Laboratory	**Test Equipment Support, Bharat Electronics Ltd., Site-IV, Sahibabad, Ghaziabad, Uttar Pradesh**
Accreditation Standard	**ISO/IEC 17025: 2005**
Certificate Number	**CC-2800** **Page 1 of 6**
Validity	**06.08.2018 to 05.08.2020** **Last Amended on -**

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
		ELECTRO-TECHNICAL CALIBRATION		
I.	**MEASURE**			
1.	DC Voltage[$]	1 mV to 100 mV 100 mV to 1000 V	0.051 % to 0.0016 % 0.0016 % to 0.001 %	Using 8½ Digit Digital Multi Meter Fluke 8508A by Direct Method
2.	DC Current[$]	1 µA to 100 mA 100 mA to 20 A	0.05 % to 0.007 % 0.007 % to 0.05 %	Using 8½ Digit Digital Multi Meter Fluke 8508A by Direct Method
3.	AC Voltage[$]	**20 Hz to 10 kHz** 10 mV to 100 V	0.061 % to 0.016 %	Using 8½ Digit Digital Multi Meter Fluke 8508A by Direct Method
		50 Hz to 10 kHz 100 V to 1000 V	0.013 % to 0.030 %	
		10 kHz to 100 kHz 100 mV to 100 V	0.021 % to 0.57 %	
		100 kHz to 1 MHz 0.5 V to 10 V	5.71 % to 0.80 %	
4.	AC Current[$]	**50 Hz to 1 kHz** 10 µA to 10 A	0.083 % to 0.12 %	Using 8½ Digit Digital Multi Meter Fluke 8508A by Direct Method
		1 kHz to 5 kHz 10 uA to 10 A	0.12 % to 0.31 %	
5.	DC Resistance[$]	1 Ω to 1 MΩ	0.01 % to 0.0013 %	Using 8½ Digit Digital Multi Meter Fluke 8508A by Direct Method
		1 MΩ to 100 MΩ	0.0013 % to 0.04 %	
		1 GΩ	0.65 %	

Sangeeta Kunwar
Convenor

Avijit Das
Program Manager

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
6.	AC Resistance[$]	**50 Hz to 1 MHz** 10 Ω to 100 Ω	2.0 % to 0.5 %	Using Precision LCR Meter Agilent 4284A by Direct Method
		50 Hz to 1 MHz 100 Ω to 10 kΩ	0.5 % to 0.12 %	
7.	Capacitance[$]	**1 kHz to 10 kHz** 1 pF to 1 nF 1 nF to 1 μF	0.21 % to 0.07 % 0.07 % to 0.21 %	Using Precision LCR Meter Agilent 4284A by Direct Method
		10 kHz to 1 MHz 1 pF to 1nF	0.07 % to 0.45 %	
8.	Inductance[$]	**1 kHz** 10 μH to 1 H	1.0 % to 0.2 %	Using Precision LCR Meter Agilent 4284A by Direct Method
9.	Frequency[$]	10 Hz to 40 GHz	1.4×10^{-6} to 6.8×10^{-10}	Using Frequency Counter CNT-90XL with GPS -89, Measuring Rx. FSMR, Signal Gen SMF 100A, RF Ref source-9640A by Comparison Method
10.	RF Power[$]	**6 KHz to 50 MHz** 1 mW	3.0 % to 2.0 %	Using Power Meter E4416A with Sensor 8481A by Comparison Method
		50 MHz to 18 GHz 1 μW to 100 mW	2.5 % to 5.7 %	
		18 GHz to 40 GHz 100 μW to 1 mW	3.22 % to 4.0 %	
11.	Amplitude [$] Modulation Depth	10 % to 85 % CW: 1 GHz MF: 1 KHz	4.7 %	Using Modulation Analyzer HP, 8901B by Direct Method

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
12.	Frequency [$] Modulation Deviation	**10 KHz to 100 KHz** CW: 1 GHz MF: 1 KHz	6.6 %	Using Modulation Analyzer HP, 8901B by Direct Method
II.	**SOURCE**			
1.	DC Voltage[$]	1 mV to 100 mV 100 mV to 1000 V	0.074 % to 0.0014 % 0.0014 % to 0.0008 %	Using Multi Function Calibrator Fluke 5520A, 5730A with Trans-conductance Amplifier 52120A by Direct Method
2.	DC Current[$]	1 μA to 100 mA 100 mA to 1A 1 A to 20 A	0.68 % to 0.006 % 0.006 % to 0.011 % 0.011 % to 0.12 %	Using Multi Function Calibrator Fluke 5520A, 5730A with Trans-conductance Amplifier 52120A by Direct Method
3.	AC Voltage[$]	**10 Hz to 50 Hz** 2 mV to 100 V	0.25 % to 0.036 %	Using Multi Function Calibrator Fluke 5520A, 5730A with Trans-conductance Amplifier 52120A by Direct Method
		50 Hz to 1 kHz 2 mV to 1000 V	0.36 % to 0.009 %	
		1 KHz to 100 KHz 2 mV to 300 V	0.35 % to 0.37 %	
		100 KHz to 1 MHz 2 mV to 10V	1.63 % to 0.25 %	
4.	AC Current[$]	**50 Hz to 1 kHz** 30 μA to 20 A	0.53 % to 3.43 %	Using Multi Function Calibrator Fluke 5520A, 5730A with Trans-conductance Amplifier 52120A by Direct Method
		1 KHz to 5 kHz 30 μA to 20 A	0.91 % to 3.42 %	

