visual Trigger on at least 8 numbers of

	user defined zones/areas.
Serial bus Trigger	I2C,SPI,RS 232/UART
Analysis & Measurement	
Waveform processing	Math functions, Gates, Waveform measurements, Voltage (scope channels),Time (scope), Mixed (scope channels only),Frequency domain, Eye-diagram measurements, Statistics , Histograms, Waveform Math, FFT
Display	
Touch Screen Display	yes
Operating Voltage	100 V to 240 V , 50 Hz
Operating Temperature	5ºC to 40 ºC or better
Warranty	3 year
Standard Probe to be supplied	Four 500 MHz passive probes.
RF probe	4Ghz active differential probes with browser head with variable pitch 0.5mm to 5.5 mm (2 units) Ground lead should be supplied.
Probe positioner	2 units (2 arms)
Product will be supported in the market for:	Next 6 years (Till Jan 01 2025)

ITEM E: Oscilloscope (BW 500 MHz)

Parameters	**Specification**
Analog Bandwidth	500 MHz
Analog channels	4 channels
Digital Channels	16
Vertical Resolution	>= 8 bits
Input Sensitivity	1 mV/div to 1V/div (1 MΩ and 50 Ω)
Channel to Channel isolation	≥ 100:1 at ≤100 MHz and ≥ 30:1 at >100 MHz to 500 MHz or better.
Time Base range	1 ns/div to 50 s/div or better
Channel Deskew	± 100 ns
Timebase Accuracy	± 10 ppm + aging factor
Max Sampling rate	Better than 2.5 GSa/s all channel
Digital Channels	Yes Available.
Number of digital channels	16 Digital Channels
Max. Waveform Acquisition Rate	>200,000 waveforms/sec update rate
Standard memory depth	>=2 Mpts on all 4 channels
Waveform arithmetic	Add, subtract, multiply, divide, differentiate, integrate, FFT, squared, square root, absolute value, common logarithm, natural logarithm, low pass filter, high pass filter, averaged value, smoothing, envelope, magnify, max hold, min hold
Sampling Modes	Normal, Peak detect, Averaging, High Resolution
Interpolation	Yes available.
Smallest detectable glitch	better than 4 ns
Waveform Measurement category	Similar to waveform measurement
Connectivity	USB, LAN
AC Supply	100 to 120 V, 50/60/400 Hz; 100 to 240 V, 50/60 Hz ± 10% auto ranging
Standard Probes	4 Qty passive probes ships standard, 1 Qty16 channel MSO flying lead probe.
Warranty	3 years
Additional probes	500 MHz active probe differential 2 units.
Probe positioner	1 unit (2 arms)
Product will be supported in the market for:	Next 6 years (Till Jan 01 2025)

ITEM G: Logic Analyzer

- Should work with differential signals.

Parameter	Specification
Number of channels	136 channels
Max Timing Sampling Rate	2.5 GHz – Full channel or better 5.0 GHz – Half Channel or better
Max State Clock Rate	350 MHz Standard, 700 MHz upgrade
Max State Data Rate	700 Mbps standard, 1400 Mbps upgrade
Timing Zoom	12.5 GHz @ 256 K memory or better
Memory Depth	4 MB or better
Probe / Signal Compatibility	Single ended 34 channel flying lead probe, Differential probe with 17 channels soft touch.
Trigger Sequencer Speed	Up to 1.4 GHz.
Standard Data View	Waveform, Listing.
Display	15-inch Touch Screen display.
Power	100 volts – 240 volts / 50 / 60 Hz
Warranty	3 years
Product will be supported in the market for:	Next 6 years (Till Jan 01 2025)

