



**SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005
& ANSI/NCSL Z540-1-1994**

Tektronix Service Solutions

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CALIBRATION

Valid to: September 8, 2014

Certificate Number: AC-1187

I. Electromagnetic - DC/Low Frequency

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY (±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
DC Voltage - Source	Up to 220 mV (2.2 to 11) V (11 to 22) V (22 to 220) V 220 V to 1.1 kV	6 µV/V + 400 nV 2.5 µV/V + 2.5 µV 2.5 µV/V + 4 µV 3.5 µV/V + 40 µV 4.5 µV/V + 400 µV	Fluke 5720A Opt 03	OEM and GIDEP Sourced Calibration Procedures
Fixed Point	10 V	20 µV	Fluke 732B	
DC Voltage - Measure	Up to 200 mV 200 mV to 2 V (2 to 20) V (20 to 200) V 200 V to 1 kV (1 to 60) kV	4.5 µV/V + 100 nV 3 µV/V + 400 nV 3 µV/V + 4 µV 4.5 µV/V + 40 µV 4.5 µV/V + 500 µV 1 mV/V	Fluke 8508A Opt 01 Ross VD60-6.2Y-A-LB-AL	
DC Current - Source	Up to 220 µA 220 µA to 2.2 mA (2.2 to 11) mA (22 to 220) mA	35 µA/A + 6 nA 30 µA/A + 7 nA 30 µA/A + 40 nA 40 µA/A + 700 nA [above 100 mA, add ± (200)(I ²) µA/A] 60 µA/A + 12 µA [above 1 A, add ± (10)(I ²) µA/A]	Fluke 5720A Opt 03	
	(2.2 to 11) A (11 to 20.5) A	500 µA/A + 500 µA 1 mA/A + 750 µA	Fluke 5520A	



PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY (±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Resistance - Measure	Up to 2 Ω (2 to 20) Ω (20 to 200) Ω 200 Ω to 2 kΩ (2 to 20) kΩ (20 to 200) kΩ 200 kΩ to 2 MΩ (2 to 20) MΩ (20 to 200) MΩ 200 MΩ to 2 GΩ	15 μΩ/ Ω + 4 μΩ 9 μΩ/ Ω + 14 μΩ 7.5 μΩ/ Ω + 50 μΩ 7.5 μΩ/ Ω + 500 μΩ 7.5 μΩ/ Ω + 5 mΩ 7.5 μΩ/ Ω + 50 mΩ 8.5 μΩ/ Ω + 1 Ω 15 μΩ/ Ω + 100 Ω 60 μΩ/ Ω + 10 kΩ 525 μΩ/ Ω + 1 MΩ	Fluke 8508A Opt 01	
AC Voltage - Source	Up to 2.2 mV (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz (2.2 to 22) mV (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz (22 to 220) mV (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	220 μV/V + 4 μV 85 μV/V + 4 μV 75 μV/V + 4 μV 180 μV/V + 4 μV 460 μV/V + 5 μV 900 μV/V + 10 μV 1.2 mV/V + 20 μV 2.5 mV/V + 20 μV 220 μV/V + 4 μV 85 μV/V + 4 μV 75 μV/V + 4 μV 180 μV/V + 4 μV 460 μV/V + 5 μV 900 μV/V + 10 μV 1.2 mV/V + 20 μV 2.5 mV/V + 20 μV 220 μV/V + 12 μV 85 μV/V + 7 μV 75 μV/V + 7 μV 180 μV/V + 7 μV 420 μV/V + 17 μV 750 μV/V + 20 μV 1.2 mV/V + 25 μV 2.5 mV/V + 45 μV	Fluke 5720A Opt 03	OEM and GIDEP Sourced Calibration Procedures

