Ref. PR No. 1000050631   **RFx. No. 6100002723**

Technical Specifications of Semiconductor Parameter Analyzer with Probe Station

Sr. No.	Item Description and Detailed Technical Specification	Technical Compliance (Yes / No)	Additional Information (if any)
A.	Semiconductor Parameter Analyser Specifications: The Semiconductor Device Parameter Analyzer should have: a. 3 Source Measure Units (SMUs), of which there should be: i. atleast 2 High Resolution SMUs ii. atleast 1 Medium resolution SMU b. 1 Multi-Frequency Capacitance Measure Unit (MFCMU) c. 1 Pulse measure/Fast measurement/Waveform generator unit d. an upgradability and support of atleast 9 slot modules, or more e. ground unit with atleast ±4 A sink current, or higher f. the capability to connect to standard probe stations		
	Detailed Specifications: 1. System should have following sourcing and Measurement capabilities. 1.1 IV capability: System should have TWO SMUs with following capabilities. a) Voltage Source and measure range: 200 mV to 200V b) Resolution: Source: 5 µV and measure: ± 200nV c) Current Source and measure ranges: 1 pA to 100 mA d) Resolutions: Source:1.5fA Measure: ± 10aA e) SMU should be able to offer captivate load of at least 100 uF. 1.2 IV capability: System should have ONE SMU of following capabilities. a) Voltage Source and measure range: 200 mV to 200V b) Resolution: Source: 5 µV and measure: ± 200nV c) Current Source and measure ranges: 100 nA to 1 A d) Resolutions: Source: 5 pA Measure: ± 100 fA 1.3 ALL THREE SMUs should provide voltage/current in Bias; Common; Sweep; List sweep (custom point-by-point user-defined sweep); Step mode.		
	2. System should have one **CVU module** of below specifications. a) Frequency Range: 1 KHz to 10 MHz b) DC drive level: -30 V to +30 V c) DC Bias resolution: atleast 1mV or higher resolution d) AC drive voltage: 10 mV to 1V		

	e) Resolution: 10kHz, so that very low frequency (<10Hz) measurements can be possible.
	To achieve resolution <10mHz extra component can be added
	(f) Signal out range: 10mVrms to 100mVrms or higher with 1mVrms resolution
	(g) Mandatory measurements:
	   i. CP-G, CP-D, CP-Q, CP-RP, CS-RS, CS-D, CS-Q
	   ii. R-X, Z-θ, Y-θ
	(i) QSCV measurement with leak compensation
	(j) Measurement configuration: Four-terminal pair, High POT, High CUR, Low POT, Low CUR
	(h) sweep parameters: DC bias voltage, frequency, AC voltage
	(k) Sweep type: Linear, custom
	(l) Sweep direction: Up sweep, down sweep
	(m) There should not be buffering-delay during measurements
	(n) To switch between SMUs and CMU (including cables), to be able to perform I-V and CV measurements without physically changing the connection.		

	3. One Dual channel - Pulse Measure unit (PMU) with below specifications To have the ability to do transient measurements, and NBTI, PBTI measurements. a) Dual channel or similar Pulse Generation & Measurement capability for voltage range of 40V with the ability to obtain synchronized or independent outputs from them. b) High Speed Voltage Outputs with programmable Pulse widths ranging from 20 nanoseconds to DC. c) System should be able to generate +/- 10V amplitude pulse simultaneously on both channels. d) Programmable parameters: Pulse width, duty cycle, rise time, fall time, amplitude, offset (e) System should have current measurement feature supporting ranges 100 nA, 1 uA, 10 uA,100 uA, 1 mA, and 8 mA or more. (f) Should do transient measurement (g) Single box Pulse Generation & Measurement capability (h) Sampling: 200 MSa/sec, 10 ns sampling rate (i) For synchronize operation with PMU to improve the integrity and to switch between IV/CV and Pulse IV measurements necessary equipment with proper connector should be provided.		

	4. Data variable display and Analysis function: Atleast 20 user-defined parameters and 20 user-defined analysis functions, or more; including, but not limited to:
	  a) Normal mode, grad mode, tangent mode, and regression mode.
	  b) Automatic locating markers using the auto analysis setup.
	  c) Parameter extraction capabilities.		

	5. Interfaces: Mandatory:
	  a) GPIB, interlock, USB, LAN, trigger in/out, digital I/O
	  b) User interface options: Touch panel, knob, soft keys, USB, keyboard and mouse
	  c) Cable and any other accessory/software to interface USB to GPIB ports to control the unit using laptop etc,.		

