

Scope of Accreditation For Tra-Cal, LLC

7901 Beechcraft Avenue, Suite M & N
Gaithersburg, Maryland 20879
Todd Chaikin
301-527-9200

In recognition of a successful assessment to ISO/IEC 17025:2005, accreditation is granted to **Tra-Cal, LLC** to perform the following Calibrations:

Accreditation granted through: **January 10, 2010**

Calibration

Electricity and Magnetism – Voltage

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) ²	Remarks
DC Voltage - Source	0 mV to 220 mV	3.7 μ V/V + 0.6 μ V	5700A/5725A
	2.2 V	30 μ V/V + 1 μ V	
	11 V	240 μ V/V + 3.5 μ V	
	22 V	160 μ V/V + 6.5 μ V	
	220 V	1.7 mV/V + 80 μ V	
	1000 V	17 mV/V + 500 μ V	
	1 kV to 30 kV	70 μ V/V + 3 μ V	CPS 100N
DC Voltage – Measure	1 μ V to 100 mV	1.7 μ V/V + 0.3 μ V	8 ½ Digit DMM
	100 mV to 1 V	23 μ V/V + 0.3 μ V	
	1 V to 10 V	88 μ V/V + 0.5 μ V	
	10 V to 100 V	990 μ V/V + 30 μ V	
	100 V to 1000 V	17 mV/V + 100 μ V	
DC Voltage – Measure	1 kV to 10 kV (10K: 1)	32 V + 1.2 μ V	Fluke 80E-10 / 8 ½ Digit DMM
	1 kV to 10 kV (1K: 1)	32 V + 4 μ V	
	1 kV to 40 kV	47 V + 0.45 μ V	CPS HVP-250 w/8 ½ Digit DMM
AC Voltage – Source 2.2 mV	10 Hz to 20 Hz	3.6 μ V/V + 6 μ V	5700A/5725A
	20 Hz to 40 Hz	2.5 μ V/V + 6 μ V	
	40 Hz to 20 kHz	2.1 μ V/V + 6 μ V	

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) ²	Remarks
	20 kHz to 50 kHz	4.1 $\mu\text{V/V} + 6 \mu\text{V}$	
	50 kHz to 100 kHz	4.9 $\mu\text{V/V} + 8 \mu\text{V}$	
	100 kHz to 300 kHz	31 $\mu\text{V/V} + 15 \mu\text{V}$	
	300 kHz to 500 kHz	66 $\mu\text{V/V} + 30 \mu\text{V}$	
	500 kHz to 1 MHz	67 $\mu\text{V/V} + 30 \mu\text{V}$	
22 mV	10 Hz to 20 Hz	5.1 $\mu\text{V/V} + 6 \mu\text{V}$	
	20 Hz to 40 Hz	3 $\mu\text{V/V} + 6 \mu\text{V}$	
	40 Hz to 20 kHz	4.5 $\mu\text{V/V} + 6 \mu\text{V}$	
	20 kHz to 50 kHz	9 $\mu\text{V/V} + 6 \mu\text{V}$	
	50 kHz to 100 kHz	21 $\mu\text{V/V} + 8 \mu\text{V}$	
	100 kHz to 300 kHz	77 $\mu\text{V/V} + 15 \mu\text{V}$	
	300 kHz to 500 kHz	250 $\mu\text{V/V} + 30 \mu\text{V}$	
220 mV	500 kHz to 1 MHz	380 $\mu\text{V/V} + 30 \mu\text{V}$	
	10 Hz to 20 Hz	31 $\mu\text{V/V} + 16 \mu\text{V}$	
	20 Hz to 40 Hz	21 $\mu\text{V/V} + 10 \mu\text{V}$	
	40 Hz to 20 kHz	36 $\mu\text{V/V} + 10 \mu\text{V}$	
	20 kHz to 50 kHz	77 $\mu\text{V/V} + 10 \mu\text{V}$	
	50 kHz to 100 kHz	200 $\mu\text{V/V} + 30 \mu\text{V}$	
	100 kHz to 300 kHz	760 $\mu\text{V/V} + 30 \mu\text{V}$	
	300 kHz to 500 kHz	2.5 $\text{mV/V} + 40 \mu\text{V}$	
2.2 V	500 kHz to 1 MHz	2.5 $\text{mV/V} + 100 \mu\text{V}$	
	10 Hz to 20 Hz	290 $\mu\text{V/V} + 100 \mu\text{V}$	
	20 Hz to 40 Hz	190 $\mu\text{V/V} + 30 \mu\text{V}$	
	40 Hz to 20 kHz	360 $\mu\text{V/V} + 7 \mu\text{V}$	
AC Voltage – Source 2.2 V	20 kHz to 50 kHz	760 $\mu\text{V/V} + 20 \mu\text{V}$	
	50 kHz to 100 kHz	2 $\text{mV/V} + 80 \mu\text{V}$	
	100 kHz to 300 kHz	7.6 $\text{mV/V} + 150 \mu\text{V}$	
	300 kHz to 500 kHz	25 $\text{mV/V} + 400 \mu\text{V}$	
22 V	500 kHz to 1 MHz	25 $\text{mV/V} + 1 \text{mV}$	5700A/5725A
	10 Hz to 20 Hz	5.6 $\text{mV/V} + 1 \text{mV}$	
	20 Hz to 40 Hz	5.1 $\text{mV/V} + 300 \mu\text{V}$	
	40 Hz to 20 kHz	5.1 $\text{mV/V} + 75 \mu\text{V}$	

