

United States Department of Commerce  
National Institute of Standards and Technology



---

**Certificate of Accreditation to ISO/IEC 17025:2017**

---

**NVLAP LAB CODE: 200679-0**

**IPS Corporation Tokyo Calibration Center**  
Chiba Prefecture  
Japan

*is accredited by the National Voluntary Laboratory Accreditation Program for specific services,  
listed on the Scope of Accreditation, for:*

**Calibration Laboratories**

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.  
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality  
management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).*

---

2019-12-09 through 2020-12-31

*Effective Dates*



A handwritten signature in blue ink, appearing to read 'Dana S. Laman', written over a horizontal line.

*For the National Voluntary Laboratory Accreditation Program*

CALIBRATION LABORATORIES

NVLAP LAB CODE 200679-0

**SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017**

<p><b>IPS Corporation Tokyo Calibration Center</b> 935, Fusa Abiko-City, Chiba Prefecture 270-1101 JAPAN Mr. Toshio Shiba Phone: 81-4-7187-7311 Fax: 81-4-7187-7312 E-mail: <a href="mailto:tcc@ips-emc.co.jp">tcc@ips-emc.co.jp</a> URL: <a href="http://www.ips-emc.co.jp">http://www.ips-emc.co.jp</a></p>	<p><b>Fields of Calibration</b> Electromagnetics – DC/Low Frequency Time and Frequency Electromagnetics – RF/Microwave</p>
---	--

**CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) <sup>Notes 1,2</sup>**

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty <sup>Notes 3,5</sup>	Remarks
<b>ELECTROMAGNETICS – DC/LOW FREQUENCY</b>			
<b>AC CURRENT and RESISTANCE (20/E02)</b>			
Resistance, Reactance, and Impedance Field calibrations available <sup>Note 4</sup>  40 Hz to 50 kHz 50 kHz to 200 kHz	100.0 mΩ to 19.999 MΩ	11 % 16 %	ZM2353 + 2325AL
<b>DC VOLTAGE (20/E06)</b>			
DC Voltage Measure Field calibrations available <sup>Note 4</sup>	0.01 V to 1 V 1 V to 1000 V	0.24 % 0.15 %	34401A
<b>LF AC VOLTAGE (20/E09)</b>			
AC Voltage Measure Field calibrations available <sup>Note 4</sup>  0.1 V to 750 V  0.1 V to 4 V	3 Hz to 5 Hz 5 Hz to 10 Hz 10 Hz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz  10 kHz to 30 MHz	3.1 % 0.46 % 0.12 % 0.19 % 0.79 % 5.2 %  8.3 %	34401A        E4418B + E9304A



2019-12-09 through 2020-12-31  
Effective dates

For the National Voluntary Laboratory Accreditation Program

**National Voluntary  
Laboratory Accreditation Program**



CALIBRATION LABORATORIES

NVLAP LAB CODE 200679-0

**CALIBRATION AND MEASUREMENT CAPABILITIES (CMC)** Notes 1,2

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty Notes 3,5	Remarks
Spectrum Analyzer-- Amplitude and Response Field calibrations available Note 4 5 Hz to 100 kHz 100 kHz to 200 kHz  Reference Level Accuracy Field calibrations available Note 4 9 kHz to 18 GHz	-36 dBm to 4 dBm    10 dB step up to 110 dB	0.14 dB 0.27 dB   0.23 dB	33220A, 33120A
<b>CAPACITANCE (20/E10)</b>			
Capacitance Field calibrations available Note 4  40 Hz to 50 kHz 50 kHz to 200 kHz	1.000 pF to 199.99 mF	11 % 16 %	ZM2353 with 2325AL
<b>INDUCTANCE (20/E11)</b>			
Inductance Field calibrations available Note 4 40 Hz to 50 kHz 50 kHz to 200 kHz	1.00 nH to 19.999 kH	11 % 16 %	ZM2353 with 2325AL
<b>MAGNETICS (20/E13)</b>			
Magnetic Field Meter 50 Hz or 60 Hz Response to H-field	1.26 μT to 62.8 μT	2.1 %	IEC 61786
<b>TIME and FREQUENCY</b>			
<b>FREQUENCY DISSEMINATION (20/F01)</b>			
Sine-Wave Frequency Measure  Field calibrations available Note 4	(Aging rate daily) 0.1 Hz to 225 MHz 10 Hz to 40 GHz	1.2 x 10 <sup>-12</sup> + 1 μHz 1.2 x 10 <sup>-12</sup> + 0.6 R	Rubidium Standard and Counter

2019-12-09 through 2020-12-31  
Effective dates

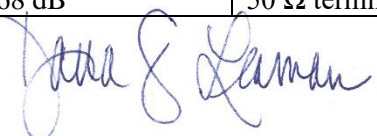
For the National Voluntary Laboratory Accreditation Program

