



**National Voluntary
Laboratory Accreditation Program**



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

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CALIBRATION LABORATORIES

NVLAP LAB CODE 100290-0

ELECTROMAGNETICS - RF MICROWAVE

NVLAP Code: 20/R08

Microwave Antenna Parameters by Standard Site Method
Biconical, Logperiodic, Complex

ANSI C63.5: 2004 (up to 1000 MHz) *note 4*
SAE ARP 958 Revision D (up to 3000 MHz) *note 4*

<i>Range in MHz</i>	<i>Uncertainty (\pm) in dB ^{note 1}</i>	<i>Polarization</i>	<i>Distance in m</i>	<i>Height in m</i>
20 to 25	1.41	Horizontal	1	1
25 to 1000	1.44	Horizontal	1	1
1000 to 3000	1.58	Horizontal	1	1
20 to 25	1.01	Vertical	1	1
25 to 1000	1.02	Vertical	1	1
1000 to 3000	1.08	Vertical	1	1
20 to 25	1.42	Horizontal	1	1.5
25 to 1000	1.42	Horizontal	1	1.5
1000 to 3000	1.42	Horizontal	1	1.5
20 to 25	1.00	Vertical	1	1.5
25 to 1000	1.00	Vertical	1	1.5
1000 to 3000	0.95	Vertical	1	1.5

2009-01-01 through 2009-12-31

Effective dates

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<i>Range in MHz</i>	<i>Uncertainty (±) in dB^{note 1}</i>	<i>Polarization</i>	<i>Distance in m</i>	<i>Height in m</i>
20 to 25	1.41	Horizontal	1	2
25 to 1000	1.42	Horizontal	1	2
1000 to 3000	1.40	Horizontal	1	2
20 to 25	1.00	Vertical	1	2
25 to 1000	1.01	Vertical	1	2
1000 to 3000	0.92	Vertical	1	2
20 to 25	1.41	Horizontal	1	3
25 to 1000	1.41	Horizontal	1	3
1000 to 3000	1.43	Horizontal	1	3
20 to 25	1.03	Vertical	1	3
25 to 1000	1.05	Vertical	1	3
1000 to 3000	1.19	Vertical	1	3
20 to 25	1.54	Horizontal	3	1
25 to 1000	0.85	Horizontal	3	1
1000 to 3000	0.91	Horizontal	3	1
20 to 25	0.95	Vertical	3	1
25 to 1000	0.96	Vertical	3	1
1000 to 3000	0.87	Vertical	3	1
20 to 25	1.17	Horizontal	3	1.5
25 to 1000	0.84	Horizontal	3	1.5
1000 to 3000	0.91	Horizontal	3	1.5
20 to 25	1.03	Vertical	3	1.5
25 to 1000	0.94	Vertical	3	1.5
1000 to 3000	0.82	Vertical	3	1.5
20 to 25	1.14	Horizontal	3	2
25 to 1000	0.85	Horizontal	3	2
1000 to 3000	0.87	Horizontal	3	2
20 to 25	1.05	Vertical	3	2
25 to 1000	0.98	Vertical	3	2
1000 to 3000	0.82	Vertical	3	2
20 to 25	1.08	Horizontal	10	1
25 to 1000	0.89	Horizontal	10	1
1000 to 3000	0.96	Horizontal	10	1

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<i>Range in MHz</i>	<i>Uncertainty (\pm) in dB^{note 1}</i>	<i>Polarization</i>	<i>Distance in m</i>	<i>Height in m</i>
20 to 25	0.90	Vertical	10	1
25 to 1000	0.90	Vertical	10	1
1000 to 3000	1.03	Vertical	10	1
20 to 25	1.48	Horizontal	10	1.5
25 to 1000	0.89	Horizontal	10	1.5
1000 to 3000	0.93	Horizontal	10	1.5
20 to 25	0.90	Vertical	10	1.5
25 to 1000	0.87	Vertical	10	1.5
1000 to 3000	0.95	Vertical	10	1.5
20 to 25	1.01	Horizontal	10	2
25 to 1000	0.89	Horizontal	10	2
1000 to 3000	1.09	Horizontal	10	2
20 to 25	0.89	Vertical	10	2
25 to 1000	0.87	Vertical	10	2
1000 to 3000	0.89	Vertical	10	2

Microwave Antenna Parameter by Reference Antenna Method

ANSI 63.5:2004 (up to 1000 MHz)^{note 4}

<i>Range in MHz</i>	<i>Best Uncertainty (\pm) in dB^{note 1}</i>	<i>Polarization</i>	<i>Distance in m</i>	<i>Height in m</i>
Biconical, Log-period Complex				
25 to 1000	0.77	Horizontal	10	2
Complex				
25 to 1000	0.78	Horizontal	10	2
Dipole				
25 to 1000	0.74	Horizontal	10	2