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY (\pm)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage - Source (cont.)	220 mV to 2.2 V (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz (2.2 to 22) V (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz (22 to 220) V (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz 220 V to 1.1 kV (15 to 50) Hz 50 Hz to 1 kHz	220 μ V/V + 40 μ V 80 μ V/V + 15 μ V 40 μ V/V + 8 μ V 70 μ V/V + 10 μ V 105 μ V/V + 30 μ V 340 μ V/V + 80 μ V 900 μ V/V + 200 μ V 1.5 mV/V + 300 μ V 220 μ V/V + 400 μ V 80 μ V/V + 150 μ V 40 μ V/V + 50 μ V 70 μ V/V + 100 μ V 95 μ V/V + 200 μ V 260 μ V/V + 600 μ V 900 μ V/V + 2 mV 1.3 mV/V + 3.2 mV 220 μ V/V + 4 mV 80 μ V/V + 1.5 mV 47 μ V/V + 600 μ V 75 μ V/V + 1 mV 130 μ V/V + 2.5 mV 800 μ V/V + 16 mV 4.2 mV/V + 40 mV 7 mV/V + 80 mV 260 μ V/V + 16 mV 60 μ V/V + 3.5 mV	Fluke 5720A Opt 03	OEM and GIDEP Sourced Calibration Procedures
AC Voltage - Measure	Up to 2.2 mV (10 to 20) Hz (20 to 40) Hz (40 Hz to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	1.7 mV/V + 1.3 μ V 740 μ V/V + 1.3 μ V 420 μ V/V + 1.3 μ V 810 μ V/V + 2 μ V 1.2 mV/V + 2.5 μ V 2.3 mV/V + 4 μ V 2.4 mV/V + 8 μ V 3.5 mV/V + 8 μ V	Fluke 5790A	

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY (\pm)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage - Measure (cont.)	(2.2 to 7) mV			
	(10 to 20) Hz	850 μ V/V + 1.3 μ V		
	(20 to 40) Hz	370 μ V/V + 1.3 μ V		
	40 Hz to 20 kHz	210 μ V/V + 1.3 μ V		
	(20 to 50) kHz	400 μ V/V + 2 μ V		
	(50 to 100) kHz	600 μ V/V + 2.5 μ V		
	(100 to 300) kHz	1.2 mV/V + 4 μ V		
	(300 to 500) kHz	1.3 mV/V + 8 μ V		
	500 kHz to 1 MHz	2.3 mV/V + 8 μ V		
	(7 to 22) mV			
	(10 to 20) Hz	290 μ V/V + 1.3 μ V		
	(20 to 40) Hz	190 μ V/V + 1.3 μ V		
	40 Hz to 20 kHz	110 μ V/V + 1.3 μ V		
	(20 to 50) kHz	210 μ V/V + 2 μ V		
	(50 to 100) kHz	310 μ V/V + 2.5 μ V		
	(100 to 300) kHz	810 μ V/V + 4 μ V		
	(300 to 500) kHz	890 μ V/V + 8 μ V		
	500 kHz to 1 MHz	1.7 mV/V + 8 μ V		
	(22 to 70) mV			
	(10 to 20) Hz	240 μ V/V + 1.5 μ V		
	(20 to 40) Hz	120 μ V/V + 1.5 μ V		
	40 Hz to 20 kHz	65 μ V/V + 1.5 μ V		
	(20 to 50) kHz	130 μ V/V + 2 μ V		
	(50 to 100) kHz	260 μ V/V + 2.5 μ V		
	(100 to 300) kHz	510 μ V/V + 4 μ V		
	(300 to 500) kHz	670 μ V/V + 8 μ V		
	500 kHz to 1 MHz	1.1 mV/V + 8 μ V		
	(70 to 220) mV			
(10 to 20) Hz	210 μ V/V + 1.5 μ V			
(20 to 40) Hz	85 μ V/V + 1.5 μ V			
40 Hz to 20 kHz	38 μ V/V + 1.5 μ V			
(20 to 50) kHz	69 μ V/V + 2 μ V			
(50 to 100) kHz	160 μ V/V + 2.5 μ V			
(100 to 300) kHz	250 μ V/V + 4 μ V			
(300 to 500) kHz	380 μ V/V + 8 μ V			
500 kHz to 1 MHz	1 mV/V + 8 μ V			
(220 to 700) mV				
(10 to 20) Hz	210 μ V/V + 1.5 μ V			
(20 to 40) Hz	76 μ V/V + 1.5 μ V			
40 Hz to 20 kHz	33 μ V/V + 1.5 μ V			
(20 to 50) kHz	51 μ V/V + 2 μ V			
(50 to 100) kHz	79 μ V/V + 2.5 μ V			
(100 to 300) kHz	180 μ V/V + 4 μ V			
(300 to 500) kHz	300 μ V/V + 8 μ V			
500 kHz to 1 MHz	960 μ V/V + 8 μ V			

