



INDIAN INSTITUTE OF TECHNOLOGY BOMBAY

MATERIALS MANAGEMENT DIVISION

Powai, Mumbai 400076.

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Rfx No. 6100002443

Technical Report: Four Point Probe (4PP) system for Sheet Resistance (R_s) measurements on thin film samples

Sr. No.	Specifications	Requirements/ Parameters	Technical compliance (Y/N)	Comments if any
1	Application	Sheet resistivity measurement of conductive and resistive metallic/compound thin films on piezoelectric/ceramic/semiconducting substrates.		
2	System configuration	The quoted system should be table top and an integrated system consisting of Source Measurement Units (SMUs), probe head, wafer holding stage, including a desktop system with required software.		
3	Measuring range	Range: 1 m Ω /sq – 1 M Ω /sq or higher Accuracy: 0.5% or better		
1	DC Current Source Unit	<ul style="list-style-type: none"> Range: 10nA to 100 mA Resolution: 1nA or better Accuracy: 0.5% or better Auto-ranging capability to determine optimum input current Provision for reversing the direction of current flow to be provided 		
2.	DC Voltage Measure Unit	<ul style="list-style-type: none"> Range: ± 1 mV to ± 1000 mV Resolution: ± 100 μV or better Accuracy: 0.5% or better Input Impedance: 10^{10} Ω or better Input bias current: 1uA or better 		
PROBE HEADS FOR R_s MEASUREMENT				
1	Probe type	Cylindrical shaped probe		

2	Probe tip material	Tungsten Carbide		
3	Tip radius	<ul style="list-style-type: none"> Radius ~ 40 μm Tolerance: 10 % or better of quoted radius. 		
4	Probe pressure	<ul style="list-style-type: none"> Pressure range 70 – 150 g Tolerance: $\pm 5\text{g}$ Provision for manually changing the pressure in the prescribed pressure range will be preferred.		
5	Probe spacing	<ul style="list-style-type: none"> Tip spacing ~ 1 mm Tolerance: $\pm 0.01\text{ mm}$ Linear array arrangement Planarity of tips: $\pm 0.025\text{ mm}$ or better 		
6	Electrical leakage	$10^{12}\Omega$ or better resistance between probe needles at 100 volts		
7	Probe Height adjustment	Adjustable probe position to accommodate samples with 15 cm maximum height is required		
8	Substrate Size	Provision to accommodate large area substrate (250 mm x 250 mm or larger) for surface mapping of SR		

CALIBRATION TEST SAMPLES

1	Calibration test samples	<ul style="list-style-type: none"> Vendor has to provide standard reference samples for calibration and demonstration of SR measurement range of the system. Calibration samples should be certified with traceability. 		
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COMPUTERS AND SOFTWARE

1	Computer and Software	<ul style="list-style-type: none"> System should be supplied with all the necessary software for measurement and analysis of the measured data System should have provision for onboard memory to store at least 25 measurement data Display for simultaneous indication of set current and either Ω/sq, $\Omega\text{ cm}$ or mV to be provided Provision for input of correction factor in the software during SR measurement to be provided. 		
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GENERAL SPECIFICATIONS

1.	Mains power supply	230 V \pm 10 % single phase (1 ϕ), 50Hz Exact electric load and heat dissipation for full operation to be specified		
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2.	Environmental conditions & site requirements	The quoted system shall be fully compatible to clean room with 22 ± 2 °C and 55 ± 5 % RH environmental condition.		
3.	Operation and trouble-shooting manuals along with electric/mechanical schematics	The system should have 2 sets of manuals in English in hard and soft copy format. This manual should cover detailed electrical/mechanical schematic diagrams, operation and troubleshooting.		
4.	System Demonstration	To assess system capability, SAC reserves the right to request the supplier to measure sheet resistivity on SAC supplied wafer/substrate before placing the order.		
5.	Warranty	System excluding consumables should be warranted for 1 year. To ensure full and efficient support during warranty period, local support is preferable.		
6.	Spares/consumables support	Manufacturer should provide list of all essential consumable spares and should ensure supply of the spares for period of not less than 10 years.		
7.	Installation & demonstration of performance	Manufacturers or their qualified representatives have the responsibility to install the complete system and demonstrate the performance as per specifications.		
8.	Training	Supplier shall provide necessary operational/maintenance training to IIT Bombay engineers/technicians by their qualified engineers.		
9.	System Weight & Size	Exact size & weight to be mentioned in the quote		
10.	OEM Authorization	If the bid is made by an Agent (other than the manufacturer), a valid authorization certificate must be submitted along with the technical bid.		
11.	Delivery period:	Within 20 Weeks from the date of PO placement		