



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

TEKTRONIX SERVICE SOLUTIONS  
Tektronix Service Solutions  
Carretera Base Aerea # 5850, Modulo 3  
Zapopan, Jalisco, Mexico C.P.  
Debi Jester Phone: 011 52 33 3818 9835

CALIBRATION

Valid To: June 30, 2013

Certificate Number: 1623.21

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations<sup>1</sup>

I. Dimensional

Parameter/Equipment	Range	CMC <sup>2</sup> ( $\pm$ )	Comments
Micrometers <sup>3,4</sup>	Up to 12 in (12 to 36) in	(52 + 1.6L) $\mu$ m (230 + 1.6L) $\mu$ m	Grade 0.5 gage blocks
Calipers <sup>3,4</sup>	Up to 12 in (12 to 36) in	(770 + 1.6L) $\mu$ m (940 + 1.6L) $\mu$ m	Grade 0.5 gage blocks
Indicators <sup>3,4</sup>	Up to 2 in	(110 + 1.6L) $\mu$ m	Grade 0.5 gage blocks
Rulers <sup>3</sup>	Up to 48 in	0.009 in	Grade 1 gage blocks

II. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
DC Voltage <sup>3</sup> – Generate	Up 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	5.6 μV/V + 0.6 μV 5.2 μV/V + 1 μV 5.2 μV/V + 3.5 μV 7.3 μV/V + 6.5 μV 8.1 μV/V + 80 μV 9.1 μV/V + 500 μV	Fluke 5700A w/5725A
DC Voltage <sup>3</sup> – Measure	Up to 100 mV (0.1 to 1) V (1 to 10) V (10 to 100) V (100 to 1000) V	5.6 μV/V + 3 μV/V 5.2 μV/V + 0.3 μV/V 5.2 μV/V + 0.05 μV/V 7.3 μV/V + 0.3 μV/V 7.3 μV/V + 0.1 μV/V	HP 3458A, OPT 002
DC Current <sup>3,5</sup> – Generate	Up to 2.2 mA (2.2 to 22) mA (22 to 220) mA (0.22 to 2.2) A (2.2 to 11) A	50 μA/A + 8 nA 50 μA/A + 80 nA 60 μA/A + 0.8 μA 80 μA/A + 25 μA 0.043 % + 480 μA	Fluke 5700A/5725A
Clamp-On Only	(11 to 20.5) A (0 to 550) A	0.12 % + 0.75 mA 0.28 % + 0.5 A	Fluke 5520A Fluke 5520A w/coil
DC Current <sup>3,5</sup> – Measure	100 pA to 100 μA (0.1 to 1) mA (1 to 10) mA (10 to 100) mA (0.1 to 1) A	23 μA/A + 0.8 nA 23 μA/A + 5 nA 23 μA/A + 50 nA 37 μA/A + 0.5 μA 0.11 mA/A + 10 μA	HP 3458A
	(1 to 10) A (10 to 100) A	0.015 % 0.052 %	HP 3458A w/Guidline 9211
DC Resistance <sup>3,5</sup> – Measure	(0.1 to 1) Ω (10 to 100) Ω (0.1 to 1) kΩ (1 to 10) kΩ (10 to 100) kΩ (0.1 to 1) MΩ (1 to 10) MΩ (10 to 100) MΩ	0.018 % + 0.05 mΩ 8.2 μΩ/Ω + 0.5 mΩ 3.2 μΩ/Ω + 0.5 mΩ 3.1 μΩ/Ω + 5 mΩ 3.9 μΩ/Ω + 0.05 Ω 14 μΩ/Ω + 2 Ω 0.011 % + 100 Ω 0.061 % + 1 kΩ	HP 3458A