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) ²	Remarks
	20 kHz to 50 kHz	8.9 mV/V + 200 μ V	
	50 kHz to 100 kHz	31 mV/V + 400 μ V	
	100 kHz to 300 kHz	100 mV/V + 1.7 mV	
	300 kHz to 500 kHz	380 mV/V + 5 mV	
	500 kHz to 1 MHz	380 mV/V + 9 mV	
220 V	10 Hz to 20 Hz	100 mV/V + 1 mV	
	20 Hz to 40 Hz	100 mV/V + 3 mV	
	40 Hz to 20 kHz	150 mV/V + 1 mV	
	20 kHz to 50 kHz	300 mV/V + 4 mV	
	50 kHz to 100 kHz	760 mV/V + 10 mV	
	100 kHz to 300 kHz	1.9 V + 110 mV	
	300 kHz to 500 kHz	1.9 V + 110 mV	
	500 kHz to 1 MHz	1.9 V + 220 mV	
750 V (5725A)	30 kHz to 50 kHz	1 V + 11 mV	
	50 kHz to 100 kHz	2.6 V + 45 mV	
1100 V (5700A)	50 Hz to 1 kHz	460 mV/V + 4 mV	
1100 V (5725A)	40 Hz to 1 kHz	470 mV/V + 4 mV	
	1 kHz to 20 kHz	690 mV/V + 6 mV	
	20 kHz to 30 kHz	1.4 V + 11 mV	
AC Voltage - Source 4.5 Vac Sinewave	0.001 Hz to 100 kHz	0.59 dB	3325A
	100 kHz to 20 MHz	0.68 dB	
AC Voltage - Measure 0 mV to 10 mV	1 Hz to 40 Hz	5.1 μ V/V + 2.7 μ V	8 ½ Digit DMM
	40 Hz to 1 kHz	4.4 μ V/V + 990 nVac	
	1 k to 20 kHz	4.5 μ V/V + 990 nVac	
	20 kHz to 50 kHz	13 μ V/V + 990 nVac	
	50 kHz to 100 kHz	58 μ V/V + 990 nVac	
	100 kHz to 300 kHz	460 μ V/V + 1.8 μ V	
20 mV	200 kHz to 1 MHz	29 mVac	Fluke 8920A
	1 MHz to 10 MHz	29 mVac	
	10 MHz to 20 MHz	1.2 mVac	
100 mV to 10 V	1 Hz to 40 Hz	110 μ V/V + 396 μ V	8 ½ Digit DMM
	40 Hz to 1 kHz	110 μ V/V + 198 μ V	
	1 kHz to 20 kHz	160 μ V/V + 198 μ V	

