



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

NI GLOBAL CALIBRATION SERVICES  
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CALIBRATION

Valid To: *SEE FOOTNOTE 9*

Certificate Number: 3237.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations at the locations listed under the 'Location' column listed below<sup>1,8</sup>:

I. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC <sup>2,5</sup> (±)	Comments	Location <sup>9</sup>
DC Voltage <sup>3</sup> – Generate	0 V (0 to 0.22) V (0.22 to 2.2) V (2.2 to 11.0) V (11 to 22) V (22 to 220) V (220 to 1100) V	0.2 µV 6.0 µV/V + 0.42 µV 3.5 µV/V + 0.70 µV 2.5 µV/V + 2.5 µV 2.5 µV/V + 5.0 µV 3.5 µV/V + 40 µV 4.5 µV/V + 0.40 mV	Two wire short Reference calibrator	TX, MY, HU, CH, IN
DC Voltage <sup>3</sup> – Measure	0 V (0 to 0.1) V (0.1 to 1.0) V (1 to 10) V (10 to 100) V (100 to 1000) V	0.32 µV 6.8 µV/V + 0.25 µV 6.7 µV/V + 0.21 µV 6.7 µV/V + 0.33 µV 8.0 µV/V + 20 µV 8.0 µV/V + 64 µV	Reference multimeter	TX, MY, HU, CH, IN

Parameter/Equipment	Range	CMC <sup>2,5</sup> ( $\pm$ )	Comments	Location <sup>9</sup>
DC Current <sup>3,6</sup> – Generate	(0 to 220) $\mu$ A (0.22 to 2.2) mA (2.2 to 22) mA (22 to 220) mA (0.22 to 2.2) A (2.2 to 3.0) A (3.0 to 10.0) A	36 $\mu$ A/A + 6.0 nA 31 $\mu$ A/A + 7.0 nA 31 $\mu$ A/A + 34 nA 41 $\mu$ A/A + 0.71 $\mu$ A 60 $\mu$ A/A + 12 $\mu$ A 0.30 mA/A + 33 $\mu$ A 0.39 mA/A + 0.39 mA	Reference calibrator	TX, MY, HU, CH, IN
	(0 to 0.1) $\mu$ A (0.1 to 10.0) $\mu$ A (0.01 to 1.0) mA (1.0 to 22) mA (0.022 to 1.0) A (1.0 to 3.0) A (3.0 to 10.0) A	27 $\mu$ A/A + 0.9 pA 12 $\mu$ A/A + 3.0 pA 0.13 mA/A + 0.17 nA 0.13 mA/A + 0.20 nA 58 $\mu$ A/A + 42 nA 0.12 mA/A + 0.51 $\mu$ A 0.12 mA/A + 0.12 $\mu$ A	Current shunts. reference digital multimeter	TX, MY, HU, CH
	0.1 to 10.0) $\mu$ A (0.01 to 1.0) mA (1.0 to 22) mA (0.022 to 1.0) A (1.0 to 3.0) A (3.0 to 10.0) A	12 $\mu$ A/A + 3.0 pA 0.13 mA/A + 0.17 nA 0.13 mA/A + 0.20 nA 58 $\mu$ A/A + 42 nA 0.12 mA/A + 0.51 $\mu$ A 0.12 mA/A + 0.12 $\mu$ A	Current shunts. reference digital multimeter	IN
DC Current <sup>3</sup> – Measure	0 A	0.58 pA	Open; reference digital multimeter	TX, MY, HU, CH, IN
	(0 to 100) nA (0.1 to 1.0) $\mu$ A (1.0 to 10.0) $\mu$ A (10.0 to 100.0) $\mu$ A (0.1 to 1.0) mA (1.0 to 10.0) mA (10.0 to 100.0) mA (0.1 to 1.0) A (1.0 to 2.0) A (2.0 to 3.0) A	23 $\mu$ A/A + 28 pA 17 $\mu$ A/A + 28 pA 17 $\mu$ A/A + 68 pA 17 $\mu$ A/A + 0.55 nA 17 $\mu$ A/A + 3.3 nA 17 $\mu$ A/A + 35 nA 27 $\mu$ A/A + 0.34 $\mu$ A 77 $\mu$ A/A + 6.8 $\mu$ A 0.45 mA/A + 0.10 mA 0.80 mA/A + 0.11 mA	Reference digital multimeter	TX, MY, HU, CH, IN
	(0 to 0.1) $\mu$ A (0.1 to 10.0) $\mu$ A (0.01 to 1.0) mA (1.0 to 22.0) mA (0.022 to 1.0) A (1.0 to 3.0) A (3.0 to 10) A (10 to 20) A (20 to 50) A (50 to 150) A	43 $\mu$ A/A + 0.06 pA 18 $\mu$ A/A + 2.4 pA 59 $\mu$ A/A + 0.77 nA 59 $\mu$ A/A + 0.43 nA 68 $\mu$ A/A + 34 nA 0.12 mA/A + 2.3 $\mu$ A 0.12 mA/A + 13 $\mu$ A 0.12 mA/A + 49 $\mu$ A 0.12 mA/A + 22 $\mu$ A 0.24 mA/A + 4.2 $\mu$ A	Current shunts Reference digital multimeter	TX, MY, HU, CH