*Peter M. Meyer*

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
DC Resistance <sup>3</sup> – Generate	(0 to 11) Ω (11 to 33) Ω (33 to 110) Ω (0.11 to 1.1)k Ω (1.1 to 11) kΩ (11 to 33) kΩ (33 to 110) kΩ (0.11 to 330) kΩ (0.33 to 1.1) MΩ (1.1 to 3.3) MΩ (3.3 to 11) MΩ (11 to 33) MΩ (33 to 110) MΩ (110 to 330) MΩ (330 to 1100) MΩ	46 μΩ/Ω + 1 mΩ 35 μΩ/Ω + 1.5 mΩ 36 μΩ/Ω + 1.4 mΩ 32 μΩ/Ω + 2 mΩ 32 μΩ/Ω + 20 mΩ 32 μΩ/Ω + 0.2 Ω 34 μΩ/Ω + 0.2 Ω 53 μΩ/Ω + 2 Ω 68 μΩ/Ω + 2 Ω 0.017 % of setting + 30 Ω 0.023 % of setting + 50Ω 0.03 % of setting + 2.5 kΩ 0.06% of setting + 3 kΩ 0.39 % of setting + 100 kΩ 1.7 % of setting + 500 kΩ	Fluke 5520A
Fixed Values	1 Ω 1.9 Ω 10 Ω 19 Ω 100 Ω 190 Ω 1 kΩ 1.9 kΩ 10 kΩ 19 kΩ 100 kΩ 190 kΩ 1 MΩ 1.9 MΩ 10 MΩ 19 MΩ 100 MΩ	120 parts in 10 <sup>6</sup> 95 parts in 10 <sup>6</sup> 29 parts in 10 <sup>6</sup> 29 parts in 10 <sup>6</sup> 18 parts in 10 <sup>6</sup> 18 parts in 10 <sup>6</sup> 13 parts in 10 <sup>6</sup> 14 parts in 10 <sup>6</sup> 12 parts in 10 <sup>6</sup> 12 parts in 10 <sup>6</sup> 16 parts in 10 <sup>6</sup> 17 parts in 10 <sup>6</sup> 50 parts in 10 <sup>6</sup> 32 parts in 10 <sup>6</sup> 720 parts in 10 <sup>6</sup> 710 parts in 10 <sup>6</sup> 760 parts in 10 <sup>6</sup>	Fluke 5700A

Parameter/Range	Frequency	CMC <sup>2</sup> (±)	Comments
Distortion <sup>3</sup> – Measure  20 Hz to 100 kHz, Fundamental Frequency  (0 to -99) dB (0 to -99) dB	   20 Hz to 20 kHz (20 to 100) kHz	   1.2 dB 2.3 dB	   HP 8903B

*Peter Mlyns*

Parameter/Range	Frequency	CMC <sup>2</sup> (±)	Comments
AC Voltage <sup>3,5</sup> – Generate			
(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	0.14 % + 4.5 μV 0.12 % + 4.5 μV 0.10 % + 4.5 μV 0.093 % + 4.5 μV 0.13 % + 7 μV 0.15 % + 13 μV 0.20 % + 25 μV 0.36 % + 25 μV	Fluke 5700A w/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	0.056 % + 5 μV 0.022 % + 5 μV 0.013 % + 5 μV 0.038 % + 5 μV 0.086 % + 7 μV 0.11 % + 12 μV 0.17 % + 25 μV 0.34 % + 25 μV	
(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	0.056 % + 13 μV 0.022 % + 8 μV 0.011 % + 8 μV 0.033 % + 8 μV 0.086 % + 25 μV 0.11 % + 25 μV 0.17 % + 35 μV 0.34 % + 80 μV	
(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	0.050 % + 80 μV 0.016 % + 25 μV 75 μV/V + 6 μV 0.012 % + 16 μV 0.025 % + 70 μV 0.043 % + 130 μV 0.11 % + 350 μV 0.22 % + 850 μV	
(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	0.051 % + 0.8 mV 0.016 % + 0.25 mV 75 μV/V + 0.06 mV 0.012 % + 0.16 mV 0.025 % + 0.35 mV 0.050 % + 1.5 mV 0.13 % + 4.3 mV 0.27 % + 8.5 mV	

