Accreditation No: LAB 018

Awarded to

Precision Measuring Equipment Laboratory
APF, PAC Kamra Attock, Pakistan.

The scope of accreditation is in accordance with the standard specifications outlined in the following page(s) of this document. The accredited scope shall be visible and legible in areas such as customer service, sample-receiving section etc and shall not mislead its users.

The accreditation was first time granted on **28-10-2005** by Pakistan National Accreditation Council.

The laboratory complies with the requirements of **ISO/IEC 17025:2017.**

The accreditation requires regular surveillance, and is valid until **01-01-2027.**

The decision of accreditation made by Pakistan National Accreditation Council implies that the organization has been found to fulfill the requirements for accreditation within the scope.

The organization however, itself is responsible for the results of performed measurements/tests.

PAKISTAN NATIONAL ACCREDITATION COUNCIL

29-03-2024
Date

SD
Director General

Calibration Laboratory.

Accreditation Scope of Precision Measuring Equipment
Laboratory APF, PAC Kamra, Attock, Pakistan

Permanent laboratory premises X

Field of Measurement: -

Measured Quantity	Range	*Expanded Uncertainty (±)	Technique, Reference Standard, Equipment
DC VOLTAGE **(SOURCE)**	100 mV at 100 mV Range	0.0003 mV	CP No. PM/CP-01 1. REFERENCE STANDARD: FLUKE 5520A MULTIFUNCTION CALIBRATOR (SOURCE) 2. UNIT UNDER TEST: HP 34401A DIGITAL MULTIMETER (MEASURE)
	1 V at 1 V Range	0.00012 V	
	10V at 10V Range	0.00011 V	
	-10V at 10V Range	0.00011 V	
	50V at 50V Range	0.0004 V	
	100V at 100V Range	0.0007 V	
	500V at 1000V Range	0.004 V	
	800V at 1000V Range	0.006 V	
	1000V at 1000V Range	0.008 V	
AC VOLTAGE **(SOURCE)**	100mV @ 10Hz at 100mV Range	0.0049 mV	CP No. PM/CP-01 1. REFERENCE STANDARD: FLUKE 5520A MULTIFUNCTION CALIBRATOR (SOURCE) 2. UNIT UNDER TEST: HP 34401A DIGITAL MULTIMETER (MEASURE)
	100mV @ 50Hz at 100mV Range	0.0058 mV	
	100mV @ 1KHz at 100mV Range	0.0047 mV	
	100mV @ 50KHz at 100mV Range	0.0068 mV	
	1V @ 50Hz at 1V Range	0.000047 V	
	10V @ 50Hz at 10V Range	0.00046 V	
	100V @ 50Hz at 100V Range	0.0048 V	
	300V @ 50Hz at 750V Range	0.045 V	
	500V @ 50Hz at 750V Range	0.048 V	
	750V @ 50Hz at 750V Range	0.14 V	
	1V @ 1KHz at 1V Range	0.000047 V	
	10V @ 1KHz at 10V Range	0.00036 V	
	100V @ 1KHz at 100V Range	0.0064 V	
	300V @ 1kHz at 750V Range	0.046 V	
	500V @ 1kHz at 750V Range	0.047 V	
	750V @ 1kHz at 750V Range	0.048 V	
	1V @ 10KHz at 1V Range	0.00053 V	
	10V @ 10KHz at 10V Range	0.00046 V	
	100V @ 10KHz at 100V Range	0.0063 V	

