THE AMERICAN
ASSOCIATION
FOR LABORATORY
ACCREDITATION

ACCREDITED LABORATORY

A2LA has accredited

ANRITSU COMPANY MORGAN HILL CALIBRATION SERVICES

Morgan Hill, CA

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 also demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 18 June 2005*).

Presented this 5th day of April 2006

President
For the Accreditation Council
Certificate Number 2160.01
Valid to April 30, 2008

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

American Association for Laboratory Accreditation

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

ANRITSU COMPANY MORGAN HILL CALIBRATION SERVICES
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CALIBRATION

Valid To: April 30, 2008 Certificate Number: 2160.01

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	Best Uncertainty[2] (±)	Comments
S Parameters – Magnitude and Phase for S11, S12, S21, S22[3]			37XXX and 360 with 3663/3653, 3666/3650-1, 3667/3651-1, 3668/3652-1
Airline:	10 MHz to 40 GHz		
S11/S22		*M*/0.025 (lin); *P*/20	
S12/S21		*M*/0.18 dB; *P*/20	MS 462X with 3663R/3753R, 3666R/3750R 3667R/3751R
Beatty Airline:			
S11/S22		*M*/0.08 (lin); *P*/20	
S12/S21		*M*/0.18 dB; *P*/20	*M* represents magnitude *P* represents phase
20 dB Attenuation:			
S11/S22		*M*/0.025 (lin); *P*/20	
S12/S21		*M*/0.18 dB; *P*/20	
40/50 dB Attenuation:			
S11/S22		*M*/0.025 (lin); *P*/20	
S12/S21		*M*/0.23 dB; *P*/20	
S12/S21	10 MHz	*M*/0.55 dB	

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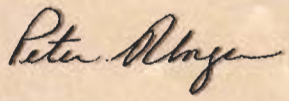
Parameter/Equipment	Range	Best Uncertainty[2] (±)	Comments
50 Ohm Airline Characteristic Impedance	(2 to 18) GHz (18 to 40) GHz	0.1 % 0.2 %	18A50, 18N50, 18NF50, 19K50, 19KF50
VSWR	40 MHz to 40 GHz	2.5 dB	54169A, 18X50, 19X50, SM/PL, 26X50-X, 28X50-X, 29X50-X, 97X50-X, 560-97X50-X, 560-98X50
Power Sensors –	100 kHz to 40 GHz Calibration Factor:		
Type N Connector	At 50 MHz At 100 kHz to 18 GHz	0.56 % 0.92 %	MA2400X 100 kHz to 18 GHz
Type K Connector	At 50 MHz At 100 kHz to 40 GHz	1.4 % 3.6 %	MA2400X 100 kHz to 40 GHz
Power Level – Type N and K-Type Connector (20 to -110) dBm 30 MHz to 40 GHz			Direct power measurement (for type N and K-type connector), MA 247XA/B with ML 2437/8A
0 dBm	30 MHz (50 to 150) MHz (0.15 to 2) GHz (2 to 12) GHz (13 to 18) GHz (19 to 32) GHz (33 to 40) GHz	0.87 dB 0.22 dB 0.17 dB 0.27 dB 0.3 dB 0.4 dB 0.54 dB	
(20 to -60) dBm (except 0 dBm)	30 MHz (50 to 150) MHz (0.15 to 2) GHz (2 to 12) GHz (13 to 18) GHz (19 to 32) GHz (33 to 40) GHz	0.88 dB 0.24 dB 0.19 dB 0.28 dB 0.32 dB 0.42 dB 0.56 dB	