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
5.	High Current[$] (DC)	20 A to 100 A	0.12 % to 0.08 %	Using Multi Function Calibrator FLUKE 5520A, 5730A with Trans- conductance Amplifier 52120A by Direct Method
6.	High Current[$] (AC)	**50 Hz** 20 A to 120 A	0.18 % to 0.08 %	Using Multi Function Calibrator FLUKE 5520A, 5730A with Trans- conductance Amplifier 52120A by Direct Method
7.	DC Resistance[$]	1 Ω to 100 kΩ 100 kΩ to 100 MΩ 1 GΩ	0.012 % to 0.003 % 0.003 % to 0.07 % 0.65 %	Using Calibration System Fluke 5520A, Standard Resistance OHM labs 109S by Direct Method
8.	AC Resistance[$]	**1 kHz** 1 Ω 10 Ω 100 Ω 1 kΩ 10 kΩ	 0.025 % 0.025 % 0.01 % 0.01 % 0.01 %	Using Tinsley 1659-1Ω, Tinsley 1659-10 Ω, Tinsley 5685A, Tinsley 5685B-1k, Tinsley 5685B-10k by Direct Method
9.	Capacitance[$]	**1 kHz** 1 pF 10 pF 100 pF 0.001 µF 0.01 µF 0.1 µF 1 µF	 0.21 % 0.31 % 0.06 % 0.08 % 0.22 % 0.22 % 0.22 %	Using IET SCA, IET 1404-9703, IET 1404-9702, GR 1409-F, GR 1409-L, GR 1409-T, GR 1409-Y by Direct Method

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
10.	Frequency[$]	10 Hz to 40 GHz	2.18×10^{-5} to 6.8×10^{-10}	Using GPS Controlled Reference Frequency Standard Pendulum GPS-89, Freq Counter Pendulum CNT 90 XL, Measuring Receiver R&S-FSMR, Signal Generator R&S SMF 100A, RF Ref Source Fluke 9640 A (Locked with GPS Controlled Frequency Standard) by Direct Method
11.	Inductance[$]	**1 kHz** 10 µH 100 µH 1mH 10 mH 100 mH 1 H	 1.0 % 0.051 % 0.03 % 0.02 % 0.02 % 0.02 %	Using IET LABS 1482 AA, IET LABS 1482-9702, TINSLEY 4190B, IET LABS 1482H, IET LABS, 1482L, TINSLEY,4190C by Direct Method
12.	Oscilloscope[$] Square Wave Voltage	6 mV to 60 V	0.31 % to 0.12 %	Using Oscilloscope Calibrator, Fluke 9500B by Direct Method
	Time	10 ns to 10 ms	0.01 %	
	Band With	50 kHz to 600 MHz	2.3 % to 5.0 %	
		600 MHz to 2 GHz	5.0 % to 6.7 %	
13.	RF Power[$]	**6 KHz to 50 MHz** 10 µW to 25 mW	 1.14 % to 1.52 %	Using RF Reference Source Fluke 9640 A, Signal Generator R&S SMF-100A,

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
		50 MHz to 12 GHz 1 µW to 100 mW	0.26 % to 3.0 %	Power Meter R&S NRP-2 with power Sensor Z51 & Z55 by Direct Method
		12 GHz to 40 GHz 1 µW to 10 mW	3.0 % to 4.5 %	
14.	Amplitude Modulation Depth[$]	10 % to 85 % CW: 1 GHz MF: 1 KHz	4.75 % to 5.63 %	Using Reference Source Fluke 9640 A, Modulation Analyzer HP 8901B by Direct Method
15.	Frequency Modulation Deviation[$]	10 KHz to 90 KHz CW: 1 GHz MF: 1 KHz	8.9 %	Using Reference Source Fluke 9640 A, Modulation Analyzer HP, 8901B by Direct Method

*** Measurement Capability is expressed as an uncertainty (±) at a confidence probability of 95%**
[$]Only in Permanent Laboratory