Parameter/Equipment	Range	CMC <sup>2, 5</sup> ( $\pm$ )	Comments	Location <sup>9</sup>
DC Current <sup>3</sup> – Measure (cont.)	(0.1 to 10.0) $\mu$ A (0.01 to 1.0) mA (1.0 to 22.0) mA (0.022 to 1.0) A (1.0 to 3.0) A (3.0 to 10) A (10 to 20) A (20 to 50) A	18 $\mu$ A/A + 2.4 pA 59 $\mu$ A/A + 0.77 nA 59 $\mu$ A/A + 0.43 nA 68 $\mu$ A/A + 34 nA 0.12 mA/A + 2.3 $\mu$ A 0.12 mA/A + 13 $\mu$ A 0.12 mA/A + 49 $\mu$ A 0.12 mA/A + 22 $\mu$ A	Current shunts Reference digital multimeter	IN
Resistance <sup>3</sup> – Generate, Fixed Points	0 $\Omega$ 0 $\Omega$ 1 $\Omega$ 1.9 $\Omega$ 10 $\Omega$ 19 $\Omega$ 100 $\Omega$ 190 $\Omega$ 1 k $\Omega$ 1.9 k $\Omega$ 10 k $\Omega$ 19 k $\Omega$ 100 k $\Omega$ 190 k $\Omega$ 1 M $\Omega$ 1.9 M $\Omega$ 10 M $\Omega$ 19 M $\Omega$ 100 M $\Omega$	5.8 $\mu\Omega$ 41 $\mu\Omega$ 81 $\mu\Omega/\Omega$ 80 $\mu\Omega/\Omega$ 21 $\mu\Omega/\Omega$ 22 $\mu\Omega/\Omega$ 9.1 $\mu\Omega/\Omega$ 9.0 $\mu\Omega/\Omega$ 7.5 $\mu\Omega/\Omega$ 7.6 $\mu\Omega/\Omega$ 7.6 $\mu\Omega/\Omega$ 7.6 $\mu\Omega/\Omega$ 9.1 $\mu\Omega/\Omega$ 9.1 $\mu\Omega/\Omega$ 15 $\mu\Omega/\Omega$ 16 $\mu\Omega/\Omega$ 31 $\mu\Omega/\Omega$ 39 $\mu\Omega/\Omega$ 95 $\mu\Omega/\Omega$	Four wire short Reference calibrator	TX, MY, HU, CH, IN
Resistance <sup>3</sup> – Measure	(0 to 10) $\Omega$ (10 to 100) $\Omega$ (0.1 to 1) k $\Omega$ (1 to 10) k $\Omega$ (10 to 100) k $\Omega$ (0.1 to 1) M $\Omega$ (1 to 10) M $\Omega$ (10 to 100) M $\Omega$ (0.1 to 1) G $\Omega$	11 $\mu\Omega/\Omega$ + 42 $\mu\Omega$ 10 $\mu\Omega/\Omega$ + 0.36 m $\Omega$ 8.8 $\mu\Omega/\Omega$ + 0.36 m $\Omega$ 8.7 $\mu\Omega/\Omega$ + 3.6 m $\Omega$ 8.7 $\mu\Omega/\Omega$ + 35 m $\Omega$ 12 $\mu\Omega/\Omega$ + 1.4 $\Omega$ 35 $\mu\Omega/\Omega$ + 67 $\Omega$ 0.34 m $\Omega/\Omega$ + 0.79 k $\Omega$ 3.3 m $\Omega/\Omega$ + 21 k $\Omega$	Reference multimeter	TX, MY, HU, CH, IN

Parameter/Equipment	Range	CMC <sup>2, 5</sup> ( $\pm$ )	Comments	Location <sup>9</sup>
Resistance <sup>3</sup> – Generate	(0 to 10.9999) $\Omega$ (11 to 32.9999) $\Omega$ (33 to 109.9999) $\Omega$ (110 to 329.9999) $\Omega$ (0.33 to 1.0999) k $\Omega$ (1.1 to 3.2999) k $\Omega$ (3.3 to 10.9999) k $\Omega$ (11 to 32.9999) k $\Omega$ (33 to 109.9999) k $\Omega$ (110 to 329.9999) k $\Omega$ (0.33 to 1.0999) M $\Omega$ (1.1 to 3.299 99) M $\Omega$ (3.3 to 10.9999) M $\Omega$ (11 to 32.9999) M $\Omega$ (33 to 109.9999) M $\Omega$ (110 to 329.999) M $\Omega$ (0.33 to 1) G $\Omega$	31 $\mu\Omega/\Omega$ + 0.78 m $\Omega$ 24 $\mu\Omega/\Omega$ + 1.2 m $\Omega$ 22 $\mu\Omega/\Omega$ + 1.1 m $\Omega$ 22 $\mu\Omega/\Omega$ + 1.6 m $\Omega$ 22 $\mu\Omega/\Omega$ + 1.5 m $\Omega$ 23 $\mu\Omega/\Omega$ + 15 m $\Omega$ 23 $\mu\Omega/\Omega$ + 15 m $\Omega$ 22 $\mu\Omega/\Omega$ + 0.15 $\Omega$ 22 $\mu\Omega/\Omega$ + 0.15 $\Omega$ 26 $\mu\Omega/\Omega$ + 5.4 $\Omega$ 26 $\mu\Omega/\Omega$ + 5.4 $\Omega$ 47 $\mu\Omega/\Omega$ + 39 $\Omega$ 0.10 m $\Omega/\Omega$ + 54 $\Omega$ 0.19 m $\Omega/\Omega$ + 2.1 k $\Omega$ 0.39 m $\Omega/\Omega$ + 2.5 k $\Omega$ 2.3 m $\Omega/\Omega$ + 78 k $\Omega$ 12 m $\Omega/\Omega$ + 0.39 M $\Omega$	Reference calibrator	TX, MY, HU, CH, IN
Inductance <sup>3</sup> – Generate  Fixed Point	  0 H	  7.1 nH	  Two wire short	  TX, MY, HU, CH, IN

Parameter/Range	Frequency	CMC <sup>2, 5</sup> ( $\pm$ )	Comments	Location <sup>9</sup>
AC Voltage <sup>3, 6</sup> – Generate				
(1 to 2.2) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.02 % + 4.0 $\mu$ V 85 $\mu$ V/V + 4.0 $\mu$ V 75 $\mu$ V/V + 4.0 $\mu$ V 0.02 % + 4.0 $\mu$ V 0.05 % + 5.0 $\mu$ V 0.09 % + 10 $\mu$ V 0.12 % + 20 $\mu$ V 0.25 % + 20 $\mu$ V	Reference calibrator	TX, MY, HU, CH, IN
(2.2 to 22) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.02 % + 4.0 $\mu$ V 85 $\mu$ V/V + 4.0 $\mu$ V 75 $\mu$ V/V + 4.0 $\mu$ V 0.02 % + 4.0 $\mu$ V 0.05 % + 5.0 $\mu$ V 0.09 % + 10 $\mu$ V 0.12 % + 20 $\mu$ V 0.25 % + 20 $\mu$ V		
(22 to 220) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.02 % + 12 $\mu$ V 85 $\mu$ V/V + 7.0 $\mu$ V 75 $\mu$ V/V + 7.0 $\mu$ V 0.02 % + 7.0 $\mu$ V 0.04 % + 17 $\mu$ V 0.08 % + 20 $\mu$ V 0.12 % + 25 $\mu$ V 0.25 % + 45 $\mu$ V		
(0.22 to 2.2) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.02 % + 40 $\mu$ V 80 $\mu$ V/V + 15 $\mu$ V 40 $\mu$ V/V + 8.0 $\mu$ V 70 $\mu$ V/V + 10 $\mu$ V 0.01 % + 30 $\mu$ V 0.03 % + 80 $\mu$ V 0.09 % + 0.2 mV 0.15 % + 0.3 mV		

