SCOPE OF ACCREDITATION TO ISO 17025:2005
& ANSI/NCSL Z540-1-1994

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CALIBRATION

Valid To: April 30, 2018 Certificate Number: 2160.04

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations[1]:

I. Electrical – RF/Microwave

Parameter/Equipment	Range	CMC[2] (±)	Comments
S Parameters[3] – Magnitude and Phase for S_{11}, S_{12}, S_{21}, S_{22}			Vector network analyzers, passive microwave components
Reflection S_{11}/S_{22} – Measure	10 MHz to 40 GHz (0.0001 to 1.0) lin (0.0001 to 0.01) lin (0.01 to 0.1) lin (0.1 to 1) lin	(0.0040 to 0.017) lin (90 to 18) deg (2.6 to 1.8) deg (0.65 to 0.95) deg	VNA: MS464XA, 37XXX and 360 with calibration/ verification kits 3663, 3653, 3666, 3650-1, 3667, 3651-1, 3668, 3652-1, 36585K, 36585V, 3657, 3669
Transmission S_{12}/S_{21} – Measure	10 MHz to 40 GHz (0 to 20) dB (20 to 40) dB (40 to 60) dB	(0.029 to 0.056) dB (0.20 to 0.38) deg (0.029 to 0.056) dB (0.20 to 0.37) deg (0.034 to 0.061) dB (0.23 to 0.41) deg	MS 462X with calibration/verification kits 3663R, 3753R, 3666R, 3750R, 3667R, 3751R

Parameter/Range	Frequency	CMC[2] (±)	Comments
Absolute Power Level[3] –			
(20 to -100) dBm 10 MHz to 40 GHz			
0 dBm	(10 to 50) MHz (50 to 150) MHz (0.15 to 2) GHz (2 to 12) GHz (12 to 18) GHz (18 to 32) GHz (32 to 40) GHz	(0.090 to 0.080) dB + *M* 0.080 dB + *M* 0.080 dB + *M* 0.080 dB + *M* (0.080 to 0.090) dB + *M* (0.090 to 0.11) dB + *M* (0.11 to 0.12) dB + *M*	Direct power measurement (for Type N and Type K connector), MA 247XA/B with ML 2437/8A and MS2691A
(20 to -60) dBm (Except 0 dBm)	(10 to 50) MHz (50 to 150) MHz (0.15 to 2) GHz (2 to 12) GHz (12 to 18) GHz (18 to 32) GHz (32 to 40) GHz	(0.13 to 0.12) dB + *M* 0.12 dB + *M* 0.12 dB + *M* 0.12 dB + *M* (0.12 to 0.13) dB + *M* (0.13 to 0.17) dB + *M* 0.17 dB + *M*	*M* = mismatch
(-60 to -85) dBm	(10 to 50) MHz (50 to 150) MHz (0.15 to 2) GHz (2 to 12) GHz (12 to 18) GHz (18 to 32) GHz (32 to 40) GHz	0.13 dB + *M* 0.13 dB + *M* 0.13 dB + *M* 0.13 dB + *M* (0.13 to 0.14) dB + *M* (0.14 to 0.17) dB + *M* (0.17 to 0.18) dB + *M*	
(-85 to -95) dBm	(10 to 50) MHz (50 to 150) MHz (0.15 to 2) GHz (2 to 12) GHz (12 to 18) GHz (18 to 32) GHz (32 to 40) GHz	0.17 dB + *M* 0.17 dB + *M* (0.17 to 0.16) dB + *M* (0.16 to 0.17) dB + *M* 0.17 dB + *M* (0.17 to 0.20) dB + *M* (0.20 to 0.21) dB + *M*	
(-95 to -100) dBm	(10 to 50) MHz (50 to 150) MHz (0.15 to 2) GHz (2 to 12) GHz (12 to 18) GHz (18 to 32) GHz (32 to 40) GHz	0.85 dB + *M* 0.85 dB + *M* 0.85 dB + *M* 0.85 dB + *M* (0.85 to 0.86) dB + *M* 0.86 dB + *M* (0.86 to 0.87) dB + *M*	
(-100 to -120) dBm	(10 to 50) MHz 50 MHz to 2 GHz (2 to 12) GHz (12 to 13.5) GHz	0.30 dB + *M* 0.29 dB + *M* 0.32 dB + *M* 0.36 dB + *M*	MS2691A