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) ²	Remarks
	20 kHz to 50 kHz	350 μ V/V + 198 μ V	
	50 kHz to 100 kHz	9.2 mV/V + 198 μ V	
	100 kHz to 300 kHz	3.5 mV/V + 990 μ V	
	300 kHz to 1 MHz	12 mV/V + 990 μ V	
	1 MHz to 2 MHz	17 mV/V + 990 μ V	
20 V	200 kHz to 1 MHz	160 mV	Fluke 8920A
	1 MHz to 10 MHz	690 mV	
	10 MHz to 20 MHz	1.2 V	
100 V	1 Hz to 40 Hz	24 mV/V + 3.6 mV	8 ½ Digit DMM
	40 Hz to 1 kHz	23 mV/V + 1.8 mV	
	1 kHz to 20 kHz	23 mV/V + 1.8 mV	
	20 kHz to 50 kHz	41 mV/V + 1.8 mV	
AC Voltage – Measure 100 V	50 kHz to 100 kHz	140 mV/V + 1.8 mV	8 ½ Digit DMM
	100 kHz to 300 kHz	460 mV/V + 9 mV	
200 V	200 kHz to 1 MHz	1.7 V	Fluke 8920A
700 V	200 kHz to 1 MHz	5.7 V	Fluke 8920A
1000 V	1 Hz to 40 Hz	460 mV/V + 36 mV	8 ½ Digit DMM
	40 Hz to 1 kHz	460 mV/V + 18 mV	
	1 kHz to 20 kHz	690 mV/V + 18 mV	
	20 kHz to 50 kHz	1.4 V + 18 mV	
	50 kHz to 100 kHz	3.5 V + 18 mV	

Electricity and Magnetism – Resistance

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) ²	Remarks
DC Resistance – Source	1 Ω	84 $\mu\Omega$	L&N 4020B
	10 Ω	1.1 m Ω	L&N 4025B
	100 Ω	1.8 m Ω	L&N 4030B
	1 k Ω	20 m Ω	L&N 4035B
	10 k Ω	100 m Ω	Fluke 742A-10k
	100 k Ω	3.1 Ω	L&N 4045B
	1 M Ω	26 Ω	L&N 4050B
	1.9 M Ω	120 Ω + 11.4 Ω	5700A
	10 M Ω	5.9 k Ω / Ω + 140 Ω	

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) ²	Remarks
	19 MΩ	11 kΩ /Ω + 456 Ω	5520A
	100 MΩ	59 kΩ/ Ω + 6 kΩ	
	110 MΩ to 329.9 MΩ	2.1 MΩ/ Ω + 100 kΩ	
	330 MΩ to 1.1 GΩ	16 MΩ/ Ω + 500 kΩ	
DC Resistance – Measure	1 Ω	66 μΩ/ Ω + 45 u	8 ½ Digit DMM / 4 Wire
	10 Ω	1.3 mΩ/ Ω + 45 uΩ	
	100 Ω	2.4 mΩ/ Ω + 450 uΩ	
	1 kΩ	25 mΩ/ Ω + 450 uΩ	
	10 kΩ	120 mΩ/ Ω + 4.5 mΩ	
	100 kΩ	3.7 Ω + 45 m Ω	
	1 MΩ	31 Ω + 1.8 Ω	
	10 MΩ	580 Ω + 90 Ω	
	100 MΩ	58 kΩ/ Ω + 9 kΩ	
	1 GΩ	13.73 MΩ/ Ω + 9 kΩ	
DC Resistance - Measure 10 mΩ to 99.999 MΩ	1 Ω	630 μΩ	GenRad 1689
	99 MΩ	48 kΩ	

Electricity and Magnetism – Current

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) ²	Remarks
DC Current – Source	0 mA to 2.2 mA	61 nA/A + 8 nA	5700A/5725A
	22 mA	950 nA/A + 80 nA	(Note: Changes due to Change)
	220 mA	26 μA/A + 0.8 μA	In 5700A/5725A)
	2.2 A	3.1 mA/A + 25 μA	
	11 A	1.3 mA/A + 480 μA	
	20.5 A	17 mA/A + 750 μA	5520A
	100 A	3.8 A	
DC Current - Measure	100 nA	4.7 nA/A + 40 pA	8 ½ Digit DMM
	1 μA	4.7 nA/A + 40 pA	(Note: Changes due to miss-calculation of ppm Floor spec And new 5700A/5725A)
	10 uA	4.7 nA/A + 100 pA	
	100 μA	5 nA/A + 800 pA	
	1 mA	50 nA/A + 5 nA	
	10 mA	580 nA/A + 50 nA	
	100 mA	4.6 μA/A + 500 nA	

