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Capabilities

Contents

Electrical – Voltage 2
 DC Voltage Source 2
 DC Voltage Measure 2
 AC Voltage Source 2
 AC Voltage Measure 3
 Electrical Simulation of Thermocouple 5
Electrical – Current 6
 DC Current - Source 6
 DC Current - Measure 6
 AC Current - Source 7
 AC Current - Measure 7
Electrical – Resistance 8
 Resistance - Source 8
 Resistance Measure 9
Time and Frequency – Frequency / Period 10
 Oscilloscope 11
Electrical-RF / Microwave 12
 Generators 12
 Pulse Measurement 14
 Spectrum Analyzers 15
 Scattering Parameters 16
Length – Artifacts and Standards 1D 17
Length – Hand Tools and Precision Gages 1D 17
Mass – Pressure/Low Vacuum 18
Mass – Scale and Balances 18
Mass – Torque 18

Electrical - Voltage

Calibration Parameter/Equipment	Range	Calibration and Measurement Capability(+/-)	Remarks
DC Voltage Source	(0 to 200) mV	5.67µV/V + 1.0 µV	Wavetek 4808 Opt 10 / 30
	(0.1 to 2.0) V	5.5 µV/V + 1.4 µV	
	(1 to 20)V	4.4 µV/V + 2.7 µV	
	(20 to 200) V	5.6 µV/V + 64.7 µV	
	(100 to 1100) V	7.36 µV/V + 591 µV	
DC Voltage Measure	(0 to 120) mV	9.4 µV/V + 1.0 µV	Agilent 3458A
	(0.1 to 1.2) V	8.0 µV/V + 0.86 µV	
	(1 to 12) V	8.2 µV/V + 2.7 µV	
	(10 to 120)V	10.5 µV/V + 59 µV	
	(100 to 1050) V	12.2 µV/V + 168 µV	
	(1 to 6) kV	11.6 mV/V + 40 mV	Fluke 80k-6 / 87V
AC Voltage Source (1 to 20) mV	(10 to 31) Hz	169 µV/V + 7.8 µV	Wavetek 4808 Opt 20 / 30
	(32 to 330) Hz	57.4 µV/V + 9.0 µV	
	(0.3 to 10) kHz	129 µV/V + 6.7 µV	
	(10 to 33) kHz	127 µV/V + 6.7 µV	
	(30 to 100) kHz	266 µV/V + 8.4 µV	
	(100 to 330) kHz	1.3 mV/V + 13.3 µV	
	(0.3 to 1) MHz	2.5 mV/V + 29.3 µV	
AC Voltage Source (10 to 200) mV	(10 to 31) Hz	139 µV/V + 14.1 µV	
	(32 to 330) Hz	27.4 µV/V + 14.7 µV	
	(0.3 to 10) kHz	81.6 µV/V + 11.6 µV	
	(10 to 33) kHz	81.6 µV/V + 11.6 µV	
	(30 to 100) kHz	324 µV/V + 19.9 µV	
	(100 to 330) kHz	1.1 mV/V + 30.2 µV	
	(0.3 to 1) MHz	2.4 mV/V + 157 µV	
AC Voltage Source (0.1 to 2) V	(10 to 31) Hz	99 µV/V + 70 µV	
	(32 to 330) Hz	62.4 µV/V + 71.2 µV	
	(0.3 to 33) kHz	54 µV/V + 45 µV	
	(30 to 100) kHz	90.8 µV/V + 74.4 µV	
	(100 to 330) kHz	260 µV/V + 146 µV	
	(0.3 to 1) MHz	1.8 mV/V + 922 µV	

