



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

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CALIBRATION

Valid To: October 31, 2013

Certificate Number: 2123.01

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. Electrical – RF/Microwave

Parameter/Equipment	Frequency	CMC <sup>2</sup> (±)	Comments
ISN –			CISPR 16-1-2, CISPR 22
Phase	150 kHz to 80 MHz	3.0°	
Insertion Loss	150 kHz to 80 MHz	0.36 dB	HP 8751A & HP 87512A E5071C, HP 4395A
Impedance	150 kHz to 80 MHz	0.14 dB	
Longitudinal Conversion Loss	150 kHz to 80 MHz	0.88 dB	
Decoupling Attenuation	150 kHz to 80 MHz	0.36 dB	

Parameter/Range	Frequency	CMC <sup>2, 4, 5</sup> ( $\pm$ )	Comments
LISN <sup>3</sup> –			ANSI C63.4, CISPR 16-1-2, CISPR 25
Insertion Loss	9 kHz to 108 MHz (108 to 400) MHz	0.66 dB + <i>M</i> 0.86 dB + <i>M</i>	HP 8751 & HP 87512A, BNC and Type “N” calibration standards
Impedance – Magnitude	9 kHz to 100 MHz (100 to 200) MHz (200 to 400) MHz	0.2 $\Omega$ 0.7 $\Omega$ 1.2 $\Omega$	
Impedance – Phase	9 kHz to 100 MHz (100 to 200) MHz (200 to 400) MHz	3.6° 3.4° 3.2°	
Isolation	9 kHz to 100 MHz (100 to 200) MHz (200 to 400) MHz	0.36 dB 1.1 dB 1.6 dB	
RF Power, Absolute <sup>3</sup> – Measure			
9 kHz to 6000 MHz	(-30 to -20) dBm (-20 to -10) dBm (-10 to 0) dBm (0 to 10) dBm (10 to 20) dBm	0.9 % + <i>M</i> 0.8 % + <i>M</i> 0.65 % + <i>M</i> 0.55 % + <i>M</i> 0.45 % + <i>M</i>	E9304
50 MHz to 50 GHz	(-30 to 20) dBm (-70 to -20) dBm	0.8 % + <i>M</i> 1.4 % + <i>M</i>	HP 8487A HP 8487A
RF Power <sup>3</sup> – Generate			
	9 kHz to 2.5 GHz (2.5 to 3.2) GHz (3.2 to 4) GHz	1 dB 1.5 dB 2 dB	HP 8648D
	1 Hz to 15 MHz	0.1 dB	HP 33120
	10 MHz to 2 GHz @ $\geq$ -10 dBm	0.6 dBm	HP 83640L
	(2 to 20) GHz (20 to 40) GHz	0.7 dBm 0.9 dBm	HP 83640L

Parameter/Range	Frequency	CMC <sup>2,4</sup> ( $\pm$ )	Comments
Current Probes & Bulk Current Injection Probes <sup>3</sup> –			CISPR 16-1-2, IEC/EN 61000-4-6
Insertion Loss	5 Hz to 500 MHz 500 MHz to 2.4 GHz	0.77 dB + <i>M</i> 1.1 dB + <i>M</i>	HP 8751A & HP 87512A, BNC and Type “N” calibration standards
Transfer Impedance	5 Hz to 500 MHz 500 MHz to 2.4 GHz	0.77 dB + <i>M</i> 1.1 dB + <i>M</i>	
CDN's & Adapters <sup>3</sup> – (50 to 150) $\Omega$			IEC/EN 61000-4-6
Adapter Insertion Loss	10 kHz to 230 MHz	1.2 dB + <i>M</i>	HP 8751A & HP 87512A, BNC and Type “N” calibration standards
Coupling Factor	10 kHz to 230 MHz	1.1 dB + <i>M</i>	
Impedance	10 kHz to 230 MHz	3.5 $\Omega$	
Absorbing Clamps	30 MHz to 1 GHz	2.4 dB	CISPR 16-1-3, HP 8593E
Injection Clamps	(0.01 to 1000) MHz	1.6 dB	IEC/EN 61000-4-6, HP 8593E
Magnetic Field Strength Meters –			
(15 to 19) mG	(5 to 20) Hz	0.73 dB	Standard field using Helmholtz coil
(150 to 190) mG	20 Hz to 2 kHz	1.1 dB	
(60 to 700) mG	(2 to 500) kHz	1.1 dB	
NSA Measurements <sup>3</sup>			ANSI C63.4 (2003), ANSI C63.4 (2009), CISPR 16-1-4
	(30 to 1000) MHz	0.5 dB	HP 8591E, HP 8593EM
	(30 to 1000) MHz	0.1 dB	HP 8753D, E8364B, Agilent N5230A

