SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017
& ANSI/NCSL Z540-1-1994, ANSI/NCSL Z540-3-2006

TEKTRONIX
1411 N. Grand Ave, Ste 300
Covina, CA 91724
Robert Hollis-Brau Phone: 626 404 2200

CALIBRATION

Valid To: January 31, 2021 Certificate Number: 2357.10

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations[1, 7]:

I. Dimensional

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
Micrometers – Inside, Outside, and Depth[3]	Up to 10 in (10 to 48) in	(30 + 1.5*L*) µin (25 + 2.0*L*) µin	Grade 0 gage blocks Grade 2 gage blocks
Calipers[3]	Up to 4 in (4 to 10) in (10 to 48) in	(58 + 0.25*L*) µin (66 + 5.6*L*) µin (115 + 7.4*L*) µin	Grade 0 gage blocks Grade 2 gage blocks
Height Gages[3]	Up to 10 in (10 to 24) in	(58 + 1.1*L*) µin (51 + 1.8*L*) µin	Grade 0 gage blocks Grade 2 gage blocks
Length – Measure	Up to 10 in	(37 + 6.5*L*) µin	Grade 0 gage blocks and bench micrometer
Indicators	Up to 4 in	51 µin	Grade 0 gage blocks
Depth Gages	(0.005 to 0.05) in (0.05 to 4) in (4 to 12) in (12 to 48) in	59 µin (58 + 0.25*L*) µin (43 + 4*L*) µin (55 + 3*L*) µin	Grade 0 gage blocks

II. Electrical – DC / Low Frequency

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
DC Voltage – Generate[3]	(0 to 220) mV (0.22 to 2.2) V (2.2 to 11) V (11 to 22) V (22 to 220) V (220 to 1100) V	9.1 µV/V + 0.62 µV 6.3 µV/V + 0.93 µV 6.2 µV/V + 3.1 µV 6.3 µV/V + 6.2 µV 7.0 µV/V + 78 µV 8.6 µV/V + 0.47 mV	Fluke 5720A
DC Voltage – Measure[3]	Up to 100 mV (0.1 to 1.2) V (1.2 to 10) V (10 to 100) V (100 to 1000) V (1.1 to 120) kV	12 µV/V + 230 nV 7.3 µV/V + 0.23 µV 4.0 µV/V + 0.39 µV 6.4 µV/V + 23 µV 7.9 µV/V + 78 µV 1.2 mV/V	HP 3458A, opt 002 Ross 120 kV divider w/ 34401A
DC Current – Generate[3]	Up to 220 µA 220 µA to 2.2 mA (2.2 to 22) mA (22 to 220) mA (0.22 to 2.2) A (2.2 to 11) A (11 to 20.5) A (20.5 to 100) A	41 µA/A + 5.4 nA 33 µA/A + 6.2 nA 33 µA/A + 39 nA 41 µA/A + 0.62 µA 71 µA/A + 12 µA 0.28 mA/A + 0.37 mA 0.78 mA/A + 0.58 mA 0.36 %	Fluke 5720A Fluke 5520A/SC1100 Valhalla 2555A w/ Fluke 5700A
With Shunts	(20 to 50) A (50 to 100) A (100 to 300) A	0.4 mA/A + 390 mA 0.4 mA/A + 780 mA 0.41 mA/A + 230 mA	3458A w/ various shunts
Clamp-On Only	(16.5 to 149.999) A (150 to 1025) A	3.9 mA/A + 0.11 mA 4.0 mA/A + 0.39 mA	Fluke 5520A w/ coil

