

Laboratory Tektronix (India) Pvt. Ltd., Salarpuria Premia, Survey No. 16,
Kadubeesana Halli, Varthur Hobli, Sarjapur Outer Ring Road,
Bangalore , Karnataka

Accreditation Standard ISO/IEC 17025: 2005

Certificate Number CC-2130

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Validity 22.05.2018 to 21.05.2020

Last Amended on 22.06.2018

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
<u>ELECTRO TECHNICAL CALIBRATION</u>				
I.	SOURCE			
	DC Voltage ^s	1mV to 100mV 100mV to 1V 1V to 100V 100V to 1000V	0.0474 % to 0.0014.3 % 0.0014.3 % to 0.0005 % 0.0005 % to 0.0007 % 0.0007 % to 0.00083 %	Using Calibrator Fluke 5730A, 5720A by Direct Method
	DC Voltage*	10mV to 100mV 100mV to 1V 1V to 100V 100V to 1000V	0.0485 % to 0.0014 % 0.0014 % to 0.0007 % 0.0007 % to 0.0008 % 0.0008 % to 0.00085 %	Using Calibrator Fluke 5720A by Direct Method
		10 Hz to 40 Hz 1mV to 2mV 2mV to 20mV 20mV to 20V 20V to 200V	0.78 % to 0.26 % 0.26 % to 0.05 % 0.05 % to 0.03 % 0.03 % to 0.025 %	Using Calibrator Fluke 5730A, 5720A, 5522A by Direct Method
		40 Hz to 1kHz 1mV to 2mV 2mV to 20mV 20mV to 200mV 200mV to 2V 2V to 20V 20V to 1000V	0.6 % to 0.25 % 0.25 % to 0.03 % 0.03 % to 0.015 % 0.015 % to 0.006 % 0.006 % to 0.0065 % 0.0065 % to 0.0090%	
		1 kHz to 100 kHz 2mV to 2V 2V to 100V	0.45 % to 0.015 % 0.015 % to 0.02 %	

Rjeshwar Kumar
Convener

Avijit Das
Program Manager

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
		50Hz >20A to 1000A	0.35 % to 0.77 %	Using Calibrator Fluke 5522A with 5500A Current Coil by Direct Method
5.	Resistance ^{\$}	1 Ω to 10M Ω 10M Ω to 100M Ω 100M Ω to 1G Ω	0.011 % to 0.0009 % 0.0009 % to 0.0128 % 0.0128 % to .0322 %	Using Calibrator Fluke5730A,5522A by Direct Method
	Resistance*	1 Ω 10 Ω 100 Ω 1K Ω 10K Ω 100K Ω 1M Ω 10M Ω 1G Ω	0.00068 % 0.0005 % 0.0009 % 0.0009 % 0.0008 % 0.0009 % 0.0012 % 0.0013 % 0.031 %	Fixed Resistors, 742A/ 8508A-7000K
		1 Ω to 10M Ω	0.01 % to .004 %	Using Calibrator Fluke 5720A
		10M Ω to 100M Ω 100M Ω to 1G Ω	0.004 % to 0.014 % 0.014 % to 0.85 %	Calibrator Fluke 5522A /8508A by Direct Method
6.	Capacitance [#]	1kHz 220PF to 10nF 10nF to 1 μ F 1 μ F to 100Mf	5.8 % to 0.41 % 0.41 % 0.41 % to 0.28 %	Using Calibrator Fluke 5522A
	Capacitance ^{\$}	100mF to 1F	0.28 % to 0.66 %	Using Capacitor Standard GR 1417 by Direct Method

Rjeshwar Kumar
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7.	Inductance [#]	1kHz 100 μ H to 10H	0.3 % to 0.12 %	Using Standard Inductance Genrad 1482 Series by Direct Method
8.	DC Power [#]	1V to 600V 1mA to 1000A 1mW to 10W 10W to 1kW 1kW to 12kW	0.038% to 0.43% 0.03 % to 0.45 % 0.45% to 0.41%	Using Calibrator Fluke 5522A with 5500 Coil
		50 Hz to 1 kHz @ UPF 120 V to 240 V 0.01 A to 20 A 1.2 W to 4.8 kW	0.095 % to 0.12 %	Using Calibrator Fluke 5522A with 5500 Coil
		50Hz to 1kHz @ 0.8PF 120V to 240V 0.1A to 20A 9.6W to 3.8kW	0.099 % to 0.24 %	
		50Hz to 1kHz @ 0.5PF 120V to 240V 0.1A to 20A 6W to 2.4kW	0.38 % to 0.39 %	
		50Hz to 1kHz @ 0.2PF 120V to 240V 0.1A to 20A 2.4W to 960W	0.56 % to 0.58 %	