Parameter/Range	Frequency	CMC <sup>2, 5</sup> ( $\pm$ )	Comments	Location <sup>9</sup>
AC Voltage <sup>3, 6</sup> – Generate (cont)				
(2.2 to 22) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.02 % + 0.4 mV 80 $\mu$ V/V + 0.15 mV 40 $\mu$ V/V + 50 $\mu$ V 70 $\mu$ V/V + 0.1 mV 95 $\mu$ V/V + 0.2 mV 0.03 % + 0.6 mV 0.09 % + 2.0 mV 0.13 % + 3.2 mV	Reference calibrator	TX, MY, HU, CH, IN
(22 to 220) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.02 % + 4 mV 80 $\mu$ V/V + 1.5 mV 47 $\mu$ V/V + 0.6 mV 75 $\mu$ V/V + 1.0 mV 0.01 % + 2.5 mV 0.08 % + 16 mV 0.42 % + 40 mV 0.70 % + 80 mV		
(220 to 750) V	(15 to 40) Hz (40 to 50) Hz 50 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.03 % + 16 mV 90 $\mu$ V/V + 4.0 mV 60 $\mu$ V/V + 3.5 mV 0.02 % + 6.0 mV 0.06 % + 11 mV 0.23 % + 45 mV		TX, MY, HU
(750 to 1100) V	(40 to 50) Hz 50 Hz to 1 kHz (1 to 20) kHz (20 to 30) kHz	90 $\mu$ V/V + 4.0 mV 60 $\mu$ V/V + 3.5 mV 0.02 % + 6.0 mV 0.06 % + 11 mV		TX, MY, HU
(220 to 750) V	(15 to 40) Hz 50 Hz to 1 kHz	0.03 % + 16 mV 60 $\mu$ V/V + 3.5 mV		CH, IN
(750 to 1100) V	50 Hz to 1 kHz	60 $\mu$ V/V + 3.5 mV		CH, IN
AC Voltage <sup>3, 6</sup> – Measure				
(1 to 10) mV	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	0.02 % + 2.0 $\mu$ V 0.01 % + 0.73 $\mu$ V 0.02 % + 0.73 $\mu$ V 0.07 % + 0.73 $\mu$ V 0.33 % + 0.73 $\mu$ V 2.7 % + 1.3 $\mu$ V	Reference multimeter	TX, MY, HU, CH, IN

Parameter/Range	Frequency	CMC <sup>2, 5</sup> ( $\pm$ )	Comments	Location <sup>9</sup>
AC Voltage <sup>3, 6</sup> – Measure (cont)				
(10 to 100) mV	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 2) MHz	48 $\mu$ V/V + 2.7 $\mu$ V 48 $\mu$ V/V + 1.3 $\mu$ V 95 $\mu$ V/V + 1.3 $\mu$ V 0.020 % + 1.3 $\mu$ V 0.053 % + 1.3 $\mu$ V 0.20 % + 6.7 $\mu$ V 0.67 % + 6.7 $\mu$ V 1.0 % + 6.7 $\mu$ V	Reference multimeter	TX, MY, HU, CH, IN
(0.1 to 1) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz	48 $\mu$ V/V + 27 $\mu$ V 48 $\mu$ V/V + 13 $\mu$ V 95 $\mu$ V/V + 13 $\mu$ V 0.02 % + 13 $\mu$ V		
(0.1 to 1) V	(50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 2) MHz	0.05 % + 13 $\mu$ V 0.20 % + 67 $\mu$ V 0.67 % + 67 $\mu$ V 1.0 % + 67 $\mu$ V		
(1 to 10) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 2) MHz	48 $\mu$ V/V + 0.27 mV 48 $\mu$ V/V + 0.13 mV 95 $\mu$ V/V + 0.13 mV 0.020 % + 0.13 mV 0.053 % + 0.13 mV 0.20 % + 0.67 mV 0.67 % + 0.67 mV 1.0 % + 0.67 mV		
(10 to 100) V	(1 to 40) Hz 40 Hz to 20 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	0.01 % + 2.7 mV 0.01 % + 1.3 mV 0.01 % + 1.3 mV 0.02 % + 1.3 mV 0.08 % + 1.3 mV 0.27 % + 6.7 mV 1.0 % + 6.7 mV		
(100 to 700) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.03 % + 27 mV 0.03 % + 13 mV 0.04 % + 13 mV 0.08 % + 13 mV 0.20 % + 13 mV		

Parameter/Range	Frequency	CMC <sup>2,5</sup> (±)	Comments	Location <sup>9</sup>
AC Current <sup>3,6</sup> – Generate				
(0 to 220) µA	(10 to 20) Hz (20 to 40) Hz (40 to 1000) Hz (1 to 5) kHz (5 to 10) kHz	0.02 % + 16 nA 0.01 % + 10 nA 0.01 % + 8.0 nA 0.03 % + 12 nA 0.09 % + 65 nA	Reference calibrator	TX, MY, HU, CH, IN
(0.22 to 2.2) mA	(10 to 20) Hz (20 to 40) Hz (40 to 1000) Hz (1 to 5) kHz (5 to 10) kHz	0.02 % + 40 nA 0.01 % + 35 nA 0.01 % + 35 nA 0.02 % + 0.11 µA 0.09 % + 0.65 µA		TX, MY, HU, CH, IN
(2.2 to 22) mA	(10 to 20) Hz (20 to 40) Hz (40 to 1000) Hz (1 to 5) kHz (5 to 10) kHz	0.02 % + 0.40 µA 0.01 % + 0.35 µA 0.01 % + 0.35 µA 0.02 % + 0.55 µA 0.09 % + 5.0 µA		TX, MY, HU, CH, IN
(22 to 220) mA	(10 to 20) Hz (20 to 40) Hz (40 to 1000) Hz (1 to 5) kHz (5 to 10) kHz	0.02 % + 4.0 µA 0.01 % + 3.5 µA 0.01 % + 2.5 µA 0.02 % + 3.5 µA 0.09 % + 10 µA		TX, MY, HU, CH, IN
(0.22 to 2.2) A	(20 to 1000) Hz (1 to 5) kHz (5 to 10) kHz	0.02 % + 35 µA 0.04 % + 80 µA 0.60 % + 0.16 mA		TX, MY, HU, CH, IN
(2.2 to 11) A	(40 to 1000) Hz (1 to 5) kHz (5 to 10) kHz	0.05 % + 0.17 mA 0.10 % + 0.38 mA 0.36 % + 0.75 mA	Reference calibrator w/ amplifier	TX, MY, HU, IN
(11 to 20.5) A	(45 to 100) Hz (100 to 1000) Hz (1 to 5) kHz	0.09 % + 3.9 mA 0.12 % + 3.9 mA 2.3 % + 3.9 mA	Reference calibrator	TX, MY, HU, CH, IN