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY (±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage - Measure (cont.)	700 mV to 2.2 V			
	(10 to 20) Hz	200 μV/V		
	(20 to 40) Hz	66 μV/V		
	40 Hz to 20 kHz	24 μV/V		
	(20 to 50) kHz	46 μV/V		
	(50 to 100) kHz	71 μV/V		
	(100 to 300) kHz	160 μV/V		
	(300 to 500) kHz	260 μV/V		
	500 kHz to 1 MHz	900 μV/V		
	(2.2 to 7) V			
	(10 to 20) Hz	200 μV/V		
	(20 to 40) Hz	67 μV/V		
	40 Hz to 20 kHz	24 μV/V		
	(20 to 50) kHz	48 μV/V		
	(50 to 100) kHz	81 μV/V		
	(100 to 300) kHz	190 μV/V		
	(300 to 500) kHz	400 μV/V		
	500 kHz to 1 MHz	1.2 mV/V		
	(7 to 22) V			
	(10 to 20) Hz	200 μV/V		
	(20 to 40) Hz	67 μV/V		
	40 Hz to 20 kHz	27 μV/V		
	(20 to 50) kHz	48 μV/V		
	(50 to 100) kHz	81 μV/V		
(100 to 300) kHz	190 μV/V			
(300 to 500) kHz	400 μV/V			
500 kHz to 1 MHz	1.2 mV/V			
(22 to 70) V				
(10 to 20) Hz	200 μV/V			
(20 to 40) Hz	68 μV/V			
40 Hz to 20 kHz	32 μV/V			
(20 to 50) kHz	57 μV/V			
(50 to 100) kHz	94 μV/V			
(100 to 300) kHz	200 μV/V			
(300 to 500) kHz	410 μV/V			
500 kHz to 1 MHz	1.2 mV/V			
(70 to 220) V				
(10 to 20) Hz	200 μV/V			
(20 to 40) Hz	68 μV/V			
40 Hz to 20 kHz	31 μV/V			
(20 to 50) kHz	69 μV/V			
(50 to 100) kHz	98 μV/V			
(100 to 300) kHz	210 μV/V			
(300 to 500) kHz	500 μV/V			

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AC Voltage - Measure Flatness (cont.)	(7 to 22) mV (1 to 2) MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz (22 to 70) mV (1 to 2) MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz (70 to 220) mV (1 to 2) MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz (220 to 700) mV (1 to 2) MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz 700 mV to 2.2 V (1 to 2) MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz (2.2 to 7) V (1 to 2) MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz	700 µV/V 1 mV/V 1.7 mV/V 3.7 mV/V 500 µV/V 1 mV/V 1.5 mV/V 3.5 mV/V 500 µV/V 1 mV/V 1.5 mV/V 3.5 mV/V 500 µV/V 1 mV/V 1.5 mV/V 3.5 mV/V 500 µV/V 1 mV/V 1.5 mV/V 3.5 mV/V	Fluke 5790A Opt 03	OEM and GIDEP Sourced Calibration Procedures
AC Current - Source	(9 to 220) uA (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz 220 uA to 2.2 mA (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	230 µA/A + 16 nA 140 µA/A + 10 nA 110 µA/A + 8 nA 250 µA/A + 12 nA 900 µA/A + 65 nA 230 µA/A + 40 nA 140 µA/A + 35 nA 110 µA/A + 35 nA 180 µA/A + 110 nA 900 µA/A + 650 nA		