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Field of Measurement: -

Measured Quantity	Range	*Expanded Uncertainty (±)	Technique, Reference Standard, Equipment
AC VOLTAGE **(SOURCE)**	300V @ 10KHz at 750V Range	0.046 V	CP No. PM/CP-01 1. REFERENCE STANDARD: FLUKE 5520A MULTIFUNCTION CALIBRATOR (SOURCE) 2. UNIT UNDER TEST: HP 34401A DIGITAL MULTIMETER (MEASURE)
	500V @ 10KHz at 750V Range	0.047 V	
	750V @ 10KHz at 750V Range	0.048 V	
	1V @ 50KHz at 1V Range	0.000043 V	
	10V @ 50KHz at 10V Range	0.012 V	
	100V @ 50KHz at 100V Range	0.047 V	
	300V @ 50KHz at 750V Range	0.047 V	
DC CURRENT **(SOURCE)**	10mA at 10mA Range	0.00016 mA	CP No. PM/CP-01 1. REFERENCE STANDARD: FLUKE 5520A MULTIFUNCTION CALIBRATOR (SOURCE) 2. UNIT UNDER TEST: HP 34401A DIGITAL MULTIMETER (MEASURE)
	100mA at 100mA Range	0.0015 mA	
	1A at 1A Range	0.001 A	
	3A at 3A Range	0.001 A	
AC CURRENT **(SOURCE)**	1A @ 50Hz at 1A Range	0.001 A	CP No. PM/CP-01 1. **REFERENCE STANDARD:** FLUKE 5520A MULTIFUNCTION CALIBRATOR **(SOURCE)** 2. **UNIT UNDER TEST:** HP 34401A DIGITAL MULTIMETER **(MEASURE)**
	3A @ 50Hz at 3A Range	0.033 A	
	1A @ 1kHz at 1A Range	0.001 A	
	3A @ 1kHz at 3A Range	0.001 A	
	1A @ 5kHz at 1A Range	0.001 A	
	3A @ 5kHz at 3A Range	0.001 A	
RESISTANCE **(SOURCE)**	100Ω at 1kΩ Range	0.0012 Ω	CP No. PM/CP-01 1. REFERENCE STANDARD: FLUKE 5520A MULTIFUNCTION CALIBRATOR (SOURCE) 2. UNIT UNDER TEST: HP 34401A DIGITAL MULTIMETER (MEASURE)
	1kΩ at 1kΩ Range	0.000018 kΩ	
	10kΩ at 10kΩ Range	0.00011 kΩ	
	100kΩ at 100kΩ Range	0.0015 kΩ	
	1MΩ at 10MΩ Range	0.000039 MΩ	
	10MΩ at 10MΩ Range	0.00031 MΩ	
	100MΩ at 100MΩ Range	0.0256 MΩ	
FREQUENCY **(SOURCE)**	9Hz at 110mV Range	0.0001 Hz	CP No. PM/CP-01 1. REFERENCE STANDARD: FLUKE 5520A MULTIFUNCTION
	30Hz at 110mV Range	0.0003 Hz	

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	300kHz at 110mV Range	0.0022 kHz	CALIBRATOR (SOURCE) 2. UNIT UNDER TEST: HP 34401A DIGITAL MULTIMETER (MEASURE)

Field of Measurement: -

Measured Quantity	Range	*Expanded Uncertainty (±)	Technique, Reference Standard, Equipment
CAPACITANCE **(SOURCE)**	1nF	0.08 nF	CP No. PM/CP-42 1. REFERENCE STANDARD: FLUKE 5520A MULTIFUNCTION CALIBRATOR (SOURCE) 2. UNIT UNDER TEST: U1242B DIGITAL MULTIMETER (MEASURE)
	10nF	0.08 nF	
	100nF	0.10 nF	
	1µF	0.0010 µF	
	10µF	0.002 µF	
	100µF	0.12 µF	
	1mF	0.0010 mF	
	10mF	0.007 mF	
DC VOLTAGE **(MEASURE)**	10V	0.00023 V	CP No. PM/CP-27 & PM/CP-16 1. REFERENCE STANDARDS: (A) HP 34401A DIGITAL MULTIMETER (MEASURE) (B) HP 6051A SYSTEM DC ELECTRONIC LOAD (MEASURE) 2. UNIT UNDER TEST**:** 6543A DC POWER SUPPLY (SOURCE)
	20V	0.0014 V	
	30V	0.0015 V	
DC CURRENT **(MEASURE)**	1A	0.00003 A	CP No. PM/CP-27 & PM/CP-16 **1. REFERENCE STANDARDS:** (A) HP 34401A DIGITAL MULTIMETER (MEASURE) (B) HP 6051A SYSTEM DC ELECTRONIC LOAD (MEASURE) (C) RC80/3 STANDARD RESISTOR (MEASURE) **2. UNIT UNDER TEST:** HP6541A DC POWER SUPPLY (SOURCE)
	5A	0.00022 A	
	10A	0.00009 A	
	15A	0.0003 A	
	20A	0.0003 A	
TEMPERATURE **(SOURCE)**	-20 ºC	0.2 ˚C	P-008 1. REFERENCE STANDARDS: (A) FLUKE 9103 DRY WELL CALIBRATOR (SOURCE)
	-10 ºC	0.2 ºC	
	0 ºC	0.2 ºC	