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) ²	Remarks
	1 A	120 μ A/A + 10 μ A	Various Current Shunts
	25 A	5.4 mA	
	50 A	2.5 mA	
	100 A	2.6 mA	
	200 A	1.3 mA	
	300 A	460 μ A	
	500 A	640 μ A	
AC Current - Source 220 uA	10 Hz to 20 Hz	1 μ A/A + 30 nA	5700A/5725A
	20 Hz to 40 Hz	380 nA/A + 25 nA	
	40 Hz to 1 kHz	150 nA/A + 20 nA	
	1 kHz to 5 kHz	77 nA/A + 50 nA	
	5 kHz to 10 kHz	150 nA/A + 100 nA	
2.2 mA	10 Hz to 20 Hz	10 μ A/A + 50 nA	
	20 Hz to 40 Hz	3.8 μ A/A + 40 nA	
	40 Hz to 1 kHz	770 nA/A + 40 nA	
	1 kHz to 5 kHz	770 nA/A + 500 nA	
	5 kHz to 10 kHz	1.5 μ A/A + 1 μ A	
22 mA	10 Hz to 20 Hz	100 μ A/A + 500 nA	
	20 Hz to 40 Hz	38 μ A/A + 400 nA	
	40 Hz to 1 kHz	7.7 μ A/A + 400 nA	
	1 kHz to 5 kHz	7.7 μ A/A + 5 μ A	
	5 kHz to 10 kHz	15 μ A/A + 10 μ A	
AC Current - Measure 100 uA	10 Hz to 20 Hz	460 μ A/A + 29.7 nA	8 ½ Digit DMM
	20 Hz to 45 Hz	170 nA/A + 29.7 nA	
	45 Hz to 100 Hz	71 nA/A + 29.7 nA	
	100 Hz to 1 kHz	71 nA/A + 29.7 nA	
1 mA to 100 mA	10 Hz to 20 Hz	460 μ A/A + 19.8 μ A	8 ½ Digit DMM
	20 Hz to 45 Hz	170 μ A/A + 19.8 μ A	
	45 Hz to 100 Hz	71 μ A/A + 19.8 μ A	
	100 Hz to 5 kHz	36 μ A/A + 19.8 μ A	
	5 kHz to 10 kHz	71 μ A/A + 19.8 μ A	
	10 kHz to 30 kHz	630 μ A/A + 39.6 μ A	
AC Current - Measure	10 Hz to 20 Hz	4.6 mA/A + 180 μ A	8 ½ Digit DMM

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) ²	Remarks
1 A	20 Hz to 45 Hz	1.9 mA/A + 180 μA	
	45 Hz to 100 Hz	930 μA/A + 180 μA	
	100 Hz to 5 kHz	1.2 mA/A + 180 μA	
10 A	45 Hz to 1 kHz	290 mA/A + 20 mA	3 ½ Digit DMM

Electricity and Magnetism – Inductance

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) ²	Remarks
Inductance – Source 100 μH	1 kHz	49 pH	GR 1482-B
10 mH	1 kHz	3.3 μH	GR 1482-H
100 mH	1 kHz	32 μH	GR 1482-L
500 mH	100 Hz to 1 kHz	190 μH	GR 1482-N
1 H	100 Hz	310 μH	GR 1482-P
1 H	1 kHz	1.4 mH	GR 1482-P
10 H	100 Hz	3.1 mH	GR 1482-T
10 H	1 kHz	20 mH	GR 1482-T
Inductance - Measure 0.00001 nH to 99.999 kH	12 Hz to 100 kHz	79 nH	GenRad 1689
100 μH			
10 H		22 mH	

Electricity and Magnetism – Capacitance

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) ²	Remarks
Capacitance – Source 1000 pF	1 kHz	0.23 pF	GR 1404-A
0.1 μF	1 kHz	25 pF	GR 1409-T
190 pF to 1.0999 nF	10 Hz to 10 kHz	15 pF/F + 0.01 nF	5520A
1.1 nF to 3.2999 nF	10 Hz to 3 kHz	11 pF/F + 0.01 nF	
3.3 nF to 10.9999 nF	10 Hz to 1 kHz	31 pF/F + 0.01 nF	
11 nF to 32.9999 nF	10 Hz to 1 kHz	110 pF/F + 0.1 nF	
33 nF to 109.999 nF	10 Hz to 1 kHz	310 pF/F + 0.1 nF	
110 nF to 329.999 nF	10 Hz to 1 kHz	960 pF/F + 0.3 nF	
0.33 μF to 1.09999 μF	10 Hz to 600 Hz	3.1 nF/F + 1 nF	
1.1 μF to 3.29999 μF	10 Hz to 300 Hz	9.6 nF/F + 3 nF	
3.3 μF to 10.9999 μF	10 Hz to 150 Hz	31 nF/F + 10 nF	