Parameter/Range	Frequency	CMC[2] (±)	Comments
Absolute Received[3]			
(20 to -60) dBm	(10 to 50) MHz	0.22 dB + *M*	Power splitter method
	(50 to 100) MHz	0.13 dB + *M*	
	100 Hz to 1.5 GHz	0.12 dB + *M*	*M* = mismatch
	(1.5 to 3.1) GHz	0.13 dB + *M*	
	(3.1 to 4) GHz	0.14 dB + *M*	
	(4 to 6) GHz	0.13 dB + *M*	
	(6 to 6.5) GHz	0.15 dB + *M*	
	(6.5 to 7.5) GHz	0.14 dB + *M*	
	(7.5 to 12) GHz	0.15 dB + *M*	
	(12 to 13) GHz	0.18 dB + *M*	
	(13 to 15.2) GHz	0.17 dB + *M*	
	(15.2 to 16) GHz	0.19 dB + *M*	
	(16 to 18) GHz	0.17 dB + *M*	
	(18 to 24) GHz	0.21 dB + *M*	
	(24 to 25) GHz	0.24 dB + *M*	
	(25 to 26) GHz	0.23 dB + *M*	
	(26 to 28) GHz	0.24 dB + *M*	
	(28 to 29) GHz	0.23 dB + *M*	
	(29 to 32) GHz	0.25 dB + *M*	
	(32 to 33) GHz	0.28 dB + *M*	
	(33 to 37) GHz	0.27 dB + *M*	
	(37 to 40) GHz	0.28 dB + *M*	
	(10 to 50) MHz	0.61 dB + *M*	Without power splitter
	(50 to 100) MHz	0.20 dB + *M*	
	100 MHz to 1.5 GHz	0.15 dB + *M*	
	(1.5 to 3.1) GHz	0.18 dB + *M*	*M* = mismatch
	(3.1 to 8) GHz	0.19 dB + *M*	
	(8 to 9) GHz	0.20 dB + *M*	
	(9 to 12) GHz	0.19 dB + *M*	
	(12 to 15.2) GHz	0.23 dB + *M*	
	(15.2 to 16) GHz	0.24 dB + *M*	
	(16 to 18) GHz	0.23 dB + *M*	
	(18 to 19) GHz	0.28 dB + *M*	
	(19 to 22) GHz	0.27 dB + *M*	
	(22 to 28) GHz	0.28 dB + *M*	
	(28 to 29) GHz	0.27 dB + *M*	
	(29 to 32) GHz	0.28 dB + *M*	
	(32 to 33) GHz	0.32 dB + *M*	
	(33 to 34) GHz	0.31 dB + *M*	
	(34 to 35) GHz	0.32 dB + *M*	
	(35 to 37) GHz	0.31 dB + *M*	
	(37 to 38) GHz	0.32 dB + *M*	
	(38 to 39) GHz	0.33 dB + *M*	
	(39 to 40) GHz	0.32 dB + *M*	

Parameter/Range	Frequency	CMC[2] (±)	Comments
Relative Power Level[3] – (0 to -127) dBm	50 Hz to 3 GHz	0.15 dB + *M*	MS2691A *M* = mismatch

II. Time and Frequency

Parameter/Equipment	Range	CMC[2] (±)	Comments
Frequency – GPS Disciplined Oscillator, Fixed Points			
Measuring Equipment	10 MHz	5.0 parts in 10^{12}	Aging rate; ET6000-RB1
Measure[3]	10 MHz 40 GHz	1.2 Hz 3.4 Hz	MS2414A, option 3

[1] This laboratory offers commercial and field calibration services.

[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. CMCs 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.

Accredited Laboratory

A2LA has accredited

ANRITSU COMPANY CANADIAN CALIBRATION SERVICE CENTER

Kanata, Ontario, CANADA

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/NCSLI 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 12th day of July 2016.

Senior Director of Quality and Communications
For the Accreditation Council
Certificate Number 2160.04
Valid to April 30, 2018

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