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	20 °C	0.2 ºC	2. UNIT UNDER TEST: 6685PK0001541 DIGITAL THERMOMETER (MEASURE)
	40 ºC	0.2 ºC	
	60 °C	0.2 ºC	
	80 ºC	0.2 ºC	
	100 ºC	0.2 ºC	

Field of Measurement: -

Measured Quantity	Range	*Expanded Uncertainty (±)	Technique, Reference Standard, Equipment
TEMPERATURE **(SOURCE)**	-190 ºC	0.08 ºC	P-015 & P-008 1. REFERENCE STANDARD: FLUKE 5520A MULTIFUNCTION CALIBRATOR (SOURCE) 2. UNIT UNDER TEST: FLUKE 51 II THERMOMETER WITH THERMOCOUPLE (MEASURE)
	-150 ºC	0.08 ºC	
	-100 ºC	0.08 °C	
	-50 ºC	0.08 ºC	
	0 ºC	0.08 ºC	
	50 ºC	0.08 ºC	
	100 ºC	0.08 ºC	
	150 ºC	0.08 ºC	
	200 ºC	0.08 ºC	
	250 ºC	0.08 ºC	
	300 ºC	0.08 ºC	
	350 ºC	0.08 ºC	
	400 ºC	0.08 ºC	
	450 ºC	0.08 ºC	
	500 ºC	0.08 ºC	
	550 ºC	0.08 ºC	
	600 ºC	0.08 ºC	
	650 ºC	0.08 ºC	
	700 ºC	0.08 ºC	
	750 ºC	0.08 ºC	
	800 ºC	0.08 ºC	
	850 ºC	0.08 ºC	
	900 ºC	0.08 ºC	
	950 ºC	0.08 ºC	
	1000 ºC	0.58 ºC	
	1050 ºC	0.58 ºC	
	1100 ºC	0.58 ºC	
	1150 ºC	0.58 ºC	

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	1200^{O}C	0.58^{O}C	
	1250^{O}C	0.58^{O}C	
	1300^{O}C	0.58^{O}C	
	1350^{O}C	0.58^{O}C	

Field of Measurement: -

Measured Quantity	Range	*Expanded Uncertainty (±)	Technique, Reference Standard, Equipment
RF AMPLITUDE **(MEASURE)**	-20 dBm @ 10.1 MHz	0.11 dBm	CP No. PM/CP-45 **1. REFERENCE STANDARDS:** (A) HP437B POWER METER (MEASURE) (B) HP8482A POWER SENSOR (MEASURE) (C) HP8485A POWER SENSOR (MEASURE) **2. UNIT UNDER TEST:** E8247C PSG CW SIGNAL GENERATOR (SOURCE)
	-10 dBm @ 10.1 MHz	0.15dBm	
	0 dBm @ 10.1 MHz	0.11 dBm	
	10dBm @ 10.1MHz	0.11 dBm	
	-20dBm @ 1GHz	0.04dBm	
	-10dBm @ 1GHz	0.11dBm	
	0dBm @ 1GHz	0.04dBm	
	10dBm @ 1GHz	0.04dBm	
	-20dBm @ 1.9GHz	0.03dBm	
	-10dBm @ 1.9GHz	0.10dBm	
	0dBm @ 1.9GHz	0.02dBm	
	10dBm @ 1.9GHz	0.02dBm	
	-20dBm @ 2.1GHz	0.17dBm	
	-10dBm @ 2.1GHz	0.20dBm	
	0dBm @ 2.1GHz	0.20dBm	
	10dBm @ 2.1GHz	0.17dBm	
	-20dBm @ 10GHz	0.17dBm	
	-10dBm @ 10GHz	0.20dBm	
	0dBm @ 10GHz	0.17dBm	
	10dBm @ 10GHz	0.17dBm	
	-20dBm @ 20GHz	0.17dBm	
	-10dBm @ 20GHz	0.20dBm	

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	0dBm @ 20GHz	0.17dBm	
	10dBm @ 20GHz	0.17dBm	