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
DC Resistance – Generate[3]	(0 to 10.9999) Ω	46 µΩ/Ω + 0.78 mΩ	Fluke 5520A
	(11 to 32.9999) Ω	52 µΩ/Ω + 1.2 mΩ	
	(33 to 109.9999) Ω	34 µΩ/Ω + 1.1 mΩ	
	(110 to 329.9999) Ω	29 µΩ/Ω + 1.6 mΩ	
	(0.33 to 1.099999) kΩ	27 µΩ/Ω + 1.6 mΩ	
	(1.1 to 3.299999) kΩ	28 µΩ/Ω + 16 mΩ	
	(3.3 to 10.99999) kΩ	27 µΩ/Ω + 16 mΩ	
	(11 to 32.99999) kΩ	29 µΩ/Ω + 0.16 Ω	
	(33 to 109.9999) kΩ	27 µΩ/Ω + 0.16 Ω	
	(110 to 329.9999) kΩ	25 µΩ/Ω + 1.6 Ω	
	(0.33 to 1.099999) MΩ	26 µΩ/Ω + 1.6 Ω	
	(1.1 to 3.299999) MΩ	49 µΩ/Ω + 23 Ω	
	(3.3 to 10.99999) MΩ	0.11 mΩ/Ω + 39 Ω	
	(11 to 32.99999) MΩ	0.20 mΩ/Ω + 1.9 kΩ	
	(33 to 109.9999) MΩ	0.40 mΩ/Ω + 2.3 kΩ	
	(110 to 329.9999) MΩ	2.4 mΩ/Ω + 78 kΩ	
	(330 to 1100) MΩ	12 mΩ/Ω + 390 kΩ	
	1 Ω	0.13 mΩ	Fluke 5720A
	1.9 Ω	0.18 mΩ	
	10 Ω	0.23 mΩ	
	19 Ω	0.43 mΩ	
	100 Ω	1.1 mΩ	
	190 Ω	2.0 mΩ	
	1 kΩ	8.2 mΩ	
	1.9 kΩ	16 mΩ	
	10 kΩ	85 mΩ	
	19 kΩ	0.15 Ω	
	100 kΩ	1.0 Ω	
	190 kΩ	2.7 Ω	
	1 MΩ	50 Ω	
	1.9 MΩ	60 Ω	
	10 MΩ	4.0 kΩ	
	19 MΩ	8.5 kΩ	
	100 MΩ	26 kΩ	
DC Current – Measure[3]	Up to 200 µA	13 µA/A + 0.40 nA	Fluke 8508A
	(0.2 to 2) mA	14 µA/A + 4.0 nA	
	(2 to 20) mA	14 µA/A + 40 nA	
	(20 to 200) mA	48 µA/A + 0.80 µA	
	(0.2 to 2) A	0.18 mA/A + 16 µA	
	(2 to 20) A	0.41 mA/A + 0.4 mA	
With Shunts	(20 to 50) A	0.40 mA/A + 0.39 A	3458A w/ various shunts
	(50 to 100) A	0.40 mA/A + 0.78 A	
	(100 to 300) A	0.41 mA/A + 0.23 A	

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
DC Resistance – Measure[3]			
True Ohms Mode	Up to 2 Ω (2 to 20) Ω (20 to 200) Ω (0.2 to 2) kΩ	19 μΩ/Ω + 4 μΩ 10 μΩ/Ω + 14 μΩ 8.8 μΩ/Ω + 50 μΩ 8.7 μΩ/Ω + 0.5 mΩ	Fluke 8508A
Normal Mode	(2 to 20) kΩ (2 to 200) kΩ (0.2 to 2) MΩ	8.7 μΩ/Ω + 5 mΩ 8.9 μΩ/Ω + 50 mΩ 11 μΩ/Ω + 1 Ω	
High Voltage Mode	(2 to 20) MΩ (20 to 200) MΩ (0.2 to 2) GΩ (2 to 20) GΩ	21 μΩ/Ω + 10 Ω 68 μΩ/Ω + 1 kΩ 0.19 mΩ/Ω + 0.1 MΩ 1.5 mΩ/Ω + 10 MΩ	

Parameter/Range	Frequency	CMC[2, 4] (±)	Comments
AC Voltage – Generate[3]			
(0.2 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 (0.5 to 1) MHz	1.2 mV/V + 5.0 μV 0.91 mV/V + 5.0 μV 0.9 mV/V + 5.0 μV 1.5 mV/V + 5.0 μV 2.1 mV/V + 6.0 μV 3.6 mV/V + 12 μV 5.2 mV/V + 25 μV 6.6 mV/V + 25 μV	Fluke 5720A w/ Fluke 5725A
(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 (0.5 to 1) MHz	0.32 mV/V + 5.0 μV 0.18 mV/V + 5.0 μV 0.18 mV/V + 5.0 μV 0.33 mV/V + 5.0 μV 0.59 mV/V + 6.0 μV 1.3 mV/V + 12 μV 1.7 mV/V + 25 μV 3.2 mV/V + 25 μV	

Parameter/Range	Frequency	CMC[2, 4] (±)	Comments
AC Voltage – Generate[3] (cont)			
(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 (0.5 to 1) MHz	0.39 mV/V + 15 µV 99 µV/V + 8.0 µV 87 µV/V + 8.0 µV 0.21 mV/V + 8.0 µV 0.49 mV/V + 20 µV 0.89 mV/V + 25 µV 1.4 mV/V + 30 µV 2.7 mV/V + 60 µV	Fluke 5720A w/ Fluke 5725A
(0.22 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 (0.5 to 1) MHz	0.54 mV/V + 50 µV 88 µV/V + 20 µV 46 µV/V + 10 µV 80 µV/V + 12 µV 0.14 mV/V + 40 µV 0.42 mV/V + 0.10 mV 0.96 mV/V + 0.25 mV 1.7 mV/V + 0.40 mV	
(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 (0.5 to 1) MHz	0.40 mV/V + 0.50 mV 95 µV/V + 0.20 mV 48 µV/V + 70 µV 82 µV/V + 0.12 mV 0.12 mV/V + 0.25 mV 0.30 mV/V + 0.80 mV 1.0 mV/V + 2.5 mV 1.7 mV/V + 4.0 mV	
(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 (0.5 to 1) MHz	0.46 mV/V + 5.0 mV 99 µV/V + 2.0 mV 71 µV/V + 0.70 mV 0.15 mV/V + 1.2 mV 0.23 mV/V + 3.0 mV 0.87 mV/V + 20 mV 4.2 mV/V + 50 mV 8.6 mV/V + 100 mV	
(220 to 250) V	(15 to 50) Hz	0.28 mV/V + 20 mV	
(220 to 1100) V	50 Hz to 1 kHz (1 to 20) kHz (20 to 30) kHz	79 µV/V + 4.0 mV 0.13 mV/V + 6.0 mV 0.49 mV/V + 11 mV	
(220 to 750) V	(30 to 50) kHz (50 to 100) kHz	0.47 mV/V + 11 mV 1.8 mV/V + 45 mV	