Parameter/Equipment	Frequency	CMC <sup>2</sup> (±)	Comments
SVSWR Measurements	(1 to 3) GHz	0.66 dB	CISPR 16-1-4, E8364B
	(3 to 18) GHz	0.84 dB	

Parameter/Equipment	Range	CMC <sup>2,5</sup> (±)	Comments
ESD Simulators –			IEC/EN 61000-4-2
Contact Voltage (Positive and Negative)	(0 to 2) kV	2.6 %	TDS 7404B
	(2 to 8) kV	0.7 %	
	(8 to 15) kV	0.6 %	
	(15 to 30) kV	0.54 %	
Rise Time	(0.6 to 1) ns	65 ps	MD 102 target 20 dB attenuator
Peak Current	(6.8 to 33) A	5.0 %	
30 ns Current	(2.8 to 20.8) A	5.6 %	
60 ns Current	(1.4 to 10.4) A	6.1 %	
Air Discharge Voltage (Positive and Negative)	(0 to 25) kV	2.0 %	SAE J1113-13 ISO 10605
Rise Time	(0.7 to 1) ns	65 ps	TDS 7404B scope
RC Time Constant (at ± 15 kV)	600 ns ± 130 ns (for 330 pF probe)	7.3 ns	
	300 ns ± 60 ns (for 150 pF probe)	6.2 ns	MD 102 target 20 dB attenuator
Indicated Voltage	(2 to 30) kV	4.5 %	Electrometer 6514 and probe MHEP-1

Parameter/Equipment	Frequency	CMC <sup>2</sup> (±)	Comments
RF Isotropic E-Field Probe –			
TEM Cell Frequency Resp	9 kHz to 200MHz	0.91 dB	Calculated/ substitution Substitution
Linearity		0.91 dB	
Isotropic		0.92 dB	
GTEM Frequency Resp	(200 to 1000) MHz	0.97 dB	
Linearity		0.97 dB	
Isotropic		0.97 dB	
Tri-plate	10 kHz to 1000 MHz	0.89 dB	
Linearity		1.2 dB	
Isotropic		1.2 dB	
Anechoic Chamber	(1000 to 18 000) MHz	1.1 dB	
Linearity		1.2 dB	
Isotropic		1.2 dB	
Anechoic Chamber	(18 000 to 40 000) MHz	2.0 dB	
Linearity		1.1 dB	
Isotropic		1.1 dB	
RF Laser Isotropic E-Field Probe –			
TEM Cell Frequency Resp	5 kHz to 200 MHz	0.73 dB	Calculated/ substitution Substitution
Linearity	9 kHz to 200 MHz	0.91 dB	
Isotropic	9 kHz to 200 MHz	0.92 dB	
GTEM Frequency Resp	(200 to 1000) MHz	0.81 dB	
Linearity		0.97 dB	
Isotropic		0.97 dB	
Anechoic Chamber	(1000 to 18 000) MHz	0.91 dB	
Linearity		1.1 dB	
Isotropic		1.1 dB	
Anechoic Chamber	(18 000 to 40 000) MHz	1.7 dB	
Linearity		1.7 dB	
Isotropic		1.7 dB	

Parameter/Equipment	Frequency	CMC <sup>2</sup> (±)	Comments
Electronic E-Field Probes			IEEE 1309, IEC/EN 61000-4-3, Substitution method
	10 kHz to 5000 MHz Correction Factor	1.3 dB	FP 5000 type probe
	10 kHz to 5000 MHz Linearity Factor	0.83 dB	FP 5000 type probe
	10 kHz to 5000 MHz Channel Match Factor	1 dB	FP 5000 type probe
	(200 to 1000) MHz Isotropic Response	0.83 dB	FP 5000 type probe
	80 MHz to 18 GHz Correction Factor	1.9 dB	FP 2080 type probe, calculated/substitution
	80 MHz to 18 GHz Linearity Factor	0.84 dB	FP 2080 type probe, calculated/substitution
	80 MHz to 18 GHz Channel Match Factor	1 dB	FP 2080 type probe , calculated/substitution
(18 to 40) GHz Correction Factor	2.3 dB	FP2080 type probe	
Linearity	1.3 dB		
Channel Match	1.3 dB		
Isotropic (400 & 1000)	1.2 dB		
RF Pre-Amplifiers, Amplifiers –			IEEE 291
Gain	10 kHz to 18 GHz (18 to 40) GHz	0.97 dB 1 dB	HP 8591E, 8593E,E8364B