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
10.	Temperature Simulation# K-Type Thermocouple J-Type Thermocouple T-Type Thermocouple R-Type Thermocouple S-Type Thermocouple N-Type Thermocouple RTD-Type	(-) 200°C to 1372°C (-) 200°C to 1200°C (-) 250°C to 400°C (-) 0°C to 1750°C (-) 0°C to 1750°C (-) 200°C to 1300°C (-) 200°C to 800°C	0.47 °C 0.32 °C 0.74 °C 0.67 °C 0.56 °C 0.47 °C 0.37 °C	Using Calibrator Fluke 5522A by Direct Method
11.	Oscilloscope# Amplitude (Dc Signal) Bandwidth Time Marker	1mV to 100mV 100mV to 190V 50kHz & 10MHz Ref 50kHz to 8GHz 8GHz to 18GHz 18GHz to 26 GHz 1ns to 5s	0.21 % to 0.06 % 0.06 % to 0.03 % 0.22 dB to 0.26 dB 0.26 dB to 0.35 dB 0.35 dB to 0.45 dB 0.0001 % to 0.00003 %	Using Oscilloscope Calibrator Fluke 9500B/9530 Heads, Bandwidth Signal Generator E8257D, MA2438A ML2444D Time Marker
	Frequency [§]	1Hz to 10MHz 10MHz to 20GHz 20 GHz to 40 GHz	0.0000058 % to 0.00000058 % 0.00000058 % to 0.00000029% 0.00000029% to 0.00000046%	Using Function Generator AFG 3252, Signal Generator E8257D By Direct Method
	Frequency*	1Hz to 10MHz 10MHz to 20GHz 20GHz to 40 GHz	0.00012 % to 0.00006 % 0.00006 % to 0.00035 % 0.00035 % to 0.00046 %	Using Function Generator AFG3252, Signal Generator MG3694C By Direct Method

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13.	Rf Power [§]	10MHz to 18GHz Impedance 50Ω -50dBm to 12dBm 18GHz to 40 GHz Impedance 50 Ω -50 dBm to 12 dBm	5.5 % to 6.0 % 6.0 % to 8.7 %	Using Signal Generator E8257D Power meter with Sensor ML2438A, MA2444D by Direct Method
14.	Rf Attenuation [#]	10MHz to 18GHz 1dB to 50dB	0.25 dB to 0.45 dB	Using Signal Generator E8257D, Power Meter MA 2438A with Sensor ML 2444d, Step Attenuator 8494B, 8496B.
15.	VSWR [§]	10MHz to 18GHz Fixed Values 1.05(0.023), 1.10, 1.20, 1.50, 2.0(0.33)	0.095 LU to 0.40 LU	Using Maury Microwave 2611A Series by Direct Method
II.	MEASURE			
	Dc Voltage [§]	1mV to 10mV 10mV to 1V 1V to 1000V	0.0082% to 0.0052% 0.0052% to 0.0005% 0.0005% to 0.00053 %	Using DMM Fluke 8508A by Direct Method
	Dc Voltage [*]	10mV to 10V 1V to 1000V	0.04 % to 0.0019 % 0.001 % to 0.0035 %	Using DMM Fluke 8508A by Direct Method
2.	AC Voltage [§]	10 Hz to 40 Hz 1 mV to 10 mV 10 mV to 1 V 1 V to 100 V	0.16 % to 0.038 % 0.038 % to 0.01 % 0.01 % to 0.01 %	Using AC Measurement Standard Fluke 5790A by Direct Method

