United States Department of Commerce
National Institute of Standards and Technology

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 200012-0

IPS Corporation Nagano Calibration Center

Nagano-ken
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 17025:2005. 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).

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SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

IPS Corporation Nagano Calibration Center	**Fields of Calibration**
1878-1, Ono, Tatsuno-machi, Kamiina-gun, Nagano-ken 399-0601 JAPAN Mr. Shuichi Aruga Phone: +81-266-44-5200 Fax: +81-266-44-5300 E-mail: qa@ips-emc.co.jp URL: http://www.ips-emc.co.jp	Electromagnetics – DC/Low Frequency Time and Frequency Electromagnetics – RF/Microwave

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	**Range**	**Expanded Uncertainty** Notes 3, 5	**Remarks**
ELECTROMAGNETICS – DC/LOW FREQUENCY			
AC RESISTANCE and CURRENT (20/E02)			
AC Current – Measure ESD Simulators			IEC 61000-4-2, ISO 10605
Peak current (2 kV to 30 kV)	7.5 A to 113 A	3.9 %	Oscilloscope
Discharge current (30 ns to 800 ns)	0.3 A to 60 A	4.9 %	
Surge Generator Field calibrations available Note 4			IEC 61000-4-5
Peak Current, Short circuit current waveform (8/20 µs, 5/320 µs)	100 A to 2 kA	2.6 %	Oscilloscope
DC VOLTAGE (20/E06)			
DC Voltage - Measure Field calibrations available Note 4	0.01 V to 1000 V	0.11 %	DMM
ESD Simulators			IEC 61000-4-2, ISO 10605
DC High Voltage	0.5 kV to 1 kV 1 kV to 3 kV 3 kV to 40 kV	2.3 % 1.2 % 1.1 %	DHM-40/10

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Measured Parameter or Device Calibrated	Range	Expanded Uncertainty Notes 3, 5	Remarks
LF AC VOLTAGE (20/E09)			
AC Voltage - Measure Field calibrations available Note 4			
0.1 V to 750 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	3.1 % 0.46 % 0.12 % 0.18 % 0.79 % 5.2 %	DMM
10 mV to 5 V	DC to 100 MHz	3.3 %	Oscilloscope
5 V to 4 kV	DC to 50 MHz	3.8 %	Oscilloscope w/ HV Probe
EFT/Burst Field calibrations available Note 4			IEC 61000-4-4
Peak Voltage	100 V to 6 kV	3.0 %	Oscilloscope
Peak Voltage with capacitive clamp		2.8 %	
Transient Generator Field calibrations available Note 4			ISO 7637-2, Annex C
Peak Voltage	10 V to 600 V	4.1 %	
Surge Generator Field calibrations available Note 4			IEC 61000-4-5
Peak Voltage, Open-circuit voltage waveform (1.2/50 μs, 10/700 μs)	100 V to 4 kV	2.8 %	Oscilloscope
Overshoot/Undershoot Field calibrations available Note 4			Oscilloscope
Voltage	1 V to 50 V	3.2 %	

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Measured Parameter or Device Calibrated	Range	Expanded Uncertainty Notes 3, 5	Remarks
Voltage Dip Simulator Field calibrations available Note 4 AC Voltage	10 V to 500 V	0.4 %	DMM
TIME and FREQUENCY			
FREQUENCY DISSEMINATION (20/F01)			
EFT/Burst (100 V to 6 kV) Field calibrations available Note 4 Repetition frequency Burst duration Burst period	 1 kHz to 500 kHz 0.5 ms to 20 ms 100 ms to 500 ms	 0.6 % 0.6 % 0.4 %	IEC 61000-4-4 Oscilloscope
Voltage Dip Simulator Field calibrations available Note 4 Duration Time	 10 ms to 5 s	 2.4 %	 Oscilloscope
Frequency - Measure Field calibrations available Note 4	1 Hz to 1 GHz 50 Hz / 60 Hz	0.5 % 0.1 %	Oscilloscope DMM
Differential - Time Measure Field calibrations available Note 4	1 ns to 5 s	0.6 %	Oscilloscope
Differential - Phase Field calibrations available Note 4	0° to 360°	2.5°	Oscilloscope
PULSE WAVEFORM (20/F04)			
ESD Simulators (2 kV to 30 kV) Rise time	0.6 ns to 1 ns	6.9 %	IEC 61000-4-2, ISO 10605 (Excluding RC time constant) Oscilloscope
EFT/Burst (100 V to 6 kV) Field calibrations available Note 4 Without Capacitive Clamp Rise time Impulse duration With Capacitive Clamp	 1 ns to 10 ns 10 ns to 500 ns	 1.5 % 1.0 %	IEC 61000-4-4 Oscilloscope