Parameter/Range	Frequency	CMC <sup>2, 5</sup> ( $\pm$ )	Comments	Location <sup>9</sup>
AC Current <sup>3, 6</sup> – Generate (cont)				
(10 to 100) $\mu$ A	(1 to 40) Hz (40 to 1000) Hz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.2 to 1) MHz	1.2 mA/A + 6.4 pA 1.2 mA/A + 38 pA 1.2 mA/A + 7.4 pA 1.2 mA/A + 6.6 pA 1.4 mA/A + 1.1 nA 3.0 mA/A + 4.3 nA 10 mA/A + 29 nA	Current shunts, reference digital multimeter	TX, MY, HU, CH, IN
(0.1 to 100) mA	(1 to 40) Hz (40 to 1000) Hz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz (1 to 2) MHz	0.15 mA/A + 0.26 $\mu$ A 0.14 mA/A + 0.11 $\mu$ A 0.17 mA/A + 0.15 $\mu$ A 0.25 mA/A + 0.20 $\mu$ A 0.56 mA/A + 0.22 $\mu$ A 2.1 mA/A + 1.1 $\mu$ A 6.7 mA/A + 1.1 $\mu$ A 10 mA/A + 1.1 $\mu$ A		
(0.1 to 1) A	(1 to 40) Hz (40 to 1000) Hz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz (1 to 2) MHz	0.24 mA/A + 14 $\mu$ A 0.24 mA/A + 5.3 $\mu$ A 0.26 mA/A + 7.0 $\mu$ A 0.31 mA/A + 9.7 $\mu$ A 0.59 mA/A + 12 $\mu$ A 2.0 mA/A + 66 $\mu$ A 6.7 mA/A + 67 $\mu$ A 10 mA/A + 67 $\mu$ A		
(1 to 3) A	(1 to 40) Hz (40 to 1000) Hz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz (1 to 2) MHz	0.26 mA/A + 27 $\mu$ A 0.26 mA/A + 10 $\mu$ A 0.28 mA/A + 16 $\mu$ A 0.33 mA/A + 26 $\mu$ A 0.59 mA/A + 36 $\mu$ A 2.0 mA/A + 0.20 mA 6.7 mA/A + 0.20 mA 10 mA/A + 0.20 mA		
(3 to 10) A	(1 to 40) Hz (40 to 1000) Hz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz (1 to 2) MHz	0.26 mA/A + 96 $\mu$ A 0.26 mA/A + 37 $\mu$ A 0.28 mA/A + 56 $\mu$ A 0.33 mA/A + 88 $\mu$ A 0.59 mA/A + 0.12 mA 2.0 mA/A + 0.66 mA 6.7 mA/A + 0.67 mA 10 mA/A + 0.67 mA		

Parameter/Range	Frequency	CMC <sup>2, 5</sup> ( $\pm$ )	Comments	Location <sup>9</sup>
AC Current <sup>3, 6</sup> – Generate (cont)  (10 to 20) A	(1 to 40) Hz (40 to 1000) Hz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz (1 to 2) MHz	0.26 mA/A + 0.17 mA 0.26 mA/A + 66 $\mu$ A 0.28 mA/A + 0.11 mA 0.33 mA/A + 0.17 mA 0.59 mA/A + 0.24 mA 2.0 mA/A + 1.3 mA 6.7 mA/A + 1.3 mA 10 mA/A + 1.3 mA	Reference calibrator	TX, MY, HU, CH
AC Current <sup>3, 6</sup> – Measure  (0 to 100) $\mu$ A  (0.1 to 1) mA  (1 to 10) mA  (10 to 100) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 1) kHz  (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz  (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz  (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.27 % + 20 nA 0.10 % + 20 nA 0.04 % + 20 nA 0.04 % + 20 nA  0.27 % + 0.13 $\mu$ A 0.10 % + 0.13 $\mu$ A 0.04 % + 0.13 $\mu$ A 0.02 % + 0.13 $\mu$ A 0.04 % + 0.13 $\mu$ A 0.27 % + 0.27 $\mu$ A 0.37 % + 1.0 $\mu$ A  0.27 % + 1.3 $\mu$ A 0.10 % + 1.3 $\mu$ A 0.04 % + 1.3 $\mu$ A 0.02 % + 1.3 $\mu$ A 0.04 % + 1.3 $\mu$ A 0.27 % + 2.7 $\mu$ A 0.37 % + 10 $\mu$ A  0.27 % + 13 $\mu$ A 0.10 % + 13 $\mu$ A 0.04 % + 13 $\mu$ A 0.02 % + 13 $\mu$ A 0.04 % + 13 $\mu$ A 0.27 % + 27 $\mu$ A 0.37 % + 0.10 mA	Reference multimeter	TX, MY, HU, CH, ,IN

Parameter/Range	Frequency	CMC <sup>2,5</sup> (±)	Comments	Location <sup>9</sup>
AC Current <sup>3,6</sup> – Measure (cont)				
(0.1 to 1) A	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz (20 to 50) kHz	0.27 % + 0.13 mA 0.11 % + 0.13 mA 0.05 % + 0.13 mA 0.07 % + 0.13 mA 0.20 % + 0.13 mA 0.67 % + 0.27 mA	Reference multimeter	TX, MY, HU, CH, IN
(1 to 3) A	(1 to 5) kHz (5 to 10) kHz (10 to 20) kHz	0.12 % + 0.69 mA 0.28 % + 0.69 mA 0.92 % + 0.69 mA		
(10 to 300) µA	(1 to 40) Hz (40 to 1000) Hz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz	1.2 mA/A + 6.4 pA 1.2 mA/A + 38 pA 1.2 mA/A + 7.4 pA 1.2 mA/A + 6.6 pA 1.4 mA/A + 1.1 nA 3.0 mA/A + 4.3 nA 10 mA/A + 29 nA	Current shunt – reference multimeter	TX, MY, HU, CH, IN
(0.3 to 100) mA	(1 to 40) Hz (40 to 1000) Hz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz (1 to 2) MHz	0.15 mA/A + 0.26 µA 0.14 mA/A + 0.11 µA 0.17 mA/A + 0.15 µA 0.25 mA/A + 0.20 µA 0.56 mA/A + 0.22 µA 2.1 mA/A + 1.1 µA 6.7 mA/A + 1.1 µA 10 mA/A + 1.1 µA		
(0.1 to 1) A	(1 to 40) Hz (40 to 1000) Hz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz (1 to 2) MHz	0.24 mA/A + 14 µA 0.24 mA/A + 5.3 µA 0.26 mA/A + 7.0 µA 0.31 mA/A + 9.7 µA 0.59 mA/A + 12 µA 2.0 mA/A + 66 µA 6.7 mA/A + 67 µA 10 mA/A + 67 µA		
(1 to 3) A	(1 to 40) Hz (40 to 1000) Hz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz (1 to 2) MHz	0.26 mA/A + 27 µA 0.26 mA/A + 10 µA 0.28 mA/A + 16 µA 0.33 mA/A + 26 µA 0.59 mA/A + 36 µA 2.0 mA/A + 0.20 mA 6.7 mA/A + 0.20 mA 10 mA/A + 0.20 mA		