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		40 Hz to 10 kHz 1 mV to 10 mV 10 mV to 1 V 1 V to 1000 V	0.17 % to 0.023 % 0.023 % to 0.008 % 0.008 % to 0.015 %	
		10 kHz to 100 kHz 1 mV to 1 V 1 V to 10 V 10 V to 100 V	0.42 % to 0.016 % 0.016 % to 0.009 % 0.009 % to 0.03 %	
		100 kHz to 1 MHz 1 mV to 10 mV 10 mV to 10 V	0.44 % to 0.19 % 0.19 % to 0.14 %	
	Ac Voltage*	1 kHz 100 mV to 1 V 1 V to 10 V 10 V to 100 V 100 V to 700 V 700 V to 1000 V	0.21 % to 0.44 % 0.04 % to 0.011 % 0.011 % to 0.03 % 0.03 % to 0.05 % 2.03 % to 0.084 %	Using DMM Agilent 3458A /Fluke 8508A by Direct Method
3.	DC Current [#]	100 μ A to 1 mA 1 mA to 100 mA 100 mA to 1 A 1 A to 20 A >20 A to 100 A	0.045 % to 0.003 % 0.003 % to 0.005 % 0.005 % to 0.0027 % 0.0027 % to 0.005 % 0.32 % to 0.33 %	Using DMM Fluke 8508A/Fluke A40 Shunts by Direct Method Using Vaiseshika 9410

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		@0.8 pF, 50Hz 60V to 240V, 0.1A to 20A 9.6W to 896W 96W to 960W 960W to 3.8kW	0.37 % to 0.15 % 0.15 % to 0.151 %	
	Frequency [§]	1Hz to 10MHz 10MHz to 20GHz 20GHz to 40GHz	0.0000058 % to 0.0000058 % 0.0000058 % to 0.0000029 % 0.0000029 % to 0.0000046 %	Using Rubidium Fluke 910R/ Counter Tek MCA 3040 counter/ Analyzer
	Frequency*	1Hz to 10MHz 10MHz to 20GHz 20GHz to 40 GHz	0.00015 % to 0.000065 % 0.000065 % to 0.000035 % 0.000035 % to 0.000049 %	Using Microwave Counter/Analyzer Tektronix MCA3040
	Rf Power [§]	10MHz to 18GHz Impedance 50 Ohm (-)50dBm to 12dBm 18MHz to 40GHz Impedance 50 Ohm (-)50dBm to 12dBm	5.5 % to 6.0 % 6.0 % to 8.7 %	Using Signal Generator E8257D, Power Meter with Sensor ML 2438A and MA2444D by Direct method
	Rf Power*	10MHz to 18GHz Impedance 50 Ohm (-)50dBm to 12dBm 18MHz to 40GHz Impedance 50 Ohm (-)50dBm to 12dBm	6.0 % to 7.0 % 7.0 % to 9.0 %	Using Signal Generator MG3694C, Power Meter with Sensor ML 2438A and MA2444D by Direct Method

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<u>THERMAL CALIBRATION</u>				
I.	TEMPERATURE			
1.	Temperature RTD, Thermocouple, (With Or Without Indicator) Temperature Gauge [§]	0°C to 400°C 400°C to 700°	0.29 °C 1.68 °C	Using SPRT & 8 ½ DMM by Comparison Method Using S-Type Thermocouple & 8 ½ DMM by Comparison Method
2	Oven, Bath ,Dry well , Furnace \$ (Single Point)	(-)40°C to 400°C 400°C to 1000°C	0.25 °C 1.74 °C	Using SPRT & 8 ½ DMM by Direct Method Using S-Type Thermocouple & 8 ½ DMM by Comparison Method
3.	Temperature Chamber, Oven, Bath* (Multipoint)	(-)70 °C to 180°C	1.52 °C	Using RTD With LOGGER 2638A by Direct Method

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4.	Specific Heat-Humidity , Humidity Chamber* (Centre of the Chamber)	20 % RH to 95%RH @25°C	1.55 % RH	Using Hygropalm Rotronic, HP22-A by direct Method

* Measurement Capability is expressed as an uncertainty (\pm) at a confidence probability of 95%

§Only in Permanent Laboratory

*Only for Site Calibration

#The laboratory is also capable for site calibration however, the uncertainty at site depends on the prevailing actual environmental conditions and master equipment used.

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