Parameter/Range	Frequency	CMC[2, 4] (±)	Comments
AC Voltage – Generate[3] (cont)			
Wideband Output			
Up to 1.1 mV	(10 to 30) Hz	2.4 mV/V	Fluke 5720A
	30 Hz to 120 kHz	0.98 mV/V	
	(0.12 to 2) MHz	2.2 mV/V + 2.3 µV	
	(2 to 10) MHz	3.7 mV/V + 2.3 µV	
	(10 to 20) MHz	5.5 mV/V + 2.3 µV	
	(20 to 30) MHz	13 mV/V + 12 µV	
(1.1 to 3) mV	(10 to 30) Hz	2.4 mV/V	
	30 Hz to 120 kHz	0.94 mV/V	
	(0.12 to 2) MHz	1.3 mV/V + 2.3 µV	
	(2 to 10) MHz	2.2 mV/V + 2.3 µV	
	(10 to 20) MHz	4.9 mV/V + 2.3 µV	
	(20 to 30) MHz	13 mV/V + 2.3 µV	
(3 to 11) mV	(10 to 30) Hz	2.4 mV/V	
	30 Hz to 120 kHz	0.94 mV/V	
	(0.12 to 2) MHz	1.12 mV/V + 2.3 µV	
	(2 to 10) MHz	2.0 mV/V + 2.3 µV	
	(10 to 20) MHz	3.9 mV/V + 2.3 µV	
	(20 to 30) MHz	8.6 mV/V + 2.3 µV	
(11 to 33) mV	(10 to 30) Hz	2.4 mV/V	
	30 Hz to 120 kHz	0.91 mV/V	
	(0.12 to 2) MHz	1.0 mV/V + 2.3 µV	
	(2 to 10) MHz	2.0 mV/V + 2.3 µV	
	(10 to 20) MHz	3.8 mV/V + 2.3 µV	
	(20 to 30) MHz	8.5 mV/V + 2.3 µV	
(33 to 110) mV	(10 to 30) Hz	2.4 mV/V	
	30 Hz to 120 kHz	0.87 mV/V	
	(0.12 to 2) MHz	1.1 mV/V + 2.3 µV	
	(2 to 10) MHz	2.0 mV/V + 2.3 µV	
	(10 to 20) MHz	3.8 mV/V + 2.3 µV	
	(20 to 30) MHz	8.1 mV/V + 2.3 µV	
(110 to 330) mV	(10 to 30) Hz	2.3 mV/V	
	30 Hz to 120 kHz	0.84 mV/V	
	(0.12 to 2) MHz	1.1 mV/V + 2.3 µV	
	(2 to 10) MHz	2.0 mV/V + 2.3 µV	
	(10 to 20) MHz	3.8 mV/V + 2.3 µV	
	(20 to 30) MHz	8.5 mV/V + 2.3 µV	

Parameter/Range	Frequency	CMC[2, 4] (±)	Comments
AC Voltage – Generate[3] (cont)			
Wideband Output			
330 mV to 1.1 V	(10 to 30) Hz	2.3 mV/V	Fluke 5720A
	30 Hz to 120 kHz	0.84 mV/V	
	(0.12 to 2) MHz	1.0 mV/V + 2.3 µV	
	(2 to 10) MHz	2.0 mV/V + 2.3 µV	
	(10 to 20) MHz	3.8 mV/V + 2.3 µV	
	(20 to 30) MHz	8.5 mV/V + 2.3 µV	
(1.1 to 3.5) V	(10 to 30) Hz	2.3 mV/V	
	30 Hz to 120 kHz	0.84 mV/V	
	(0.12 to 2) MHz	1.0 mV/V + 2.3 µV	
	(2 to 10) MHz	2.0 mV/V + 2.3 µV	
	(10 to 20) MHz	3.8 mV/V + 2.3 µV	
	(20 to 30) MHz	8.5 mV/V + 2.3 µV	
AC Current – Generate[3]			
(1 to 220) µA	(10 to 20) Hz	0.4 mA/A + 16 nA	Fluke 5720A
	(20 to 40) Hz	0.17 mA/A + 10 nA	
	40 Hz to 1 kHz	0.12 mA/A + 8 nA	
	(1 to 5) kHz	0.33 mA/A + 12 nA	
	(5 to 10) kHz	1.0 mA/A + 65 nA	
(0.22 to 2.2) mA	(10 to 20) Hz	0.36 mA/A + 40 nA	
	(20 to 40) Hz	0.19 mA/A + 35 nA	
	40 Hz to 1 kHz	0.15 mA/A + 35 nA	
	(1 to 5) kHz	0.22 mA/A + 110 nA	
	(5 to 10) kHz	1.0 mA/A + 650 nA	
(2.2 to 22) mA	(10 to 20) Hz	0.37 mA/A + 400 nA	
	(20 to 40) Hz	0.17 mA/A + 350 nA	
	40 Hz to 1 kHz	0.12 mA/A + 350 nA	
	(1 to 5) kHz	0.20 mA/A + 550 nA	
	(5 to 10) kHz	1.0 mA/A + 5.0 µA	
(22 to 220) mA	(10 to 20) Hz	0.38 mA/A + 4.0 µA	
	(20 to 40) Hz	0.17 mA/A + 3.5 µA	
	40 Hz to 1 kHz	0.13 mA/A + 2.5 µA	
	(1 to 5) kHz	0.20 mA/A + 3.5 µA	
	(5 to 10) kHz	1.0 mA/A + 10 µA	