Parameter/Range	Frequency	CMC <sup>2,5</sup> (±)	Comments	Location <sup>9</sup>
AC Current <sup>3,6</sup> – Measure (cont)				
(3 to 10) A	(1 to 40) Hz (40 to 1000) Hz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz (1 to 2) MHz	0.26 mA/A + 96 µA 0.26 mA/A + 37 µA 0.28 mA/A + 56 µA 0.33 mA/A + 88 µA 0.59 mA/A + 0.12 mA 2.0 mA/A + 0.66 mA 6.7 mA/A + 0.67 mA 10 mA/A + 0.67 mA	Current shunt – reference multimeter	TX, MY, HU, CH, IN
(10 to 20) A	(1 to 40) Hz (40 to 1000) Hz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz (1 to 2) MHz	0.26 mA/A + 0.17 mA 0.26 mA/A + 66 µA 0.28 mA/A + 0.11 mA 0.33 mA/A + 0.17 mA 0.59 mA/A + 0.24 mA 2.0 mA/A + 1.3 mA 6.7 mA/A + 1.3 mA 10 mA/A + 1.3 mA		TX, MY, HU, CH
Capacitance <sup>3</sup> – Generate, Fixed Points				TX, MY, HU, CH
0 F 270 pF 1 nF 100 nF 100 nF 10 µF 10 µF 1000 µF	1 Hz to 3 kHz 3 kHz 3 kHz 3 kHz 1 kHz 1 kHz 91 Hz 91 Hz	0.20 pF 0.20 pF 0.35 pF 10 pF 7.7 pF 1.9 nF 2.0 nF 0.76 µF	Open test standard, reference capacitors	
Capacitance <sup>3</sup> – Generate, 4 Terminal Pair				MY
1 pF	1 kHz > 1 kHz to < 1 MHz 1 MHz (> 1 to < 2) MHz 2 MHz	0.36 fF 0.43 fF 0.49 fF 0.71 fF 0.70 fF	Standard air capacitor Set, BNC 4 terminal pair	
10 pF	1 kHz > 1 kHz to < 1 MHz 1 MHz (> 1 to < 2) MHz 2 MHz	3.6 fF 3.6 fF 3.6 fF 3.7 fF 4 fF		

Parameter/Equipment	Frequency	CMC <sup>2,5</sup> (±)	Comments	Location <sup>9</sup>
Capacitance <sup>3</sup> – Generate, 4 Terminal Pair (cont.)				
100 pF	1 kHz > 1 kHz to < 1 MHz 1 MHz (> 1 to < 2) MHz 2 MHz	14 fF 36 fF 36 fF 37 fF 39 fF	Standard air capacitor set, BNC 4 terminal pair	MY
1000 pF	1 kHz > 1 kHz to < 1 MHz 1 MHz (> 1 to < 2) MHz 2 MHz	0.14 pF 0.37 pF 0.37 pF 0.41 pF 0.41 pF		
10 nF	120 Hz > 120 Hz to < 1 kHz 1 kHz (> 1 to < 10) kHz 10 kHz (> 10 to < 100) kHz 100 kHz	1.2 pF 1.2 pF 1.2 pF 1.2 pF 1.2 pF 1.3 pF 1.4 pF		
100 nF	120 Hz > 120 Hz to < 1 kHz 1 kHz (> 1 to < 10) kHz 10 kHz (> 10 to < 100) kHz 100 kHz	12 pF 12 pF 12 pF 12 pF 12 pF 14 pF 14 pF		
1 μF	120 Hz > 120 Hz to < 1 kHz 1 kHz (> 1 to < 10) kHz 10 kHz (> 10 to < 100) kHz 100 kHz	0.12 F 0.12 F 0.12 F 0.12 F 0.12 F 1.14 F 0.14 F		

Parameter/Equipment	Frequency	CMC <sup>2,4</sup> (±)	Comments	Location <sup>9</sup>
Dissipation Factor <sup>3</sup> – Generate, 4 Terminal Pair				
1 pF	1 kHz	0.000 12	Standard air capacitor Set, BNC 4 terminal pair	MY
	> 1 kHz to < 1 MHz	0.000 28		
	1 MHz	0.000 26		
	(> 1 to < 2) MHz	0.000 27		
	2 MHz	0.000 29		
10 pF	1 kHz	0.000 12		
	> 1 kHz to < 1 MHz	0.000 13		
	1 MHz	0.000 14		
	(> 1 to < 2) MHz	0.000 16		
	2 MHz	0.000 19		
100 pF	1 kHz	0.000 12		
	> 1 kHz to < 1 MHz	0.000 12		
	1 MHz	0.000 12		
	(> 1 to < 2) MHz	0.000 13		
	2 MHz	0.000 13		
1000 pF	1 kHz	0.000 09		
	> 1 kHz to < 1 MHz	0.000 12		
	1 MHz	0.000 13		
	(> 1 to < 2) MHz	0.000 15		
	2 MHz	0.000 15		
10 nF	120 Hz	0.000 09		
	> 120 Hz to < 1 kHz	0.000 09		
	1 kHz	0.000 09		
	(> 1 to < 10) kHz	0.000 30		
	10 kHz	0.000 29		
	(> 10 to < 100) kHz	0.000 35		
	100 kHz	0.000 35		
100 nF	120 Hz	0.000 09		
	> 120 Hz to < 1 kHz	0.000 09		
	1 kHz	0.000 09		
	(> 1 to < 10) kHz	0.000 30		
	10 kHz	0.000 56		
	(> 10 to < 100) kHz	0.000 34		
	100 kHz	0.000 35		
1 μF	120 Hz	0.000 09		
	> 120 Hz to < 1 kHz	0.000 13		
	1 kHz	0.000 13		
	(> 1 to < 10) kHz	0.000 56		
	10 kHz	0.000 56		
	(> 10 to < 100) kHz	0.000 34		
	100 kHz	0.000 36		