*Peter Mlynar*

Parameter/Range	Frequency	CMC <sup>2</sup> (±)	Comments
AC Voltage <sup>3,5</sup> – Generate (cont)			
(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	0.051 % + 8 mV 0.017 % + 2.5 mV 81 μV/V + 0.8 mV 0.022 % + 3.5 mV 0.062 % + 8 mV 0.15 % + 90 mV 0.47 % + 90 mV 1.2 % + 190 mV	Fluke 5700A w/5725A
(220 to 1100) V	(15 to 50) Hz 50 Hz to 1 kHz	0.041 % + 17 mV 84 μV/V + 4 mV	
(220 to 750) V	(30 to 50) kHz (50 to 100) kHz	96 μV/V + 11 mV 0.022 % + 45 mV	w/5725
(750 to 1100) V	40Hz to 1kHz (1 to 20) kHz (20 to 30) kHz	0.061 % + 4 mV 0.063 % + 6 mV 0.23 % + 11 mV	w/5725
AC Current <sup>3,5</sup> – Measure			
(10 to 100) μA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz	0.46 % + 0.03 μA 0.17 % + 0.03 μA 0.07 % + 0.03 μA 0.07 % + 0.03 μA	HP 3458A
(0.1 to 1) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz	0.46 % + 0.2 μA 0.17 % + 0.2 μA 0.07 % + 0.2 μA 0.04 % + 0.2 μA	
(1 to 10) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz	0.46 % + 2 μA 0.17 % + 2 μA 0.07 % + 2 μA 0.04 % + 2 μA	
(10 to 100) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz	0.46 % + 20 μA 0.17 % + 20 μA 0.07 % + 20 μA 0.04 % + 20 μA	
(0.1 to 1) A	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz	0.46 % + 200 μA 0.19 % + 200 μA 0.09 % + 200 μA 0.12 % + 200 μA	

*Peter Mlynar*

Parameter/Range	Frequency	CMC <sup>2</sup> (±)	Comments
AC Voltage <sup>3,5</sup> – Measure			
(0.03 to 10) mV	(1 to 40) Hz (0.40 to 1) kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	0.059 % + 3 μV 0.046 % + 1.1 μV 0.059 % + 1.1 μV 0.13 % + 1.1 μV 0.58 % + 1.1 μV 4.7 % + 2 μV	HP 3458A (synchronous sub-sampled mode)
(10 to 100) mV	(1 to 40) Hz (0.40 to 1) kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz (1 to 2) MHz	0.043 % + 4 μV 0.025 % + 2 μV 0.051 % + 2 μV 0.059 % + 2 μV 0.11 % + 2 μV 0.36 % + 10 μV 1.2 % + 10 μV 1.8 % + 10 μV	
(0.10 to 1) V	(1 to 40) Hz (0.40 to 1) kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz (1 to 2) MHz	0.025 % + 0.04 mV 0.008 % + 0.02 mV 0.051 % + 0.02 mV 0.059 % + 0.02 mV 0.092 % + 0.02 mV 0.35 % + 0.1 mV 1.6 % + 0.1 mV 1.8 % + 0.1 mV	
(1 to 10) V	(1 to 40) Hz (0.40 to 1) kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz (1 to 2) MHz	0.029 % + 0.4 mV 0.011 % + 0.2 mV 0.051 % + 0.2 mV 0.059 % + 0.2 mV 0.093 % + 0.2 mV 0.35 % + 1 mV 1.2 % + 1 mV 1.8 % + 1 mV	
(10 to 100) V	(1 to 40) Hz (0.40 to 1) kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz	0.068 % + 4 mV 0.061 % + 2 mV 0.053 % + 2 mV 0.063 % + 2 mV 0.21 % + 2 mV 0.50 % + 10 mV 1.8 % + 10 mV	
(100 to 700) V	(1 to 40) Hz (0.40 to 1) kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.061 % + 40 mV 0.060 % + 20 mV 0.075 % + 20 mV 0.15 % + 20 mV 0.39 % + 20 mV	