**CALIBRATION LABORATORIES**

**NVLAP LAB CODE 200679-0**

**CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) <sup>Notes 1,2</sup>**

<b>Measured Parameter or Device Calibrated</b>	<b>Range</b>	<b>Expanded Uncertainty <sup>Notes 3,5</sup></b>	<b>Remarks</b>
Signal Generator --			
Pulse Rise and Fall Time Field calibrations available <sup>Note 4</sup>	1 ns to 20 ns	4.7 %	Agilent 54622A Oscilloscope
Pulse Period and Width Field calibrations available <sup>Note 4</sup>	10 s to 0.5 ms	0.84 %	
Function Generator --			
Pulse Rise and Fall Time Field calibrations available <sup>Note 4</sup>	5 ns to 20 ns	0.89 %	Agilent 54622A Oscilloscope and 54845A Oscilloscope
Pulse Period and Width Field calibrations available <sup>Note 4</sup>	10 s to 0.5 ms	0.63 %	
Receiver--			
Overall Selectivity Field calibrations available <sup>Note 4</sup>	9 kHz to 18 GHz	6.6 %	CISPR Band A/B/C/D/E
Random Noise Field calibrations available <sup>Note 4</sup>	9 kHz to 1 GHz	0.19 dB	(for 10 dB level variation)
Impulse Bandwidth Field calibrations available <sup>Note 4</sup>	1 MHz IF Filter	8.9 %	CISPR Band E
Spectrum Analyzer-- Field calibrations available <sup>Note 4</sup>			
IF Bandwidth Accuracy and Selectivity	Bandwidth: 0 dB to -6 dB	2.1 %	
	Bandwidth: -6 dB to -60 dB	3.0 %	
Noise Level	5 Hz to 9 kHz	0.68 dB	50 Ω termination



2019-12-09 through 2020-12-31  
Effective dates

For the National Voluntary Laboratory Accreditation Program

**CALIBRATION LABORATORIES**

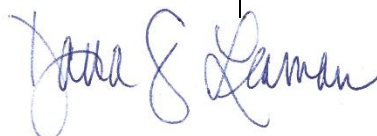
**NVLAP LAB CODE 200679-0**

**CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2**

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty Notes 3,5	Remarks
Frequency Readout Accuracy	9 kHz to 40 GHz	0.63 dB	Relative Measurement
Frequency Span Accuracy	9 kHz to 40 GHz	0.92 %	
Frequency Span Accuracy	9 kHz to 40 GHz	0.75 %	
IF BW Switching Accuracy	9 kHz to 40 GHz	0.12 dB	

**OSCILLATOR CHARACTERISTICS (20/F03)**

Signal Generator-- Modulation (at carrier shown) Field calibrations available Note 4	at Rate		
AM (5 % to 99 %)			
150 kHz to 10 MHz	50 Hz to 10 kHz	2.3 %	Modulation Analyzer
10 MHz to 1300 MHz	50 Hz to 50 kHz	1.2 %	
9 kHz to 3GHz	2 Hz to 100 kHz	0.82 %	Spectrum Analyzer
3 GHz to 6.5GHz	2 Hz to 100 kHz	2.4 %	
FM			Modulation Analyzer
< 40 kHz peak, 250 kHz to 10 MHz	20 Hz to 10 kHz	2.3 %	
< 400 kHz peak 10 MHz to 1300 MHz	50 Hz to 100 kHz	1.2 %	
PM Note 7			
< 40 kHz peak, 150 kHz to 10 MHz	200 Hz to 10 kHz	4.6 %	
< 400 kHz peak 10 MHz to 1300 MHz	200 Hz to 20 kHz	3.5 %	
Harmonics Field calibrations available Note 4			



2019-12-09 through 2020-12-31  
Effective dates

For the National Voluntary Laboratory Accreditation Program

**National Voluntary  
Laboratory Accreditation Program**



CALIBRATION LABORATORIES

NVLAP LAB CODE 200679-0

**CALIBRATION AND MEASUREMENT CAPABILITIES (CMC)** <sup>Notes 1,2</sup>

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty <sup>Notes 3,5</sup>	Remarks
9 kHz to 3 GHz	0 dBc to 80 dBc	0.35 dB	Spectrum Analyzer
3 GHz to 6.5 GHz	0 dBc to 80 dBc	0.63 dB	
6.5 GHz to 18 GHz	0 dBc to 80 dBc	0.96 dB	
18 GHz to 26.5 GHz	0 dBc to 80 dBc	0.92 dB	
<b>PULSE WAVEFORM (20/F04)</b>			
CISPR Pulse Generator			CISPR 16-1-1
Pulse Area (integral function)	9 kHz to 1 GHz	6.0 %	CISPR Band A, B, and C/D
Pulse Width (horizontal scale)		2.6 %	
Amplitude Variation		0.27 dB	
Flatness of Spectrum Amplitude			
Band A		0.37 dB	
Band B		0.30 dB	
Band C/D		0.57 dB	
CISPR Receiver			
Field calibrations available <sup>Note 4</sup>			
Response to Pulse – Amplitude Relationship – RMS Average and Average Detector			Power Sensor, Power Meter, RF Signal Generator, Power Splitter
9 kHz to 30 MHz	10 dB to 60 dB	1.5 dB	CISPR Band A/B
30 MHz to 1 GHz		0.90 dB	CISPR Band C/D
Response to Pulse – Amplitude Relationship – QP Detector			
Response to Pulse – Amplitude Relationship			
9 kHz to 30 MHz	10 dB to 60 dB	0.83 dB	CISPR Band A/B
100 MHz		0.94 dB	CISPR Band C