ITEM F: Arbitrary Waveform Generator

	Has to be a dedicated test instrument.
No. of Analog Outputs	4
Analog Output impedance	50 Ohm
Resolution	14 bits or better
Waveform Memory	2GS/channel or better
Run Modes	Continuous, Triggered
Sample Rate	>= 5 GS/s (10 GS/s Interpolated)
3dB BW	> 2 GHz @ 5 GS/s, > 4 GHz (interpolated) @ 10 GS/s
Effective Frequency output	> 400 MHz
Reference clock input	10MHz or 100 MHz
Differential mode	Yes (100 Ω terminated)
Channel to channel skew	±25 ps
ENOB @ 1GHz	> 9 Bits
Synchronized	All channels should be time synchronized.
Software	ARB generation (through .mat and other formats). Ability to play multiple files in sequence up to 16k segments/steps.
Warranty	3 years
Product will be supported in the market for:	Next 6 years (Till Jan 01 2025)

ITEM H: Real Time Oscilloscope and BERT

Real time oscilloscope

Parameter	Specifications
Bandwidth:	≥ 60 GHz
No. of Channels:	2 nos of 60 GHz Channels
Sample Rate on each Channel:	better than 150 GSa/s
Rise Time (10% to 90%):	≤ 8 ps
Memory Points:	Better than 200 MSa on each Channel
Trigger Edge Bandwidth:	20GHz or better
Trigger Types:	Edge, Period/Frequency, Glitch, Width, Runt & Window
Vertical Resolution:	8 Bits or better
Channel to Channel Isolation:	60dB or better through Bandwidth of oscilloscope
Software features for Analysis:	Full Characterization of the PAM4 & NRZ eyes to support standard based and debug analysis -> Isolate the effects of ISI and random jitter -> Rise and Fall times for all 12 PAM4 transitions -> Eye width and height analysis per OIF-CEI standards or to custom BER targets -> Eye diagram annotated to show BER contours and width/height measurement locations -> Electrical PAM4 SNDR must be available -> Symbol and Bit Error Detector should be available -> Measurement results across multiple acquisitions can be exported to a consolidated CSV file useful for additional analysis
Accessories	All accessories must be quoted which includes Phase Stable Cables, 10 & 20 dB attenuators and DC block up to maximum Frequency Range. All connectors and Savers for unused ports.
	30 GHz (or better) differential active probe: 1 unit Probe calibration fixture should be supplied with the probe.
	Integrated 33 GHz Optical to electrical converter with connector type FC/PC for oscilloscope: 1 unit

Warranty:	3 years
Operating System:	Windows 7 or better
Product will be supported in the market for:	Next 6 years (Till Jan 01 2025)

BERT

Objectives:

1. R&D in Highspeed digital design (NRZ & PAM-4 Technologies)
2. Testing Transmitter (Tx) & Receiver (Rx) designed at 40GBPS NRZ & 56Gbps PAM4 (28 GBaud) technologies.
3. Intrinsic Jitter of the equipment's (Oscilloscope & J-BERT) to be as low as possible, so that actual jitter measurements of the Device Under Test (DUT) are made at sub Pico Seconds.
4. Flexibility to switch over from NRZ to PAM4 standards while testing.

Parameter	**Specification**
# of BERT Channels	1 Generator and 1 analyzer channel
Measurements	BER, Jitter Tolerance
Data Rate (NRZ) (Pattern Gen. & Error Detector)	NRZ – ≤8 Gbps to 40Gbps
Symbol Rate (PAM4) (Pattern Gen. & Error Detector)	PAM4 – ≤6 Gbd to 28 Gbd
	(equivalent to 12 Gbps to 56 gbps)
Transition time (20%-80%) (for pattern gen.)	≤15 ps
PAM4 and NRZ Output	The same output channel must support PAM-4 and NRZ signals and signal type should be user selectable (without change of cabling) upto the data rates defined above
Jitter Injection	Inbuilt jitter sources for injecting a combination of Random jitter, two tone periodic jitter , SSC
Patterns Supported	2^n–1, n= 7, 10, 11, 15, 23, 31, w/ user defined patterns, Test patterns for 100GbE
User Defined PAM4 coding	Gray coding,
	Custom coding - mapping of 00, 01,10,11 to