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY (\pm)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Current - Source (cont.)	<p>(2.2 to 22) mA (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz</p> <p>(22 to 220) mA (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz</p> <p>220 mA to 2.2 A 20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz</p> <p>(2.2 to 3) A (10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz</p> <p>(3 to 11) A (45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz</p> <p>(11 to 20.5) A (45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz</p>	<p>230 μA/A + 400 nA 140 μA/A + 350 nA 110 μA/A + 350 nA 180 μA/A + 550 nA 900 μA/A + 5 μA</p> <p>140 μA/A + 3.5 μA 110 μA/A + 2.5 μA 180 μA/A + 3.5 μA 900 μA/A + 10 μA 240 μA/A + 35 μA</p> <p>390 μA/A + 80 μA 6 mA/A + 160 μA 1.8 mA/A + 100 μA</p> <p>600 μA/A + 100 μA 6 mA/A + 1 mA 25 mA/A + 5 mA 600 μA/A + 2 mA</p> <p>1 mA/A + 2 mA 30 mA/A + 2 mA 1.2 mA/A + 5 mA</p> <p>1.5 mA/A + 5 mA 30 mA/A + 5 mA 230 μA/A + 4 μA</p>	<p>Fluke 5720A Opt 03</p> <p>Fluke 5520A</p>	<p>OEM and GIDEP Sourced Calibration Procedures</p>
AC Current - Measure	<p>Up to 200 μA (1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz</p> <p>200 μA to 2 mA (1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz</p>	<p>475 μA/A + 20 nA 475 μA/A + 20 nA 650 μA/A + 20 nA 4 mA/A + 20 nA</p> <p>290 μA/A + 200 nA 280 μA/A + 200 nA 650 μA/A + 200 nA 4 mA/A + 200 nA</p>	<p>Fluke 8508A Opt 01</p>	



PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY (±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Current - Measure (cont.)	(2 to 20) mA (1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	290 µA/A + 2 µA 250 µA/A + 2 µA 650 µA/A + 2 µA 4 mA/A + 2 µA	Fluke 8508A Opt 01	
	(20 to 200) mA (1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz 200 mA to 2 A 10 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (2 to 20) A 10 Hz to 2 kHz (2 to 10) kHz	290 µA/A + 20 µA 250 µA/A + 20 µA 600 µA/A + 20 µA 600 µA/A + 200 µA 710 µA/A + 200 µA 3 mA/A + 200 µA 800 µA/A + 2 mA 2.5 mA/A + 2 mA		
	20 mA to 2 A 10 Hz to 100 kHz (2 to 10) A 10 Hz to 50 kHz	220 µA/A 142 µA/A	Fluke A40 Shunts with Fluke 5790A Opt 03	
Electrical Simulation of Thermocouple Indicators				OEM and GIDEP Sourced Calibration Procedures
Type B	(600 to 800) °C (800 to 1 000) °C (1 000 to 1 550) °C (1 550 to 1 820) °C	0.44 °C 0.34 °C 0.30 °C 0.33 °C		
Type C	(0 to 150) °C (150 to 650) °C (650 to 1 000) °C (1 000 to 1 800) °C (1 800 to 2 316) °C	0.30 °C 0.26 °C 0.31 °C 0.50 °C 0.84 °C	Fluke 5520A-SC1100	
Type E	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1 000) °C	0.50 °C 0.16 °C 0.14 °C 0.16 °C 0.21 °C		
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1 200) °C	0.27 °C 0.16 °C 0.14 °C 0.17 °C 0.23 °C		

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Electrical Simulation of Thermocouple Indicators (cont.)						
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1 000) °C (1 000 to 1 372) °C	0.33 °C 0.18 °C 0.16 °C 0.26 °C 0.40 °C	Fluke 5520A-SC1100	`OEM and GIDEP Sourced Calibration Procedures		
Type L	(-200 to -100) °C (-100 to 800) °C (800 to 900) °C	0.37 °C 0.26 °C 0.17 °C				
Type N	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 410) °C (410 to 1 300) °C	0.40 °C 0.22 °C 0.19 °C 0.18 °C 0.27 °C				
Type R	(0 to 250) °C (250 to 400) °C (400 to 1 000) °C (1 000 to 1 767) °C	0.57 °C 0.35 °C 0.33 °C 0.40 °C				
Type S	(0 to 250) °C (250 to 1000) °C (1 000 to 1 400) °C (1 400 to 1 767) °C	0.47 °C 0.36 °C 0.37 °C 0.46 °C				
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.63 °C 0.24 °C 0.16 °C 0.14 °C				
Type U	(-200 to 0) °C (0 to 600) °C	0.56 °C 0.27 °C				
Electrical Simulation of RTDs Pt 395 (100 Ω)	(-200 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C (400 to 630) °C (630 to 800) °C	0.05 °C 0.07 °C 0.09 °C 0.10 °C 0.12 °C 0.23 °C				