Parameter/Equipment	Range	CMC <sup>2, 4</sup> (±)	Comments	Location <sup>9</sup>
Thermocouple Simulation <sup>3, 6</sup> – Type E	(-270 to < -245) °C (-245 to < -195) °C  (-195 to < -155) °C (-155 to < -90) °C (-90 to < 15) °C (15 to < 890) °C (890 to 1000) °C	1.2 °C 0.18 °C  0.12 °C 0.09 °C 0.08 °C 0.06 °C 0.07 °C	Thermocouple simulator	TX, MY, HU  TX, MY, HU, CH
Oscilloscope Functions <sup>3, 6</sup> –  Amplitude – DC Voltage:  50 Ω 1 MΩ  Square Wave Voltage – 10 Hz to 10 kHz:  50 Ω 1 MΩ  Input Impedance  Input Capacitance	  1 mV to 5 V 1 mV to 200 V     0.5 mV to 2.5 V 0.5 mV to 100 V  (40 to 90) Ω 800 kΩ to 1.2 MΩ  (1 to 35) pF (35 to 95) pF	  0.02 % + 20 μV 0.02 % + 21 μV     0.78 % + 4.0 μV 0.78 % + 15 μV  39 mΩ 0.8 kΩ  1.5 % + 0.20 pF 2.3 % + 0.19 pF	  Oscilloscope calibrator      Oscilloscope calibrator  Oscilloscope calibrator  Oscilloscope calibrator	  TX, MY, HU, CH      TX, MY, HU, CH  TX, MY, HU, CH  TX, MY, HU, CH

Parameter/Equipment	Range	CMC <sup>2,4</sup> (±)	Comments	Location <sup>9</sup>	
AC Voltage Flatness & Bandwidth	50 kHz to 10 MHz (wrt Reference Frequency)	0.1 Hz to 300 MHz (300 to 550) MHz 550 MHz to 1.1 GHz (1.1 to 3.2) GHz	0.17 dB 0.19 dB 0.25 dB 0.28 dB	Oscilloscope calibrator	TX, MY, HU, CH
		(9 to 20) kHz 20 kHz to 100 MHz (0.1 to 4) GHz (4 to 6) GHz	0.07 dB 0.07 dB 0.08 dB 0.09 dB	Generator w/ sensor/splitter	TX, MY, HU, CH
RMS Noise	(0 to 0.04) % (0.04 to 0.05) % (0.05 to 0.06) % (0.06 to 0.08) % (0.08 to 0.11) % (0.11 to 0.34) % (0.34 to 0.62) % (0.62 to 2.5) %	0.000 18 % of full scale 0.000 25 % of full scale 0.000 38 % of full scale 0.000 48 % of full scale 0.000 64 % of full scale 0.0097 % of full scale 0.015 % of full scale 0.018 % of full scale	50 Ω termination	TX, MY, HU, CH	

Parameter/Range	Frequency	CMC <sup>2,5</sup> (±)	Comments	Location <sup>9</sup>	
AC Voltage Gain <sup>3</sup> – Generate	5 mVp-p to 5 Vp-p	0.1 Hz to 300 MHz (300 to 550) MHz	0.17 dB 0.19 dB	Oscilloscope calibrator	TX, MY, HU, CH
	5 mVp-p to 3 Vp-p	(0.550 to 1.1) GHz (1.1 to 2.5) GHz	0.25 dB 0.28 dB		
	5 mVp-p to 2 Vp-p	(2.5 to 3.2) GHz	0.28 dB		
(0 to 10) mV	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	0.02 % + 2.0 μV 0.01 % + 0.73 μV 0.02 % + 0.73 μV 0.07 % + 0.73 μV 0.33 % + 0.73 μV 2.7 % + 1.3 μV	Generator/DMM as transfer standard	TX, MY, HU, CH	



Parameter/Range	Frequency	CMC <sup>2,5</sup> (±)	Comments	Location <sup>9</sup>
AC Voltage Gain <sup>3</sup> – Generate (cont)				
(10 to 100) mV	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 2) MHz	49 μV/V + 2.7 μV 49 μV/V + 1.3 μV 95 μV/V + 1.3 μV 0.02 % + 1.3 μV 0.05 % + 1.3 μV 0.20 % + 6.7 μV 0.67 % + 6.7 μV 1.0 % + 6.7 μV	Generator/DMM as transfer standard	TX, MY, HU, CH
(0.1 to 1) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 2) MHz	49 μV/V + 27 μV 49 μV/V + 13 μV 95 μV/V + 13 μV 0.02 % + 13 μV 0.05 % + 13 μV 0.20 % + 67 μV 0.67 % + 67 μV 1.0 % + 67 μV	Generator/DMM as transfer standard	TX, MY, HU, CH
(1 to 7.07) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 2) MHz	49 μV/V + 0.27 mV 49 μV/V + 0.13 mV 95 μV/V + 0.13 mV 0.02 % + 0.13 mV 0.053 % + 0.13 mV 0.20 % + 0.67 mV 0.67 % + 0.67 mV 1.0 % + 0.67 mV	Generator/DMM as transfer standard	TX, MY, HU, CH

II. Electrical – RF/Microwave

Parameter/Range	Frequency	CMC <sup>2, 5</sup> (±)	Comments	Location <sup>9</sup>
RF Absolute Power <sup>3</sup> <sup>6</sup> – Measure				
(-100 to < -50) dBm	1 MHz to 3.6 GHz	0.28 dB	Spectrum analyzer	TX, MY, HU, CH
	(3.6 to 8) GHz	0.96 dB		
	(8 to 22) GHz	1.3 dB		
	(22 to 26) GHz	1.5 dB		
(-50 to < -19) dBm	(9 to < 20) kHz	0.12 dB	Power meter, power sensor	TX, MY, HU, CH
	20 kHz to < 100 MHz	0.09 dB		
	100 MHz to 4 GHz	0.10 dB		
	(< 4 to 6) GHz	0.11 dB		
(-19 to < 1) dBm	(9 to < 20) kHz	0.10 dB		
	20 kHz to < 100 MHz	0.06 dB		
	100 MHz to 4 GHz	0.06 dB		
	(< 4 to 6) GHz	0.08 dB		
(1 to 20) dBm	(9 to < 20) kHz	0.09 dB		
	20 kHz to <100 MHz	0.05 dB		
	100 MHz to 4 GHz	0.06 dB		
	(< 4 to 6) GHz	0.09 dB		
(-50 to 20) dBm	(6 to 18) GHz	0.13 dB		
	(18 to 32) GHz	0.21 dB		
	(32 to 40) GHz	0.23 dB		