Parameter/Frequency	Range	CMC <sup>2,4</sup> ( $\pm$ )	Comments
Reflection S <sub>11</sub> /S <sub>22</sub> – Magnitude			
5 Hz to 300 kHz	(0 to 0.5) LIN (0.5 to 1) LIN	<i>M</i> + 0.05 (LIN) <i>M</i> + 0.1 (LIN)	HP 8751 and 8753D w/ 85032B calibration kit
300 kHz to 6 GHz	(0 to 1) LIN	<i>M</i> + 0.1 (LIN)	E8364B w/ electronic calibration kit
10 MHz to 50 GHz	(0 to 1) LIN	<i>M</i> + 0.1 (LIN)	
Reflection S <sub>11</sub> /S <sub>22</sub> – Phase			
5 Hz to 300 kHz	(0 to 180)°	3.5°	HP 8753D w/ 85032B calibration kit
300 kHz to 6 GHz	(0 to 180)°	3.3°	
10 MHz to 18 GHz	(0 to 180)°	3.5°	E8364B w/ electronic calibration kit
(18 to 50) GHz	(0 to 180)°	4.1°	
Transmission S <sub>12</sub> /S <sub>21</sub> – Magnitude			
5 Hz to 500 MHz 10 MHz to 50 GHz	(0 to 70) dB (0 to 70) dB	0.15 dB 0.15 dB	E8364B w/ electronic calibration kit
10 Hz to 500 MHz (0.5 to 18) GHz	(0 to 70) dB (0 to 70) dB	0.97 dB 0.97 dB	HP 8591E, HP 8593E
300 kHz to 6 GHz	(0 to 30) dB (30 to 40) dB (40 to 50) dB (50 to 60) dB (60 to 70) dB	<i>M</i> + 0.07 dB <i>M</i> + 0.08 dB <i>M</i> + 0.09 dB <i>M</i> + 0.1 dB <i>M</i> + 0.15 dB	HP 8753D w/ 85032B calibration kit
10 MHz to 18 GHz	(0 to 12) dB (12 to 40) dB (40 to 60) dB (60 to 70) dB	<i>M</i> + 0.05 dB <i>M</i> + 0.07 dB <i>M</i> + 0.08 dB <i>M</i> + 0.15 dB	E8364B w/ electronic calibration kit

Parameter/Frequency	Range	CMC <sup>2</sup> (±)	Comments
Transmission S <sub>12</sub> /S <sub>21</sub> – Phase			
5 Hz to 500 MHz	(0 to 180)°	3.5°	E8364B w/ electronic calibration kit
10 MHz to 50 GHz	(0 to 180)°	3.2°	
300 kHz to 6 GHz	(0 to 180)°	3.7°	HP 8753D w/ 85032B calibration kit
10 MHz to 18 GHz	(0 to 180)°	3.9°	E8364B w/ electronic calibration kit

Parameter/Equipment	Frequency	CMC <sup>2</sup> (±)	Comments
Antenna Pattern Measurements	(10 to 1000) MHz (1 to 40) GHz	0.87 dB 1 dB	E8364B w/ electronic calibration kit
Antenna Cross-Polar Response	(200 to 2000) MHz	0.5 dB	CISPR 16-1-4 HP 8591E, HP 8593E
Antenna Balance	(20 to 300) MHz	0.5 dB	CISPR 16-1-4 HP 8591E, HP 8593E
Antenna VSWR	(20 to 2000) MHz (1 to 40) GHz	0.6 dB 0.9 dB	IEEE 149 N5230A w/ electronic calibration kit
Rod Antennas <sup>3</sup> (ECSM) –  Antenna Factor	10 Hz to 60 MHz	0.23 dB	CISPR 25, ANSI C63.5-1988, ANSI C63.5-1998, ANSI C63.5-2006, SAE ARP 958, CISPR 16-1-4  HP 8751A & HP 87512A, BNC calibration standards