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Electrical Simulation of RTDs (cont.)				
Pt 3926 (100 Ω)	(-200 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C (400 to 630) °C	0.05 °C 0.07 °C 0.09 °C 0.10 °C 0.12 °C	Fluke 5520A-SC1100	OEM and GIDEP Sourced Calibration Procedures
Pt 3916 (100 Ω)	(-200 to -190) °C (-190 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.25 °C 0.04 °C 0.05 °C 0.06 °C 0.07 °C 0.08 °C 0.09 °C 0.10 °C 0.23 °C		
Pt 385 (200 Ω)	(-200 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.04 °C 0.05 °C 0.12 °C 0.13 °C 0.14 °C 0.16 °C		
Pt 385 (500 Ω)	(-200 to -80) °C (-80 to 100) °C (100 to 260) °C (260 to 400) °C (400 to 600) °C (600 to 630) °C	0.04 °C 0.05 °C 0.06 °C 0.08 °C 0.09 °C 0.11 °C		
Pt 385 (1 kΩ)	(-200 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 600) °C (600 to 630) °C	0.03 °C 0.04 °C 0.05 °C 0.06 °C 0.07 °C 0.23 °C		
Ni 120 (120 Ω) Cu 427 (10 Ω)	(-80 to 100) °C (100 to 260) °C (-100 to 260) °C	0.08 °C 0.14 °C 0.3 °C		

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Capacitance - Source 10 Hz to 10 kHz 10 Hz to 10 kHz 10 Hz to 3 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz (10 to 600) Hz (10 to 300) Hz (10 to 150) Hz (10 to 120) Hz (10 to 80) Hz (0 to 50) Hz (0 to 20) Hz (0 to 6) Hz (0 to 2) Hz (0 to 0.6) Hz (0 to 0.2) Hz	(190 to 400) pF 400 pF to 1.1 nF (1.1 to 3.3) nF (3.3 to 11) nF (11 to 33) nF (33 to 110) nF (110 to 330) nF 330 nF to 1.1 µF (1.1 to 3.3) µF (3.3 to 11) µF (11 to 33) µF (33 to 110) µF (110 to 330) µF 330 µF to 1.1 mF (1.1 to 3.3) mF (3.3 to 11) mF (11 to 33) mF (33 to 110) mF	5 mF/F + 10 pF 5 mF/F + 10 pF 5 mF/F + 10 pF 2.5 mF/F + 10 pF 2.5 mF/F + 100 pF 2.5 mF/F + 100 pF 2.5 mF/F + 300 pF 2.5 mF/F + 1 nF 2.5 mF/F + 3 nF 2.5 mF/F + 10 nF 4 mF/F + 30 nF 4.5 mF/F + 100 nF 4.5 mF/F + 300 nF 4.5 mF/F + 1 µF 4.5 mF/F + 3 µF 4.5 mF/F + 10 µF 7.5 mF/F + 30 µF 11 mF/F + 100 µF	Fluke 5520A-SC1100	OEM and GIDEP Sourced Calibration Procedures
Capacitance - Measure 10 Hz to 500 kHz	1 pF to 10 F	500 µF/F	Quadtech 7400 Fluke 5520A-SC1100	
Inductance - Measure 10 Hz to 500 KHz	1 pH to 10 H	500 µH/H		
DC Power - Source	33 mV to 1 kV 330 µA to 330 mA 330 mA to 3 A (3 to 20.5) A	0.02 % of Watts Output 0.02 % of Watts Output 0.06 % of Watts Output	Fluke 5520A-SC1100	OEM, GIDEP, and National Instruments Sourced Calibration Procedures
AC Power - Source (45 to 65) Hz	(33 to 330) mV (3.3 to 9) mA (9 to 33) mA (33 to 90) mA (90 to 330) mA (330 to 900) mA 900 mA to 2.2 A (2.2 to 4.5) A (4.5 to 20.5) A	0.13 % of Watts Output 0.09 % of Watts Output 0.13 % of Watts Output 0.09 % of Watts Output 0.12 % of Watts Output 0.10 % of Watts Output 0.12 % of Watts Output 0.10 % of Watts Output		