2019-12-09 through 2020-12-31  
Effective dates

For the National Voluntary Laboratory Accreditation Program

**National Voluntary  
Laboratory Accreditation Program**



CALIBRATION LABORATORIES

NVLAP LAB CODE 200679-0

**CALIBRATION AND MEASUREMENT CAPABILITIES (CMC)** Notes 1,2

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty Notes 3,5	Remarks
30 MHz to 100 MHz 100 MHz to 1 GHz 1 GHz to 3 GHz 3 GHz to 18 GHz		1.1 dB 1.5 dB 1.6 dB 0.75 dB	CISPR Band C CISPR Band C/D CISPR Band E CISPR Band E
Response to Pulse – Variation with Repetition Frequency 9 kHz to 30 MHz 30 MHz to 1 GHz 1 GHz to 3 GHz 3 GHz to 18 GHz	(10 to 60) dB $\mu$ V	0.69 dB 0.90 dB 0.22 dB 0.52 dB	Pulse Generator IGUU2916
9 kHz to 1 GHz	(10 to 80) dB $\mu$ V	0.18 dB	Power Sensor, Power Meter, RF Signal Generator, Power Splitter – Pulse Modulation CISPR Band A/B/C/D

**ELECTROMAGNETICS – RF/MICROWAVE**

**MICROWAVE ANTENNA PARAMETERS (20/R08)**

Monopole Antenna Field calibrations available Note 4 Antenna Factor, Gain	30 Hz to 50 MHz	0.39 dB	IEEE 291 & ARP958
Loop Antenna Field calibrations available Note 4 Antenna Factor	5 Hz to 200 kHz	0.47 dB	ARP958 Standard Field Method
Isotropic Electric Field Probes Correction Factor	10 kHz to 1 GHz	1.4 dB	HI- 4422 / FP2000
	100 kHz to 1 GHz 1 GHz to 2 GHz	1.0 dB 2.0 dB	HI-6005 / FP6001 / EP-60x

2019-12-09 through 2020-12-31  
Effective dates

For the National Voluntary Laboratory Accreditation Program

**National Voluntary  
Laboratory Accreditation Program**



CALIBRATION LABORATORIES

NVLAP LAB CODE 200679-0

**CALIBRATION AND MEASUREMENT CAPABILITIES (CMC)** Notes 1,2

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty Notes 3,5	Remarks	
Rotational Response	2 GHz to 4 GHz	0.72 dB	HI4433 / FP2080 / EMC-20	
	4 GHz to 6 GHz	0.95 dB		
	100 kHz to 1 GHz	1.0 dB		
		1 GHz to 3.5 GHz	2.0 dB	OEFS-H-NS, OEFS-H-S1
		4 GHz	1.7 dB/-1.3 dB	
		100 kHz to 1 GHz	1.0 dB	HI-4422 / FP2000
		1 GHz to 3 GHz	2.0 dB	
	100 kHz to 1 GHz	0.2 dB	HI-6005 / FP6001 / EP-60x	
	1 GHz to 3.5 GHz	0.4 dB		
	100 kHz to 3.5 GHz	0.2 dB	HI4433 / FP2080/ EMC-20	
<b>RF/MICROWAVE POWER (20/R17)</b>				
CISPR Receiver Internal Calibration Source – Level Accuracy Field calibrations available Note 4	120 MHz, -40 dBm	0.17 dB	Power Sensor, Power Meter, 40 dB attenuator	
High Power Sensor/Meters Field calibrations available Note 4				
Amplitude and Linearity				
9 kHz to 1 GHz	0.1 W to 100 W	13 %		
	1 GHz to 4.2 GHz	0.1 W to 20 W	19 %	
10 kHz to 1 GHz	100 W to 500 W	13%		
Power Meter & Power Sensor Termination Type Field calibrations available Note 4			E9304A & 11667A (type N)	
Calibration Factor at 0 dBm	9 kHz to 6 GHz	1.7 %		

2019-12-09 through 2020-12-31  
Effective dates

For the National Voluntary Laboratory Accreditation Program



**National Voluntary  
Laboratory Accreditation Program**



CALIBRATION LABORATORIES

NVLAP LAB CODE 200679-0

**CALIBRATION AND MEASUREMENT CAPABILITIES (CMC)** Notes 1,2

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty Notes 3,5	Remarks
	10 MHz to 2 GHz	1.9 %	E4412A & 11667A (type N)
	2 GHz to 10 GHz	2.8 %	
	10 GHz to 18 GHz	3.4 %	
	50 MHz to 2 GHz	3.1 %	E4413A & 11667B (type 3.5 mm)
	2 GHz to 10 GHz	3.2 %	
	10 GHz to 18 GHz	3.4 %	
	18 GHz to 26.5 GHz	4.2 %	
	50 MHz to 18 GHz	5.6 %	8487A & 11667C (type 2.4 mm)
	18 GHz to 26 GHz	7.0 %	
	26 GHz to 34 GHz	8.2 %	
	34 GHz to 40 GHz	8.9 %	
	50 MHz to 18 GHz	7.3 %	8487D, 11708A, and 11667C (type 2.4 mm)
	18 GHz to 26 GHz	8.9 %	
	26 GHz to 34 GHz	13 %	
	34 GHz to 40 GHz	13 %	
Power Linearity 9 kHz to 6 GHz	-40 dBm to 20 dBm	3.7 %	E9304A
10 MHz to 18 GHz	-50 dBm to 20 dBm	6.6 %	E4412A
10 MHz to 26.5 GHz	-50 dBm to 20 dBm	6.2 %	E4413A
50 MHz to 40 GHz	-30 dBm to 20 dBm	8.5 %	8487A
50 MHz to 40 GHz	-70 dBm to -20 dBm	12 %	8487D
RF Absolute Power Measure (Unmodulated Sine-wave) Field calibrations available Note 4			
100 kHz to 4.2 GHz	-30 dBm to 20 dBm	3.7 %	8482A (type N)