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) ²	Remarks
11 μF to 32.9999 μF	10 Hz to 120 Hz	130 nF/F + 30 nF	
33 μF to 109.999 μF	10 Hz to 80 Hz	480 nF/F + 100 nF	
110 μF to 329.999 μF	DC to 50 Hz	1.5 μF/F + 300 nF	
0.33 mF to 1.09999 mF	DC to 20 Hz	4.8 μF/F + 1 μF	
1.1 mF to 3.2999 mF	DC to 6 Hz	21 μF/F + 3 μF	
3.3 mF to 10.999 mF	DC to 2 Hz	48 μF/F + 10 μF	
11 mF to 32.9999 mF	DC to 0.6 Hz	430 μF/F + 30 μF	
33 mF to 99.999 mF	DC to 0.2 Hz	1.1 mF/F + 100 μF	
Capacitance - Measure 0.00001 pF to 99.999 mF	12 Hz to 100 kHz	11 pF	
190 pF			
99 mF			1.1 mF

Electricity and Magnetism – Electrical Temperature Simulation

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) ²	Remarks
Electrical Simulation of Thermocouple Indicators			5520A
Type B	600 °C to 1820 °C	0.45 °C	
Type C	0 °C to 2316 °C	0.85 °C	
Type E	- 250 °C to 1000 °C	0.5 °C	
Type J	- 210 °C to 1200 °C	0.28 °C	
Type K	- 200 °C to 1372 °C	0.41 °C	
Type L	- 200 °C to 900 °C	0.37 °C	
Type N	- 200 °C to 1300 °C	0.4 °C	
Type R	0 °C to 1767 °C	0.58 °C	
Type S	0 °C to 1767 °C	0.48 °C	
Type T	- 250 °C to 400 °C	0.63 °C	
Type U	- 200 °C to 600 °C	0.56 °C	
Pt 395, 100 Ω	- 200 °C to 800 °C	0.23 °C	5520A
Pt 385, 200 Ω	- 200 °C to 630 °C	0.18 °C	
Pt 385, 500 Ω	- 200 °C to 630 °C	0.22 °C	
Pt 385, 1 k Ω	- 200 °C to 630 °C	0.44 °C	
Pt 3916, 100 Ω	- 200 °C to 630 °C	0.25 °C	
Pt 3926, 100 Ω	- 200 °C to 630 °C	0.13 °C	

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) ²	Remarks
Cu 427, 10 Ω	- 100 °C to 260 °C	0.3 °C	5520A
PtNi 385, 120 Ω	- 80 °C to 260 °C	0.15 °C	

Electricity and Magnetism / Time and Frequency – Oscilloscopes

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) ²	Remarks
Voltage Function Square Wave into 1M ohm	40 μVpp to 0.999 mVpp	460.0 nVpp + 10 μVpp	Fluke 9500B 9530 Active Head
	1 mVpp to 200 Vpp	270.0 mVpp + 10 μVpp	
Square Wave into 50 ohm	40 μVpp to 0.999 mVpp	460.0 nVpp + 10 μVpp	
	1 mVpp to 5 Vpp	4.7 mVpp + 10 μVpp	
Square Wave Freq Accy	10 Hz to 100 kHz	5.8 Hz	
Edge Function 500ps into 50/1M ohm (Rise/Fall Time)	5 mVpp to 3 Vpp	12 ps	
	10 Hz to 2 MHz	0.19 Hz	
HV Edge into 1M ohm	1 mVpp to <100 Vpp	3.5 ns	
	≥ 100 Vpp to 200Vpp	4.7 ns	
	10 Hz to 100 KHz	0.6 Hz	
150ps Fast Edge 50 Ohms (Rise/Fall Time)	5 mVpp to 3V pp	3.9 ps	
		3.9 ps	
	10 Hz to 2 MHz	0.19 Hz	
Timing Marker Function Narrow Triangle	900.91 ns to 55 s	11 ps	
Level Sinewave Function Frequency	0.1 Hz to 11.99 kHz	0.61 Hz	Fluke 9500B w/9530 Active Head
	12 kHz to 225 MHz	5.8 kHz	
	225 MHz to 3.2 GHz	59 kHz	
Flatness	0.1 Hz to 300 MHz	0.067 dB	
	300 MHz to 550 MHz	0.072 dB	
	550 MHz to 1.1 GHz	0.078 dB	
	1.1 GHz to 3.2 GHz	0.085 dB	
Frequency – Source	10 MHz	<110ns of USNO MC	
	10 MHz	1.6E-12	HP 58503A
	DC to 20 MHz	0.058 Hz	3325B
	10 MHz to 26.5 GHz	0.058 Hz	8340B