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AC Power - Source (45 to 65) Hz	330 mV to 1 kV (3.3 to 9) mA (9 to 33) mA (33 to 90) mA (90 to 330) mA (330 to 900) mA 900mA to 3 A (3 to 11) A (11 to 20.5) A	0.11 % of Watts Output 0.07 % of Watts Output 0.11 % of Watts Output 0.07 % of Watts Output 0.10 % of Watts Output 0.08 % of Watts Output 0.11 % of Watts Output 0.09 % of Watts Output	Fluke 5520A-SC1100	OEM, GIDEP, and National Instruments Sourced Calibration Procedures
Calibration of Oscilloscopes Amplitude DC Signal 50 Ω Load 1 M Ω Load	(-6.6 to 6.6) V (-130 to 130) V	2.5 mV/V + 40 μ V 500 μ V/V + 40 μ V		
Amplitude Squarewave 50 Ω Load 1 M Ω Load	10 Hz to 10 kHz \pm 1 mV to \pm 6.6 V p-p \pm 1 mV to \pm 130 V p-p	2.5 mV/V + 40 μ V 1 mV/V + 40 μ V		
Edge Specs into 50 Ω Load Rise Time Range (p-p)	\leq 300 ps 5 mV to 2.5 V	(0 /-100) ps 20 mV/V + 200 μ V		
Leveled Sine Wave 50 kHz/10MHz (reference) [5 mV to 5.5 V] p-p 50 Ω Load	50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz 600 MHz to 1.1 GHz	35 mV/V + 300 μ V 40 mV/V + 300 μ V 60 mV/V + 300 μ V 70 mV/V + 300 μ V		
Time Marker into 50 Ω Load	5 s to 50 ms 20 ms to 1 ns	(25 + 1000t) μ s/s 2.5 μ s/s		
Wave Generator Amplitude Square, Sine, Triangle into 1 M Ω Square, Sine, Triangle into 50 Ω	(10 Hz to 100 kHz) 1.8 mV to 55 V p-p 1.8 mV to 2.5 V p-p	30 mV/V + 100 μ V 30 mV/V + 100 μ V		

II. Electromagnetic - RF/Microwave

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY (±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
RF Power - Source 50 Ω load	1 dB 1 mHz to 100 kHz	0.1 dB	HP 3325B	OEM and GIDEP Sourced Calibration Procedures
	100 kHz to 20 MHz	0.4 dB		
	(2 to 8) dB 1 mHz to 100 Hz	0.2 dB	Agilent E4426B	
	100 kHz to 10 MHz	0.5 dB		
	(+10 to -127) dBm 250 kHz to 2 GHz	0.5 dB	HP 8340B	
	(2 to 3) GHz	0.9 dB		
	(3 to 4) GHz	1.5 dB		
	(+18 to +10) dBm (2.3 to 20) GHz	1.8 dB		
	(20 to 26.5) GHz	2.3 dB		
	(+10 to -10) dBm Up to 2.3 GHz	0.9 dB		
	(2.3 to 20) GHz	1.5 dB		
	(20 to 26.5) GHz	2 dB		
	(-10 to -20) dBm Up to 2.3 GHz	1.2 dB		
	(2.3 to 20) GHz	2 dB		
	(20 to 26.5) GHz	2.5 dB		
	(-20 to -50) dBm Up to 2.3 GHz	1.5 dB		
	(2.3 to 20) GHz	2.3 dB		
	(20 to 26.5) GHz	2.8 dB		
	(-50 to -80) dBm Up to 2.3 GHz	1.8 dB		
	(2.3 to 20) GHz	2.6 dB		
(20 to 26.5) GHz	3.1 dB			
(-80 to -100) dBm Up to 2.3 GHz	2.1 dB			
(2.3 to 20) GHz	2.9 dB			
(20 to 26.5) GHz	3.4 dB			
(-100 to -110) dBm Up to 2.3 GHz	2.9 dB			
(2.3 to 20) GHz	3.7 dB			
(20 to 26.5) GHz	4.2 dB			