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<i>Range in MHz</i>	<i>Best Uncertainty (\pm) in dB^{note 1}</i>	<i>Polarization</i>	<i>Distance in m</i>	<i>Height in m</i>
Horn, Log-Periodic				
1000 to 2600	0.97	Free Space	10	Free Space
2600 to 12000	1.44	Free Space	10	Free Space
12000 to 18000	2.05	Free Space	10	Free Space

Antenna Impedance, VSWR, Gamma, Return Loss

<i>Frequency Range in MHz</i>	<i>Best Uncertainty (\pm)^{note 1}</i>	<i>Value of k</i>
20 to 1000	0.50 %	2
1000 to 18000	0.31 %	2
18000 to 26500	0.28 %	2

CISPR Receiver 50 ohm Nominal Impedance^{note 3}

CISPR 16-1-1:2003^{note 4}

Input Impedance

<i>Frequency Range</i>	<i>Best Uncertainty (\pm)^{note 1}</i>	<i>Value of k</i>
9 kHz to 6 GHz	1.37 %	2

Sine-wave Voltage Accuracy

9 kHz to 4 GHz	0.39 dB	2
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Overall Selectivity

9 kHz to 4GHz	1.36 dB	2
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Amplitude Relationship (Absolute / Relative)

9 kHz to 1 GHz	1.69 dB	2
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Random Noise

9 kHz to 4 GHz	0.32 dB	2
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Monopole Antenna using Capacitance Substitution Method ^{note 3}

CISPR 16-1-4:2003 ^{note 4}, ANSI 63.5 2004 ^{note 4}, SAE ARP958 Revision D ^{note 4}

<i>Frequency Range in MHz</i>	<i>Best Uncertainty (\pm) ^{note 1}</i>	<i>Value of k</i>
0.000020 to 50	0.72 dB	2

Loop Antenna by Standard Field Strength Method ^{note 3}

Standard Field using Shunt Resistor SAE ARP958 Revision D ^{note 4}

0.000020 to 0.3	1.22 dB	2
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Standard Field using Vacuo Junction

0.009 to 0.1	0.52 dB	2
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0.1 to 30	0.39 dB	2
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Current Probe, Injection Probe, Transfer Impedance ^{note 3}

CISPR 16-1-2:2003 ^{note 4}

0.000020 to 500	0.81 dB	2
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Magnetic Field Meter, Standard H-Field Method, DC-200 Hz ^{note 3}

DC to 200 Hz	1.66 %	2
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Frequency Response ^{note 3}

Gain

0.000010 to 0.01	0.48	2
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0.01 to 1000	0.33	2
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1000 to 40 000	0.42	2
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<i>Frequency Range in MHz</i>	<i>Best Uncertainty (±) ^{note 1}</i>	<i>Value of k</i>
Insertion Loss		
0.000010 to 0.01	0.27	2
0.01 to 1000	0.12	2
1000 to 40 000	0.20	2
Impedance, VSWR, Gamma, Return Loss		
0.000010 to 1000	0.41 %	2
1000 to 6000	1.37 %	2
6000 to 26500	1.28 %	2

Horn Antennas, Log – periodic

ANSI 63.5:2004 ^{note 4} SAE ARP958 Revision D ^{note 4}

<i>Frequency Range in GHz</i>	<i>Best Uncertainty (±) in dB ^{note 1}</i>	<i>Distance in m</i>
1 to 2.6	1.01	1
2.6 to 12	1.00	1
12 to 18	2.15	1
18 to 26.5	2.94	1
26.5 to 40	2.97	1
1 to 2.6	0.84	3
2.6 to 12	0.82	3
12 to 18	1.75	3
18 to 26.5	2.11	3
26.5 to 40	2.34	3
1 to 2.6	0.42	10
2.6 to 12	0.81	10
12 to 18	1.22	10

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Microwave Antenna Parameters by Standard Site Method

Log Spiral Antennas, SAE ARP958 Revision D ^{note 4}

<i>Frequency Range in GHz</i>	<i>Best Uncertainty (±) in dB ^{note 1}</i>	<i>Distance in m</i>
0.2 to 1	0.97	1
1 to 10	1.05	1

LISNs – CDNs ^{note 3}

CISPR 16-1-2: 2003 ^{note 4} IEC 61000-4-6: 2003 ^{note 4}

<i>Frequency Range in MHz</i>	<i>Best Uncertainty (±) ^{note 2}</i>	<i>Value of k</i>
LISNs		
Insertion Loss		
0.009 to 30	0.30 dB	2
30 to 200	0.67 dB	2
Impedance		
0.009 to 30	1.37 %	2
30 to 200	7.29 %	2
Phase		
0.009 to 30	0.50 %	2
30 to 200	3.08 %	2
Isolation		
0.009 to 30	0.48 dB	2
30 to 200	1.43 dB	2
VSWR for RF Output Port		
0.009 to 200	0.41 %	2