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) ²	Remarks
Frequency - Measure	1 Hz to 225 MHz	0.13 Hz	HP 53131A
	10 Hz to 525 MHz	0.58 Hz	5351B 50 ohm Input
	500 MHz to 26.5 GHz	0.88 Hz	5351B 1 Mohm Input

Electricity and Magnetism - Other

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) ²	Remarks
Pulse Width Function Pulse Width	1 ns to 100 ns	11 ps +/- 200 ps	
RF Power - Source CW Mode	200 Hz to 80 MHz	580 μ Hz	3335A
	10 MHz to 26.5 GHz	58 mHz	8340B
	26.5 GHz to 40 GHz	58 mHz	8340B/83554A
Sweep Mode	10 MHz to 26.49 GHz	58 mHz	
RF Out 10MHz to 2.29GHz	18 dB to -20 dB	1.4 dB	
RF Out 2.3GHz to 19.99GHz	18 dB to -20dB	2.3 dB	
RF Out 20GHz to 26.5GHz	18 dB to -20dB	2.9 dB	83554A
RF Out 26.5GHz to 40GHz	8 dB to -5 dB	2.3 dB	
Flatness 10MHz- 2.29GHz	18 dB to -20dB	1.1 dB	8340B
Flatness 2.3GHz-19.99GHz	18 dB to -20dB	1.9 dB	
Flatness 20GHz - 26.5GHz	18 dB to -20dB	2.4 dB	
Flatness 26.5GHz - 40GHz	8 dB to -5 dB	1.7 dB	83554A
RF Power - Source RF Out 200Hz to 10.0MHz	13.01dB to -86.98 dB	0.085 dB	3335A
RF Out 10MHz to 80.0MHz	13.01dB to -86.98 dB	0.12 dB	
Flatness	1 kHz to 10 MHz	0.099 dB	
Flatness	10 MHz to 25 MHz	0.13 dB	
Flatness	25 MHz to 80 MHz	0.2 dB	
RF Power - Measure -127dBm to -30 dBm	100 MHz to 26.5 GHz	0.33 dB	8902A w/11793A-11
1 μ W to 100mW (-30 to +20dB)	100 kHz to 4.2 GHz	0.093 dB	438A w/ 8482A
1 μ W to 100mW (-30 to +20dB)	10 MHz to 18 GHz	0.13 dB	438A w/ 8481A
1 μ W to 100mW (-30 to +20dB)	10 MHz to 26.5 GHz	0.23 dB	438A w/ 8485A
1 μ W to 100mW (-30 to +20dB)	10 MHz to 50 GHz	0.40 dB	438A w/ 8487A
Modulation - Measure AM 20Hz to 10KHz	150 kHz to 10 MHz	8 % of reading +/- 1 digit	8902A

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) ²	Remarks
AM 50Hz to 10KHz	150 kHz to 10 MHz	7.7 % of reading +/- 1 digit	
AM 20Hz to 100KHz	10 MHz to 1.3 GHz	8 % of reading +/- 1 digit	
AM 50Hz to 50KHz	10 MHz to 1.3 GHz	7.5 % of reading +/- 1 digit	
FM 20Hz to 10KHz	250 kHz to 10 MHz	84 Hz +/- 1 digit + 10 Hz	
FM 50Hz to 100KHz	10 MHz to 1.3 GHz	82 Hz +/- 1 digit + 10 Hz	
FM 20Hz to 200KHz	10 MHz to 1.3 GHz	99 Hz +/- 1 digit + 10 Hz	
Phase 200Hz to 10KHz	150 kHz to 10 MHz	1.3 rad +/- 1 digit	
Phase 200Hz to 20KHz	10 MHz to 1.3 GHz	1.2 rad +/- 1 digit	
Pulse <=8ps RT & FT	10 MHz to 26.5 GHz	29 ns	

Notes:

- 1) Laboratory offers calibration services at the laboratory's own facilities and at the client or other agreed upon facilities.
- 2) Best uncertainties represent expanded uncertainties at approximately the 95% confidence level using a coverage factor of k=2.

Approved by: _____



 R. Douglas Leonard Jr.
Chief Technical Officer

 Date: February 13, 2008

 Revised: 2/12/08
Revised: 2/13/08