Parameter/Range	Frequency	CMC[2, 4] (±)	Comments
AC Current – Generate[3] (cont)			
(0.22 to 2.2) A	20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.27 mA/A + 35 µA 0.41 mA/A + 80 µA 6.3 mA/A + 160 µA	Fluke 5720A
(2.2 to 11) A	40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.4 mA/A + 170 µA 0.76 mA/A + 380 µA 2.9 mA/A + 750 µA	
(11 to 20.5) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.94 mA/A + 3.9 mA 1.2 mA/A + 3.9 mA 23 mA/A + 3.9 mA	Fluke 5520A
Clamp-On Only (10 to 149.999) A	(45 to 65) Hz (65 to 440) Hz	0.31 % 0.81 %	Fluke 5520A w/coil
(150 to 1025) A	(45 to 65) Hz (65 to 440) Hz	0.33 % 0.82 %	
AC Voltage – Measure			
Up to 199.99 mV	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz (0.1 to 2) kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.35 mV/V + 14 µV 0.16 mV/V + 4.0 µV 0.12 mV/V + 4.0 µV 0.12 mV/V + 2.0 µV 0.14 mV/V + 4.0 µV 0.35 mV/V + 8.0 µV 0.77 mV/V + 20 µV	Fluke 8508A
(0.2 to 1.9999) V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz (0.1 to 2) kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz	0.50 mV/V + 0.12 mV 0.12 mV/V + 20 µV 0.11 mV/V + 20 µV 79 µV/V + 20 µV 0.11 mV/V + 20 µV 0.23 mV/V + 40 µV 0.59 mV/V + 0.20 mV 3.0 mV/V + 2.0 mV 10 mV/V + 20 mV	
(2 to 19.999) V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz (0.1 to 2) kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz	0.36 mV/V + 1.2 mV 0.13 mV/V + 0.20 mV 95 µV/V + 0.20 mV 85 µV/V + 0.20 mV 0.11 mV/V + 0.20 mV 0.22 mV/V + 0.40 mV 0.58 mV/V + 2.0 mV 3.0 mV/V + 20 mV 10 mV/V + 0.20 V	

Parameter/Range	Frequency	CMC[2, 4] (±)	Comments
AC Voltage – Measure (cont)			
(20 to 199.99) V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz (0.1 to 2) kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz	0.43 mV/V + 12 mV 0.13 mV/V + 2.0 mV 98 µV/V + 2.0 mV 83 µV/V + 2.0 mV 0.12 mV/V + 2.0 mV 0.22 mV/V + 4.0 mV 0.58 mV/V + 20 mV 1.6 mV/V + 0.2 V 5.2 mV/V + 2.0 V	Fluke 8508A
(100 to 1050) V	(1 to 10) Hz (10 to 40) Hz (40 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.50 mV/V + 10 mV 0.13 mV/V + 20 mV 0.16 mV/V + 20 mV 0.38 mV/V + 40 mV 0.66 mV/V + 0.20 V	
(1.1 to 10) kV (10 to 25) kV (25 to 50) kV (50 to 75) kV (75 to 85) kV	60 Hz 60 Hz 60 Hz 60 Hz 60 Hz	5.9 mV/V 5.9 mV/V 6.0 mV/V 6.0 mV/V 6.0 mV/V	Ross 120 kV divider w/ 34401A
AC Current – Measure[3]			
Up to 199.99 µA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.58 mA/A + 20 nA 0.52 mA/A + 20 nA 0.65 mA/A + 20 nA 3.1 mA/A + 20 nA	Fluke 8508A
(0.2 to 1.9999) mA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.42 mA/A + 0.20 µA 0.31 mA/A + 0.20 µA 0.63 mA/A + 0.20 µA 3.1 mA/A + 0.20 µA	
(2 to 19.999) mA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.41 mA/A + 2.0 µA 0.31 mA/A + 2.0 µA 0.63 mA/A + 2.0 µA 3.7 mA/A + 2.0 µA	
(20 to 199.99) mA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz	0.42 mA/A + 20 µA 0.30 mA/A + 20 µA 0.68 mA/A + 20 µA	
(0.2 to 1.9999) A	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz	0.57 mA/A + 0.20 mA 0.85 mA/A + 0.20 mA 2.4 mA/A + 0.20 mA	