2019-12-09 through 2020-12-31  
Effective dates

For the National Voluntary Laboratory Accreditation Program

**National Voluntary  
Laboratory Accreditation Program**



CALIBRATION LABORATORIES

NVLAP LAB CODE 200679-0

**CALIBRATION AND MEASUREMENT CAPABILITIES (CMC)** Notes 1,2

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty Notes 3,5	Remarks
9 kHz to 6 GHz	-40 dBm to 20 dBm	3.7 %	E9304A (type N)
10 MHz to 18 GHz	-50 dBm to 20 dBm	6.6 %	E4412A (type N)
50 MHz to 26.5 GHz	-50 dBm to 20 dBm	6.2 %	E4413A (type 3.5 mm)
50 MHz to 18 GHz	-30 dBm to 20 dBm	7.1 %	8487A (type 2.4 mm)
18 GHz to 40 GHz		8.5 %	
40 GHz to 50 GHz		11 %	
50 MHz to 18 GHz	-70 dBm to -20 dBm	8.0 %	8487D (type 2.4mm)
18 GHz to 40 GHz		12 %	
40 GHz to 50 GHz		15 %	
100 kHz to 1 GHz	20 dBm to 50 dBm	4.1 %	E9304, LA250
10 kHz to 1 GHz	50 dBm to 57 dBm	13 %	E9304A, Attenuator
9 kHz to 3 GHz	-110 dBm to 10 dBm	0.62 dB	Spectrum Analyser
3 GHz to 6 GHz	-110 dBm to 10 dBm	1.83 dB	
6 GHz to 26.5 GHz	-110 dBm to 10 dBm	3.21 dB	
CISPR Receiver Field calibrations available Note 4			CISPR 16-1-1
Frequency Response to Sine Wave Voltage			
-10 dBm to +10 dBm	9kHz to 6GHz	0.26 dB	E9304 and 8496B
-47 dBm to +10 dBm	9kHz to 6GHz	0.23 dB	E9304 (Type N)
-50 dBm to +10 dBm	10 MHz to 6 GHz	0.28 dB	E4412A (Type N)
	6 GHz to 18 GHz	0.30 dB	
0 dBm to +10 dBm	6 GHz to 18 GHz	0.41 dB	E4412A and 8496B
-50 dBm to +10 dBm	50 MHz to 2 GHz	0.25 dB	E4413A (Type 3.5 mm)
	2 GHz to 10 GHz	0.26 dB	
	10 GHz to 18 GHz	0.27 dB	
	18 GHz to 26.5 GHz	0.29 dB	

*Jana S. Laman*

2019-12-09 through 2020-12-31  
Effective dates

For the National Voluntary Laboratory Accreditation Program

**National Voluntary  
Laboratory Accreditation Program**



CALIBRATION LABORATORIES

NVLAP LAB CODE 200679-0

**CALIBRATION AND MEASUREMENT CAPABILITIES (CMC)** Notes 1,2

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty Notes 3,5	Remarks
-30 dBm to +10 dBm	50 MHz to 2 GHz 2 GHz to 12.4 GHz 12.4 GHz to 18 GHz 18 GHz to 26.5 GHz 26.5 GHz to 40 GHz	0.35 dB 0.36 dB 0.37 dB 0.40 dB 0.43 dB	8487A (Type 2.4 mm)
CISPR Average Response to Unsteady Narrowband Disturbances 9 kHz to 30 MHz 30 MHz to 999.999 MHz 1 GHz to 18 GHz	60 dB $\mu$ V Reference 60 dB $\mu$ V Reference 60 dB $\mu$ V Reference	0.60 dB 0.66 dB 0.90 dB	CISPR Band A/B CISPR Band C/D CISPR Band E
CW Simulator (RF Generator) Unmodulated Sine Wave Field calibrations available Note 4 Absolute Power 100 kHz to 1 GHz 10 kHz to 1 GHz	0.1 W to 100 W 100 W to 500 W	4.1 % 13 %	Power Sensor, Power Meter, 40 dB attenuator
<b>SCATTERING PARAMETERS (20/R18)</b>			
VSWR Note 8 Field calibrations available Note 4 (0 to 0.1)	10 Hz to 500 MHz  5 Hz to 100 Hz 100 Hz to 150 MHz 150 MHz to 3 GHz  9 kHz to 10 MHz 10 MHz to 3 GHz 3 GHz to 6 GHz 6 GHz to 8.5 GHz  45 MHz to 2GHz 2 GHz to 8 GHz 8 GHz to 18 GHz  45 MHz to 2 GHz	2.0 %  2.0 % 1.0 % 1.4 %  1.2 % 1.5 % 2.3 % 2.9 %  1.2 % 2.0 % 2.8 %  1.2 %	4395A + 87512A + 85032B/F  E5061B + 85032B/85032F  E5071C + 85032F  E8363B + 85054B (Type-N)  E8363B + 85052B (3.5mm)

