

## Specs for Spectrum Analyzer and Signal Synthesizer

- a) Technical and Financial bids are invited in a single bid system for an expression of interest for a Spectrum analyzer and signal synthesizer.
- b) An EMD of Rs 50,000 is to be enclosed as a DD in favour of Registrar IISER Mohali.
- c) Technical compliance for the specs given below must be enclosed as part of technical offer.
- d) Both units are standalone bench-top models expected to also work together as a scalar network analyzer when operated together. Hence among technically qualified models that offer the lowest price for both units together will be chosen.
- e) The spectrum analyzer is for measuring very low level signals. Hence units with the lowest DANL, phase noise etc will be given preference.
- f) Approved OEMS include Agilent, Anritsu and Rohde & Schwartz. Only models satisfying major specifications will be accepted technically. Minor deviations in specs are up-to committee/end users discretion based on whether it affects end user requirements e.g 13.5 GHz instead of 13.75 GHz freq range will be accepted,
- g) Please give customer references
- h) Delays cannot be accepted. Also don't use **Professional Courier** as they do not deliver in our area.
- i) We may call for a presentation if anything is not clear.
- k) Vendors complaining about other vendors may be disqualified .

## Technical Specifications for Spectrum analyzer

S. No.	Parameter	Tech Specs
1	Frequency range	3 Hz to 13.6 GHz, or better with 3.5 mm/2.92 port (or with test cable having 3.5 mm or 2.92 m or connector in one end if providing N-type port.)
2	Aging per year with Ocxo	$\pm 1 \times 10^{-7}$ (if offering better option please quote as an option). Confirm if external standards can be used.
3	Achievable initial calibration accuracy	$\pm 1 \times 10^{-8}$ Hz
4	Frequency counter resolution	0.001 Hz
5	Sweep time range	1 $\mu$ s to 16000 s
6	Number of points	Around 32001 or more
7	Resolution bandwidths	1 Hz to 8 MHz
8	Video Bandwidths	1 Hz to 8 MHz
9	Display range	displayed noise floor up to +30 dBm
10	Resolution filters	1 Hz to 8 MHz, or better
11	Channel filters	100 Hz to 8 MHz
12	Typical DANL (1Hz) RBW = 1 kHz, VBW = 1 Hz With pre-amp on (These typical values must be without any additional data processing like noise cancellation options)	50 MHz < f $\leq$ 150 MHz < -163 dBm, typ. -166 dBm 150 MHz < f $\leq$ 8 GHz < -166 dBm, typ. -169 dBm 8 GHz < f $\leq$ 13.6 GHz < -164 dBm, typ. -168 dBm Very small deviations in specs will be accepted
13	Maximum input power DC + AC voltage	Around +20 dBm with/without pre-amp or atten +/- 4 V or more
14	Typical Phase noise 10 kHz offset @ 1GHz CF	Around < -134 dBc (1Hz), typ. < -137 dBc (1Hz)
15	Typical Phase noise 10 kHz offset @ 10GHz CF	Around < -128 dBc (1Hz)
16	T.O.I @ 1 GHz / 2 GHz	+30 dBm / +25 dBm or better
17	Second-harmonic intercept point (SHI) RF attenuation = 0 dB, level = -5 dBm	1 MHz < fin $\leq$ 350 MHz > 50 dBm, typ. 62 dBm 350 MHz < fin $\leq$ 500 MHz > 70 dBm, typ. 80 dBm 500 MHz < fin < 1.5 GHz > 47 dBm, typ. 52 dBm 500 MHz < fin < 1.5 GHz > 62 dBm, typ. 70 dBm 1.5 GHz $\leq$ fin $\leq$ 4 GHz > 62 dBm, typ. 70 dBm 4 GHz < fin $\leq$ 13.5 GHz 65 dBm (nom.)
18	1-db-compression of input mixer	fin $\leq$ 3 GHz +15 dBm (nom.) 3 GHz < fin $\leq$ 8 GHz +10 dBm (nom.) or better
19	Remote measurement and LAN transfer	5 ms ( 200/s) or better
20	Marker peak search	Around 1.7 ms or better
21	Analog Demodulation (quote as option and confirm if can be added later on)	AM & FM Demod with Audio O/p. Instrument should be upgradable capable to demodulate Vector Modulated Signals. Results should be available as frequency, amplitude & phase versus time, RF power versus time, RF spectrum (FFT), AF spectrum (FFT), table with numeric values for: modulation deviation (peak, RMS), modulation frequency, carrier offset, carrier power (power of unmodulated carrier), THD, SINAD

