



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017
& ANSI/NCSL Z540-1-1994

THE EMC SHOP
7401 Galilee Rd. Suite #160
Roseville, CA 95678
Bill Hedrick Phone: 303-210-0984

CALIBRATION

Valid To: January 31, 2024

Certificate Number: 5518.01

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, 3} (±)	Comments
ESD Simulators Contact Impulse Amps at 2 Ohms			
Peak Current	(7.5 to 112.5) A for (2kV to 30 kV), (30 & 60) ns	2.2 %	IEC/EN, EN61000-4-2 & ISO 10605, oscilloscope Rohde & Schwarz RTO 1024, ESD-TARGET & attenuators with cables
Rise Time	(600 to 1000) ps	3.2 %	
ESD Simulators Air Discharge	(2 to 30) kV	2.1 %	IEC/EN, EN61000-4-2 & ISO 10605 voltage divider ES105-100

Parameter/Equipment	Range	CMC ^{2,3} (±)	Comments
EFT Burst Generators –			IEC/EN 61000-4-4
Peak Voltage	(0.25 to 4) kV	4.0 %	Oscilloscope- Rohde & Schwarz RTO 1024, 50 Ω & 1000 Ω load terminations
Repetition Frequency	5 kHz 100 kHz	0.05 % 0.05 %	
Rise Time:	(3.5 to 6.5) ns 50 Ω 1000 Ω	6.8 % 8.4 %	
Burst Duration:			
5 kHz	(12 to 18) ms	3.8 %	
100 kHz	(0.6 to 0.9) ms	4.2 %	
Burst Period	(240 to 360) ms	3.5 %	
Residual Voltage	(0.25 to 4) kV	3.9 %	
Pulse Width	(35 to 65) ns	4.3 %	
Surge –Transient Open Circuit			IEC/EN 61000-4-5
Voltage	(0.5 to 4) kV	3.4 %	Oscilloscope- Rohde & Schwarz RTO 1024, PM4241 high voltage differential probe,
Front/Rise Time	(0.84 to 1.56) μs	4.2 %	
Time to Half Value/Duration	(40 to 60) μs	3.3 %	
Synchronization	(0 to 360)°	0.1°	
Surge – Transient Short Circuit			IEC/EN 61000-4-5
Current	(260 to 3000) A	2.6 %	Oscilloscope- Rohde & Schwarz RTO 1024, Pearson model 101 current probe,
Front/Rise Time	(6.4 to 9.6) μs	0.27 %	
Time to Half Value/Duration	(16 to 24) μs	0.04 %	

Parameter/Equipment	Range	CMC ^{2,3} (±)	Comments
Electrical Loads Road Vehicles, Potential Environmental Stress Voltages Front Time, Duration Time, Fall Time	(1 to 200) V 0.1 ms to 10 sec	2.9 % 2.5 %	ISO 16750-2 Rohde & Schwarz RTO 1024, PM 4241, HV probe, Keysight 34460A DMM
Automotive-Transient Pulse Simulators Road Vehicles – Electrical Disturbances Conduction & Coupling Voltage Front Time -Tr Duration Time -Td	(-600 to +600) V (0.5 to 1.0) µs (0 to 2000) µs	3.3 % 3.3 % 4.2 %	ISO 7637-2: oscilloscope- Rohde & Schwarz RTO 1024, PM 4241 HV probe, 50 Ω & 1000 Ω load terminations
Test Generators – RF Power Level	250 kHz to 1.0 GHz	0.3 dB	Network analyzer Rohde-Schwarz ZNB8-2 port, Keysight N5183A signal generator, RFCI-25, multi-function generator, IEC 61000-4-6
Test Generators – RF Power Amplifier Gain Linearity 10 kHz to 1.0 GHz	(0 to 50) dB	0.44 dB	Network analyzer Rohde-Schwarz ZNB8-2 port, RFCI-25, multi-function generator, IEC 61000-4-6
Current Injection Probes – Wide Band Narrow Band	9 kHz to 1.0 GHz (1 to 200) MHz	3.5 dB 0.79 dB	Network analyzer Rohde-Schwarz ZNB8-2 port, ISO 61000-4-6, ISO 11452-4

Parameter/Equipment	Range	CMC ^{2,3} (\pm)	Comments
LISNs – Insertion Loss dB Impedance Ω	(0.1 to 108) MHz	0.20 dB 1.4 Ω	Rohde-Schwarz Network analyzer type: ZNB8-2Port, CISPR 16-1-2, Mil Std. 461, ANSI C63, FCC part 15, CISPR 25, ISO 7637
CDNs (Coupling & De-Coupling Network) Impedance Ω Phase – Insertion Loss	0.1 MHz to 230 MHz (0.15 to 230) MHz 9 kHz to 400 MHz	2.9 Ω 1.6 ° 0.35 dB 4.3 dB	Network analyzer Rohde-Schwarz ZNB8-2 port, Keysight E4419B power meter, Keysight E9304A H18, IEC 61000-4-6
ESD Targets – Insertion Loss Transfer Impedance	9 kHz to 1 GHz (1 to 4) GHz	0.22 dB 0.30 Ω	Network analyzer Rohde-Schwarz ZNB8-2 port, Keysight 34460A DMM, ZV-Z21 calibration kit, IEC 61000-4-2

¹ This laboratory offers commercial calibration service and field calibration service.

² Calibration and Measurement Capability Uncertainty (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. CMC's 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 In the statement of CMC, percentages are percentages of reading.

⁴ This scope meets A2LA's *P112 Flexible Scope Policy*.



Accredited Laboratory

A2LA has accredited

THE EMC SHOP

Roseville, CA

for technical competence in the field of

Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets the requirements of ANSI/NCSL Z540-1-1994 and R205 – Specific Requirements: Calibration Laboratory Accreditation Program. 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 April 2017).



Presented this 18th day of January 2022.

A blue ink signature of a person, likely the Vice President of Accreditation Services, written over a horizontal line.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 5518.01
Valid to January 31, 2024

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