Parameter/Range	Frequency	CMC[2, 4] (±)	Comments
AC Current – Measure[3] (cont)			
(20 to 19.999) A	10 Hz to 2 kHz (2 to 10) kHz	0.74 mA/A + 0.20 mA 2.1 mA/A + 0.20 mA	Fluke 8508A
With Shunts (20 to 100) A (100 to 300) A	 60 Hz 60 Hz	 040 µA/A + 390 mA 0.41 mA/A + 230 mA	 3458A w/ various shunts
Capacitance – Generate[3]			
(0.190 to 1.1) nF (1.1 to 3.3) nF (3.3 to 11) nF (11 to 110) nF (110 to 330) nF (0.330 to 1.1) µF (1.1 to 3.29) µF (3.3 to 11) µF (11 to 33) µF (33 to 110) µF (110 to 330) µF (0.33 to 1.1) mF (1.1 to 3.3) mF (3.3 to 11) mF (11 to 33) mF (33 to 110) mF	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 to 600) Hz (10 to 300) Hz (10 to 150) Hz (10 to 120) Hz (10 to 80) Hz (10 to 50) Hz (10 to 20) Hz Up to 6 Hz Up to 2 Hz Up to 0.6 Hz Up to 0.2 Hz	4.1 mF/F + 7.8 pF 4.0 mF/F + 7.8 pF 2.3 mF/F + 7.8 pF 2.3 mF/F + 78 pF 2.3 mF/F + 230 pF 2.3 mF/F + 0.78 nF 2.3 mF/F + 2.3 nF 2.3 mF/F + 7.8 nF 3.4 mF/F + 23 nF 3.7 mF/F + 78 nF 3.5 mF/F + 230 nF 3.5 mF/F + 0.78 µF 3.5 mF/F + 2.3 µF 3.5 mF/F + 7.8 µF 5.8 mF/F + 23 µF 8.5 mF/F + 78 µF	Fluke 5520A/SC1100
AC Level Flatness[3] –			
1 VRMS, 3 VRMS	10 Hz 100 Hz 1 kHz 10 kHz 30 kHz 100 kHz 300 kHz 1 MHz 3 MHz 8 MHz 10 MHz 20 MHz	0.12 % 0.12 % 0.12 % 0.12 % 0.23 % 0.29 % 0.29 % 0.58 % 0.70 % 0.70 % 0.70 % 0.72 %	Thermal converters

Parameter/Range	Frequency	CMC[2, 4] (±)	Comments
AC Level Flatness[3] – (cont) 1 VRMS, 3 VRMS	 30 MHz 50 MHz 70 MHz 80 MHz 100 MHz	 1.7 % 2.6 % 3.5 % 3.9 % 4.7 %	 Thermal converters
Oscilloscopes – Square Wave 50 Ω Load 1 MΩ Load Rise Time Leveled Sine Wave Relative to 50 kHz [5 mV to 5.5 V] $_{p-p}$ [5 mV to 3.5 V] $_{p-p}$ Time Marker into 50 Ω Load – Generate	 ±1 mV to ±6.6 V_{p-p} 0 mV to ±130 V_{p-p} Nominal 300 ps 5 mV to 5.5 V_{p-p} 50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz 5 mV to 3.5 V_{p-p} (600 to 1100) MHz Cardinal Points 1 ns to 20 ms Non-Cardinal Points 1 ns to 20 ms Any value in range 50 ms to 5 s	 2.0 mV/V + 31µV 0.78mV/V + 31 µV 51 ps 1.6 % 2.8 % 3.0 % 4.1 % 4.7 % 2.1 µs/s 39 µs/s (19 + 39*t*) µs/s	 Fluke 5520A/SC1100 t = time

Parameter/Equipment	Range	CMC[2] (±)	Comments
Electrical Calibration of Thermocouple Indicators[3] –			
Type B	(600 to 800) °C (800 to 1550) °C (1550 to 1820) °C	0.29 °C 0.24 °C 0.20 °C	Fluke 7526A
Type C	(0 to 1000) °C (1000 to 1800) °C (1800 to 2000) °C (2000 to 2316) °C	0.16 °C 0.21 °C 0.22 °C 0.29 °C	
Type E	(-250 to -200) °C (-200 to -100) °C (-100 to 0) °C (0 to 600) °C (600 to 1000) °C	0.22 °C 0.14 °C 0.12 °C 0.12 °C 0.13 °C	
Type J	(-210 to -100) °C (-100 to 800) °C (800 to 1200) °C	0.20 °C 0.13 °C 0.13 °C	
Type K	(-250 to -200) °C (-200 to -100) °C (-100 to 500) °C (500 to 800) °C (800 to 1372) °C	0.37 °C 0.16 °C 0.13 °C 0.13 °C 0.14 °C	
Type L	(-200 to -100) °C (-100 to 900) °C	0.13 °C 0.12 °C	
Type N	(-250 to -200) °C (-200 to -100) °C (-100 to 0) °C (0 to 100) °C (100 to 800) °C (800 to 1300) °C	0.57 °C 0.21 °C 0.14 °C 0.13 °C 0.13 °C 0.14 °C	