Parameter/Equipment	Frequency	CMC <sup>2</sup> (±)	Comments	
Loop Antennas <sup>3</sup>	1 kHz to 30 MHz	0.32 dB	Standard field using Vacuo junction	
	10 Hz to 2 MHz	0.34 dB	Standard field using loop current measurement	
	10 Hz to 30 MHz	0.44 dB	Substitution method using reference antenna	
Conical Log Spiral Antennas – 1 Meter Distance	(200 to 400) MHz (400 to 1000) MHz (1000 to 10 000) MHz	2.2 dB 0.88 dB 1.7 dB	SAE ARP 958 N5230A w/ electronic calibration kit, calibration site 2 <sup>6</sup>	
Dipole Antennas –	3 Meter Distance	(30 to 60) MHz	0.5 dB	ANSI C63.5-1988, ANSI C63.5-1998,  Standard site method, horizontal polarization, calibration site 2 <sup>6</sup> , HP 8591E, HP 8593EM
		(50 to 150) MHz	0.48 dB	
		(140 to 400) MHz	0.55 dB	
		(400 to 1000) MHz	0.60 dB	
	3 Meter Distance	(30 to 60) MHz	0.52 dB	Reference antenna method, horizontal polarization, calibration site 2 <sup>6</sup> , HP 8591E, HP 8593EM
		(50 to 150) MHz	0.55 dB	
		(140 to 400) MHz	0.60 dB	
		(400 to 1000) MHz	0.62 dB	
	3 Meter Distance	(30 to 60) MHz	0.45 dB	Equal antenna method, horizontal polarization, calibration site 2 <sup>6</sup> , HP 8591E, HP 8593EM
		(50 to 150) MHz	0.52 dB	
		(140 to 400) MHz	0.45 dB	
		(400 to 1000) MHz	0.58 dB	
10 Meter Distance	(30 to 60) MHz	0.41 dB	ANSI C63.5-1988, ANSI C63.5-1998, ANSI C63.5-2006, Standard site method, horizontal polarization, calibration site 2 <sup>6</sup> , HP 8591E, HP 8593EM	
	(50 to 150) MHz	0.45 dB		
	(140 to 400) MHz	0.51 dB		
	(400 to 1000) MHz	0.55 dB		

Parameter/Equipment	Frequency	CMC <sup>2</sup> (±)	Comments
Dipole Antennas – (cont)			ANSI C63.5-1988, ANSI C63.5-1998, ANSI C63.5-2006,
10 Meter Distance	(30 to 60) MHz (50 to 150) MHz (140 to 400) MHz (400 to 1000) MHz	0.35 dB 0.40 dB 0.45 dB 0.51 dB	Reference antenna method, horizontal polarization, calibration site 2 <sup>6</sup> , HP 8591E, HP 8593EM
10 Meter Distance	(30 to 60) MHz (50 to 150) MHz (140 to 400) MHz (400 to 1000) MHz	0.41 dB 0.38 dB 0.45 dB 0.50 dB	Equal antenna method, horizontal polarization, calibration site 2 <sup>6</sup> , HP 8591E, HP 8593EM
Biconical Antennas <sup>3</sup> –			
1 Meter Distance	(30 to 70) MHz (70 to 200) MHz (200 to 300) MHz	0.33 dB 0.34 dB 0.37 dB	SAE ARP 958, calibration site 1, HP 8591E, HP 8593EM
3 Meter Distance	(30 to 70) MHz (70 to 200) MHz (200 to 300) MHz	0.37 dB 0.48 dB 0.37 dB	SAE ARP 958, Appendix C, calibration site 1, HP 8591E, HP 8593EM, N5230A w/ electronic calibration kit
3 Meter Distance	(30 to 70) MHz (70 to 200) MHz (200 to 300) MHz	0.93 dB 0.54 dB 0.25 dB	ANSI C63.5-1988, ANSI C63.5-1998 Standard site method, horizontal polarization, calibration site 2 <sup>6</sup> , N5230A w/ electronic calibration kit
3 Meter Distance	(30 to 72.5) MHz (72.5 to 115) MHz (115 to 157.5) MHz (157.5 to 200) MHz (200 to 300) MHz	0.95 dB 0.55 dB 0.41 dB 0.50 dB 0.60 dB	ANSI C63.5-1988, ANSI C63.5-1998 Reference antenna method, horizontal polarization, calibration site 2 <sup>6</sup> , N5230A w/ electronic calibration kit

