

REF: PH/PSA/16/2017-18

Date: 1st February 2018

Dear Sir,

Kindly send a quote for the following item on CIP Bangalore basis. Your quotation should clearly indicate the terms of delivery, delivery schedule, payment terms etc. The tender should be submitted in two separate sealed envelopes - one containing the technical bid and the other containing the commercial bid, both of which should reach us, duly signed on or before 1700 hours, 21st February 2018.

Please enclose a compliance certificate along with the technical bid.

Yours Sincerely,

P S Anil Kumar
Department of Physics

Specifications for instruments

A. Semiconductor Parametric analyzer

Technical Specifications	Range/Remark
IV Measurement	Atleast two SMU units
Voltage source and measure capability	$\pm 200V$
Voltage Range	500mV to 200V
Voltage Source resolution	100 μV
Voltage measure resolution	$\pm 200nV$
Current source and measure capability	$\pm 100mA$
Current ranges	1pA to 100mA
Min source resolution	10pA
Min measure resolution	100aA
SMU modes required	Bias, common, sweep, user defined sweep, step mode
CV measurement	
Frequency range	Upto 5MHz
DC drive level	-30V to +30V
External DC voltage	400V differential
Low frequency CV required	Yes
Frequency range	10mHz to 10Hz
Voltage range	Upto 200V
Modes	CS-GS, CP-GP, Z theta, Cs-D, Cp-D, R+jX

Capability to switch measurement modes without changing connections to DUT	Yes
Connectivity	LAN/GPIB/USB
Optional items	
Pulse Capability	
Pulse generation and measurement	Yes
Minimum pulse widths	100nS
Amplitude of pulse	$\pm 40V$
Current measurement capability	Yes
TRX female to TRX female connector	4
BNC female to BNC female connector	4
TRX male to BNC female connector	4
BNC male to TRX female connector	4
TRX cable with alligator clips	4

B. Oscilloscope

Technical Specifications	Range/Remark
Bandwidth	1GHz
No of Channel	4 Analog
Sample Rate	5 GS/s (When 2 channels turned on simultaneously) 2.5 GS/s (When 4 channels turned on simultaneously)
Memory Depth per channel	4M per channel
Input impedance	1 M Ω $\pm 1\%$, 50 Ω $\pm 1\%$
Measurement Algorithm	Measurements should be computed on acquired data but not on display data
Hardware input sensitivity	1 mV/div to 10 V/div(1 M Ω) 1 mV/div to 1 V/div(50 Ω ,75)
DC Gain Accuracy	$\pm 1.5\%$
Time Base Range	1 ns/div to 1000 s/div
Time base accuracy	± 10 ppm
Data Saving	Should be able automatically save waveform data & screen captures to pendrive automatically based on trigger
Connectivity	LAN
Probes	
Passive probes	1GHz 10X, <4pF capacitive loading
Warranty	3 Yrs on Equipment & 1 Year on probes

C. Lockin amplifier

Technical Specification	Range/remark
Mode of operation:	
Internal reference	Single and dual
External reference	Single and dual
Higher harmonics	Atleast 3
Input specification:	
Frequency range	DC-500MHz
Filter time constants	30 ns- 50 s
Filter bandwidth	0.1mHz – 5 MHz
Fliter slope	6, 12, 18, 24, 30 dB/octave
Input noise level	4nV/sqrt(Hz) for frequency > 1MHz
A/D conversion	12 bit 1.8 GSa/s
Sensitivity	1nV to 1.5 V
No. of inputs	2
Source specifications:	
Frequency range	DC-600MHz
Input impedance	50 Ohm or 1 Mohm
Dynamic range	better than 100 dB
No. of outputs	2
Source range	± 1.5 V for high load and at least 7 dBm for 50 Ohm load
D/A conversion	14 bit, 1.8 GSa/s
Reference, auxiliary channels:	
Reference frequency resolution	Better than 1 mHz
Sample rate of aux outputs	Better than 25 MSa/s (each), 16 bit.
Outputs	X, Y, R, θ
Connectivity:	
LAN/Ethernet connection	Yes
Clock	10 MHz, high stability OCXO with deviations < 0.5ppm
Optional items:	

Upgrade to AWG	Yes
Upgrade to digitizer	Yes
Upgrade to multi-frequency	Yes

D. Analog signal generator

Technical Specification	Range/remark
Frequency Range	10 MHz to 20 GHz
Resolution	0.01 Hz
Internal Timebase aging Stability	< 2 x 10 ⁻⁹ /day
Temperature	< 2 x 10 ⁻⁸ /°C over 0 °C to 55 °C
Output Level	
Minimum Settable Power	-130 dBm
Maximum Leveled Power	10 GHz: +18 dBm
	20 GHz: +15 dBm
Level Accuracy	< ± 1 dB, typical
Step Attenuator	0 dB to 110 dB in 10 dB Steps
Resolution	0.01 dB
Units	dBm and mV
Switching Speed	5 ms (typical)
Power sweep	List or step
Spectral Purity	
Spurious Harmonics	10 MHz to 2 GHz: < -40 dBc 2 GHz to 20 GHz: < -60 dBc
10 GHz SSBPhase Noise	10 Hz offset: -60 dBc/Hz 100 Hz offset: -80 dBc/Hz 1 kHz offset: -100 dBc/Hz 10 KHz offset: -105 dBc/Hz 100 kHz offset: -110 dBc/Hz 1 MHz offset: -130 dBc/Hz
Modulation	

Amplitude Modulation	Internal, External
Modulation Frequency Range (3dB BW)	DC to 100 KHz, typical
Modulation Depth	0 to 100%
AM Distortion @ 1 KHz (m<80%), 0 dBm	Reading +/- 5%
Frequency Modulation	Internal, External
Frequency Deviation	Wide Dev < 20 GHz: 100 MHz
Accuracy	Accuracy: < 10% (5% typ)
Pulse Modulation	On/Off Ratio: 80 dB Min PW leveled: 100 ns Min Modes: Sgl, Dbl, Triple, Quad
Triggering	Auto, External, single
Interfaces	GPIB, LAN
Impedance	50Ω
Connector Output	K(f) connector Or N-type (Female)

E. Sourcemeter

Technical Specification	Range/Remark
Number of sources	2
Simultaneous 2 channel measurements	Yes
Source resolution	6 and ½
Measurement resolution	6 and ½
Voltage source	200V to 200mV
Voltage source resolution	100nV
Current source	100nA to 1A
Current source resolution	1pA
Communication	LAN/GPIB
Storage internal memory	16MB
Warranty	3 years

F. High voltage power supply

Technical Specification	Range/Remark
Range of dc voltage	+/-5 kV
Output ripple maximum	0.01% of full scale
Programmable voltage limit, current limit and current trip	Yes
Communication	RS232 /GPIB/LAN
Trip response time	< 10 microseconds
Voltage set accuracy	< 0.06%
Protection	arc and short circuit protected
Should be possible to set voltage through external voltages less than +/- 10V	
Stability	< 0.01% per hour

Minimum power	25 W
Max current	at least 5 mA
Max current accuracy	< 10uA

G. Electrometer

Technical Specification	Range/Remark
Noise	<1fA
Input impedance on voltage measurements	>200TΩ
Charge measurements range:	from at least 10fC up to 10μC
Current measurement range	minimum 100 aA to maximum at least 20 mA
Voltage measurement range	Minimum 10 microvolt to maximum at least 200 V
Speed of reading	least 1200 readings/second
Possible to cancel voltage and current offsets	yes
triax cables	Yes
Communication	GPIB/LAN/RS232