Parameter/Equipment	Range	CMC[2] (±)	Comments
Electrical Calibration of Thermocouple Indicators[3] – (cont)			
Type R	(-50 to -25) °C (-25 to 0) °C (0 to 100) °C (100 to 400) °C (400 to 600) °C (600 to 1000) °C (1000 to 1600) °C (1600 to 1767) °C	0.44 °C 0.37 °C 0.32 °C 0.24 °C 0.20 °C 0.19 °C 0.18 °C 0.21 °C	Fluke 7526A
Type S	(-50 to -25) °C (-25 to 0) °C (0 to 100) °C (100 to 400) °C (400 to 600) °C (600 to 1000) °C (1000 to 1600) °C (1600 to 1767) °C	0.41 °C 0.37 °C 0.31 °C 0.25 °C 0.21 °C 0.20 °C 0.20 °C 0.23 °C	
Type T	(-250 to -200) °C (-200 to -100) °C (-100 to 0) °C (0 to 200) °C (200 to 400) °C	0.30 °C 0.16 °C 0.13 °C 0.12 °C 0.12 °C	
Type U	(-200 to 0) °C (0 to 200) °C (200 to 600) °C	0.17 °C 0.13 °C 0.13 °C	
Electrical Calibration of RTDs[3] –			
PT 385, 100 Ω	(-200 to -800) °C	0.044 °C	Fluke 7526A
Pt 3926, 100 Ω	(-200 to 630) °C	0.044 °C	
Pt 3916, 100 Ω	(-200 to 630) °C (JIS)	0.044 °C	

Parameter/Equipment	Range	CMC[2] (±)	Comments
Electrical Calibration of RTDs[3] – (cont)			
Pt 385, 200 Ω	(-200 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	0.041 °C 0.043 °C 0.044 °C 0.051 °C 0.098 °C 0.11 °C 0.11 °C 0.13 °C	Fluke 5520A
Pt 385, 500 Ω	(-200 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	0.036 °C 0.043 °C 0.044 °C 0.051 °C 0.066 °C 0.066 °C 0.073 °C 0.088 °C	
Pt 385, 1000 Ω	(-200 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	0.029 °C 0.029 °C 0.036 °C 0.042 °C 0.050 °C 0.18 °C 0.057 °C 0.18 °C	
PtNi 385, 120 Ω	(-80 to 0) °C (0 to 100 °C (100 to 260 °C	0.081 °C 0.11 °C 0.11 °C	
Cu 427, 10 Ω	(-100 to 260) °C	0.69 °C	

III. Electrical – RF / Microwave

Parameter/Range	Frequency	CMC[2, 4] (±)	Comments
RF Attenuation – Tuned RF Power Measure[3]			
(0 to 10) dB	100 kHz to 1.3 GHz	0.064 dB	HP 8902A
(10 to 20) dB		0.067 dB	
(20 to 30) dB		0.069 dB	
(30 to 40) dB		0.082 dB	
(40 to 50) dB		0.10 dB	
(50 to 60) dB		0.10 dB	
(60 to 70) dB		0.11 dB	
(70 to 80) dB		0.11 dB	
(80 to 90) dB		0.14 dB	
(90 to 100) dB		0.14 dB	
(100 to 110) dB		0.15 dB	
(110 to 120) dB		0.18 dB	
(120 to 127) dB		0.20 dB	
(0 to 10) dB	(1.3 to 18) GHz	0.064 dB	HP 8902A w/ 11793A, down converter
(10 to 20) dB		0.067 dB	
(20 to 30) dB		0.08 dB	
(30 to 40) dB		0.082 dB	
(40 to 50) dB		0.10 dB	
(50 to 60) dB		0.10 dB	
(60 to 70) dB		0.11 dB	
(70 to 80) dB		0.11 dB	
(80 to 85) dB		0.14 dB	
RF Power – Generate			
(+24.0 to -56.00) dBm	DC to 20 MHz	0.42 dB	HP 3325AB
(+13 to -70) dBm	(0.1 to 18.0) GHz	2.6 dB	HP 83630B w/ 8902A, 11722A, 11793A, 8484A, and 11792A
Distortion – Measure[3]			
50 Hz to 500 kHz	20 Hz to 20 kHz	1.2 dB	HP 8903B
(-99 to 0) dB	(20 to 100) kHz	2.3 dB	

