



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

**PR No. 1000038603**

**Rfx No. 6100001671**

**Technical Specifications for Ferroelectric/Multiferroic Tester System (Qty-1)**

<b><u>Sr. No.</u></b>	<b><u>Content</u></b>	<b><u>Specifications</u></b>	
<b>1</b>	<b>Introduction</b>	1) IIT Bombay is planning to procure a polarization vs. electric field (PE) loop ferroelectric test system (Ferroelectric tester) with the following capabilities. 2) The bidder must provide detailed specifications of each equipment/item. Model numbers, datasheets, and brochures must be included for each quoted equipment/accessories/item. Specifications corresponding to the quoted model number must be available publicly via OEM's website for scrutiny. If not, the bid can be disqualified on technical grounds. 3) The Institute reserves the right to ask for photographs/CAD drawings/design proofs to satisfy themselves of the proven capabilities of the system being offered. The bidder must provide these details within two working days of receiving such a request via email. Decisions regarding the technical compliance of the bidder can be taken on the basis of this information. 4) The compliance sheet for the technical specification and OEM Brochure has to be attached along with the technical bid. The vendor has to fill the compliance sheet and mention the page number or reference number in the OEM brochure. Unfilled /partially filled sheets lead to disqualification.	
<b>2</b>	<b>Measurement Capabilities</b>	1) Voltage Range:- 100V in-built expandable up to +/-10,000V or 20,000V peak to peak(100V should be built-in to the system, no external amplifier will be allowed up to 100V) 2) Number of ADCBIT:- Atleast18 BIT(attach information in the compliance report from the main manufacturer of this ADC, the system cabinet will be opened during installation to check the same) 3) Minimum Charge Resolution using a built-in electron counter circuit or electrometer:- <0.8fC 4) Maximum Charge Resolution:- 5.26mC 5) Maximum Number of Data Points:- Atleast32000 6) Internal Clock:- (Atmost)25ns 7) Hardware Ports Required:-	



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		<p>Note: Detailed annotated pictures of the front/back of the instrument case demonstrating capability for(a),(b),(c), and (d) need to be attached with the bid. Unclear information will lead to disqualification.</p> <p>a) External Sensor Input port – Two independent channels. Should accept analog Input in the +/-10Vrange with 18 BIT resolution.</p> <p>b) Sync Port-should allow for triggering of charge measurement using an external trigger. The tester/setup must be capable of capturing external sensor data synchronously With polarization measurements.</p> <p>c) I2C.</p> <p>d) Electrometer/Electron counter port</p>	
		<p>8) Supported Capabilities (with basic system with no hardware configuration change or simultaneous measurement capability)</p> <p>Hysteresis, Remanent Hysteresis, Leakage, Charge, Retain, Resist, Fatigue, IV, CV, PUND, Imprint, Leakage Current, Poling, Dynamic Leakage Compensation/Time dependent compensation etc.</p> <p>The software operating the tester must be programmable and capable of executing all measurement types in an arbitrary order without configuration change (ie with no connection changes made to the sample while testing all parameters simultaneously).</p> <p>Computer and Ferroelectric Test System should be separate and connected through USB Cable, so that in future any</p>	
		<p>9) Software</p> <p>a) The system should incorporate software for Poling Studies of samples (AC+DC Poling facility).</p> <p>b) The system should incorporate software for C(V) Measurement from 1Hz to1MHz.</p> <p>c) The system should incorporate software for Time Dependent Compensation/ Dynamic Leakage Compensation.</p> <p>advanced new computer can be utilized with Ferroelectric Test System.</p>	



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<b>3</b>	<b>Charge and Current Hysteresis Capability</b>	1) Minimum Hysteresis Frequency :- Atmost 0.03Hz	
		2) Maximum Hysteresis Frequency :- Atleast 270 khzatz +- 100V(270kHz @ 100 V)	
		3) Waveforms  Note: Detailed annotated screenshots of GUI demonstrating capability for (a)and (b) need to be attached with bid. Unclear information will lead to disqualification. (a) Inbuilt Waveforms: (At least)Triangular, Sinusoidal, Standard Monopolar, Double Bipolar, Inverse cosine, Double bipolarsine, Switched triangular, Unswitched triangular/10%pulse for charge decay characterization, All zeros waveform for disturbance sensitivity measurement. (b) User Defined: Capability to generate Waveform from file with at least 32000 points.	
<b>4</b>	<b>Pulsed Measurement Capability</b>	1) Minimum Pulse Width :- Atmost 0.5 $\mu$ s	
		2) Maximum Pulse Width :- Atleast 1s	
		3) Maximum Delay between Pulses :- Atleast 10hours	
		4) Waveforms  Note: Detailed annotated screenshots of GUI demonstrating capability for(a),(b) need to be attached with bid. Unclear information will lead to disqualification a) Inbuilt: PUND b) User Defined: Capability to build pulse waveform incorporating (at least) four pulse periods. In each period, capability to set the: i) Negative voltage value and time ii) Two different positive values and times iii) Zero voltage value and time	
<b>5</b>	<b>Capacitance Measurement Capability</b>	1) Minimum Small Signal Capacitance Measurement Frequency :- (Atmost)1Hz	
		2) Maximum Small Signal Capacitance Measurement Frequency :- (Atleast)1MHz	
		3) Minimum Leakage Current that can be measured(assuming current integration period of atleast 20 seconds) :- <1pA (the same will be checked during installation, mention level of accuracy)	
		4) Input Capacitance of Tester :- <6fF (femto farads)	