*Peter Meyer*

Parameter/Range	Frequency	CMC <sup>2</sup> (±)	Comments
AC Current <sup>3,5</sup> – Generate			
(9 to 220) µA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.071 % + 25 nA 0.037 % + 20 nA 0.017 % + 16 nA 0.061 % + 40 nA 0.16 % + 80 nA	Fluke 5700A
(0.22 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	0.071 % + 40 nA 0.037 % + 35 nA 0.017 % + 35 nA 0.061 % + 400 nA 0.16 % + 800 nA	
(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	0.042 % + 0.4 µA 0.055 % + 0.35 µA 0.044 % + 0.35 µA 0.061 % + 4 µA 0.16 % + 8 µA	
(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	0.070 % + 4 µA 0.035 % + 3.5 µA 0.015 % + 3.5 µA 0.060 % + 40 µA 0.16 % + 80 µA	
(0.22 to 2.2) A	20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.067 % + 35 µA 0.077 % + 80 µA 0.85 % + 160 µA	
(2.2 to 11) A	20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.048 % + 170 µA 0.095 % + 380 µA 0.36 % + 750 µA	
(11 to 20.5) A	(10 to 100) Hz (0.1 to 1) kHz (1 to 5) kHz	0.15 % + 5 mA 0.18 % + 5 mA 3.5 % + 5 mA	
Clamp-On Only			
(0 to 550) A	(45 to 65) Hz	0.38 % + 0.5 A	Fluke 5500A w/ coil
(0 to 110) A	(65 to 440) Hz	0.32 % + 0.5 A	

*Peter M. Meyer*

Parameter/Range	Frequency	CMC <sup>2</sup> (±)	Comments
Capacitance <sup>3,5</sup> – Generate			Fluke 5520A
(0.19 to 1.09) nF	10 Hz to 10 kHz	0.50 % + 0.01 nF	
(1.1 to 3.29) nF	10 Hz to 3 kHz	0.50 % + 0.01 nF	
(3.3 to 109.9) nF	10 Hz to 1 kHz	0.25 % + 0.01 nF	
(110 to 329.9) nF	10 Hz to 1 kHz	0.44 % + 0.3 nF	
(110 to 329.9) nF	10 Hz to 1 kHz	0.27 % + 0.3 nF	
(0.33 to 1.09) μF	(10 to 600) Hz	0.25 % + 1 nF	
(1.1 to 3.29) μF	(10 to 300) Hz	0.25 % + 3 nF	
(3.29 to 10.9) μF	(10 to 150) Hz	0.31 % + 10 nF	
(11 to 32.9) μF	(10 to 120) Hz	0.40 % + 30 nF	
(33 to 109.9) μF	(10 to 80) Hz	0.68 % + 100 nF	
(110 to 329.9) μF	(10 to 50) Hz	0.55 % + 300 nF	
(0.33 to 1.09) mF	(10 to 20) Hz	0.45 % + 1000 nF	

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Electrical Calibration of Thermocouple Indicators <sup>3</sup> –			Fluke 5520A
Type J	(-210 to -100) °C	0.31 °C	
	(-100 to -30) °C	0.21 °C	
	(-30 to 150) °C	0.20 °C	
	(150 to 760) °C	0.22 °C	
	(760 to 1200) °C	0.27 °C	
Type K	(-200 to -100) °C	0.37 °C	
	(-100 to -25) °C	0.25 °C	
	(-25 to 120) °C	0.24 °C	
	(120 to 1000) °C	0.31 °C	
	(1000 to 1372) °C	0.44 °C	
Type T	(-250 to -150) °C	0.72 °C	
	(-150 to 0) °C	0.42 °C	
	(0 to 120) °C	0.38 °C	
	(120 to 400) °C	0.37 °C	