Parameter/Range	Frequency	CMC[2, 4] (±)	Comments
RF Power – Measure (Absolute)			
(+30 to -20) dBm	100 kHz to 2.6 GHz (0.01 to 18) GHz	2.8 % 3.7 %	HP 8902A w/: HP 11722A HP 11793A and HP 11792A
(-20 to -70) dBm	(0.01 to 18) GHz	2.5 %	HP 8484A
Power Reference Out 1 mW	50 MHz	0.3 %	HP 432A, HP 3458A, w/ HP 478A-H75
Phase Modulation – Measure[3]			
150 kHz to 10 MHz	200 Hz to 10 kHz	2.4 %	HP 8902A
10 MHz to 18.0 GHz	200 Hz to 20 kHz	2.4 %	HP 8902A
Amplitude Modulation – Generate[3]			
Rate: 50 Hz to 50 kHz Depths: 0 % to 99 %	(11 to 13.5) MHz	0.20 %	HP 11715A
Rate: 20 Hz to100 kHz Depths: 0 % to 99 %	(11 to 13.5) MHz	0.33 %	
Frequency Modulation – Generate[3]			
Rate: ≤100 kHz Rate: ≤200 kHz	(11 to 13.5) MHz	0.39 % 0.38 %	HP 11715A
Rate: ≤100 kHz Rate: ≤200 kHz	(88 to 108) MHz	0.38 % 0.38 %	
Rate: ≤100 kHz Rate: ≤200 kHz	(352 to 432) MHz	0.38 % 0.53 %	

Parameter/Range	Frequency	CMC[2, 4] (±)	Comments
Amplitude Modulation – Measure[3]			
Rate: 50 Hz to 10 kHz Depths: 5 % to 99 %	150 kHz to 10 MHz	1.6 % + 1 digit	HP 8902A
Rate: 20 Hz to 10 kHz Depths: to 99 %	150 kHz to 10 MHz	2.4 % + 1 digit	
Rate: 50 Hz to 50 kHz Depths: 5 % to 99 %	10 MHz to 1.3 GHz	0.89 % + 1 digit	
Rate: 20 Hz to 100 kHz Depths: to 99 %	10 MHz to 1.3 GHz	2.4 % + 1 digit	
Rate: 50 Hz to 50 kHz Depths: 5 % to 99 %	(1.3 to 18) GHz	1.3 % + 1 digit	
Rate: 20 Hz to 100 kHz Depths: to 99 %	(1.3 to 18) GHz	2.4 % + 1 digit	
Frequency Modulation – Measure[3]			
Rate: 20 Hz to 10 kHz Dev.: ≤ 40 kHz peak	250 kHz to 10 MHz	1.6 % + 1 digit	HP 8902A
Rate: 50 Hz to 100 kHz Dev.: ≤ 400 kHz peak	10 MHz to 1.3 GHz	0.80 % + 1 digit	
Rate: 20 Hz to 200 kHz Dev.: ≤ 400 kHz peak	10 MHz to 1.3 GHz	3.9 % + 1 digit	
Rate: 50 Hz to 100 kHz Dev.: ≤ 400 kHz peak	(1.3 to 18) GHz	0.79 % + 1 digit	
Rate: 20 Hz to 200 kHz Dev.: ≤ 400 kHz peak	(1.3 to 18) GHz	3.9 % + 1 digit	

IV. Mechanical

Parameter/Equipment	Range	CMC[2, 8] (±)	Comments
Scales & Balances[3]	(1 to 500) mg (0.5 to 2) g (2 to 3) g (3 to 5) g (5 to 10) g (10 to 50) g (50 to 100) g (100 to 200) g (200 to 300) g (300 to 500) g (0.5 to 1) kg (1 to 2) kg (2 to 3) kg (3 to 8.1) kg 5.0 lb 10.0 lb (20.0 to 50.0) lb (50 to 100) lb (100 to 250) lb (250 to 500) lb	12 µg 44 µg 47 µg 54 µg 61 µg 0.15 mg 0.30 mg 0.61 mg 0.63 mg 1.4 mg 2.9 mg 5.9 mg 6.5 mg 11 mg 7.6 mg 11 mg 83 mg 4.1 g 6.5 g 9.1 g	Class S1 weights Class F weights
Mass	(1 to 20) mg 30 mg (50 to 200) mg 300 mg 500 mg 1 g 2 g 3 g 5 g 10 g 20 g 30 g 50 g 100 g	14 µg 14 µg 14 µg 14 µg 14 µg 41 µg 41 µg 42 µg 41 µg 60 µg 87 µg 88 µg 0.14 mg 0.30 mg	Class S1 weights using comparison method

Parameter/Equipment	Range	CMC[2, 6, 8] (±)	Comments
Mass (cont)	200 g 300 g 500 g 1 kg 2 kg 3 kg 5 kg 20 lb 50 lb	0.60 mg 0.89 mg 1.4 mg 2.9 mg 5.9 mg 8.7 mg 15 mg 22 mg 60 mg	Class S1 weights using comparison method
Tachometers	(60 to 100 000) RPM	0.60 RPM	Datum 9390 w/3325B
Torque – Measure[3]	(10 to 100) in·ozf (5 to 50) in·lbf (40 to 400) in·lbf (100 to 1000) in·lbf (25 to 250) ft·lbf (60 to 600) ft·lbf (200 to 2000) ft·lbf	0.59 % 0.30 % 0.30 % 0.30 % 0.30 % 0.29 % 0.31 %	1001-O-DTT CDI 5000 ST w/ 2000-400-02 2000-12-02 2000-14-02
Pressure	Up to 2 in·H_2O (2 to 200) in·H_2O (0 to 75) psi (150 to 300) psi (300 to 725) psi (725 to 1500) psi (1500 to 3000) psi (300 to 10 000) psi	0.0012 in·H_2O 0.12 % 0.0087 psi 0.017 % 0.035 psi 0.17 % 0.35 % 0.03 %	Dwyer Microtector Omega PCL-200A Mensor CPC6050 Ametek TQ-100-1

