



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

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CALIBRATION

Valid To: January 31, 2013

Certificate Number: 1266.02

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations: ^{1,4}

I. Electrical-RF/Microwave

Parameter/Equipment	Range	CMC ² (±)	Comments ⁴
RF Absolute Power ³ –Measure	10 Hz to 10 kHz	0.78 dB	Spectrum analyzer
(-60 to +20) dBm	9 kHz to 18 GHz	0.24 dB	Power meter & sensors
(-70 to +20) dBm	50 MHz to 26.5 GHz	0.56 dB	
(-30 to +20) dBm	50 MHz to 40 GHz	0.59 dB	
RF Relative Power ³ –Measure			
(-60 to +20) dB	10 kHz to 18 GHz	0.16 dB	Signal generators Power meter & sensors
(-70 to +20) dB	50 MHz to 26.5 GHz	0.28 dB	
(-30 to +20) dB	50 MHz to 40 GHz	0.22 dB	
RF Absolute Power ³ –Generate			
(-60 to +10) dBm	10 Hz to 10 kHz	0.86 dB	Signal generators with power meter & sensors
(-60 to +10) dBm	10 kHz to 20 MHz	0.43 dB	
(-60 to +10) dBm	10 kHz to 2.7 GHz	0.63 dB	
(-30 to +10) dBm	(1 to 20) GHz	0.81 dB	
(-30 to +10) dBm	(20 to 40) GHz	0.83 dB	

Parameter/Equipment	Range	CMC ² (±)	Comments ⁴
Attenuation ³ – Generate			Step attenuators
(0 to 70) dB 10 dB steps	10 Hz to 12.4 GHz	0.58 dB	
(0 to 11) dB 1 dB steps		0.35 dB	
(0 to 70) dB 10 dB steps	(12.4 to 18) GHz	0.70 dB	
(0 to 11) dB 1 dB steps		0.81 dB	
(0 to 50) dB (60) dB 10 dB steps	10 Hz to 2 GHz	1.2 dB 1.6 dB	
(0 to 60) dB 1 dB steps	10 Hz to 2 GHz	0.35 dB	
Impedance ³ – Measure	9 kHz to 8.5 GHz	0.42 Ohm	Network analyzer with calibration kit one –port device
VSWR ³ – Measure	9 kHz to 8.5 GHz	0.72 dB	Network analyzer with calibration kit one –port device
Current Probe ³ Transfer Impedance	9 kHz to 1 GHz	1.9 dB	CISPR16-1-2 Network analyzer
Preamplifier Gain ³ (0 to 60) dB	10 Hz to 3 GHz (3 to 6.7) GHz (6.7 to 26.5) GHz 9 kHz to 8.5 GHz	0.14 dB 0.48 dB 0.48 dB 0.24 dB	Signal generator and spectrum analyzer Network analyzer

Parameter/Equipment	Range	CMC ² (±)	Comments ⁴
Attenuator ³ (0 to 70) dB	10 Hz to 3 GHz (3 to 6.7) GHz (6.7 to 26.5) GHz 9 kHz to 8.5 GHz	0.14 dB 0.48 dB 0.48 dB 0.24 dB	Signal generator and spectrum analyzer Network analyzer
Coaxial Cable ³	10 Hz to 3 GHz (3 to 6.7) GHz (6.7 to 26.5) GHz 9 kHz to 8.5 GHz	0.14 dB 0.48 dB 0.48 dB 0.24 dB	Signal generator and spectrum analyzer Network analyzer
Signal Generator ³			
Output Frequency	10 Hz to 10 MHz 10 MHz to 1 GHz (1 to 40) GHz	2.2×10^{-5} % 2.8×10^{-6} % 2.8×10^{-6} %	Frequency counter with GPS reference
Output Level	10 Hz to 10 kHz 9 kHz to 1 GHz (1 to 18) GHz (18 to 26.5) GHz (18 to 40) GHz	0.78 dB 0.24 dB 0.40 dB 0.56 dB 0.59 dB	Spectrum analyzer Power meter/sensors
Amplitude Modulation – Measure Depth: (5 to 99) % Rate: 50 Hz to 10 kHz	150 kHz to 10 MHz	2.6 %	Modulation analyzer
Depth: (5 to 99) % Rate: 50 Hz to 50 kHz	(10 to 1300) MHz	1.5 %	
Modulation Frequency – Measure	50 Hz to 10 kHz	0.06 Hz	Modulation analyzer and frequency counter with GPS reference