Peter Alonzo

Parameter/Equipment	Range	Best Uncertainty[2] (±)	Comments
Power Level – Type N and K-Type Connector 20 dBm to -110 dBm (30 MHz to 40 GHz)			Direct power measurement, MA 247XA/B with ML 2437/8A
(-60 to -85) dBm	30 MHz (50 to 150) MHz (0.15 to 2) GHz (2 to 12) GHz (13 to 18) GHz (19 to 32) GHz (33 to 40) GHz	0.92 dB 0.34 dB 0.3 dB 0.37 dB 0.4 dB 0.49 dB 0.62 dB	
(-85 to -95) dBm	30 MHz (50 to 150) MHz (0.15 to 2) GHz (2 to 12) GHz (13 to 18) GHz (19 to 32) GHz (33 to 40) GHz	0.93 dB 0.35 dB 0.32 dB 0.39 dB 0.41 dB 0.5 dB 0.63 dB	
(-95 to -100) dBm	30 MHz (50 to 150) MHz (0.15 to 2) GHz (2 to 12) GHz (13 to 18) GHz (19 to 32) GHz (33 to 40) GHz	1.3 dB 0.92 dB 0.91 dB 0.94 dB 0.95 dB 1 dB 1.1 dB	
Frequency – GPS Disciplined Oscillator	10 MHz	1 part in 10^{12}	Aging rate
Frequency Modulation – Measure			8902 Measuring receiver
Rate: 20 Hz to 10 kHz, ≤40 kHz peak	(0.25 to 10) MHz	2.3 % + 1 digit	40 to 400: 1 digit = 100 Hz
Rate: 50 Hz to 100 kHz, ≤400 kHz peak		1.2 % + 1 digit	4 to 39.99: 1 digit = 10 Hz

Parameter/Equipment	Range	Best Uncertainty[2] (±)	Comments
Frequency Modulation – Measure (cont)			8902 Measuring receiver
Rate: 20 Hz to 200 kHz, ≤400 kHz peak	(10 to 1300) MHz	5.8 % + 1 digit	0 to 3.999: 1 digit = 1 Hz
Amplitude Modulation – Measure			8902 measuring receiver:
Rate: 50 Hz to 10 kHz, 5% to 99%	(0.15 to 10) MHz	2.3 % + 1 digit	10 % to 99.9 %: 1 digit =0.1 %
Rate: 20 Hz to 10 kHz, to 99%		3.5 % + 1 digit	0 % to 9.99 %: 1 digit = 0.01%
Rate: 50 Hz to 50 kHz, 5% to 99%	(10 to 1300) MHz	1.2 % + 1 digit	
Rate: 20 Hz to 100 kHz, to 99%		3.5 % + 1 digit	
Attenuation –			VNA
Coaxial Type K (2.92 mm)	(0 to 40) dB; (0.05 to 2.0 GHz)	0.18 dB	
	(0 to 40) dB; (2.0 to 20.0 GHz)	0.18 dB	
	(0 to 40) dB; (20.0 to 40.0 GHz)	0.18 dB	
	(40 to 60) dB; (0.05 to 2.0 GHz)	0.18 dB	
	(40 to 60) dB; (2.0 to 20.0 GHz)	0.18 dB	
	(40 to 60) dB; (20.0 to 40.0 GHz)	0.18 dB	



Parameter/Equipment	Range	Best Uncertainty[2] (±)	Comments
Attenuation – (cont)			Measuring receiver
Coaxial Type-N			Note: mismatch
(10 to 1300) MHz	0 dB	0.026 dB	uncertainty not included
	10 dB	0.026 dB	
	20 dB	0.034 dB	
	30 dB	0.045 dB	
	40 dB	0.055 dB	
	50 dB	0.065 dB	
	60 dB	0.074 dB	
	70 dB	0.088 dB	
	80 dB	0.096 dB	
	90 dB	0.098 dB	
	100 dB	0.110 dB	
	110 dB	0.150 dB	
(1300 to 2000) MHz	0 dB	0.035 dB	
	10 dB	0.035 dB	
	20 dB	0.053 dB	
	30 dB	0.074 dB	
	40 dB	0.096 dB	
	50 dB	0.130 dB	
	60 dB	0.150 dB	
	70 dB	0.170 dB	
	80 dB	0.190 dB	
	90 dB	0.230 dB	
	100 dB	0.250 dB	
	110 dB	0.270 dB	

[1] This laboratory offers commercial and on-site calibration services.

[2] "Best Uncertainty" 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 of nearly ideal measuring equipment. Best uncertainties represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of $k = 2$. The best uncertainty of a specific calibration performed by the laboratory may be greater than the best uncertainty due to the behavior of the customer's device and to influences from the circumstances of the specific calibration.

[3] On-site calibration service is available for this calibration. The uncertainties achievable on a customer's site can normally be expected to be larger than the Best Measurement Capabilities (BMC) that the accredited laboratory has been assigned as Best Uncertainty 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 uncertainty introduced by the item being calibrated, (e.g. resolution) must also be considered and this, on its own, could result in the calibration uncertainty being larger than the BMC.