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

ANRITSU COMPANY CALIBRATION SERVICES
TX FACILITY
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CALIBRATION

Valid To: April 30, 2018 Certificate Number: 2160.02

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/Range	Frequency	CMC[2] (±)	Comments
Power Level[3] – Measure			
Relative			
(0 to -127) dBm	50 Hz to 3 GHz	0.15 dB + *M*	ML2530A, MS2691A *M* = mismatch
Absolute & Relative[4] (20 to -120) dBm:			
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 0.11) dB + *M* (0.080 to 0.11) dB + *M* (0.10 to 0.12) dB + *M*	Direct power measurement (for Type N & Type K connector), MA 247XA/B with ML 2437/8A & ML 2530A; MS269X *M* = mismatch
(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 to 0.13) dB + *M* (0.12 to 0.14) dB + *M* (0.13 to 0.17) dB + *M* (0.16 to 0.18) dB + *M*	

Parameter/Range	Frequency	CMC[2] (±)	Comments
Power Level[3] – Measure (cont)			
Absolute & Relative[4] (20 to -120) dBm:			
(-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*	Direct power measurement (for Type N & Type K connector), MA 247XA/B with ML 2437/8A & ML 2530A; MS269X *M* = mismatch
(-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*	MS269XA
Absolute Received Power – Generate			
(20 to -60) dBm	(10 to 50) MHz (50 to 100) MHz 100 MHz to 1.5 GHz (1.5 to 3.1) GHz (3.1 to 4) GHz (4 to 6) GHz (6 to 6.5) GHz (6.5 to 7.5) GHz (7.5 to 12) GHz	0.22 dB + *M* 0.13 dB + *M* 0.12 dB + *M* 0.13 dB + *M* 0.14 dB + *M* 0.13 dB + *M* 0.15 dB + *M* 0.14 dB + *M* 0.15 dB + *M*	Power splitter method *M* = mismatch

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

Parameter/Range	Frequency	CMC[2] (±)	Comments
Audio Level – 20 Hz to 100 kHz	3 mV to 500 V_{p-p}	5.7 % of reading	Peak to peak voltmeter Rohde Schwartz URE3 & Scope Tektronix TDS3052B

Parameter/Equipment	Range	CMC[2] (±)	Comments
BER/FER – Single Slot BER	(0 to 100) %	0.12 % of reading	Blue Tooth test set MT885X
Single Slot FER	(0 to 100) %	12 % of reading	100 frames/CDMA

Parameter/Equipment	Frequency	CMC[2] (±)	Comments
Error Vector Magnitude (EVM): LTE & WCDMA Format – Measure Modulation Bandwidth: (0 to 40) MHz	50 Hz to 6 GHz	0.30 % rms of reading	MS2691A

II. Time & Frequency

Parameter/Equipment	Frequency	CMC[2] (±)	Comments
Frequency – Measuring Equipment	10 MHz	5 parts in 10^{12} Hz/Hz	GPS disciplined oscillator aging rate
Frequency[3] – Measure	10 MHz to 40 GHz	$5 \times 10^{-12} f$	Counter MF241X f = frequency

[1] This laboratory offers commercial calibration service and field calibration service (where noted).

[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.

[4] Enlisted values represent absolute power level uncertainty; relative power level uncertainty does not include 1 mW reference and associated mismatch uncertainty of the enlisted values.

Accredited Laboratory

A2LA has accredited

ANRITSU COMPANY CALIBRATION SERVICE

Richardson, TX

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 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 8 January 2009*).

Presented this 22nd day of July 2016.

President and CEO
For the Accreditation Council
Certificate Number 2160.02
Valid to April 30, 2018
Revised on April 7, 2017

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