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CDNs ^{note 3}

CISPR16-1-2:2003, IEC 61000-4-6:2003

<i>Frequency Range in MHz</i>	<i>Best Uncertainty (±) ^{note 2}</i>	<i>Value of k</i>
Insertion Loss		
0.009 to 80	0.82 dB	2
80 to 300	0.82 dB	2
Impedance		
0.009 to 80	1.86 %	2
80 to 300	1.78 %	2
150 ohms Adapter ^{note 3}		
Insertion Loss		
0.009 to 80	0.56 dB	2
80 to 300	0.53 dB	2
Impedance		
0.009 to 80	0.60 %	2
80 to 300	4.58 %	2
Frequency		
0.0000001 to 18000	1.26E-07 + 0.1 Hz	2
Voltage Probe ^{note 3}		
CISPR 16-1-2		
Insertion Loss, VDF		
0.009 to 30	0.49 dB	2
Impedance		
0.009 to 30	3.44 %	2
Capacitive Voltage Probes ^{note 3}		
CISPR 16-1-2		

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<i>Frequency Range in MHz</i>	<i>Best Uncertainty (\pm)^{note 2}</i>	<i>Value of k</i>
Insertion Loss, VDF 0.009 to 30	0.56 dB	2
Insertion Loss w/ Influence of external electric field 0.009 to 30	1.99 dB	2
ISNs ^{note 3} CISPR 16-1-2		
Asymmetric Impedance 0.009 to 80	2.20 %	2
Asymmetric Impedance Phase 0.009 to 80	0.44 %	2
LCL \leq 55 dB 0.009 to 80	0.43 dB	2
LCL \leq 65 dB 0.009 to 80	0.63 dB	2
LCL \leq 75 dB 0.009 to 80	2.30 dB	2
Decoupling Attenuation 0.009 to 80	1.21 dB	2
Symmetric Insertion Loss 0.009 to 80	0.07 dB	2
Voltage Division Factor 0.009 to 80	0.12 dB	2

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<i>Frequency Range in MHz</i>	<i>Best Uncertainty (\pm)^{note 2}</i>	<i>Value of k</i>
Symmetric Impedance 0.009 to 80	2.20 %	2
Absorbing Clamp CISPR 16-1-3		
CISPR 16-1:1998 30 to 10000	2.33 dB	2
Original Method 30 to 10000	1.24 dB	2
Jig Method 30 to 10000	0.82 dB	2
Decoupling Factor 30 to 1000	3.70 dB	2
Decoupling Ratio for CMD 30 to 1000	3.37 dB	2
EM, Injection Clamp ^{note 3} IEC 61000-4-6		
Coupling Factor 0.1 to 230	0.53 dB	2
230 to 1000	1.39 dB	2
Decoupling Factor 0.1 to 230	0.52 dB	2
230 to 1000	1.38 dB	2

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<i>Frequency Range in MHz</i>	<i>Best Uncertainty (\pm)^{note 2}</i>	<i>Value of k</i>
E- Field Sensor IEEE Std.1309		
Frequency Response (Septum Height = 500 mm)		
0.1 to 1800	1.54 dB	2
1800 to 4000	2.30 dB	2
4000 to 6000	2.89 dB	2
Frequency Response (Septum Height = 330 mm)		
0.1 to 1800	1.69 dB	2
1800 to 4000	2.53 dB	2
4000 to 6000	3.22 dB	2
Linearity		
0.1 to 6000	0.29 dB	2
Isotropic Response		
0.1 to 6000	0.19 dB	2
Directional Coupler ^{note 3}		
Insertion Loss, Coupling Factor, Directivity, Isolation		
0.01 to 1000	0.12 dB	2
1000 to 40000	0.20 dB	2

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1. Represents an expanded uncertainty using a coverage factor, $k = 2$, at an approximate level of confidence of 95 %.
 2. Represents an expanded uncertainty corresponding to a 95% level of confidence using a coverage factor, k . Values of k other than 2 were approximated by a t-distribution with the effective degrees of freedom V_{eff} obtained from the Welch-Satterthwaite formula.
 3. Items available for on-site service.
 4. When international, national, or commercial / engineering – society methods or standards are cited, such references apply only to the specific equipment, parameters and conditions listed in this scope of accreditation, and do not imply compliance to other requirements that may appear within the cited documents.

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A handwritten signature in cursive script that reads 'Sally S. Bruce'.

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