*Peter Mlynar*

III. Electrical – RF/Microwave

Parameter/Range	Frequency	CMC <sup>2</sup> (±)	Comments
RF Power <sup>3</sup> – Generate			
(23.98 to 13.52) dBm	0.001 Hz to 100 kHz (0.1 to 10) MHz (10 to 20) MHz	0.15 dB 0.47 dB 0.47 dB	HP 3325B
(13.52 to -16.02) dBm	0.001 Hz to 100 kHz (0.1 to 10) MHz (10 to 20) MHz	0.25 dB 0.70 dB 0.70 dB	
(-16.02 to -56.02) dBm	0.001 Hz to 100 kHz (0.1 to 10) MHz (10 to 20) MHz	0.25 dB 0.70 dB 1.1 dB	
(+13 to +10) dBm	20 MHz to 2 GHz (2 to 20) GHz	1.4 dB 1.5 dB	HP 83630B opt 001
(+10 to -10) dBm	20 MHz to 2 GHz (2 to 20) GHz (20 to 26.5) GHz	0.7 dB 0.81 dB 1.1 dB	
(-10 to -60) dBm	20 MHz to 2 GHz (2 to 20) GHz (20 to 26.5) GHz	1.1 dB 1.2 dB 1.8 dB	
(-60 to -110) dBm	20 MHz to 2 GHz (2 to 20) GHz (20 to 26.5) GHz	1.7 dB 1.4 dB 2.0 dB	
RF Power <sup>3,5</sup> – Measure			
(+30 to -20) dBm	100 kHz to 26.5 GHz	2.9 %	HP 8902A w/11722A and 11792A
(+20 to -30) dBm	(0.01 to 18) GHz	2.9 %	E4419B w/8481A
(-30 to -70) dBm	(0.01 to 18) GHz	2.9 %	E4419B w/8481D



Parameter/Range	Frequency	CMC <sup>2</sup> (±)	Comments
RF Attenuation <sup>3</sup> – Tuned RF Power Measure			
(-0.0 to -1.0) dB	100 kHz to 1.3 MHz	0.11 dB	HP 8902A
(-1 to -10) dB		0.11 dB	HP 11722A
(-10 to -20) dB		0.12 dB	
(-20 to -30) dB		0.12 dB	
(-30 to -40) dB		0.15 dB	
(-40 to -50) dB		0.17 dB	
(-50 to -60) dB		0.19 dB	
(-60 to -70) dB		0.22 dB	
(-70 to -80) dB		0.24 dB	
(-80 to -90) dB		0.26 dB	
(-90 to -100) dB		0.28 dB	
(-100 to -110) dB		0.33 dB	
(-110 to -120) dB		0.38 dB	
(-0.0 to -1.0) dB	1.3 MHz to 26.5 GHz	0.12 dB	HP 8902A
(-1 to -10) dB		0.12 dB	HP 11722A
(-10 to -20) dB		0.13 dB	HP 11792A
(-20 to -30) dB		0.14 dB	HP 11793A
(-30 to -40) dB		0.16 dB	
(-40 to -50) dB		0.18 dB	
(-50 to -60) dB		0.20 dB	
(-60 to -70) dB		0.23 dB	
(-70 to -80) dB		0.25 dB	
(-80 to -90) dB		0.27 dB	
(-90 to -100) dB		0.29 dB	
(-100 to -110) dB		0.34 dB	
RF Attenuation <sup>3</sup> – Generate 1 dB Steps			
(0 to 5) dB	(0.001 to 12.4) GHz	0.61 dB	HP 8494B
	(12.4 to 18) GHz	0.84 dB	
(5 to 11) dB	(0.001 to 12.4) GHz	0.61 dB	
	(12.4 to 18) GHz	1.1 dB	
(11 to 50) dB	(0.001 to 12.4) GHz	1.8 dB	HP 8496B
	(12.4 to 18) GHz	2.4 dB	
(50 to 110) dB	(0.001 to 12.4) GHz	3.8 dB	
	(12.4 to 18) GHz	5.1 dB	