2019-12-09 through 2020-12-31  
Effective dates

For the National Voluntary Laboratory Accreditation Program

**National Voluntary  
Laboratory Accreditation Program**



CALIBRATION LABORATORIES

NVLAP LAB CODE 200679-0

**CALIBRATION AND MEASUREMENT CAPABILITIES (CMC)** Notes 1,2

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty Notes 3,5	Remarks
	2 GHz to 8 GHz	2.2 %	E8363B + 85056A (2.4mm)
	8 GHz to 20 GHz	2.7 %	
	20 GHz to 26.5 GHz	2.8 %	
	45 MHz to 2 GHz	1.5 %	
	2 GHz to 8 GHz	1.9 %	
	8 GHz to 20 GHz	1.9 %	
	20 GHz to 40 GHz	3.0 %	N5234B + 85054B (Type-N)
	10 MHz to 2 GHz	1.0 %	
	2 GHz to 8 GHz	1.8 %	
	8 GHz to 18 GHz	2.6 %	N5234B + 85052B (3.5mm)
	10 MHz to 2 GHz	1.1 %	
	2 GHz to 8 GHz	2.1%	
8 GHz to 20 GHz	2.6 %		
20 GHz to 26.5 GHz	2.7 %	N5234B + 85056A (2.4mm)	
10 MHz to 2 GHz	1.3 %		
2 GHz to 8 GHz	1.7 %		
8 GHz to 20 GHz	1.7 %		
20 GHz to 40 GHz	2.8%	ISO 11452-7	
BAN Field calibrations available Note 4			
Impedance	250 kHz to 500 MHz		3.5 %
Insertion Loss	250 kHz to 500 MHz	2.1 dB	
CDN Field calibrations available Note 4			
Impedance	100 kHz to 80 MHz	1.4 %	

*Jana S. Laman*

2019-12-09 through 2020-12-31  
Effective dates

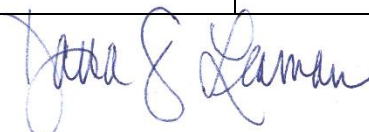
For the National Voluntary Laboratory Accreditation Program

**CALIBRATION LABORATORIES**

**NVLAP LAB CODE 200679-0**

**CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) <sup>Notes 1,2</sup>**

<b>Measured Parameter or Device Calibrated</b>	<b>Range</b>	<b>Expanded Uncertainty <sup>Notes 3,5</sup></b>	<b>Remarks</b>
Insertion Loss	80 MHz to 230 MHz 100 kHz to 230 MHz	2.1 % 0.2 dB	CISPR 16-1-2
Artificial Hand Field calibrations available <sup>Note 4</sup>			
Impedance	100 kHz to 30 MHz	2.0 %	
LISN Field calibrations available <sup>Note 4</sup>			Network Analyzer, Type N Cal Kit
Impedance	9 kHz to 30 MHz 30 MHz to 108 MHz 108 MHz to 200 MHz	2.1 % 3.3 % 3.6 %	
Insertion Loss	9 kHz to 108 MHz 108 MHz to 150 MHz	0.2 dB 0.39 dB	
Isolation	9 kHz to 108 MHz 108 MHz to 200 MHz	1.4 dB 0.4 dB	Network Analyzer, Type N Cal Kit
Phase Angle	9 kHz to 30 MHz 30 MHz to 108 MHz 108 MHz to 200 MHz	5.4 ° 6.6 ° 11.2 °	Network Analyzer, Type N Cal Kit
Spectrum Analyzer Field calibrations available <sup>Note 4</sup>			
Scale Fidelity – Log scale	0 dB to 80 dB scale range	0.23 dB	
Scale Fidelity – Linear scale	0 dB to 20 dB scale range	0.18 dB	
Switching Accuracy of RF Output 10 dB Step	9 kHz to 12.4 GHz 12.4 GHz to 18 GHz	0.31 dB 0.41 dB	8496B



2019-12-09 through 2020-12-31  
Effective dates

For the National Voluntary Laboratory Accreditation Program

**National Voluntary  
Laboratory Accreditation Program**



CALIBRATION LABORATORIES

NVLAP LAB CODE 200679-0

**CALIBRATION AND MEASUREMENT CAPABILITIES (CMC)** Notes 1,2

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty Notes 3,5	Remarks
1dB to 2 dB Step	9 kHz to 12.4 GHz 12.4 GHz to 18 GHz	0.29 dB 0.42 dB	8494B
Input Attenuator Switching Accuracy	9 kHz to 18 GHz	0.18 dB	
Response to Sine Wave Voltage – Linearity 0 dB to -110 dB step change	9 kHz to 18 GHz	0.32 dB	
EM Clamp / Decoupling Clamp Field calibrations available Note 4			IEC 61000-4-6, Network Analyzer, Type N Cal kit
Insertion Loss	100 kHz to 230 MHz	0.4 dB	
Impedance	100 kHz to 100 MHz	5.8 %	
	100 MHz to 230 MHz	9.0 %	
Decoupling Factor	100 kHz to 100 MHz	0.3 dB	
	100 MHz to 230 MHz	0.7 dB	
Coupling Factor	100 kHz to 100 MHz	0.6 dB	
	100 MHz to 230 MHz	0.9 dB	
150 Ohm to 50 Ohm Adapter Field calibrations available Note 4			Vector network analyzer, Type N calibration kit
Insertion Loss	100 kHz to 230 MHz	0.3 dB	
Current Probe / Current Injection Probe Field calibrations available Note 4			Vector network analyzer, Type N calibration kit
Insertion Loss	10 Hz to 10 kHz	1.1 dB	
	10 kHz to 500 MHz	0.5 dB	
	500 MHz to 2.1 GHz	0.8 dB	
	2.1 GHz to 2.7GHz	0.9 dB	
	2.7 GHz to 7 GHz	1.5 dB	
Transfer Impedance	10 Hz to 10 kHz	1.1 dB	
	10 kHz to 500 MHz	0.5 dB	