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY (±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
RF Power - Measure 50 Ω load (cont.)	(+30 to -20) dBm 100 kHz to 2 GHz (2 to 26.5) GHz (+20 to -30) dBm 110 kHz to 4.2 GHz 50 MHz to 26.5 GHz (+10 to -20) dBm 10 MHz to 2.6 GHz (2.6 to 18) GHz (18 to 20) GHz (20 to 26.5) GHz (+10 to +20) dBm 10 MHz to 18 GHz (18 to 26.5) GHz (-20 to -70) dBm 10 MHz to 6 GHz (6 to 15) GHz (17 to 18) GHz (-30 to +20) dBm 100 kHz to 4.2 GHz	0.07 dBm 0.08 dBm 0.07 dBm 0.12 dBm 0.07 dBm 0.1 dBm 0.12 dBm 0.13 dBm 0.08 dBm 0.12 dBm 0.1 dBm 0.1 dBm 0.11 dBm 0.07 dBm	HP 8902 w/11722A HP 8902 w 11792A or 11793A HP 438A w/8482A HP 438A w/8485A HP 8902A w/ 11793A, 11722A, and 11792A HP 436A w/ 8481A HP 436A w/ 8485A HP 436A w/ 8481D HP 436A w/ 8482A	OEM and GIDEP Sourced Calibration Procedures
Power Reference 1 mW	50 MHz	0.006 dB (3.4 μW)	HP 478-H76	
Phase Modulation - Measure Carrier Frequency: 150 kHz to 10 MHz 10 MHz to 26.5 GHz	200 Hz to 10 kHz 200 Hz to 20 kHz	5 % 4 %	HP 8902A w/ 11722A HP 8902A w/ 11793A	
Amplitude Modulation - Source Rate: 50 Hz to 10 kHz Depths: (5 to 99) %	100 MHz to 1.28 GHz	2.3 %	HP 8902A w/ 8662A	OEM and GIDEP Sourced Calibration Procedures
20 Hz to 10 kHz Depths: to 99 %	150 kHz to 10 MHz	3.5 %	HP 8902A w/ 11722A	
50 Hz to 10 kHz Depths: (5 to 99) %	150 kHz to 10 MHz	2.3 %		
20 Hz to 10 kHz Depths: to 99 %	10 MHz to 1.3 GHz	3.5 %	HP 8902A w/ 11793A	
50 Hz to 10 kHz Depths: (5 to 99) %	10 MHz to 1.3 GHz	1.2 %		

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY (±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Frequency Modulation - Source Modulation Rate: 20 Hz to 10 kHz 50 Hz to 100 kHz 20 Hz to 200 kHz	250 kHz to 10 MHz 10 MHz to 1.3 GHz 10 MHz to 1.3 GHz	2.4 % 1.3 % 5.8 %	HP 8902A Agilent E4426B	OEM, and GIDEP Sourced Calibration Procedures
Frequency Modulation - Measure Modulation Rate: 20 Hz to 10 kHz 50 Hz to 100 kHz 20 Hz to 200 kHz	250 kHz to 10 MHz 10 MHz to 1.3 GHz 10 MHz to 1.3 GHz	2.4 % 1.3 % 5.8 %	HP 8902A	
Insertion Loss- (0 to 110) dB	2.5 MHz to 26.5 GHz	0.13 dB	HP 8902A w/ 11793A, 11722A, and 11792A	
Distortion - Measure Fundamental Frequency	20 Hz to 20 kHz (20 to 100) kHz	1.19 dB 2.38 dB	HP 8903B	

III. Time & Frequency

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY (±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Frequency - Source	10 MHz DC to 225 MHz 225 MHz to 18 GHz	1.15 parts in 10 ⁹ 1.15 parts in 10 ⁹ 1.16 parts in 10 ⁹	Datum 9390-6000 HP 53132A HP 5342B	OEM and GIDEP Sourced Calibration Procedures
Frequency - Measure	10 MHz DC to 225 MHz 225 MHz to 18 GHz	1.15 parts in 10 ⁹ 1.15 parts in 10 ⁹ 1.16 parts in 10 ⁹	Datum 9390-6000 HP 53132A HP 5342B	