6. Cables
a. The following should support low current measurements (atleast below 1 pA).
   i.   Triaxial cables: Each SMU unit must come with atleast 2 triaxial cables: 6 units of atleast 3-m length
   ii.   Coaxial cables: atleast 1.5-m-length
b. High-voltage (HV) triaxial cables: atleast 1.5-m-length
c. GPIB cable of atleast 2-m-length	

7. Adaptors/ Connectors
a. The following connectors should support low current measurements (atleast below 1 pA).
   I.   Triax to BNC connectors:
     1. Triax(M) to BNC(F) connectors – 5 No.s
     2. Triax(F) to BNC(M) connectors – 10 No.s
     3. Triax(F) to BNC(F) connectors – 5 No.s
   II.   BNC tee connectors – 10 No.s
   III.   Banana connectors -10 No.s
b. High-current (HC) banana connectors – 5 No.s
c. GPIB adapter -2	

8. System should have built in Capability to switch the measurements from IV, CV to pulsed IV from select menu without changing the connections on the DUT.	
9. System should have Kelvin connection at GND unit.	
10. System should have facility to modify or write user test modules.	
11. System should have Built in Memory.	
12. Provided software should have parameter extraction facility.	
13. Should be able to connect with any probe station by suitable connecting cables.	
14. The instrument software/firmware should have both offline and online capability	
15. System should be provided with below adaptors, Connectors & Cables: a) Test fixture with MOSFET and MOSCAP for system verification of IV, CV and Pulse IV operation, low current upto 1 pA. b) System should be provided with MOSCAP: 5 no, MOSFET: at least 5 no devices as reference sample.	
16. Installation and Training: The OEM representative should install the system and provide operational training to group of students. OEM should have the NABI & ISO certified service center should be available in India.	
17. System should be provided with 6 Triaxial cables and 6 triax to BNC converter	

B.	Probe Station Specifications: Manual Analytical probe station system. Probe station should be able to do IV/CV/Pulsed IV measurement system. The station should be field upgradable to allow the user to increase colinear measurement, dark box and optics.		
	The probe station consists of below parts **Chuck X_Y Stage** a. Travel Range: 4-inch x 4 inch b. Fine travel resolution: 75 mm per degree of knob rotation c. Planarity: <10 mm d. Theta Travel: 360° e. Chuck to Platen Separation: (Quick Lift) 12.75mm (1/2"), Fine adjust 38.1mm (1/5")		
	Manual Microscope Stage a. Scope "Z" range: 25 mm – 100 mm b. Motion Control: Independently controlled X and Y knobs c. Scope X-Y Movement: Microscope should have 4"x 4"X-Y Movement along with Z movement d. Microscope: Stereo-Zoom Low power Microscope e. Magnification: 7.5X -50X magnification f. Working Distance: 113 mm g. Camera port: Should have camera port to mount camera on microscope h. Illumination: Fully intensity controllable LED illuminations i. Z focus adjust: 50 mm		
	Digital Camera System a. Connection to computer: USB 2.0 b. Display port: HDMI 1080 P output, SD card Slot c. Capture size: 1980 x 1080 capture sze 5.0 MP d. C-mos sensor: 1/ 2.8." CMOS sensor, C-mount e. Image Analysis software: Image capture and Measurement scale to be displayed to measure the distance between probes f. Display: 21 " Flat Panel Display With HDMI, 12 V		
	Probe Platen Specification a. Design: Four Post Support b. Dimension: 10.25" x 16" x 0.5" c. Chuck to platen top: Min. 12.7mm (Variable Separation with Fine Platen Adjust) d. Max. No of Micorpositioners: 6 x DC e. Quick Platen Lift Control (CVL): Continuous Variable Lift (0 to 12.7mm) f. Contact Repeatability: < 1 μm (0.04 mils) by Manual Control g. DC/High Power Micro Positioner Mounting: Magnetic or Vacuum h. Four Probe Coliniere Micropositioner: Magnetic or Vacuum		
	Micropositioner - 4 No a. Accuracy: 5 micrometers b. X-Axis motion: 15 mm c. Y-Axis motion: 15 mm d. Z-Axis motion: 15 mm		

	e. Resolution: 8 TPI 5 micron f. Knob: left or right head g. Mounting base style: Magnetic h. Head style: Rigid head		
	Probe Tip Holder - 4 no a. Probe Tip Holder: Coax BNC (m) b. Max Voltage: 500 V c. Temperature range: -60oC to 300oC d. Leakage current: <50fA e. Connectivity: Coax f. Connectivity type: Single low noise coaxial g. Characteristic impedance: 50 ohms h. Residual capacitance: <80fF i. Probe tip material: Tungsten j. Probe tip size: 0.5 µm – 25 µm k. Minimum pad size: 25 µm x 25 µm l. Quiet vacuum pump: 230 VAC 50 Hz operation; Vacuum: 428mbar; Airflow: 7 lpm; Includes 10' soft ½" vacuum tubing and power cord; 40 dB max @ 1m		
	Accessories: a. Cables & Connectors: Necessary Cables and Connectors to be provided to connect to the Semiconductor characterisation system b. Vibration Table: System Should Provide Vibration Isolation table with Granite table top or optical Breadboard top compatible with the probing solutions		
C.	**General Requirements:**		
	1. Vendor should quote for A & B and integrate and demonstrate the probe station with semiconductor parameter analyzer.		
	2. Installation requirement: a) Installation of the complete set up with probe station. b) Demonstration of all the features and Programming related to FETs, photovoltaics, LEDs, non-volatile memory. c) c) Demonstration of a LabVIEW program for I-V scan with multiple SMUs, and Pulsed measurement.		
	3. Warranty: Three (03) years from the date of successful Installation.		
	4. Vendor should have at least five successful installations across different IITs, IISERs or NITs. Provide details in Format 2- Previous supply order.		