Parameter/Equipment	Range	CMC ² (±)	Comments ⁴
LISN ³			CISPR16-1-2, CISPR 25, ISO 7637-2, ANSI C63.4
Insertion Loss (VDF)	9 kHz to 108 MHz (108 to 200) MHz	0.53 dB 0.53 dB	Network analyzer
Impedance (Magnitude)	9 kHz to 108 MHz (108 to 200) MHz	1.9 % 4.2 %	Network analyzer with calibration kit
(Phase)	9 kHz to 108 MHz (108 to 200) MHz	0.38 ° 0.39 °	
Isolation	9 kHz to 108 MHz (108 to 200) MHz	0.68 dB 0.69 dB	
VSWR	9 kHz to 108 MHz (108 to 200) MHz	0.75 dB 0.73 dB	
ISN ³			CISPR 16-1-2, CISPR 22
CM Impedance	150 kHz to 30 MHz	2.0 %	Network analyzer with calibration kit
Phase angle	150 kHz to 30 MHz	1.1°	TESEQ calibration kit (calibrations applicable to TESEQ ISNs only)
Voltage Division Factor	150 kHz to 30 MHz	0.66 dB	
Isolation	150 kHz to 30 MHz	2.2 dB	
LCL	150 kHz to 30 MHz	1.6 dB	

Parameter/Equipment	Range	CMC ² (±)	Comments ⁴
Antenna Factor –			SAE ARP958D (excluding Appendix C)
Biconical Antenna	(25 to 300) MHz	0.70 dB	Network analyzer
Log-Periodic Antenna	150 MHz to 1 GHz	0.73 dB	
Horn Antenna	(1 to 3) GHz	0.67 dB	
Rod Antenna	9 kHz to 50 MHz	0.59 dB	CISPR 25, ANSI C63.5: 2006, CISPR16-1-4, Annex B , SAE ARP 958 Network analyzer
Antenna Factor			VCCI.V10, ANSI C63.5:1998, 2006 Ref. Antenna Method
Biconical Antenna	(30 to 300) MHz	1.2 dB	Signal generator Spectrum analyzer
Log-Periodic Broadband Hybrid Antenna	(300 to 1000) MHz	1.1 dB	
Horn Antenna	(1 to 6.7) GHz (6.7 to 13.2) GHz (13.2 to 18) GHz	1.2 dB 1.5 dB 1.5 dB	ANSI C63.5:1998 Standard site method ANSI C63.5: 2006 Standard site method Signal generator Spectrum analyzer
Loop Coil/Sensor ³ –			MIL-STD-461F
Antenna Factor	5 Hz to 300 kHz	0.91 dB	Signal generator Spectrum analyzer DMM

Parameter/Equipment	Range	CMC ² (±)	Comments ⁴
Electric Field Probe –			IEEE Std 1309
Correction Factor (Frequency Response)	10 kHz to 1 MHz	0.86 dB	TEM cell using transfer standard
	1 MHz to 200 MHz	1.2 dB	
	10 kHz to 1 MHz (1 to 1000) MHz	0.86 dB 1.2 dB	GTEM cell using transfer standard
	(1 to 4) GHz	1.1 dB	
	(1 to 4) GHz	0.89 dB	Anechoic chamber using transfer standard
Linearity	100 MHz	1.2 dB	TEM cell using transfer standard
Rotational Response (Isotropic Response)		0.62 dB	GTEM cell