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<b>6</b>	<p><b>E.High Voltage Capabilities</b></p> <p><i>Note: Items required for testing samples up to +/- 10,000V or( 20,000V Peak to Peak).</i></p>	<p><b>1) High Voltage Amplifier.</b></p> <p>a) Voltage Range(spec A.1) should be +/- 10kV or 20KV peak to peak</p> <p>b) Overload and over current protection</p> <p><b>2) High Voltage Interface (HVI)</b></p> <p><b>For safety of the user from high voltage the following specifications should be met positively:</b></p> <p>a) Maximum International Rating - 10KV (AC) Voltage</p> <p>b) High speed Protection Current Rating- 10Amps or better</p> <p>c) High speed Protection Trigger Voltage- 2.0V or better</p> <p>d) Low Speed Protection Delay Time- 14ms or better</p> <p>e) Isolation Relay Switchable Voltage- 12KV or better</p> <p>f) Maximum Charge Resolution using the HVI should be 25Mc</p> <p><b>3) Test Fixture</b></p>	
<b>7</b>	<b>Local supplies/ Consumables</b>	<p>1) Compatible branded PC, 23-inch monitor, 2 TB SSD hard-drive, 16/32 GB RAM along with accessories like keyboard, mouse included (Lenovo/HP desktop only)</p> <p>2) A compatible UPS with 5 kVA with minimum of 30 minutes back up</p> <p>3) Silver Conductive Paste (Brand: RS Pro/ Tech-instro) <b>Quantity of minimum 5 bottles</b></p> <p>4) Copper foil tape electrodes <b>Quantity of 5 rolls</b></p> <p>5) Ceramic Tweezers (anti-corrosion, anti-static, anti-magnetic, heat resistant): <b>Quantity of 5</b></p> <p>6) Other consumable items which is routinely required for the measurements</p>	
<b>8</b>	<b>Future upgradation capabilities (Bidder must provide technical documents to prove that the quoted system can be extended for the listed</b>	<p>1) The system in future must be upgradable for Piezoelectric Measurements such as d33, e31 using all 3 means i.e AFM's, Laser Doppler Vibrometer's or Photonic sensors.</p> <p>2) The system should be compatible with Quantum design PPMS system for testing samples at 10K and 9 or 14 Tesla magnetic field simultaneously for Magnetolectric and Pyroelectric measurements.</p> <p>3) The system in future should be upgradable for Deep Level Transient Spectroscopy.</p> <p>4) The system should be upgradable for Magnetolectric coefficient measurements as followed:</p> <p>a. Magnetolectric Charge Coefficient</p> <p>b. Magnetolectric Voltage Coefficient</p> <p>c. Magnetolectric Coupling Coefficient</p>	



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	<i>capabilities. Unclear information will lead to disqualification)</i>		
9	<b>Bidder instruction</b>	ALL INFORMATION REGARDING EACH AND EVERY SPECIFICATION/MEASUREMENT/CALCULATION SHOULD BE MENTIONED ON THE OFFICIAL COMPANY WEBSITE. DATA IN TYPED FORMAT ON COMPANY LETTERHEAD IS ALSO UNACCEPTABLE (DATA HAS TO BE SUPPORTED WITH EVIDENCE/ RESEARCH PAPERS ON OFFICIAL COMPANY WEBSITE ONLY). BIDS THAT ARE NOT SUPPORTED BY LITERATURE ON THE OFFICIAL COMPANY WEBSITE WILL BE REJECTED WITHOUT GIVING ANY NOTICE. ALL DATA WILL BE CHECKED/CROSS-CHECKED FROM THE OFFICIAL COMPANY WEBSITE	
10	<b>Warranty</b>	One Year	