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Measured Parameter or Device Calibrated	Range	Expanded Uncertainty Notes 3, 5	Remarks
Rise time	1 ns to 10 ns	1.4 %	
Impulse duration	10 ns to 500 ns	0.6 %	
Surge Generator			IEC 61000-4-5
Field calibrations available Note 4			
Open-circuit voltage waveform (100 V to 4 kV) (1.2/50 µs, 10/700 µs)			
Rise Time	0.5 µs to 20 µs	3.5 %	Oscilloscope
Half value duration	10 µs to 1000 µs	3.7 %	
Short-circuit current waveform (50 A to 2 kA) (8/20 µs, 5/320 µs)			
Rise Time	1 µs to 20 µs	3.4 %	
Half value duration	10 µs to 500 µs	2.3 %	
Transient Generator (10 V to 600 V)			ISO 7637-2, Annex C
Field calibrations available Note 4			
Rise Time	1 ns to 50 ms	5.8 %	Oscilloscope
Pulse Width	50 ns to 3 s	5.9 %	
Voltage Dip Simulator (10 V to 500 V)			IEC 61000-4-11
Field calibrations available Note 4			
Rise/Fall Time	1 µs to 5 µs	2.7 %	Oscilloscope
ELECTROMAGNETICS – RF/MICROWAVE			
MICROWAVE ANTENNA PARAMETERS (20/R08)			
Dipole Antenna (such as the VHA9103/UHA9105)			Substitution method
Horizontal Antenna Factor (D = 10 m, H = 2 m)	30 MHz to 80 MHz (Tuned at 80 MHz)	0.6 dB	EMI Receiver Network Analyzer
	30 MHz to 300 MHz	0.6 dB	
	300 MHz to 1 GHz	0.8 dB	

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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) [Notes 1,2]

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty [Notes 3, 5]	Remarks
Biconical Antenna (such as the BBA9106) Antenna Factor			Substitution method
Horizontal (D = 10 m, H = 2 m)	30 MHz to 300 MHz	0.7 dB	Network Analyzer
Horizontal (D = 3 m, H = 2 m)		0.6 dB	
Horizontal (D = 3 m, H = 1 m)		0.7 dB	
Vertical (D = 3 m, H = 1.5 m)		0.8 dB	
Vertical (D = 3 m, H = 1m)		0.9 dB	
Log-Periodic Antenna (such as the USLP9143/UHALP9108A) Antenna Factor			Substitution method
Horizontal (D = 10 m, H = 2 m)	300 MHz to 1GHz	1.1 dB	Network Anaylzer
Horizontal (D = 3 m, H = 2 m)		1.1 dB	
Horizontal (D = 3 m, H = 1 m)		1.1 dB	
Vertical (D = 3 m, H = 1.5 m)		1.1 dB	
Vertical (D = 3 m, H = 1m)		1.2 dB	
Bi-log Antenna (such as the CBL6112B)			Substitution method
Horizontal Antenna Factor			
(D = 10 m, H = 2 m)	30 MHz to 1 GHz	1.3 dB	Network Analyzer
(D = 3 m, H = 2 m)		1.3 dB	
Biconical Antenna Antenna Factor			SAE ARP958
Horizontal (D = 1 m, H = 3 m)	25 MHz to 300 MHz	0.5 dB	Network Analyzer
Vertical (D = 1 m, H = 3 m)		0.4 dB	
Log-Periodic Antenna Antenna Factor			SAE ARP958
Horizontal (D = 1 m, H = 3 m)	150 MHz to 300 MHz	0.7 dB	Network Analyzer

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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty Notes 3, 5	Remarks
Horizontal (D = 1 m, H = 3 m)	300 MHz to 1 GHz	0.3 dB	
Horizontal (D = 1 m, H = 3 m)	1 GHz to 1.8 GHz	0.5 dB	
Vertical (D = 1 m, H = 3 m)	150 MHz to 300 MHz	0.4 dB	
Vertical (D = 1 m, H = 3 m)	300 MHz to 1 GHz	0.2 dB	
Vertical (D = 1 m, H = 3 m)	1 GHz to 1.8 GHz	0.4 dB	
Horn Antenna			
Antenna Factor			
Free Space (D = 1 m, H = 3 m)	0.75 GHz to 8.5 GHz	1.0 dB	Network Analyzer
	0.75 GHz to 18 Hz	1.4 dB	Spectrum Analyzer
NSA Measurement			CISPR 16-1-4, and ANSI C63.4
Field calibrations available Note 4			
Horizontal	30 MHz to 200 MHz	1.4 dB	Network Analyzer
Vertical		1.7 dB	
Horizontal	200 MHz to 1 GHz	1.4 dB	
Vertical		1.5 dB	
SVSWR Measurement			CISPR 16-1-4, and ANSI C63.4
Field calibrations available Note 4			Network Analyzer
Horizontal	1 GHz to 3 GHz	2.2 dB	Spectrum Analyzer
Vertical		2.1 dB	
Horizontal	3 GHz to 6 GHz	2.4 dB	
Vertical		2.7 dB	
Horizontal	6 GHz to 12 GHz	2.5 dB	
Vertical		1.9 dB	
Horizontal	12 GHz to 18 GHz	2.0 dB	
Vertical		1.9 dB	
Absorbing Clamp			CISPR 16-1-3:2004
Clamp Factor	30 MHz to 300 MHz	0.8 dB	Original Method
	300 MHz to 1 GHz	1.1 dB	Network Analyzer
Decoupling Factor (DF)	30 MHz to 150 MHz	1.3 dB	