Electrical – Voltage

Calibration Parameter/Equipment	Range	Calibration and Measurement Capability(+/-)	Remarks
AC Voltage Source (1 to 20) V	(10 to 31) Hz	99.1 $\mu\text{V}/\text{V}$ + 708 μV	Wavetek 4808 Opt 20 / 30
	(32 to 330) Hz	62.5 $\mu\text{V}/\text{V}$ + 721 μV	
	(0.3 to 33) kHz	44 $\mu\text{V}/\text{V}$ + 350 μV	
	(30 to 100) kHz	91.5 $\mu\text{V}/\text{V}$ + 829 μV	
	(100 to 330) kHz	262 $\mu\text{V}/\text{V}$ + 1.8 mV	
	(0.3 to 1) MHz	1.7 mV/V + 1.2 mV	
AC Voltage Source (10 to 200) V	(10 to 31) Hz	130 $\mu\text{V}/\text{V}$ + 7 mV	Wavetek 4808 Opt 20 / 30
	(32 to 330) Hz	70.4 $\mu\text{V}/\text{V}$ + 6.8 mV	
	(0.3 to 10) kHz	53.9 $\mu\text{V}/\text{V}$ + 3.1 mV	
	(10 to 33) kHz	69.3 $\mu\text{V}/\text{V}$ + 3.6 mV	
	(30 to 100) kHz	131 $\mu\text{V}/\text{V}$ + 9.6 mV	
	(100 to 330) kHz	843 $\mu\text{V}/\text{V}$ + 34.5 mV	
AC Voltage Source (100 to 1100) V 750V max	(10 to 330) Hz	141 $\mu\text{V}/\text{V}$ + 26.2 mV	Wavetek 4808 Opt 20 / 30
	(0.3 to 3.3) kHz	92.9 $\mu\text{V}/\text{V}$ + 35.8 mV	
	(3 to 10) kHz	93.5 $\mu\text{V}/\text{V}$ + 31.2 mV	
	(10 to 33) kHz	131 $\mu\text{V}/\text{V}$ + 34.6 mV	
	(30 to 100) kHz	998 $\mu\text{V}/\text{V}$ + 92.2 mV	
AC Voltage Measure (1 to 12) mV	(1 to 40) Hz	293 $\mu\text{V}/\text{V}$ + 5.7 μV	Agilent 3458A
	40 Hz to 1 kHz	123 $\mu\text{V}/\text{V}$ + 4.2 μV	
	(1 to 20) kHz	335 $\mu\text{V}/\text{V}$ + 3.1 μV	
	(20 to 50) kHz	888 $\mu\text{V}/\text{V}$ + 3.1 μV	
	(50 to 100) kHz	4.7 mV/V + 3.5 μV	
	(100 to 300) kHz	37.8 mV/V + 11.4 μV	
AC Voltage Measure (10 to 120) mV	(1 to 40) Hz	83.6 $\mu\text{V}/\text{V}$ + 11 μV	Agilent 3458A
	40 Hz to 1 kHz	61.4 $\mu\text{V}/\text{V}$ + 5.3 μV	
	(1 to 20) kHz	121 $\mu\text{V}/\text{V}$ + 5.2 μV	
	(20 to 50) kHz	275 $\mu\text{V}/\text{V}$ + 5 μV	
	(50 to 100) kHz	690 $\mu\text{V}/\text{V}$ + 13.9 μV	
	(100 to 300) kHz	2.8 mV/V + 24.9 μV	
	(0.3 to 1) MHz	9.1 mV/V + 78 μV	
AC Voltage Measure (0.1 to 1.2) V	(1 to 40) Hz	61.4 $\mu\text{V}/\text{V}$ + 81.4 μV	Agilent 3458A
	40 Hz to 1 kHz	49 $\mu\text{V}/\text{V}$ + 49.2 μV	
	(1 to 20) kHz	128 $\mu\text{V}/\text{V}$ + 44.1 μV	
	(20 to 50) kHz	277 $\mu\text{V}/\text{V}$ + 47.1 μV	
	(50 to 100) kHz	745 $\mu\text{V}/\text{V}$ + 61.5 μV	
	(100 to 300) kHz	2.9 mV/V + 223 μV	
	(0.3 to 1) MHz	9.4 mV/V + 518 μV	