IV. Thermodynamic

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY (±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Temperature - Source	(-30 to 231) °C	0.76 °C	T-100 PRT with F250 Thermometer and Well	OEM, GIDEP, NIST, and ASTM Sourced Calibration Procedures
Temperature - Measure	-39 °C 0.01 °C 157 °C 231 °C	0.01 °C 0.01 °C 0.01 °C 0.01 °C		

V. Mechanical

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY (±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Mass/Force	10 mg	0.02 mg	Class 2 Weights	OEM and GIDEP Sourced Calibration Procedures
	20 mg	0.02 mg		
	30 mg	0.02 mg		
	50 mg	0.02 mg		
	100 mg	0.03 mg		
	200 mg	0.03 mg		
	300 mg	0.03 mg		
	500 mg	0.03 mg		
	1 g	0.06 mg		
	2 g	0.06 mg		
	3 g	0.06 mg		
	5 g	0.06 mg		
	10 g	0.06 mg		
	20 g	0.12 mg		
	30 g	0.2 mg		
	50 g	0.3 mg		
	100 g	0.6 mg		
	200 g	1.2 mg		
	300 g	1.8 mg		
	500 g	3 mg		
	1 kg	5.9 mg		
	2 kg	14 mg		
	3 kg	20 mg		
5 kg	33 mg			
10 kg	66 mg			
20 kg	161 mg			
Up to 700 lbf	0.023 % of indication	Class F Weights		



PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY (±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Pressure (Air/Oil)	Up to 2 430 psi (2 430 to 12 140) psi	0.18 psi 1.3 psi	Ruska 120X System	OEM and GIDEP Sourced Calibration Procedures

VI. Dimensional

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY (±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
*Single Axis Dimensional Gaging - Outside - Inside	Up to 11 in Up to 11.5 in	15.6 µin + 0.9L 15.8 µin + 0.9L	P&W Universal Supermicrometer	OEM and GIDEP Sourced Calibration Procedures
*Thread Plug Gage - Simple Pitch Diameter	Up to 11 in	26.9 µin + 0.9L	P&W Supermicrometer with Thread Wires	
*Thread Ring Gage- Simple Pitch Diameter	Up to 11 in	26.9 µin + 0.9L	Setting Plugs	
Micrometers	Up to 4 in (4 to 10) in (10 to 20) in (20 to 48) in	67 µin 105 µin 182 µin 832 µin	Grades 1 and 3 Gage Blocks with Optical Flats	
Calipers	Up to 6 in (6 to 20) in (20 to 48) in	128 µin 208 µin 737 µin	Grade 1 and 3 Gage Blocks	
Indicators	Up to 4 in	67 µin	Grade 1 Gage Blocks	

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY (±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Height Gages	Up to 4 in (4 to 10) in (10 to 20) in (20 to 48) in	67 µin 105 µin 182 µin 730 µin	Grades 1 and 3 Gage Blocks with Surface Plate	OEM and GIDEP Sourced Calibration Procedures

Notes:

1. Calibration and Measurement Capabilities (CMC) (Expanded Uncertainties) are based on approximately a 95% confidence interval, using a coverage of $k=2$.
2. This laboratory's capabilities include in-laboratory and on-site calibration services. Since on-site conditions are typically more variable than those in the laboratory, larger measurement uncertainties are expected on-site than what is reported on the accredited scope.
3. Parameters denoted with an asterisk (*) are not available for on-site calibrations.
4. CMC for Electromagnetic – DC/Low Frequency and RF/Microwave parameters do not include possible contributions to uncertainty from a "best available" unit under test.
5. CMC for RF/Microwave do not include possible contributions from mismatch error.
6. The use of (I) denotes Applied Current.
7. The use of (L) signifies an expression of Length in inches.
8. The use of (t) stands for Time in seconds.
9. This scope is part of and must be included with the Certificate of Accreditation No. AC-1187.



Vice-President