	symbols 0,1,2,3
Inbuilt pattern memory for custom patterns	NRZ: 2 Gbit/channel
	PAM4: 1 Gsymbol/channel
Sensitivity	≤100 mV peak-to-peak differential.
Decision threshold resolution	≤1mV
Detector Sampling Point	Manual and automatic. Finds optimum voltage range, threshold and delay of the sampling point.
Output clock	full-rate clock and sub-rate clocks
Recovered clock input	Single-ended or differential channel
Accessory 1	All cables and connectors for receiver characterization which includes cables for differential data input to receiver, recovered differential data from the receiver, recovered clock, and sub-rate clock. 50-ohm terminations or port savers for modules when not in use. The supplied cable pair should be matched cables
Accessory 2	Any intermediate connectors required to connect modules to SMA cables
Warranty	3 Years
Product will be supported in the market for:	Next 6 years (Till Jan 01 2025)

ITEM I: Vector Network Analyzer (Basic)

Parameter	Required Specifications
Frequency Range	10MHz to 40 GHz
Number of ports Number of sources	2 1 (Should be internally switchable between ports)
Connector type	2.92mm/2.4mm
Output Power	>= +2dBm
Minimum settable power	-90 dBm
Frequency accuracy	± 1ppm
Frequency resolution	1 Hz
IFBW	1Hz to 1 MHz
Number of measurement points	1 to ≥ 30000
Directivity	
	>37dB 2GHz to 20GHz
	>33dB 20GHz to 40GHz
Source match	
	>34dB 2GHz to 20GHz
	>30dB 20GHz to 40GHz
Load match	
	>34 dB 2GHz to 20GHz
	>30 dB 20GHz to 40GHz
Reflection tracking	<±0.2 dB upto 20GHz
	<±0.2 dB above 20GHz
Transmission tracking	<0.2 dB up to 20GHz
	<0.2dB above 20GHz
Dynamic Range (At test port)	>117dB 2GHz to 20GHz 124--135(typ.)
	>106dB 20GHz to 40GHz 119--130(typ.)
Power Sweep Range (ALC)	≥ 34dB from 2 GHz to 20GHz (34dB)
	≥ 29dB above 20GHz (29dB)
Harmonics (full frequency range)	-15dBc (typical)

Trace Noise Magnitude	0.004 dB 500MHz to 20GHz (10 kHz IF BW) or 0.007dB 500MHz to 20GHz (1 kHz IF BW)
	0.015 dB 20GHz to 40GHz (10 kHz IF BW) or 0.007 dB 20GHz to 40GHz (1 kHz IF BW)
Test port noise floor (10Hz IF BW)	≤-106dBm 500MHz to 20GHz
	≤-90dBm 20GHz to 40GHz
Damage input power level	≥ +27dBm RF, 30 VDC
Measurements capability	Measurements for Gain ,Phase, SWR, Group delay, S-parameters, Time domain measurements
Bias tee	On All ports
Display	Built-in >10” screen color display
Operating System	Windows 7 embedded
Supply Voltage	230V ±10% , 50 Hz
Extras	Following RF adaptors to be provided (2 nos. each): 2.4 mm (m) to 2.92 mm (m) 2.4 mm (m) to 2.92 mm (f) 2.4 mm (f) to 2.92 mm (m) 2.4 mm (f) to 2.92 mm (f)
Direct generator receiver access	Yes
Generator step attenuator	Yes (>=60 dB in 10 dB steps or better) Present on all ports
Receiver Step attenuator	Yes (>=35 dB in 5 dB steps or better) Receiver attenuator must be available on all ports for protecting the mixers from going in to compression
Calibration kit	Ecal kit (2.4 or 2.92 mm) calibration kit with standards for both male and female connectors as well as torque wrenches for 2.4 or 2.92 mm connector
Test port cables	Single set of phase matched test port cables to be supplied for 2 ports. Test port cables should

	be for 2.4 or 2.92 mm with matching connectors for VNA.
Torque wrench set	2.92/2.4 mm connector torque wrench set.
Warranty	3 years
Product will be supported in the market for:	Next 6 years (Till Jan 01 2025)