Field of Measurement: -

Measured Quantity	Range	*Expanded Uncertainty (±)	Technique, Reference Standard, Equipment
RF FREQUENCY **(MEASURE)**	10 MHz @ 0 dBm	0.0000098 MHz	CP No. PM/CP-45 & P-294 1. REFERENCE STANDARDS: (A) M/W FREQUENCY COUNTER 53151A(MEASURE) (B) GPS CONTROLLED FREQ STANDARD 2. UNIT UNDER TEST: (A) E8247C PSG CW SIGNAL GENERATOR (SOURCE) (B) GIGA-TRONICS 2440B SIGNAL GENERATOR (SOURCE)
	100 MHz @ 0 dBm	0.00069 MHz	
	200 MHz @ 0 dBm	0.0014 MHz	
	400 MHz @ 0 dBm	0.0028 MHz	
	750 MHz @ 0 dBm	0.0052 MHz	
	1.111111111 GHz @ 0 dBm	0.0000077 GHz	
	2.222222222 GHz @ 0 dBm	0.000015 GHz	
	3.333333333 GHz @ 0 dBm	0.000023 GHz	
	4.444444444 GHz @ 0 dBm	0.000031 GHz	
	5.555555555 GHz @ 0 dBm	0.000038 GHz	
	6.666666666 GHz @ 0 dBm	0.000046 GHz	
	7.777777777GHz @ 0 dBm	0.000054 GHz	
	8.888888888GHz @ 0 dBm	0.000062 GHz	
	9.999999999GHz @ 0 dBm	0.000069 GHz	
	10GHz @ 0 dBm	0.000069 GHz	
	20GHz @ 0 dBm	0.00014 GHz	
AC POWER **(SOURCE)**	3µW	0.01µW	CP No. PM/CP-02 1. REFERENCE STANDARD: HP11683A RANGE CALIBRATOR (SOURCE) 2. UNIT UNDER TEST: HP 437B POWER METER (MEASURE)
	10µW	0.01µW	
	30µW	0.1µW	
	100µW	0.1µW	
	0.3mW	0.001mW	
	1mW	0.001mW	
	3mW	0.01mW	

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	10mW	0.01mW	
	30mW	0.1mW	
	100mW	0.1mW	

Field of Measurement: -

Measured Quantity	Range	*Expanded Uncertainty (±)	Technique, Reference Standard, Equipment
OUTPUT OFFSET **(MEASURE)**	4.995 VDC @1kHz	0.00015 V	CP No. PM/CP-64 1. REFERENCE STANDARD: HP34401A DMM (MEASURE) 2. UNIT UNDER TEST: AGILENT 33250A FUNCTION / ARBITRARY WAVEFORM GENERATOR (SOURCE)
	4.0 VDC @1kHz	0.00015 V	
	3.0 VDC @1kHz	0.00012 V	
	2.0 VDC @1 kHz	0.00015 V	
	1.0 VDC @1 kHz	0.00012 V	
	0.0 VDC @1 kHz	0.000001 V	
	-1.0 VDC @1 kHz	0.00017 V	
	-2.0 VDC @1 kHz	0.00018 V	
	-3.0 VDC @1 kHz	0.00018 V	
	-4.0 VDC @1kHz	0.00018 V	
	-4.995 VDC @1kHz	0.00018 V	
PRESSURE **(SOURCE)**	500 psi	7 psi	CP No. PM/CP-25 1. REFERENCE STANDARD: KNC 3666-C AUTOMATIC PRESSURE CALIBRATION SYSTEM (SOURCE) 2. UNIT UNDER TEST: PRESSURE GAUGE 0-6000 psi (MEASURE)
	1000 psi	7 psi	
	1500 psi	7 psi	
	2000 psi	7 psi	
	2500 psi	7 psi	
	3000 psi	7 psi	
	3500 psi	8 psi	
	4000 psi	7 psi	
	4500 psi	7 psi	
	5000 psi	8 psi	
	5500 psi	7 psi	

* **Expanded Uncertainty:**

*Expanded Uncertainty is the measurement uncertainty at a coverage probability of 95 %, which usually requires the use of a coverage factor of k = 2. This measurement uncertainty is a value for which the laboratory has been accredited using the procedure that was the subject of assessment. In certificates issued under its accreditation scope an accredited laboratory is not permitted to quote an uncertainty that is smaller than the published uncertainty for respective ranges as given above.

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