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Measured Parameter or Device Calibrated	Range	Expanded Uncertainty [Notes 3, 5]	Remarks
Decoupling Factor (DR)	150 MHz to 1GHz 30 MHz to 150 MHz 150 MHz to 1GHz	4.4 dB 0.9 dB 6.1 dB	
Biconical, Log-peridioc, Hybrid Antenna			Standard Site Method
Horizontal Antenna Factor (D = 10 m, H = 2 m)	20 MHz to 30 MHz 30 MHz to 300 MHz 300 MHz to 1 GHz 1 GHz to 1.8 GHz	1.1 dB 1.0 dB 0.9 dB 1.2 dB	ANSI C63.5: 2006 (OATS Calibration) (excluding GSCF)
Biconical, Log-periodic, Hybrid Antenna			ANSI C63.5: 2006 Clause 4.4.1 (OATS Calibration)
Antenna Symmetry	20 MHz to 300 MHz 300 MHz to 1 GHz 1 GHz to 1.8 GHz	0.6 dB 0.6 dB 0.5 dB	
Horn Antenna			
Free Space Antenna Factor (D = 3 m)	0.75 GHz to 8.5 GHz 0.75 GHz to 18 GHz	1.0 dB 1.2 dB	Network Analyzer Spectrum Analyzer
Loop Antenna – Antenna Factor	9 kHz to 30 MHz	1.2 dB	Standard Field Strength Method
Large Loop Antenna – Validation Factor Field calibrations available [Note 4]	9 kHz to 30 MHz	0.8 dB	CISPR 16-1-4 Annex C
SCATTERING PARAMETERS (20/R18)			
Impedance & VSWR - Measure Field calibrations available [Note 4]	9 kHz to 300 kHz 300 kHz to 3 GHz 3 GHz to 6 GHz	2.0 % 1.2 % 2.2 %	Network Analyzer
Directional Coupler (9 kHz to 6 GHz) Field calibrations available [Note 4]			
Insertion Loss	0 dB to 60 dB	0.20 dB	Network Analyzer

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Measured Parameter or Device Calibrated	Range	Expanded Uncertainty Notes 3, 5	Remarks
Coupling Factor	0 dB to 60 dB 60 dB to 70 dB 70 dB to 80 dB	0.20 dB 0.44 dB 0.95 dB	
EM Clamp / Decoupling Clamp 0.1 MHz to 230 MHz Field calibrations available Note 4			IEC 61000-4-6
Insertion Loss	100 kHz to 230 MHz	0.4 dB	
Impedance	100 kHz to 100MHz 100MHz to 230MHz	6.0 % 8.8 %	
Decoupling Factor	100 kHz to 100MHz 100MHz to 230MHz	0.6 dB 0.7 dB	
Coupling Factor	100 kHz to 100MHz 100MHz to 230MHz	0.7 dB 0.6 dB	
50 ohm to 150 ohm Adaptor 0.1 MHz to 230 MHz Field calibrations available Note 4			Network Analyzer
Insertion Loss	0 dB to 60 dB	0.3 dB	
Current Probe/Current Injection Probe 10 kHz to 500 MHz Field calibrations available Note 4			
Insertion Loss Transfer Impedance	0 dB to 60 dB 0 dB to 60 dB	0.5 dB 0.5 dB ohm	
Calibration Jig of Current Injection Probe Field calibrations available Note 4			
Transmission Loss	150 kHz to 230MHz	0.6 dB	IEC 61000-4-6
Hi-Impedance Probe 9 kHz to 30 MHz Field calibrations available Note 4			

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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) [Notes 1,2]

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty [Notes 3, 5]	Remarks
Voltage Division Factor	0 dB to 60 dB	0.3 dB	
RF Insertion Loss/Gain Measure			
Field calibrations available [Note 4]			
9 kHz to 300 kHz	0 dB to 60 dB	0.20 dB	
300 kHz to 3 GHz		0.10 dB	
3 GHz to 6 GHz		0.13 dB	
LISN			
Field calibrations available [Note 4]			
Insertion Loss	9 kHz to 108 MHz	0.2 dB	
Impedance	9 kHz to 30 MHz	2.1 %	
	30 MHz to 108 MHz	3.3 %	
Phase	9 kHz to 30 MHz	4.9°	
	30 MHz to 108 MHz	6.6°	
Isolation	9 kHz to 108 MHz	2.9 dB	
CDN			
Field calibrations available [Note 4]			
Insertion Loss	100 kHz to 230 MHz	0.2 dB	
Impedance	100 kHz to 80 MHz	1.4 %	
	80 MHz to 230 MHz	2.1 %	
CMAD			
Field calibrations available [Note 4]			
Transmission Coefficient	30 MHz to 200 MHz	0.0051 (linear)	
Reflection Coefficient	30 MHz to 200 MHz	0.013 (linear)	
END			

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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.

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