*Jana S. Laman*

2019-12-09 through 2020-12-31  
Effective dates

For the National Voluntary Laboratory Accreditation Program

**National Voluntary  
Laboratory Accreditation Program**



**CALIBRATION LABORATORIES**

**NVLAP LAB CODE 200679-0**

**CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2**

<b>Measured Parameter or Device Calibrated</b>	<b>Range</b>	<b>Expanded Uncertainty</b> Notes 3,5	<b>Remarks</b>	
Insertion Impedance	500 MHz to 2.1 GHz	0.8 dB	CISPR 16-1-2	
	2.1 GHz to 2.7GHz	0.9 dB		
	2.7 GHz to 7 GHz	1.5 dB		
Calibration Jig of Current Injection Probe Field calibrations available Note 4	9 kHz to 200 MHz	2.1 %	IEC 61000-4-6  e.g. EZ-17 type	
Transmission Loss				
CISPR Current Probe Field calibrations available Note 4	150 kHz to 80MHz	0.5 dB	33120A + 4395A SA function 4395A + 87512 VNA function	
Transducer Factor	20 Hz to 1 kHz	0.27 dB		
	1 kHz to 100 MHz	0.25 dB		
Hi-Impedance Probe Field calibrations available Note 4	9 kHz to 30 MHz	0.3 dB	E5061B	
Voltage Division Factor				
RF Insertion Loss / Gain Measure Field calibrations available Note 4	10 Hz to 500 MHz	0 dB to 60 dB	4395A + 87512A	
5 Hz to 100 Hz		60 dB to 70 dB		0.44 dB
		70 dB to 80 dB		0.95 dB
	80 dB to 90 dB	0.15 dB		
	0 dB to 60 dB	0.19 dB		
100 Hz to 9 kHz	60 dB to 70 dB	0.29 dB		
	70 dB to 80 dB	0.60 dB		
	80 dB to 90 dB	0.17 dB		
	0 dB to 60 dB	0.36 dB		
	60 dB to 70 dB	1.0 dB		
	70 dB to 80 dB	2.7 dB		
	80 dB to 90 dB			

2019-12-09 through 2020-12-31  
Effective dates

For the National Voluntary Laboratory Accreditation Program

CALIBRATION LABORATORIES

NVLAP LAB CODE 200679-0

**CALIBRATION AND MEASUREMENT CAPABILITIES (CMC)** Notes 1,2

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty <small>Notes 3,5</small>	Remarks
9 kHz to 150 MHz	0 dB to 60 dB	0.20 dB	
	60 dB to 70 dB	0.47 dB	
	70 dB to 80 dB	1.3 dB	
	80 dB to 90 dB	3.3 dB	
150 kHz to 3 GHz	0 dB to 60 dB	0.13 dB	
	60 dB to 70 dB	0.19 dB	
	70 dB to 80 dB	0.34 dB	
	80 dB to 90 dB	0.82 dB	
9 kHz to 300 kHz	0 dB to 60 dB	0.27 dB	E5071C
	60 dB to 70 dB	0.80 dB	
	70 dB to 80 dB	2.1 dB	
300 kHz to 10 MHz	0 dB to 60 dB	0.15 dB	
	60 dB to 70 dB	0.31 dB	
	70 dB to 80 dB	0.87 dB	
10 MHz to 3 GHz	0 dB to 60 dB	0.11 dB	
	60 dB to 70 dB	0.16 dB	
	70 dB to 80 dB	0.28 dB	
3 GHz to 6 GHz	0 dB to 60 dB	0.15 dB	
	60 dB to 70 dB	0.20 dB	
	70 dB to 80 dB	0.35 dB	
6 GHz to 8.5 GHz	0 dB to 60 dB	0.18 dB	
	60 dB to 70 dB	0.26 dB	
	70 dB to 80 dB	0.48 dB	
45 MHz to 2 GHz	0 dB to 50 dB	0.23 dB	E8363B, Type N
	50 dB to 60 dB	0.63 dB	
	60 dB to 70 dB	1.80 dB	