Parameter/Equipment	Frequency	CMC <sup>2</sup> (±)	Comments
Biconical Antennas <sup>3</sup> – (cont)			
3 Meter Distance	(30 to 72.5) MHz (72.5 to 115) MHz (115 to 157.5) MHz (157.5 to 200) MHz (200 to 300) MHz	0.96 dB 0.6 dB 0.39 dB 0.47 dB 0.52 dB	ANSI C63.5-1988, ANSI C63.5-1998 Equal antenna method, horizontal polarization, calibration site 2 <sup>6</sup> , N5230A w/ electronic calibration kit
10 Meter Distance	(30 to 72.5) MHz (72.5 to 115) MHz (115 to 157.5) MHz (157.5 to 200) MHz (200 to 300) MHz	0.93 dB 0.52 dB 0.24 dB 0.20 dB 0.25 dB	ANSI C63.5-1988, ANSI C63.5-1998, ANSI C63.5- 2006, standard site method, horizontal polarization, calibration site 2 <sup>6</sup> , N5230A w/ electronic calibration kit
10 Meter Distance	(30 to 72.5) MHz (72.5 to 115) MHz (115 to 157.5) MHz (157.5 to 200) MHz (200 to 300) MHz	0.97 dB 0.62 dB 0.41 dB 0.30 dB 0.31 dB	ANSI C63.5-1988, ANSI C63.5-1998, ANSI C63.5- 2006, reference antenna method, horizontal polarization, calibration site 2 <sup>6</sup> , N5230A w/ electronic calibration kit
10 Meter Distance	(30 to 72.5) MHz (72.5 to 115) MHz (115 to 157.5) MHz (157.5 to 200) MHz (200 to 300) MHz	0.96 dB 0.60 dB 0.38 dB 0.46 dB 0.52 dB	ANSI C63.5-1988, ANSI C63.5-1998, ANSI C63.5- 2006, equal antenna method, horizontal polarization, calibration site 2 <sup>6</sup> , N5230A w/ electronic calibration kit
Log-Periodic Antennas <sup>3</sup> –			
1 Meter Distance	(200 to 400) MHz (400 to 1000) MHz (1000 to 5000) MHz	0.32 dB 0.38 dB 0.52 dB	SAE ARP 958 Calibration site 1, HP 8591E, HP 8593EM
3 Meter Distance	(200 to 400) MHz (400 to 1000) MHz (1000 to 5000) MHz	0.38 dB 0.45 dB 0.58 dB	SAE ARP 958, Appendix C, calibration site 1, HP 8591E, HP 8593E, N5230A w/ electronic calibration kit

Parameter/Equipment	Frequency	CMC <sup>2</sup> (±)	Comments
Log-Periodic Antennas <sup>3</sup> – (cont)			
3 Meter Distance	(200 to 300) MHz (300 to 400) MHz (400 to 500) MHz (500 to 600) MHz (600 to 700) MHz (700 to 800) MHz (800 to 900) MHz (900 to 1000) MHz (1000 to 5000) MHz	0.3 dB 0.3 dB 0.4 dB 0.4 dB 0.4 dB 0.5 dB 0.5 dB 0.6 dB 0.7 dB	ANSI C63.5-1988, ANSI C63.5-1998, Standard site method, horizontal polarization, calibration site 2 <sup>6</sup> , N5230A w/ electronic calibration kit
3 Meter Distance	(200 to 300) MHz (300 to 400) MHz (400 to 500) MHz (500 to 600) MHz (600 to 700) MHz (700 to 800) MHz (800 to 900) MHz (900 to 1000) MHz (1000 to 5000) MHz	0.2 dB 0.2 dB 0.2 dB 0.25 dB 0.35 dB 0.45 dB 0.45 dB 0.5 dB 0.6 dB	ANSI C63.5-1988, ANSI C63.5-1998, Identical antenna method, horizontal polarization, calibration site 2 <sup>6</sup> , N5230A w/ electronic calibration kit
10 Meter Distance	(200 to 300) MHz (300 to 400) MHz (400 to 500) MHz (500 to 600) MHz (600 to 700) MHz (700 to 800) MHz (800 to 900) MHz (900 to 1000) MHz (1000 to 5000) MHz	0.3 dB 0.3 dB 0.4 dB 0.4 dB 0.4 dB 0.5 dB 0.5 dB 0.6 dB 0.7 dB	ANSI C63.5-1988, ANSI C63.5-1998, Standard site method, horizontal polarization, calibration site 2 <sup>6</sup> , N5230A w/ electronic calibration kit
10 Meter Distance	(200 to 300) MHz (300 to 400) MHz (400 to 500) MHz (500 to 600) MHz (600 to 700) MHz (700 to 800) MHz (800 to 900) MHz (900 to 1000) MHz (1000 to 5000) MHz	0.3 dB 0.3 dB 0.3 dB 0.3 dB 0.45 dB 0.45 dB 0.55 dB 0.6 dB 0.7 dB	ANSI C63.5-1988, ANSI C63.5-1998, ANSI C63.5-2006 Identical antenna method, horizontal polarization, calibration site 2 <sup>6</sup> , N5230A w/ electronic calibration kit