Parameter/Equipment	Range	CMC ² (±)	Comments ⁴
EMI Receiver ³			CISPR 16-1-1
Input Impedance	Band A	0.57 dB	Network analyzer with calibration kit
	Band B	0.52 dB	
	Band C	0.68 dB	
	Band D	0.68 dB	
	Band E (up to 8.5GHz)	0.53 dB	
Pulse Response	Band A	1.2 dB	CISPR pulse generator
	Band B	1.2 dB	
	Band C	1.2 dB	
	Band D	1.2 dB	
	Band E	1.2 dB	
Relative Pulse Response	Band A	0.82 dB	CISPR pulse generator
	Band B	0.83 dB	
	Band C	0.83 dB	
	Band D	0.84 dB	
Sine-wave Accuracy	Band A	0.76 dB	Signal generators with power meter & sensor
	Band B	0.78 dB	
	Band C	0.77 dB	
	Band D	0.80 dB	
	Band E	0.89 dB	
Selectivity (6dB Bandwidth)	Band A	0.66 dB	Signal generator
	Band B	0.61 dB	
	Band C	0.60 dB	
	Band D	0.60 dB	
	Band E	0.60 dB	

Parameter/Equipment	Range	CMC ² (±)	Comments ⁴
EMI Receiver ³ (cont.)			
Peak Detector Verification	Band A Band B Band C Band D	0.59 dB 0.59 dB 0.60 dB 0.60 dB	CISPR pulse generator
Average Detector Verification	Band A Band B Band C Band D	0.61 dB 0.60 dB 0.62 dB 0.59 dB	CISPR pulse generator
CISPR Average Detector Verification	Band A Band B Band C Band D	1.3 dB 1.3 dB 1.3 dB 1.3 dB	Signal generator and function generator

Parameter/Equipment	Range	CMC ² (±)	Comments ⁴
Spectrum Analyzer ³			
Calibration Output Frequency		$2.1 \times 10^{-5} \%$	Frequency counter with GPS reference
Calibration Output Level		0.19 dB	Power meter/sensors
Frequency Readout Accuracy	10 Hz to 40 GHz	$1.2 \times 10^{-9} \%$	Signal generator with GPS reference
Level Accuracy		0.43 dB	Power meter & sensors Signal generator
Resolution Bandwidth		2.0 %	Signal generator
Input Attenuator Switching		1.7 dB	Signal generator
Scale Fidelity		1.8 dB	Signal generator
VSWR		1.4 dB	Network analyzer with calibration kit
Tracking Generator Absolute Output	9 kHz to 8.5 GHz	0.19 dB	Power meter & sensors
Tracking Generator Output Level Flatness	9 kHz to 18 GHz	0.19 dB	Power meter & sensors
(150 to 50) Ω Adapters ³			
Insertion Loss	150 kHz to 230 MHz	0.45 dB	Network analyzer
CDNs ⁴			
Coupling Factor	150 kHz to 230 MHz	0.36 dB	Network analyzer
Impedance	150 kHz to 230 MHz	4.6 %	Network analyzer with calibration kit

Parameter/Equipment	Range	CMC ² (±)	Comments ⁴
Directional Couplers ³			Network analyzer
Insertion loss	9 kHz to 8.5 GHz	0.24 dB	
Coupling Factor	9 kHz to 8.5 GHz	0.25 dB	
Isolation	9 kHz to 8.5 GHz	0.32 dB	
Bulk Current Injection Probe and Fixture ³			
Insertion Loss	9 kHz to 1 GHz (0.8 to 2.1) GHz	0.61 dB 0.53 dB	Network analyzer
VSWR	9 kHz to 1000 MHz (0.8 to 2.1) GHz	0.27 dB 0.38 dB	Network analyzer with Calibration kit
ESD Simulator –			IEC61000-4-2 ISO10605 RTCA/DO-160
Contact Discharge (±2, 3, 4, 6, 8, 15, 20, 25kV)	(0.15 A-50 % to 3.75 A+30 %) /kV	5.6 % of rdg. 6.4 % of rdg.	Oscilloscope
Current (I_p) Current (I_1) (I_2)			
Rise/Fall Time	(0.6 to 1) ns	53 ps	
Air Discharge			
Rise/Fall Time	(0.7 to 20) ns	53 ps	
RC Time Constant	(230 to 730) ns	7.2 ns	
Charging Voltage (+ and -)	(0 to 20) kV (20 to 40) kV	0.17 % 0.33 %	High voltage meter