Electrical – Voltage

Calibration Parameter/Equipment	Range	Calibration and Measurement Capability(+/-)	Remarks
AC Voltage Measure (1 to 12) V	(1 to 40) Hz	61.4 $\mu\text{V}/\text{V}$ + 814 μV	Agilent 3458A
	40 Hz to 1 kHz	64.5 $\mu\text{V}/\text{V}$ + 445 μV	
	(1 to 20) kHz	127 $\mu\text{V}/\text{V}$ + 442 μV	
	(20 to 50) kHz	277 $\mu\text{V}/\text{V}$ + 471 μV	
	(50 to 100) kHz	745 $\mu\text{V}/\text{V}$ + 615 μV	
	(100 to 300) kHz	2.9 mV/V + 2.3 mV	
	(0.3 to 1) MHz	9.4 mV/V + 5.2 mV	
AC Voltage Measure (10 to 120) V	(1 to 40) Hz	175 $\mu\text{V}/\text{V}$ + 8.8 mV	Agilent 3458A
	40 Hz to 1 kHz	184 $\mu\text{V}/\text{V}$ + 4.4 mV	
	(1 to 20) kHz	184 $\mu\text{V}/\text{V}$ + 4.4 mV	
	(20 to 50) kHz	324 $\mu\text{V}/\text{V}$ + 4.8 mV	
	(50 to 100) kHz	1.2 mV/V + 6.8 mV	
	(100 to 300) kHz	3.8 mV/V + 29 mV	
AC Voltage Measure (100 to 700) V	(1 to 40) Hz	465 $\mu\text{V}/\text{V}$ + 74.5 mV	Agilent 3458A
	40 Hz to 1 kHz	444 $\mu\text{V}/\text{V}$ + 33.2 mV	
	(1 to 20) kHz	672 $\mu\text{V}/\text{V}$ + 33.8 mV	
	(20 to 50) kHz	1.4 mV/V + 44.8 mV	
	(50 to 100) kHz	3.5 mV/V + 44.8 mV	
700V to 5 kV	(45 to 500) Hz	15.1 mV/V + 6.2 V	Fluke 80k-6 / 87V

PARAMETER EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITIES EXPRESSED AS UNCERTAINTY (±)	REFERENCE STANDARD OR EQUIPMENT	
Electrical Simulation of Thermocouple				
	Indicators			
	Type T	-250 to -150 °C	0.63 °C	Fluke 5500A
		-150 to 0 °C	0.24 °C	
		0 to 120 °C	0.16 °C	
		120 to 400 °C	0.12 °C	
		0 to 15 °C	0.30 °C	
		150 to 650 °C	0.26 °C	
	Type C	650 to 1 000 °C	0.31 °C	
		1 000 to 1 800 °C	0.50 °C	
		1 800 to 2 316 °C	0.84 °C	
		-250 to -100 °C	0.50 °C	
		-100 to -25 °C	0.16 °C	
	Type E	-25 to 350 °C	0.14 °C	
		350 to 650 °C	0.16 °C	
		650 to 1 000 °C	0.21 °C	
		-210 to -100 °C	0.27 °C	
		-100 to -30 °C	0.16 °C	
	Type J	-30 to 150 °C	0.14 °C	
		150 to 760 °C	0.17 °C	
	760 to 1 200 °C	0.23 °C		
	200 to -100 °C	0.33 °C		
	-100 to -25 °C	0.18 °C		
Type K	-25 to 120 °C	0.16 °C		
	120 to 1 000 °C	0.26 °C		
	1 000 to 1 372 °C	0.40 °C		
	200 to -100 °C	0.37 °C		
Type L	-100 to 800 °C	0.26 °C		
	800 to 900 °C	0.17 °C		