22	Should Support Power Sensors for Power Measurements	Power Sensors may be directly connected & used for measurements.
23	Should Support Control of External Generators	Offer as per specs
24	Operating System of Device	Windows XP or 7
25	Interfaces	USB Ports > 5 , LAN, GPIB, DVI-D, AF Output
26	Support for RF Power Sensors	Power Sensor may be directly used with the instrument quote for power sensors with data sheets.
27	Touch Screen size/ also provide mouse and key board ports (via USB)	~ 12.1" (31 cm) or better
28	Noise figure measurements for amplifiers and other DUTs	Please quote noise figure measurement option with noise.com hardware. We will also be interested in the software as an additional option to use it with our own noise sources.
29	Warranty	3 Years or More

TECHNICAL SPECIFICATIONS FOR RF SIGNAL GENERATOR - 12.75 GHz		
S.No.	Parameters	Values
1	Output port	3.5 mm or 2.92 or K-connector (if providing N-type appropriate calibration grade adapter must be provided. )
2	Frequency	
A	Range	100KHz to 12.75 GHz or Better
B	Resolution	0.001 Hz
C	Settling Time	< 3ms
D	Settling Time in Predefined List Mode (Supports Freq Sweep from High to Low, Low to High or combination of Low & High)	< 1ms
F	Aging Rate	0.1 ppm/year offer lower drift as option
3	Level Accuracy	~ 0.5 dB for freq 1MHz upto around 3GHz and < 0,9 dB for above 3GHz
4	Electronic /manual Step Attenuator	Should be present for complete freq range
5	Reference Frequency Input/output	10 MHz and other standard choices output atleast one 10 Mhz
6	RF Power	
A	Level Performance PEP 1 MHz < f ≤ 12.75 GHz	-120 dBm to +18 dBm higher power in lower range will be accepted if other performance criteria are not affected.
B	Reverse Power/ Back Feed Protection against DC upto 10V or better	1 MHz < f ≤ 1 GHz 50 W 1 GHz < f ≤ 2 GHz 25 W 2 GHz < f ≤ 12.75 GHz 10 W
7	VSWR	< 1.8 (must preferably improve with atten)
8	Spectral purity	
A	SSB phase noise at 20KHz offset	
	1GHz carrier	<-122 dBc/Hz
	10GHz carrier	<-102 dBc/Hz
B	Harmonics at level f > 6 GHz; level ≤ 10 dBm	< -30 dBc or Better
C	Non-Harmonics at level >-10dBm; offset >10 kHz	< -52dBc upto 20 GHz
9	Analog Modulations	Amplitude Modulation with 100% Mod Depth, Frequency Modulation & Phase Modulation should be supported
10	Internal Modulation Generators	

	LF generators for use with AM,FM,PM	LF generator for use with AM,FM,PM Waveforms : sine .1 Hz to 1 MHz square .1 Hz to 20 kHz
11	Interface & drivers	USB, LAN & GPIB drivers for Labview and also preferably also matlab drivers for remote programming
12	In built pulse generator: Quote Optionally	
a	Pulse mode	single pulse, double pulse
B	Pulse period setting range	40 ns to 85 s with 10 ns resolution
C	Pulse width setting range	10 ns to 1 s with 10 ns resolution
13	Pulse Modulation : Quote Optionally	
A	On/off ratio	> 80 dB
B	Rise/fall time; 10 % to 90 % of RF amplitude, f > 23.4375 MHz	< 15 ns
14	Inputs for external modulation AM/FM as well as reference 10 MHz	BNC/SMA inputs in rear port.
15	Instrument should be covered with Warranty	3 Years or more

#### Accessories :

Please try to quote following accessories. Accessories will not be included in comparative. It may also be procured separately if specs/prices are not good.)

#### Adapters:

- 1) Quote for 3.5 mm jack to jack , plug to plug adapters with wrench flats cables
  - 2) Hand-formable tin dipped cables with FEP jacket 2m long 2 pieces with 3.5 mm male plug connectors.
  - 3) 10 cm long hand-formable tin dipped cable with FEP jacket 2 pieces with 3.5mm jack connectors on one end and male on another end.
  - 4) BNC cable ( 2 m ) 4 pieces
  - 5) SMA adapters ( jack to jack , plug to plug , tee piece jack) 6 pieces each
  - 6) SMA to BNC adapter
- Approved brands ( Rosenberger, Huber-Suher, Anritsu )

#### Time Standard:

- 1) please quote for 10 MHz rubidium time standard if available, Provide brochure and specs.