Parameter/Equipment	Range	CMC ² (±)	Comments ⁴
EFT/Burst Generator ³ (50 and 1000) Ω			IEC61000-4-4
Peak Voltage (+ and -)	112.5 V to 4.4 kV	3.4 %	Oscilloscope
Rise/Fall Time	5 ns ±30 %	0.63 ns	
Impulse 50 %	50 ns ±30 % (50 Ω), 50 ns (-15 ns to +100) ns (1 kΩ)	5.5 ns	
Burst Duration	15 ms ±20 % (5 kHz) 0.75 ms ±20 % (100 kHz)	0.01 ms	
Burst Period	300 ms ±20 % (2.5,5,100) kHz ±20 %	0.01 ms	
Repetition Rate		0.04 %	
Surge Generator ³ –			IEC61000-4-5
Front time (+ and -) Open Circuit Short Circuit	1.2 and 10 μs ± 30 % 5 and 8 μs ± 20 %	0.08 μs 0.10 μs	Oscilloscope HV differential probe current probe
Rise time (+ and -) Open Circuit Short Circuit	1 and 6.5 μs ± 30 % 4 and 6.4 μs ± 20 %	0.07 μs 0.20 μs	
Time to Half Value Open Circuit Short Circuit	(16 to 840) μs	2.5 μs 1.3 μs	
Duration time Open Circuit Short Circuit	(12.8 to 840) μs	2.1 μs 0.42 μs	
Voltage (+ and -) Open Circuit	(0.45 to 4.4) kV	4.3 %	
Current (+ and -) Short Circuit	(0.225 to 2.2) kA	3.4%	
Over/Under Shoot	(0 to 30) %	2.5 %	
Phase Shift	(0 to 360)°	0.74°	

Parameter/Equipment	Range	CMC ² (±)	Comments ⁴
Magnetic Field Meter – Frequency Response 50 Hz, 60 Hz	1.26 μT	5.9 %	IEC 61786 Helm holt's Coil using Substitution Method
	3.78 μT	2.4 %	
	12.6 μT	0.68 %	
	37.8 μT	0.74 %	
	63 μT	0.50 %	

II. Time and Frequency

Parameter/Equipment	Frequency	CMC ² (±)	Comments ⁵
Frequency ³ – Measure	10 Hz to 10 MHz 10 MHz to 1GHz 1 GHz to 40 GHz	$2.2 \times 10^{-5} \%$ $2.8 \times 10^{-6} \%$ $4.9 \times 10^{-6} \%$	Frequency Counter with GPS Reference
Frequency ³ – Measuring Equipment	10 Hz to 40 GHz	$1.2 \times 10^{-9} \%$	Signal Generators with GPS Reference
Time Interval ³ – Measure Pulse Width Pulse Period Duty Cycle Rise/ Fall Time	10 ps/div to 20 s/div	$2.7 \times 10^{-4} \%$ 0.77 % 1.4 % 0.43 ps	Oscilloscope
Impulse Bandwidth ³	1 MHz	29 kHz	CISPR16-1-1 Function Generator

- ¹ This laboratory offers commercial calibration service and on-site calibration service.
- ² 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.
- ³ 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.
- ⁴ For standards or methods listed on the scope of accreditation without a revision date, laboratories are expected to be competent in the use of the current version within one year of the date of publication of the standard calibration method contained in referenced standards (e.g. CISPR 25). When a superseded standard or method is required for an accredited test, the scope will include the superseded date/version.



The American Association for Laboratory Accreditation

World Class Accreditation

Accredited Laboratory

A2LA has accredited

EMC KASHIMA CORPORATION

Chiba-ken, Japan

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 23rd day of March 2011.





Peter Meyer

President & CEO
For the Accreditation Council
Certificate Number 1266.02
Valid to January 31, 2013

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