ITEM J: Vector Network Analyzer (Advanced)

Parameter	**Specifications**
Frequency range, resolution	10MHz to 40GHz or better, ≤1Hz
No. of test ports No. of sources	≥4 ≥2 1)Sources should be switchable between all the four ports 2) All four ports of the basic VNA should have dedicated receivers and should be on a single instrument.
Test port connector, impedance	2.4mm/2.92 ruggedized, 50Ω nominal
Source attenuators Step attenuator range, resolution	VNA must be equipped with built-in step attenuators on each test port . ≥60dB, ≤10dB
Receiver attenuators Receiver attenuation range, resolution	VNA must be equipped with built-in receiver step attenuators on each test port. ≥35dB, ≤5dB
Source and Receiver Access on test ports	Must be provided on all test ports to access internal source / receiver path for measurement flexibility
Bias Tees Bias voltage, current	VNA must include built-in bias tees at both test ports for DC + RF coupling with BNC(f) connectors ≥±30V, ≥±200mA
Built-in combiner	Must be available for combining RF signal from both sources for providing amplitude calibrated two-tone stimulus to device under test from the test port itself. Combiner must not be supplied as an external

	accessory as it could lead to inaccurate calibration.
Measurement capability	Must be able to measure s11, s21, s12, s22 vector s-parameters (i.e. magnitude and phase) with single connection of device under test, Time domain s-parameters with TDR functionality, Mixer conversion loss/gain, Intermodulation Distortion measurements (for amplifier, Harmonic distortion for amplifiers, AM-AM and AM-PM measurements for amplifiers Switching from s-parameter measurement to IMD and Gain compression should not require any physical connections/disconnections of VNA with the DUT or within the VNA.
Frequency offset capability	VNA must be configurable to set source and receiver at different frequencies
Mixer measurements	Conversion loss/gain Network analyzer software should support setting the input frequency/power, LO frequency/power, output frequency calculation, source/receiver attenuation settings, etc.
Intermodulation distortion (IMD) measurements	Should support two-tone IMD, Swept-IMD measurements, IM-spectrum display, Software should be able to configure sweep for center frequency, and control both tones individual power as well. The receiver should be able to tune to 3, 5, 7, 9 order intermod components as well as intercept points (whatever falls in the 40 GHZ frequency range)
Non-linear vector network analysis	VNA should support non-linear characterization of the device under test to measure amplitude and phase of each distortion product of interest with data display in amplitude, time, power domain with fixed load impedance
Dynamic range of the VNA	10MHz to 500MHz: ≥80dB >500MHz to 20GHz: ≥118dB >20GHz to 40GHz: ≥105dB
S-parameter calibration Source power calibration	Two-port 2.4mm(or 2.92mm) Electronic calibration kit must be supplied for s-parameter full two-port vector calibration covering full frequency range i.e. 10MHz-40GHz

	Appropriate calibration standard i.e. USB/LAN power sensors must be supplied covering 10MHz-40GHz frequency range
Corrected performance Directivity Source Match Load Match Transmission Tracking Reflection Tracking	Must be met with the quoted Ecal kit ≥ 35 dB 2GHz to 20 GHz ≥ 28 dB 20 GHz to 40 GHz ≥ 33 dB 2GHz to 20GHz ≥ 28 dB 20 GHz to 40 GHz ≥ 34 dB 2GHz to 20GHz ≥ 28 dB 20 GHz to 40 GHz ≤ ±0.15 dB 2 GHz to 20 GHz ≤ ±0.2 dB 20 GHz to 40 GHz ≤ ±0.15 dB 2 GHz to 20 GHz ≤ ±0.2 dB 20 GHz to 40 GHz
Output power range from all test ports, 10MHz-40GHz Maximum combined leveled output power from all test ports, 10MHz-40GHz Power sweep range on all ports, 10MHz-40GHz	-90dBm to +0dBm or better ≥ 2 dBm (10MHz-20GHz); ≥-10 dBm (20-40GHz) ≥ 27dB
2nd and 3rd Harmonics 10MHz-40GHz	≤-30 dBc
IF Bandwidth range	Settable, 1Hz to 1MHz or better Should be upgradable to 5 MHz later.
Damage level on all test ports	≥0.5W, ≥30VDC
Display	Must be built-in, ≥10-inch size, color LCD screen (or touch screen)
Operating system	Windows 7 / Windows 10, the network analyzer control software must be installed to the OS
Supply voltage	220-240VAC, 50Hz
Torque wrench	Suitable torque wrenches for VNA test port as well as 2.4mm/2.92 mm connector must be provided