2019-12-09 through 2020-12-31  
Effective dates

For the National Voluntary Laboratory Accreditation Program



**National Voluntary  
Laboratory Accreditation Program**



CALIBRATION LABORATORIES

NVLAP LAB CODE 200679-0

**CALIBRATION AND MEASUREMENT CAPABILITIES (CMC)** Notes 1,2

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty <small>Notes 3,5</small>	Remarks
2 GHz to 8 GHz	0 dB to 80 dB 80 dB to 90 dB 90 dB to 100 dB	0.33 dB 0.87 dB 2.2 dB	
8 GHz to 18 GHz	0 dB to 80 dB 80 dB to 90 dB 90 dB to 100 dB	0.32 dB 0.74 dB 1.9 dB	
45 MHz to 2 GHz	0 dB to 50 dB 50 dB to 60 dB 60 dB to 70 dB	0.21 dB 0.63 dB 1.8 dB	E8363B, 3.5mm
2 GHz to 8 GHz	0 dB to 80 dB 80 dB to 90 dB 90 dB to 100 dB	0.33 dB 0.87 dB 2.2 dB	
8 GHz to 20 GHz	0 dB to 80 dB 80 dB to 90 dB 90 dB to 100 dB	0.32 dB 0.73 dB 1.9 dB	
20 GHz to 26.5 GHz	0 dB to 80 dB 80 dB to 90 dB 90 dB to 100 dB	0.49 dB 1.2 dB 3.1 dB	
45 MHz to 2 GHz	0 dB to 50 dB 50 dB to 60 dB 60 dB to 70 dB	0.22 dB 0.61 dB 1.8 dB	E8363B, 2.4mm
2 GHz to 8 GHz	0 dB to 80 dB 80 dB to 90 dB 90 dB to 100 dB	0.32 dB 0.87 dB 2.2 dB	
8 GHz to 20 GHz	0 dB to 80 dB 80 dB to 90 dB 90 dB to 100 dB	0.29 dB 0.73 dB 1.9 dB	

*Jana S. Laman*

2019-12-09 through 2020-12-31  
Effective dates

For the National Voluntary Laboratory Accreditation Program

**National Voluntary  
Laboratory Accreditation Program**



CALIBRATION LABORATORIES

NVLAP LAB CODE 200679-0

**CALIBRATION AND MEASUREMENT CAPABILITIES (CMC)** Notes 1,2

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty Notes 3,5	Remarks
20 GHz to 40.0 GHz	0 dB to 80 dB 80 dB to 90 dB 90 dB to 100 dB	0.50 dB 1.2 dB 3.1 dB	
10 MHz to 2 GHz	0 dB to 70 dB 70 dB to 80 dB 80 dB to 90 dB 90 dB to 100 dB	0.20 dB 0.59 dB 1.7 dB 4.1 dB	N5234B, Type-N
2 GHz to 8 GHz	0 dB to 70 dB 70 dB to 80 dB 80 dB to 90 dB 90 dB to 100 dB	0.21 dB 0.59 dB 1.7 dB 4.1 dB	
8 GHz to 18 GHz	0 dB to 60 dB 60 dB to 70 dB 70 dB to 80 dB 80 dB to 90 dB	0.22 dB 0.59 dB 1.7 dB 4.1 dB	
10 MHz to 2 GHz	0 dB to 70 dB 70 dB to 80 dB 80 dB to 90 dB 90 dB to 100 dB	0.19 dB 0.58 dB 1.7 dB 4.1 dB	N5234B, 3.5mm
2 GHz to 8 GHz	0 dB to 70 dB 70 dB to 80 dB 80 dB to 90 dB 90 dB to 100 dB	0.20 dB 0.59 dB 1.7 dB 4.1 dB	
8 GHz to 20 GHz	0 dB to 60 dB 60 dB to 70 dB 70 dB to 80 dB 80 dB to 90 dB	0.21 dB 0.59 dB 1.7 dB 4.1 dB	
20 GHz to 26.5 GHz	0 dB to 60 dB 60 dB to 70 dB	0.21 dB 0.59 dB	

*Jana S. Laman*

2019-12-09 through 2020-12-31  
Effective dates

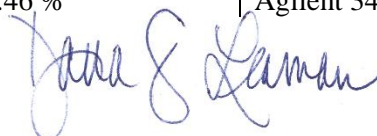
For the National Voluntary Laboratory Accreditation Program

CALIBRATION LABORATORIES

NVLAP LAB CODE 200679-0

**CALIBRATION AND MEASUREMENT CAPABILITIES (CMC)** <sup>Notes 1,2</sup>

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty <sup>Notes 3,5</sup>	Remarks	
10 MHz to 2 GHz	70 dB to 80 dB	1.7 dB	N5234B, 2.4mm	
	80 dB to 90 dB	4.1 dB		
	0 dB to 70 dB	0.19 dB		
	70 dB to 80 dB	0.59 dB		
2 GHz to 8 GHz	80 dB to 90 dB	1.7 dB		
	90 dB to 100 dB	4.1 dB		
	0 dB to 70 dB	0.20 dB		
	70 dB to 80 dB	0.59 dB		
8 GHz to 20 GHz	80 dB to 90 dB	1.7 dB		
	90 dB to 100 dB	4.1 dB		
	0 dB to 60 dB	0.20 dB		
	60 dB to 70 dB	0.59 dB		
20 GHz to 40 GHz	70 dB to 80 dB	1.7 dB		
	80 dB to 90 dB	4.1 dB		
	0 dB to 60 dB	0.22 dB		
	60 dB to 70 dB	0.59 dB		
RF Attenuation Field calibrations available <sup>Note 4</sup>	10 dB Step 9 kHz to 2 GHz 2 GHz to 8 GHz 8 GHz to 18 GHz	0 dB to 110 dB	0.08 dB	8496B-001
			0.10 dB	
			0.17 dB	
	1 dB Step 9 kHz to 2 GHz 2 GHz to 12.4 GHz 12.4 GHz to 18 GHz	0 dB to 11 dB	0.09 dB	8494B-001
			0.11 dB	
			0.21 dB	
	Digital Oscilloscope Field calibrations available <sup>Note 4</sup> Vertical scale accuracy – DC Voltage	10 mV to 25 V	0.46 %	Agilent 34401A