*Peter M. Meyer*

Parameter/Range	Frequency	CMC <sup>2</sup> (±)	Comments
Phase Modulation <sup>3,5</sup> – Measure			
Rate: 200 Hz to 10 kHz	150 kHz to 10 MHz	4 % + 1 digit	HP 8902A
Rate: 200 Hz to 20 kHz	10 MHz to 1.3 GHz (1.3 to 26.5) GHz	3 % + 1 digit 4 % + 1 digit	HP 8902A w/11793A
Amplitude Modulation <sup>3,5</sup> – Measure			
Rate: 50 Hz to 10 kHz Depths: 5 % to 99 %	(0.15 to 10) MHz	2.3 % + 1 digit	HP 8902A
Rate: 20 Hz to 10 kHz Depths: to 99 %	(0.15 to 10) MHz	3.5 % + 1 digit	
Rate: 50 Hz to 50 kHz Depths: 5 % to 99 %	(0.01 to 1.3) GHz	1.2 % + 1 digit	
Rate: 20 Hz to 100 kHz Depths: to 99 %	(0.1 to 1.3) GHz	3.5 % + 1 digit	
Rate: 20 Hz to 50 kHz Depths: 5 % to 99 %	(1.3 to 26.5) GHz	1.8 % + 1 digit	w/11793A
Rate: 20 Hz to 100 kHz Depths: to 99 %	(1.3 to 26.5) GHz	3.5 % + 1 digit	
Amplitude Modulation <sup>3,5</sup> – Generate			
Rate: (0.05 to 50) kHz Depths: 0 % to 99 %	11 MHz to 13.5 MHz	0.12 %	HP 11715A
Rate: (20 to 50) Hz and (50 to 100) kHz Depths: 0 % to 99 %	11 MHz to 13.5 MHz	0.29 %	HP 11715A
Rate: DC to 100 kHz Depths: 0 % to 30 %	10 MHz to 1.3 GHz (1.3 to 26.5) GHz	2.1 % of AM 1.8 % of AM	HP 83630B HP 83630A/B

*Peter Mlyns*

Parameter/Range	Frequency	CMC <sup>2</sup> (±)	Comments
Frequency Modulation <sup>3,5</sup> – Measure			
Rate: 20 Hz to 10 kHz Dev.: ≤ 40 kHz peak	(0.25 to 10) MHz	2.3 % + 1 digit	HP 8902A
Rate: 50 Hz to 100 kHz Dev.: ≤ 400 kHz peak	(0.1 to 1.3) GHz	1.2 % + 1 digit	
Rate: 20 Hz to 200 kHz Dev.: ≤ 400 kHz peak	(0.1 to 1.3) GHz	5.8 % + 1 digit	
Rate: 50 Hz to 100 kHz Dev.: ≤ 400 kHz peak	(1.3 to 26.5) GHz	1.2 % + 1 digit	w/11793A
Rate: 20 Hz to 200 kHz Dev.: ≤ 400 kHz peak	(1.3 to 26.5) GHz	5.8 % + 1 digit	
Frequency Modulation <sup>3,5</sup> – Generate			
Rate: DC to 100 kHz Dev.: ≤ 12.5 kHz peak	(11 to 13.5) MHz	0.12 %	HP 11715A
Rate: (100 to 200) kHz Dev.: ≤ 12.5 kHz peak	(11 to 13.5) MHz	0.29 %	
Rate: DC to 100 kHz Dev.: ≤ 100 kHz peak	(88 to 108) MHz	0.12 %	
Rate: (100 to 200) kHz Dev.: ≤ 100 kHz peak	(88 to 108) MHz	0.29 %	
Rate: DC to 100 kHz Dev.: ≤ 400 kHz peak	(352 to 432) MHz	0.12 %	
Rate: (100 to 200) kHz Dev.: ≤ 400 kHz peak	(352 to 432) MHz	0.29 %	
Rate: (100 to 200) kHz Dev.: ≤ 400 kHz peak	11 MHz to 26.5 GHz	5.8 %	HP 83630 A/B

*Peter M. Meyer*

Parameter/Range	Frequency	CMC <sup>2</sup> (±)	Comments
Digital Modulation <sup>3,5</sup> – Measure			
Carrier: 2 MHz to 26.5 GHz	Mod Frequency Span:		Agilent 89441A
Error Vector Magnitude for Modulation Types: MSK, GMSK, BPSK, DQPSK, $\pi/4$ DQPSK, 8PSK, 16QAM and 32QAM	(0.001 to 100) kHz (0.1 to 1) MHz (1 to 2650) MHz	0.36 % 0.59 % 1.2 %	
Phase Error for Modulation Types: MSK, GMSK, BPSK, DQPSK, $\pi/4$ DQPSK, 8PSK, 16QAM and 32QAM	Mod Frequency Span: (0.001 to 100) kHz (0.1 to 1) MHz (1 to 2650) MHz	0.22° of EVM 0.45° of EVM 0.73° of EVM	
Error Vector Magnitude for FSK Modulation	Mod Frequency: 3.2 kHz 1.152 kHz	0.68 % 2.1 %	
Phase Error for FSK Modulation	Mod Frequency: 3.2 kHz 1.152 kHz	17 Hz 3.4 kHz	
Error Vector Magnitude for Modulation Types: QPSK and OQPSK	Mod Frequency: 2.6 MHz	1.2 %	
Phase Error for Modulation Types: QPSK and OQPSK	Mod Frequency: 2.6 MHz	0.69° of EVM	