Test port cables	Two pair of flexible, stable with test port equivalent (2.4mm/2.92mm) connector type must be supplied
Accessories to be supplied:	High quality RF adaptors to be provided (4 nos. each): 2.4 mm (m) to 2.92 mm (m) 2.4 mm (m) to 2.92 mm (f) 2.4 mm (f) to 2.92 mm (m) 2.4 mm (f) to 2.92 mm (f)
Warranty	3 years required for VNA
Product will be supported in the market for:	Next 6 years (Till Jan 01 2025)

ITEM K: 65 GSPS Arbitrary Wave Form Generator

	Has to be a dedicated test instrument. Generate arbitrary waveforms
No. of Analog Outputs	4
Analog Output impedance	50 Ohm
Resolution	8 bits or better
Waveform Memory	1MS/channel or better and possibility to upgrade
Run Modes	Continuous, Triggered
Sample Rate	>= 65 GS/s on all channels simultaneously
3dB BW	> 25 GHz per channel
Reference clock input	10MHz or 100 MHz
Differential mode	Yes (100 Ω terminated)
Channel to channel skew	±7 ps or better
Synchronized	All channels should be time synchronized.
Software	ARB generation (through .mat and other formats). Ability to play multiple files
	Software for pulse shaping and generation of standard complex modulations up to 256 QAM.
Warranty	3 years
Product will be supported in the market for:	Next 6 years (Till Jan 01 2025)

ITEM L: Vector Signal Analyzer (Sub 6GHZ)

Parameter	Specification
	Should be a single box solutions. No external RF mixers/components are allowed.
Frequency range	10 Hz to 6 GHz
Resolution BW	1Hz to 8 MHz
Analysis BW (See **Error! Reference source not found.**)	>= 100 MHz
Displayed Average Noise Level (DANL) for greater than 1 Mhz	Better than -150 dBm
SSB Phase Noise @ 1GHz	Better than -100dBc/Hz @ 1KHz offset Or equivalently Better than -112 dBc/Hz @10KHz offset
Vector Signal Analysis capabilities	Multi-domain measurements: Time and Frequency (spectrum) measurements. Demodulate standard waveforms for at least the Analysis BW Capability to demodulate the Digital modulated signals: 16QAM, 32QAM, 64QAM, 128QAM,256QAM. Filter types: Raised cosine, square-root raised cosine, user defined Demodulate Multi-carrier Modulation, Generic OFDM Demodulate 5G NR signals uplink and downlink for both TDD/FDD and display and other important measurements. LTE TDD/FDD Signal Analysis as per 3GPP rel. 14 uplink and downlink and NB-IOT EVM measurement (for data and reference signals) and demodulation and decoding of UL and DL channels/signals for 5G NR, LTE FDD/TDD for Rel 14 for both uplink and downlink. If the above software is in PC, then we require >= 5 licenses

Memory	200 MSa
5G NR Analysis (Inbuilt)	5g NR as per the 38 series > = release 15.0.0.
Display and CPU (Integrated)	Integrated color display screen for performing signal analysis Built-in CPU with Win 7/10 OS
Power Supply	230V AC, 50Hz
Accessories to be supplied:	a. Type N male to 3.5mm male adapter (1no) b. Type N male to 3.5mm female adapter (1no) c. DC Block
Warranty	3 years
Pre-Amplifier	Yes
Product will be supported in the market for:	Next 6 years (Till Jan 01 2025)

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