Electrical - Current

Calibration Parameter/Equipment	Range	Calibration and Measurement Capability(+/-)	Remarks
DC Current - Source	(0 to 200) μ A	111 μ A/A + 2.4 nA	Wavetek 4808 Opt 10 / 40
	(0.1 to 2.0) mA	44.4 μ A/A + 12.4 nA	
	(1.0 to 20) mA	44 μ A/A + 130 nA	
	(10 to 200) mA	44.6 μ A/A + 1.3 μ A	
	(0.1 to 2) A	110 μ A/A + 25.2 μ A	Wavetek 9100
	(1 to 20) A	711 μ A/A + 11 mA	
DC Current - Measure	(0 to 120) μ A	15.4 μ A/A + 2.0 nA	Agilent 3458A
	(0.1 to 1.2) mA	15.1 μ A/A + 15.3 nA	
	(1.0 to 12) mA	14.4 μ A/A + 161 nA	
	(10 to 120) mA	29.1 μ A/A + 2 μ A	
	(0.1 to 1.05) A	98.1 μ A/A + 24.3 μ A	
	(1 to 20) A	711 μ A/A + 11 mA	3458A / EL7520

Electrical – Current

Calibration Parameter/Equipment	Range	Calibration and Measurement Capability(+/-)	Remarks
AC Current - Source (10 to 200) μ A (0.1 to 2) mA (1 to 20) mA (10 to 200) mA (0.1 to 2) A	10 Hz to 1 kHz	210 μ A/A + 18.7 nA	Wavetek 4808 Opt 20 / 40
	(1 to 5) kHz	336 μ A/A + 26.4 nA	
	10 Hz to 1 kHz	171 μ A/A + 220 nA	
	(1 to 5) kHz	288 μ A/A + 215 nA	
	10 Hz to 1 kHz	114 μ A/A + 1.3 μ A	
	(1 to 5) kHz	203 μ A/A + 1.2 μ A	
	10 Hz to 1 kHz	128 μ A/A + 16.9 μ A	
	(1 to 5) kHz	223 μ A/A + 16.8 μ A	
	10 Hz to 1 kHz	358 μ A/A + 163 μ A	
(1 to 5) kHz	526 μ A/A + 197 μ A		
AC Current - Source (1 to 20) A	(10 to 40) Hz	1.6 mA/A + 1.8 mA	Wavetek 9100
	40 Hz to 1 kHz	1.6 mA/A + 1.7 mA	
	(1 to 5) kHz	5.5 mA/A + 27.1 mA	
AC Current - Measure (10 to 120) μ A	(10 to 20) Hz	3.8 mA/A + 50.6 nA	Agilent 3458A
	(20 to 45) Hz	1.5 mA/A + 45.6 nA	
	(45 to 100) Hz	576 μ A/A + 43.8 nA	
	100 Hz to 1 kHz	565 μ A/A + 43.1 nA	
AC Current - Measure (0.1 to 1.2) mA	(10 to 20) Hz	3.8 mA/A + 390 nA	
	(20 to 45) Hz	1.4 mA/A + 355 nA	
	(45 to 100) Hz	521 μ A/A + 348 nA	
	100 Hz to 5 kHz	271 μ A/A + 301 nA	
	(5 to 20) kHz	519 μ A/A + 348 nA	
	(20 to 50) kHz	3.8 mA/A + 665 nA	
AC Current - Measure (1 to 12) mA	(10 to 20) Hz	3.8 mA/A + 3.9 μ A	
	(20 to 45) Hz	1.4 mA/A + 3.6 μ A	
	(45 to 100) Hz	540 μ A/A + 3.5 μ A	
	100 Hz to 5 kHz	277 μ A/A + 3 μ A	
	(5 to 20) kHz	538 μ A/A + 3.5 μ A	
	(20 to 50) kHz	3.8 mA/A + 6.7 μ A	