*Peter Mlyns*

IV. Mechanical

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Pressure Gauges, Transducers and Calibrators <sup>3</sup> – Measuring Equipment & Measure	(0 to 23) psia (0 to 100) psig	0.059 % of FS + 0.01 psia 0.059 % of FS + 0.01 psig	DPG700
	(100 to 10 000) psig	0.30 % of FS	T-100-1
Scales & Balances <sup>3</sup>	(1 to 100) mg (100 to 500) mg (1 to 5) g (5 to 20) g (20 to 50) g (50 to 100) g	0.011 mg 0.026 mg 0.06 mg 0.09 mg 0.13 mg 0.34 mg	Class 1 weights
Torque Wrenches <sup>3,5</sup>	(2.5 to 5) in·lb (5 to 25) in·lb (25 to 100) in·lb (25 to 50) ft·lb (50 to 250) ft·lb	1.2 % 0.58 % 0.58 % 1.2 % 0.59 %	TL-10i w/transducers BMX-250F  BMX-100I BMX-25I

V. Time & Frequency

Parameter/Equipment	Frequency	CMC <sup>2</sup> (±)	Comments
Frequency <sup>3</sup> – Generate	Time Base – 10 MHz	2.9 parts in 10 <sup>9</sup>	Efratom PRF-102
	DC to 20 MHz	2.9 parts in 10 <sup>9</sup>	HP 3325B w/efratom PRF-102
	20 MHz to 26.5 GHz	2.9 parts in 10 <sup>9</sup>	HP 83630B w/efratom PRF-102
Frequency <sup>3</sup> – Measure	DC to 3GHz	2.9 parts in 10 <sup>9</sup>	HP 53132A w/efratom PRF-102
	(0.5 to 26.5) GHz	2.9 parts in 10 <sup>9</sup>	HP 5351B w/efratom PRF-102

*Peter Meyer*

VI. Thermodynamics

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Relative Humidity <sup>3</sup> – Generate  Fixed Values	11% RH 33% RH 75% RH	1.2 % RH 1.2 % RH 1.3 % RH	Salts w/vaisala HM141
Relative Humidity <sup>3</sup> – Measure	5 % RH to 90 % RH	1.2 % RH	Vaisala HM141


<sup>1</sup> This laboratory offers commercial calibration service and field calibration service.

<sup>2</sup> Calibration and Measurement Capability (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. Calibration and Measurement Capabilities 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.

<sup>3</sup> 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.

<sup>4</sup> In the statement of CMC,  $L$  is the numerical value of the nominal length of the device measured in inches.

<sup>5</sup> In the statement of CMC, percentages are to be read as percent of reading unless otherwise noted.





World Class Accreditation

The American Association for Laboratory Accreditation

# Accredited Laboratory

A2LA has accredited

## TEKTRONIX SERVICE SOLUTIONS

*Zapopan, Jalisco, C.P., Mexico*

for technical competence in the field of

### Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General Requirements for the Competence of Testing and Calibration Laboratories*. This laboratory also meets the requirements of ANSI/NCSL Z540-1-1994 and any additional program requirements in the field of calibration. 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 8 January 2009*).

Presented this 11<sup>th</sup> day of November 2011.



A handwritten signature in black ink, appearing to read "Peter Meyer".

President & CEO  
For the Accreditation Council  
Certificate Number 1623.21  
Valid to June 30, 2013

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