Parameter/Range	Frequency	CMC <sup>2,5</sup> (±)	Comments	Location <sup>9</sup>
RF Relative Power <sup>3</sup> – Measure				
(-120 to 30) dBm	1 MHz to 3.6 GHz (3.6 to 8) GHz (8 to 22) GHz (22 to 26) GHz	0.31 dB 1.0 dB 1.3 dB 1.5 dB	Spectrum analyzer (R&S FSUP)	HU
(-120 to 30) dBm	1 MHz to 3.6 GHz (3.6 to 8) GHz (8 to 22) GHz (22 to 26) GHz	0.28 dB 0.39 dB 0.97 dB 1.3 dB	Spectrum analyzer (R&S FSWP)	TX, MY, CH
(-110 to -70) dBm	(1 to 100) MHz 100 MHz to 4 GHz (4 to 6) GHz (6 to 18) GHz (18 to 26) GHz	0.13 dB 0.13 dB 0.15 dB 0.18 dB 0.28 dB	Spectrum analyzer & power sensor	TX, MY, HU, CH
(-70 to 0) dBm	(1 to 100) MHz 100 MHz to 4 GHz (4 to 6) GHz (6 to 18) GHz (18 to 26) GHz	0.09 dB 0.10 dB 0.11 dB 0.16 dB 0.23 dB		
RF Absolute Power <sup>3,6</sup> – Generate				
(-120 to 16) dBm (-120 to 18) dBm (-120 to 15) dBm	(1 to 30) MHz 30 MHz to 3 GHz (3 to 6) GHz	0.62 dB 0.63 dB 1.1 dB	Signal generator	TX, MY, HU, CH
(-120 to 15) dBm (-120 to 12) dBm (-120 to 9) dBm	(6 to 10) GHz (10 to 20) GHz (20 to 40) GHz	1.2 dB 1.2 dB 1.2 dB		
(16 to 19) dBm (16 to 19) dBm (18 to 19) dBm (18 to 25) dBm (15 to 25) dBm (15 to 25) dBm (12 to 22) dBm (9 to 21) dBm	(1 to 10) MHz (10 to 30) MHz 30 MHz to 2 GHz (2 to 3) GHz (3 to 6) GHz (6 to 10) GHz (10 to 16) GHz (16 to 20) GHz	1.7 dB 1.7 dB 1.7 dB 1.7 dB 1.7 dB 1.7 dB 1.7 dB 1.7 dB		

Parameter/Range	Frequency	CMC <sup>2,5</sup> (±)	Comments	Location <sup>9</sup>
RF Absolute Power <sup>3,6</sup> – Generate (cont)				
(-50 to < -19) dBm	9 kHz to < 20 MHz 20 kHz to 100 MHz 100 MHz to 4 GHz (< 4 to 6) GHz	0.10 dB 0.09 dB 0.10 dB 0.12 dB	Signal generator	TX, MY, HU, CH
(-19 to < 1) dBm	9 kHz to < 20 MHz 20 kHz to 100 MHz 100 MHz to 4 GHz (< 4 to 6) GHz	0.05 dB 0.05 dB 0.06 dB 0.08 dB		
(1 to < 20) dBm	9 kHz to < 20 MHz 20 kHz to 100 MHz 100 MHz to 4 GHz (< 4 to 6) GHz	0.05 dB 0.05 dB 0.07 dB 0.09 dB	Power meter, power sensor, power splitter, signal generator	TX, MY, HU, CH
(1 to < 20) dBm	(6 to 18) GHz (18 to 32) GHz (32 to 40) GHz	0.16 dB 0.28 dB 0.31 dB		
Average Noise Level <sup>3,6</sup> – Measure	10 MHz to 3.6 GHz (3.6 to 8) GHz (8 to 22) GHz (22 to 26) GHz	0.36 dB 0.99 dB 1.3 dB 1.5 dB	Spectrum analyzer	HU
Average Noise Level <sup>3,6</sup> – Measure	9 kHz to 10 MHz 10 MHz to 3.6 GHz (3.6 to 8) GHz (8 to 22) GHz (22 to 26) GHz	0.36 dB 0.26 dB 0.37 dB 0.96 dB 1.3 dB	Spectrum analyzer (R&S FSWP)	TX, MY, CH
SSB Phase Noise <sup>3</sup> – Measure				
Carrier Frequency:	Offset:			
(1 to 10) MHz (10 to 100) MHz 100 MHz to 26 GHz	100 Hz to 100 kHz 100 Hz to 1 MHz 100 Hz to 10 MHz	1.0 dB 1.0 dB 1.0 dB	Spectrum analyzer	TX, MY, HU, CH

Parameter/Range	Frequency	CMC <sup>2,5</sup> (±)	Comments	Location <sup>9</sup>
Reflection (S11/S22) – Measure  (0 to -25) dB (0 to -25) dB	(10 to 700) MHz 700 MHz to 18 GHz	0.035 lin 0.020 lin	Vector network analyzer with VNA Cal Kit	TX, HU, CH
Reflection (S11/S22) – Measure	100 kHz to 10 GHz (10 to 20) GHz (20 to 26.5) GHz	0.010 lin 0.013 lin 0.015 lin	Vector network analyzer (R&S ZNA26) w/ Ecal VNA module	MY
Transmission (S12/S21) – Measure	(10 to 700) MHz 700 MHz to 18 GHz	0.0019 lin 0.0018 lin	Vector network analyzer w/ VNA cal kit	TX, CH, MY, HU
Transmission (S12/S21) – Measure  1-40dB 41-50dB 41-50dB 41-50dB 51-60dB 51-60dB 61-70dB 61-70dB 71-80dB 71-80dB 81-90dB 81-90dB 91-100dB 91-100dB	100MHz-26.5GHz 100MHz-5GHz 5.1GHz-24GHz 24.1GHz-26.5GHz 100MHz-24GHz 24.1GHz-26.5GHz 100MHz-24GHz 24.1GHz-26.5GHz 100MHz-24GHz 24.1GHz-26.5GHz 100MHz-24GHz 24.1GHz-26.5GHz 100MHz-24GHz 24.1GHz-26.5GHz	0.0015 lin 0.0015 lin 0.0027 lin 0.0046 lin 0.0065 lin 0.0134 lin 0.0178 lin 0.0522 lin 0.0522 lin 0.1331 lin 0.1856 lin 0.3879 lin 0.4316 lin 0.7295 lin	Vector Network Analyzer (R&S ZNA26) METAS Corrected w/ VNA Cal Kit (Maury Microwave 8050CK41)	MY