Electrical – Current

Calibration Parameter/Equipment	Range	Calibration and Measurement Capability(+/-)	Remarks
AC Current - Measure (10 to 120) mA	(10 to 20) Hz	3.8 mA/A + 39 μ A	Agilent 3458A
	(20 to 45) Hz	1.4 mA/A + 35.4 μ A	
	(45 to 100) Hz	540 μ A/A + 34.6 μ A	
	100 Hz to 5 kHz	277 μ A/A + 30 μ A	
	(5 to 20) kHz	538 μ A/A + 34.6 μ A	
	(20 to 50) kHz	3.8 mA/A + 66.4 μ A	
AC Current - Measure (0.1 to 1.05) A	(10 to 20) Hz	3.8 mA/A + 362 μ A	
	(20 to 45) Hz	1.5 mA/A + 336 μ A	
	(45 to 100) Hz	717 μ A/A + 329 μ A	
	100 Hz to 5 kHz	932 μ A/A + 282 μ A	
	(5 to 20) kHz	2.8 mA/A + 349 μ A	
AC Current - Measure (1 to 20) A	(10 to 40) Hz	175 μ A/A + 219 μ A	
	40 Hz to 1 kHz	152 μ A/A + 311 μ A	
	(1 to 5) kHz	159 μ A/A + 477 μ A	

Electrical – Resistance

Calibration Parameter/Equipment	Range	Calibration and Measurement Capability(+/-)	Remarks
Resistance - Source Fixed Points	10 Ω	0.31 m Ω	Wavetek 4808 Opt 50
	100 Ω	1.2 m Ω	
	1 k Ω	11.8 m Ω	
	10 k Ω	118 m Ω	
	100 k Ω	1.3 Ω	
	1 M Ω	30.9 Ω	
	10 M Ω	612 Ω	
	100 M Ω	10.4 k Ω	

Electrical – Resistance

Calibration Parameter/Equipment	Range	Calibration and Measurement Capability(+/-)	Remarks
Resistance - Source Adjustable	(0.1 to 10.999) Ω	139 μΩ/ Ω + 7 mΩ	Fluke 5500A
	(11 to 32.999) Ω	138 μΩ/ Ω + 11.7 mΩ	
	(33 to 109.999) Ω	104 μΩ/ Ω + 11.7 mΩ	
	(110 to 329.999) Ω	107 μΩ/ Ω + 11.3 mΩ	
	330Ω to 1.0999 k Ω	36.2 μΩ/ Ω + 31.4 mΩ	
	(1.1 to 3.2999) kΩ	109 μΩ/ Ω + 64.6 mΩ	
	(3.3 to 10.9999) kΩ	104 μΩ/ Ω + 697 mΩ	
	(11 to 32.9999) kΩ	108 μΩ/ Ω + 651 mΩ	
	(33 to 109.999) kΩ	126 μΩ/ Ω + 7.1 Ω	
	(110 to 329.999) kΩ	147 μΩ/ Ω + 6.1 Ω	
	330kΩ to 1.0999M Ω	172 μΩ/ Ω + 65.1 Ω	
	(1.1 to 3.2999) MΩ	218 μΩ/ Ω + 57.6 Ω	
	(3.3 to 10.9999) MΩ	693 μΩ/ Ω + 662 Ω	
	(11 to 32.9999) MΩ	1.3 mΩ/ Ω + 4.3 kΩ	
(33 to 109.999) MΩ	5.6 mΩ/ Ω + 6.6 kΩ		
Resistance Measure	(1 to 12) Ω	12.8 μΩ/ Ω + 180 μΩ	Agilent 3458A
	(10 to 120) Ω	9.6 μΩ/ Ω + 1.6 mΩ	
	100 Ω to 1.2 kΩ	7.2 μΩ/ Ω + 6.6 mΩ	
	(1 to 12) kΩ	7.1 μΩ/ Ω + 65.9 mΩ	
	(10 to 120) kΩ	7.2 μΩ/ Ω + 647 mΩ	
	100 kΩ to 1.2 MΩ	11.7 μΩ/ Ω + 10 Ω	
	(1 to 12) MΩ	40 μΩ/ Ω + 299 Ω	
	(10 to 120) MΩ	501 μΩ/ Ω + 5.7 kΩ	