Parameter/Equipment	Frequency	CMC <sup>2</sup> (±)	Comments
Hybrid Antennas <sup>3</sup> –			
1 Meter Distance	(30 to 70) MHz (70 to 200) MHz (200 to 400) MHz (400 to 1000) MHz (1000 to 2000) MHz	0.5 dB 0.76 dB 0.91 dB 0.74 dB 0.75 dB	SAE ARP 958 Calibration site 1, HP 8593EM w/ electronic calibration kit
3 Meter Distance	(30 to 70) MHz (70 to 200) MHz (200 to 400) MHz (400 to 1000) MHz (1000 to 6000) MHz	0.11 dB 0.11 dB 0.19 dB 0.26 dB 0.41 dB	SAE ARP958, Appendix C calibration site 1, HP 8591E, HP 8593E, N5230A w/ electronic calibration kit
3 Meter & 10 Meter Distance	(20 to 1000) MHz (1000 to 6000) MHz	0.58 dB 0.75 dB	ANSI C63.5-1988, ANSI C63.5-1998, ANSI C63.5-2006 Standard site method, horizontal polarization, calibration site 2 <sup>6</sup> , N5230A w/ electronic calibration kit
	(20 to 1000) MHz (1000 to 6000) MHz	0.68 dB 0.89 dB	ANSI C63.5-1988, ANSI C63.5-1998, ANSI C63.5-2006 Identical antenna method, horizontal polarization, calibration site 2 <sup>6</sup> , N5230A w/ electronic calibration kit
Horn Antennas – LPA's			
1 Meter Distance	700 MHz to 40 GHz	0.45 dB	SAE ARP 958 Calibration site 1, N5230A w/ electronic calibration kit
3 Meter Distance	700 MHz to 40 GHz	0.48 dB	SAE ARP958, Appendix C, calibration site 1, N5230A w/ electronic calibration kit

Parameter/Equipment	Frequency	CMC <sup>2</sup> (±)	Comments
Horn Antennas – LPA's (cont)			ANSI C63.5-1988, ANSI C63.5-1998, ANSI C63.5-2006
3 Meter Distance	700 MHz to 18 GHz (18 to 26.5) GHz (26.5 to 40) GHz	0.37 dB 0.42 dB 0.47 dB	Standard site method, horizontal polarization, calibration site 2 <sup>6</sup> , N5230A w/ electronic calibration kit
	700 MHz to 40 GHz	0.50 dB	Identical antenna method, horizontal polarization, calibration site 2 <sup>6</sup> , N5230A w/ electronic calibration kit

## II. Thermodynamic

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Relative Humidity, Fixed Points	11 % RH 33 % RH 75 % RH 97 % RH	2.6 % RH 2.5 % RH 2.5 % RH 3.1 % RH	Vaisala humidity calibrator, HMK15

<sup>1</sup> This laboratory offers commercial 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,  $M$  is the uncertainty contribution of the mismatch error caused by the impedance mismatch between the calibration system of the laboratory and the device under calibration.

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

<sup>6</sup> The ground plane of size of calibration site 2 is  $50 \times 80$  square meters and does meet the stated requirements for antenna calibration test sites called out in CISPR 16-1-5.



World Class Accreditation

The American Association for Laboratory Accreditation

# Accredited Laboratory

A2LA has accredited

**LIBERTY LABS, INC.**

*Kimballton, IA*

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 27<sup>th</sup> day of December 2011.



A handwritten signature in black ink, reading "Peter Abney", written over a horizontal line.

President & CEO  
For the Accreditation Council  
Certificate Number 2123.01  
Valid to December 31, 2013

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