V. Thermodynamics

Parameter/Equipment	Range	CMC[2, 8] (±)	Comments
Temperature – Measure	(-196 to -80)°C (-80 to -38)°C (-38 to 0.0)°C (0.0 to 100) °C (100 to 419)°C (420 to 660)°C	2.2 m°C 2.2 m°C 2.3 m°C 4.2 m°C 6.4 m°C 14.0 m°C	Fluke 1595A w/ 568 and 5628 SPRT using comparison method
Temperature – Measuring Equipment	-196°C (-80 to -38)°C (-38 to 0.0)°C (0.0 to 50.0) °C (50 to 150) °C (150 to 300)°C (300 to 700)°C	27 m°C 17 m°C 17 m°C 17 m°C 7.8 m°C 28 m°C 52 m°C	Fluke 1595A w/ 5683, 5628 and various baths and dry wells
Relative Humidity – Measuring Equipment	(10 to 95) %	0.53 % RH	Thunder Scientific 2500
Relative Humidity – Measuring Equipment[3]	(10 to 95) %	1.2 % RH	Rotronic HP 23A w/ HC 2-S probe

VI. Time & Frequency

Parameter/Equipment	Range	CMC[2] (±)	Comments
Frequency – Measuring Equipment	(0.01 to 1000) Hz 1000 Hz to 50.0 MHz 10 MHz to 18.0 GHz	0.12 mHz 0.12 nHz/Hz 64 pHz/Hz	Datum 9390 w/ 3325B Datum 9390 w/ HP 8340A

Parameter/Equipment	Range	CMC[2, 8] (±)	Comments
Frequency – Measure Equipment	DC to 1.0 kHz (1.0 to 1000) kHz (1.0 to 225) MHz (0.225 to 12.4) GHz (0.5 to 18.0) GHz	0.12 mHz 0.29 nHz/Hz 38 pHz/Hz 39 pHz/Hz 1.2 Hz/GHz	Datum 9390 and 53132A Datum 9390 and 5352B
Rise Time – Measure	20 ps to 1 ns	20 ps	83486A (RT=0.35/BW)

[1] This laboratory offers commercial calibration service and field calibration service.

[2] Calibration and Measurement Capability Uncertainty (CMC) is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine calibrations of nearly ideal measurement standards or nearly ideal measuring equipment. CMCs represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of $k = 2$. The actual measurement uncertainty of a specific calibration performed by the laboratory may be greater than the CMC due to the behavior of the customer's device and to influences from the circumstances of the specific calibration.

[3] Field calibration service is available for this calibration and this laboratory meets A2LA *R104 – General Requirements: Accreditation of Field Testing and Field Calibration Laboratories* for these calibrations. Please note the actual measurement uncertainties achievable on a customer's site can normally be expected to be larger than the CMC found on the A2LA Scope. Allowance must be made for aspects such as the environment at the place of calibration and for other possible adverse effects such as those caused by transportation of the calibration equipment. The usual allowance for the actual uncertainty introduced by the item being calibrated, (e.g. resolution) must also be considered and this, on its own, could result in the actual measurement uncertainty achievable on a customer's site being larger than the CMC.

[4] The stated measured values are determined using the indicated instrument (see Comments). This capability is suitable for the calibration of the devices intended to measure or generate the measured value in the ranges indicated. CMC's are expressed as either a specific value that covers the full range or as a percent or fraction of the reading plus a fixed floor specification.

[5] In the statement of CMC, L is the numerical value of the nominal length of the device measured in inches.

[6] All CMC's listed in % are percent of reading of input unless otherwise stated.

[7] This scope meets A2LA's *P112 Flexible Scope Policy*.

[8] The type of instrument or material being calibrated is defined by the parameter. This indicates the laboratory is capable of calibrating instruments that measure or generate the values in the ranges indicated for the listed measurement parameter.

Accredited Laboratory

A2LA has accredited

TEKTRONIX, INC.

Covina, CA

for technical competence in the field of

Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets the requirements of ANSI/NCSLI Z540-1-1994 and the requirements of ANSI/NCSLI Z540.3-2006 and R205 – Specific Requirements: Calibration Laboratory Accreditation Program. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 1st day of June 2019.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 2357.10
Valid to January 31, 2021
Revised November 20, 2019

For the calibrations to which this accreditation applies, please refer to the laboratory's Calibration Scope of Accreditation.