Time and Frequency - Frequency / Period

Calibration Parameter/Equipment	Range	Calibration and Measurement Capability(+/-)	Remarks
Frequency Source	10 MHz Fixed	2.8 parts in 10^{11}	GPSDO Z3805A
	(0.1 to 30) Hz	3.7 parts in 10^5	Agilent 3325A
	30 Hz to 100 kHz	1.3 parts in 10^7	
	(0.1 to 20) MHz	5.8 parts in 10^9	
	20 MHz to 2.05 GHz	1.2 parts in 10^9	Agilent 8644A
	(2 to 26) GHz	6.3 parts in 10^{10}	Agilent 83650B
	(26 to 50) GHz	2.3 parts in 10^{10}	
Frequency Measure	(0.1 to 30) Hz	3.6 parts in 10^5	Agilent 53132A
	30 Hz to 200 kHz	5.4 parts in 10^8	
	(0.2 to 100) MHz	1.2 parts in 10^9	
	100 MHz to 3 GHz	2.4 parts in 10^{10}	
	(3 to 26) GHz	6.4 parts in 10^{10}	Agilent 5351B
	(26 to 50) GHz	7.5 parts in 10^{10}	Agilent 8563E

<p>Oscilloscope</p> <p>Amplitude DC Signal into 50 Ω load into 1M Ω load</p> <p>Amplitude Squarewave 50 Ω load</p> <p>1MΩ load</p> <p>Rise Time</p>	<p>-2.2 to 2.2 V -33 to 33 V</p> <p>1.8 mV to 2.2 V p-p 10 Hz to 10 kHz</p> <p>1.8 mV to 5 V p-p 10 Hz to 10 kHz 95 To 105 V p-p 100 to 1000 Hz</p> <p>305 pS</p>	<p>2.0 mV/V + 100 μV 2.0 mV/V + 100 μV</p> <p>2.1 mV/V + 100 μV</p> <p>.1 mV/V + 100 μV 3.9 mV/V + 100 μV</p> <p>65 pS</p>	<p>Fluke 5500A opt SC300</p>
<p>Leveled Sine Wave Relative to 50 kHz 5 mV to 5.5 V</p> <p>Time Marker</p> <p>Wave Generator - Source Amplitude 10 Hz to 10 kHz square, sine, triangle into 1 MΩ square, sine, triangle into 50 Ω</p>	<p>50 kHz to 100 MHz 100 to 300 MHz</p> <p>2 nS to 5 S 5 - 2 - 1</p> <p>1.8 mV to 55 V p-p 1.8 mV to 2.2 V p-p</p>	<p>35 mV/V + 300 μV 40 mV/V + 300 μV</p> <p>0.78 mSec / Sec</p> <p>30 mV/V + 100 μV 30 mV/V + 100 μV</p>	<p>Fluke 5500A opt SC300</p>

Electrical-RF / Microwave

PARAMETER EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITIES EXPRESSED AS UNCERTAINTY (\pm)	REFERENCE STANDARD OR EQUIPMENT
Generators			
<p>Tune RF Level – Measure, 0 to -120 dB</p> <p>0 to 10 dB 0 to 20 dB 0 to 30 dB 0 to 40 dB 0 to 50 dB 0 to 60 dB 0 to 70 dB 0 to 80 dB 0 to 90 dB 0 to 100 dB 0 to 110 dB 0 to 120 dB</p>	<p>2 MHz to 26.5 GHz</p>	<p>0.22 dB 0.23 dB 0.23 dB 0.23 dB 0.24 dB 0.24 dB 0.25 dB 0.25 dB 0.25 dB 0.26 dB 0.27 dB 0.29 dB</p>	<p>Agilent 8902A W/ 11722A & Microwave Mixer</p>
<p>Modulation – Measure</p>			
<p>Phase Rates 200Hz to 10 kHz</p>	<p>0.15 to 10 MHz 10 to 1300 MHz 1.3 GHz to 26.5 GHz</p>	<p>5.0% 4.0% 5.0%</p>	
<p>Frequency Rates 50Hz to 10 kHz</p>	<p>0.25 to 10 MHz 10 to 1300 MHz 1.3 GHz to 26.5 GHz</p>	<p>3.0% 2.0% 3.0%</p>	<p>Agilent 8902A W/ 11722A Microwave Mixer</p>
<p>Amplitude Rates 50Hz to 10 kHz</p>	<p>0.15 to 10 MHz 10 to 1300 MHz 1.3 GHz to 26.5 GHz</p>	<p>3.0% 2.0% 3.0%</p>	