2019-12-09 through 2020-12-31  
Effective dates

For the National Voluntary Laboratory Accreditation Program

**National Voluntary  
Laboratory Accreditation Program**



CALIBRATION LABORATORIES

NVLAP LAB CODE 200679-0

**CALIBRATION AND MEASUREMENT CAPABILITIES (CMC)** Notes 1,2

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty Notes 3,5	Remarks
Vertical scale accuracy – AC Voltage	10 mV to 25 V 100 Hz to 100 kHz	0.88 %	Agilent 34401A
Horizontal scale accuracy - Frequency	0.1 Hz to 6 GHz	0.35 %	R&S SMA 100A, Agilent 33X20A
Bandwidth (-3 dB)	9 kHz to 6 GHz	14 %	R&S SMA 100A
Input resistance	50 Ω, 1 MΩ	0.012 %	Agilent 34401A
Frequency Response	9 kHz to 150 MHz	3.6 %	R&S SMA 100A, Power Sensor, Power Meter
RF Power Amplifier Field calibrations available Note 4			
Gain	9 kHz to 8.5 GHz	0.38 dB	
Power linearity	9 kHz to 10 MHz	12 %	
	10 MHz to 1 GHz	9.7 %	
	1 GHz to 4 GHz	11 %	
Harmonics (0 to -80) dBc	9 kHz to 6.5 GHz	1.6 dB	
	6.5 GHz to 26.5 GHz	1.3 dB	
<b>END</b>			

2019-12-09 through 2020-12-31  
Effective dates

For the National Voluntary Laboratory Accreditation Program

**National Voluntary  
Laboratory Accreditation Program**



**CALIBRATION LABORATORIES**

**NVLAP LAB CODE 200679-0**

**Notes**

**Note 1:** A Calibration and Measurement Capability (CMC) is a description of the best result of a calibration or measurement (result with the smallest uncertainty of measurement) that is available to the laboratory's customers under normal conditions, when performing more or less routine calibrations of nearly ideal measurement standards or instruments. The CMC is described in the laboratory's scope of accreditation by: the measurement parameter/device being calibrated, the measurement range, the uncertainty associated with that range (see note 3), and remarks on additional parameters, if applicable.

**Note 2:** Calibration and Measurement Capabilities are traceable to the national measurement standards of the U.S. or to the national measurement standards of other countries and are thus traceable to the internationally accepted representation of the appropriate SI (Système International) unit.

**Note 3:** The uncertainty associated with a measurement in a CMC is an expanded uncertainty with a level of confidence of approximately 95 %, typically using a coverage factor of  $k = 2$ . However, laboratories may report a coverage factor different than  $k = 2$  to achieve the 95 % level of confidence. Units for the measurand and its uncertainty are to match. Exceptions to this occur when marketplace practice employs mixed units, such as when the artifact to be measured is labeled in non-SI units and the uncertainty is given in SI units (Example: 5 lb weight with uncertainty given in mg).

**Note 3a:** The uncertainty of a specific calibration by the laboratory may be greater than the uncertainty in the CMC due to the condition and behavior of the customer's device and specific circumstances of the calibration. The uncertainties quoted do not include possible effects on the calibrated device of transportation, long term stability, or intended use.

**Note 3b:** As the CMC represents the best measurement results achievable under normal conditions, the accredited calibration laboratory shall not report smaller uncertainty of measurement than that given in a CMC for calibrations or measurements covered by that CMC.

**Note 3c:** As described in Note 1, CMCs cover calibrations and measurements that are available to the laboratory's customers under *normal conditions*. However, the laboratory may have the capability to offer special tests, employing special conditions, which yield calibration or measurement results with lower uncertainties. Such special tests are not covered by the CMCs and are outside the laboratory's scope of accreditation. In this case, NVLAP requirements for the labeling, on calibration reports, of results outside the laboratory's scope of accreditation apply. These requirements are set out in Annex A.5. of NIST Handbook 150, Procedures and General Requirements.

**Note 4:** Uncertainties associated with field service calibration may be greater as they incorporate on-site environmental contributions, transportation effects, or other factors that affect the measurements. (This note applies only if marked in the body of the scope.)

**Note 5:** Values listed with percent (%) are percent of reading or generated value unless otherwise noted.

**Note 6:** NVLAP accreditation is the formal recognition of specific calibration capabilities. Neither NVLAP nor NIST guarantee the accuracy of individual calibrations made by accredited laboratories.

**Note 7:** Measured value in Radians. Range is dependent on rate, carrier, and peak deviation.

**Note 8:** Reflection Coefficient, Impedance or Return Loss measurements are available.

2019-12-09 through 2020-12-31

Effective dates

A handwritten signature in blue ink that reads 'Jane S. Laman'.

For the National Voluntary Laboratory Accreditation Program