PARAMETER EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITIES EXPRESSED AS UNCERTAINTY (±)	REFERENCE STANDARD OR EQUIPMENT
Generators Continued			
Spectrum Analysis	100 Hz to 50 GHz	1.5 dB	Agilent 8563E Agilent 11970 Mixer
Total Harmonic Distortion	20 Hz to 20 kHz 20 kHz to 100 kHz	1.2 dB 2.2dB	Agilent 8903B
Pwer Accuracy Frequency Response/Power	1 mW 50 MHz	1.3%	478A H76
Accuracy	0.1 to 1000 MHz	4.3%	8482A
1 uW - 100 mW	1 to 12 GHz	4.3%	8481A
	12 to 18 GHz	4.5%	8481A
	18 to 26.5GHz	4.8%	8485A
	26.5 to 50 GHz	5.1%	8487A

PARAMETER EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITIES EXPRESSED AS UNCERTAINTY (\pm)	REFERENCE STANDARD OR EQUIPMENT
<p>Leveled Sine Wave Relative to 50 kHz 5 mV to 5.5 V</p> <p>Time Marker</p> <p>Wave Generator - Source Amplitude 10 Hz to 10 kHz square, sine, triangle into 1 MΩ square, sine, triangle into 50 Ω</p>	<p>50 kHz to 100 MHz 100 to 300 MHz</p> <p>2 nS to 5 S 5 - 2 - 1</p> <p>1.8 mV to 55 V p-p 1.8 mV to 2.2 V p-p</p>	<p>35 mV/V + 300 μV 40 mV/V + 300 μV</p> <p>0.78 mSec / Sec</p> <p>30 mV/V + 100 μV 30 mV/V + 100 μV</p>	<p>Fluke 5500A opt SC300</p>
<p>Pulse Measurement</p> <p>Transition Time</p> <p>Pulse Width</p>	<p>10 to 90 %</p> <p>\leq10 ns >10 ns >50 μs >500 μs</p>	<p>17.5 pS</p> <p>5.0% + 10 pS</p> <p>1.56% 0.20% 0.02%</p>	<p>Agilent 54120T</p> <p>Agilent 53131A</p>

PARAMETER EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITIES EXPRESSED AS UNCERTAINTY (\pm)	REFERENCE STANDARD OR EQUIPMENT
Spectrum Analyzers			
Frequency Readout Accuracy	100 Hz to 50GHz	2 Count of LSD of rdg	Agilent 8663A / 83650B
Amplitude Accuracy and Frequency Response			
50 Ω	1 mHz to 200 Hz 200 Hz to 100 kHz 100 kHz to 12 GHz 12 to 18 GHz 18 to 26.5 GHz 26.5 to 50 GHz	0.15 dB 0.12 dB 0.19 dB 0.21 dB 0.22 dB 0.24 dB	Agilent E4419A 848XX Sensor 3325A, 3335A
75 Ω	200 Hz to 1 kHz 1 kHz to 25 MHz 25 to 80 MHz	0.17 dB 0.09 dB 0.17 dB	Agilent 3335A
Scale Fidelity			
50 Ω ref to 100 kHz	0 to 18 dB 20 to 58 dB 60 to 98 dB	0.06 dB 0.10 dB 0.21 dB	Agilent 3335A
75 Ω ref to 100 kHz	0 to 18 dB 20 to 58 dB 60 to 98 dB	0.16 dB 0.26 dB 0.51 dB	
Span	1 Hz to 50 GHz	2 Count of LSD of rdg	Agilent 83650B Agilent 8663A
Resolution Bandwidth	1 Hz to 10 MHz	2 Count of LSD of rdg	Agilent 3335A

PARAMETER EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITIES EXPRESSED AS UNCERTAINTY (\pm)	REFERENCE STANDARD OR EQUIPMENT
<p>Scattering Parameters (Worst Case) Reflection: S11 and S22 Reflection Coefficient 0 to 1</p> <p>Scattering Parameters – Transmission: S21 and S12 0 to -40</p>	0.3 to 45 MHz	0.05 lin 6.5°	Agilent 8753C
	.045 to 2 GHz	0.02 lin 2.7°	Agilent 8510C
	2 to 8 GHz	0.03 lin 4.3°	
	8 to 20 GHz	0.04 lin 4.5°	
	20 to 26.5 GHz	0.04 lin 4.8°	
	0.3 to 45 MHz	0.2 dB 2.5°	Agilent 8753C
	.045 to 2 GHz	0.07 dB 0.5°	Agilent 8510C
	2 to 8 GHz	0.07 dB 1.3°	
8 to 20 GHz	0.11 dB 2.8°		
20 to 26.5 GHz	0.23 dB 4.2°		

Length - Artifacts and Standards 1D

Calibration Parameter/Equipment	Range	Calibration and Measurement Capability(+/-)	Remarks
Plugs Cylindrical ¹	(0.011 to 0.75) in	35 μin	Super micrometer

Length - Hand Tools and Precision Gages 1D

Calibration Parameter/Equipment	Range	Calibration and Measurement Capability(+/-)	Remarks
Calipers ¹	(0.05 to 60) in	(330 + 3L) μin	Gage Blocks
Micrometers ¹	(0.05 to 12) in	(29 + 5L) μin	Gage Blocks
Height Gages ¹	(0.05 to 60) in	(330 + 3L) μin	Gage Blocks
Indicators ¹	(0.05 to 2) in	(14 + 23L) μin	Gage Blocks

PARAMETER EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITIES EXPRESSED AS UNCERTAINTY (±) ²	REFERENCE STANDARD OR EQUIPMENT
Gage Blocks	(0 to 0.1) in (0.1 to 4) in	4.0 μin (3.4 + 3.0L) μin	Gage Block Comparator Gage Blocks
Micrometers Depth	(0 to 12) in	(65 + 1.5L) μin	Gage Blocks
Micrometers Inside	(3 to 12) in	(58 + 1.7L) μin	Gage Blocks

Mass - Pressure/Low Vacuum

Calibration Parameter/Equipment	Range	Calibration and Measurement Capability(+/-)	Remarks
Pressure Gages and Transducers ¹	(0 to 300) psi	0.17 psi + 0.0007 psi/psi	Pressure Calibrator
	(5 to 5 000) psi	0.02 psi + 0.00007 psi/psi	Dead weight Tester
Vacuum Gages and Transducers ¹	(0 to 29) in Hg	0.38 in Hg	Pressure Calibrator

Mass - Scale and Balances

Calibration Parameter/Equipment	Range	Calibration and Measurement Capability(+/-)	Remarks
Analytical Balances ¹	(0 to 200) g	0.62 mg	Class S Masses
Weigh Scales ¹	(0 to 100) lb	0.32 g + 0.08 mg/g	Class 6/7 Masses

Mass - Torque

Calibration Parameter/Equipment	Range	Calibration and Measurement Capability(+/-)	Remarks
Torque Watches & Screwdrivers ¹	(2 to 215) ozf·in	0.07 ozf·in + 0.009 ozf·in/ozf·in	Torque Watch Calibrator
Torque Wrenches ¹	(1 to 100) lbf·ft	0.1 lbf·in + 0.01 lbf·in/ lbf·in	Torque Calibrator

Notes

- 1 ISO IEC 17025 Accredited calibrations available
- 2 L = length in inches,