Parameter/Equipment	Range	CMC <sup>2, 4, 7</sup> (±)	Comments	Location <sup>9</sup>
Phase (S12/S21) – Measure			Vector Network Analyzer (R&S ZNA26) METAS Corrected w/ VNA Cal Kit (Maury Microwave 8050CK41)	MY
1-40dB	100MHz-26.5GHz	0.010 °		
41-50dB	100MHz-5GHz	0.010 °		
41-50dB	5.1GHz-24GHz	0.018 °		
41-50dB	24.1GHz-26.5GHz	0.030 °		
51-60dB	100MHz-24GHz	0.043 °		
51-60dB	24.1GHz-26.5GHz	0.088 °		
61-70dB	100MHz-24GHz	0.118 °		
61-70dB	24.1GHz-26.5GHz	0.343 °		
71-80dB	100MHz-24GHz	0.343 °		
71-80dB	24.1GHz-26.5GHz	0.871 °		
81-90dB	100MHz-24GHz	1.211 °		
81-90dB	24.1GHz-26.5GHz	2.503 °		
91-100dB	100MHz-24GHz	2.779 °		
91-100dB	24.1GHz-26.5GHz	4.621 °		
Source Linearity			Step Attenuator (Keysight 7201C) METAS Corrected	TX, MY, CH
1-40dB	100MHz-26.5GHz	0.01 dB		
41-50dB	100MHz-5GHz	0.01 dB		
41-50dB	5.1GHz-24GHz	0.02 dB		
41-50dB	24.1GHz-26.5GHz	0.04 dB		
51-60dB	100MHz-24GHz	0.06 dB		
51-60dB	24.1GHz-26.5GHz	0.12 dB		
61-70dB	100MHz-24GHz	0.16 dB		
61-70dB	24.1GHz-26.5GHz	0.47 dB		
71-80dB	100MHz-24GHz	0.47 dB		
71-80dB	24.1GHz-26.5GHz	1.24 dB		
81-90dB	100MHz-24GHz	1.78 dB		
81-90dB	24.1GHz-26.5GHz	4.26 dB		
91-100dB	100MHz-24GHz	4.91 dB		
91-100dB	24.1GHz-26.5GHz	11.36 dB		

### III. Time & Frequency

Parameter/Equipment	Range	CMC <sup>2, 4, 7</sup> ( $\pm$ )	Comments	Location <sup>9</sup>
Frequency <sup>3</sup> – Measure	1 Hz to 350 MHz	0.52 nHz/Hz + 16 $\mu$ Hz	Universal frequency counter	TX, MY, HU, CH, IN
	350 MHz to 26 GHz	0.51 nHz/Hz + 24 mHz	Spectrum analyzer	TX, MY, HU, CH
	350 MHz to 20 GHz	0.51 nHz/Hz + 24 mHz	Spectrum analyzer	IN
Frequency <sup>3, 6</sup> – Generate	10 MHz	5.8 mHz	Rubidium frequency standard	TX, MY, HU, CH, IN
	1 Hz to 10 kHz	0.48 nHz/Hz + 1.1 $\mu$ Hz	Function generator	TX, MY, HU, CH, IN
	10 kHz to 80 MHz	0.58 nHz/Hz + 0.10 nHz	Signal generator	TX, MY, HU, CH
	(80 to 350) MHz	0.58 nHz/Hz + 30 nHz		
	350 MHz to 6 GHz	0.59 nHz/Hz + 4.0 mHz		
	(6 to 26) GHz	0.58 nHz/Hz + 54 mHz	Signal generator	IN
	(80 to 350) MHz	0.58 nHz/Hz + 30 nHz		
	350 MHz to 3 GHz	0.59 nHz/Hz + 4.0 mHz		
(6 to 20) GHz	0.58 nHz/Hz + 54 mHz			
Time Interval <sup>3</sup> – Measure	Up to 1.2 ns	12 ps	Digital oscilloscope	TX, MY, HU, CH
Delta Time Interval <sup>3</sup> – Measure	1 fs to 10 ns	0.011 % + 2.4 fs	Digital TDR w/ sampling module	TX, CH, MY, HU

<sup>1</sup> This laboratory offers commercial calibration service.

<sup>2</sup> 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.

<sup>3</sup> This laboratory performs field calibration activities for these parameters. Please note the actual measurement uncertainties achievable on a customer's site can normally be expected to be larger than the Calibration and Measurement Capability Uncertainty (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 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.

<sup>4</sup> In the statement of CMC, percentages are to be read as percent of reading unless otherwise noted.

<sup>5</sup> The stated measured values are determined using the indicated instrument (see Comments). This capability is suitable for the calibration of the devices intended to measure or generate the measured value in the ranges indicated. CMC's are expressed as either a specific value that covers the full range or as a percent or fraction of the reading plus a fixed floor specification.

<sup>6</sup> The contributions from the "best existing device" are not included in the CMC claim.

<sup>7</sup> The type of instrument or material being calibrated is defined by the parameter. This indicates the laboratory is capable of calibrating instruments that measure or generate the values in the ranges indicated for the listed measurement parameter.

<sup>8</sup> This scope meets A2LA's *P112 Flexible Scope Policy*.

<sup>9</sup> The locations of the laboratories that can perform the calibration are given by a two-letter code with valid to dates given in the table below:

Location	Code	Valid to Dates
11500 N Mopac Expressway, Building A Austin, TX 78759-3504	TX	January 31, 2026
NI Malaysia Sdn Bhd 8 Lebuh Batu Maung 1 Bayan Lepas 11960 Penang Malaysia	MY	January 31, 2026
1A Hatar Street Debrecen, Hungary H4031	HU	January 31, 2026
2nd Floor, Building 2, No. 400 Fangchun Road, Pudong New District Shanghai, People's Republic of China 201203	CH	January 31, 2026
NI India 81/1 & 82/1, Salarpuria Softzone, Wing B, 5th Floor, Block A, Bellandur, Varthur Hobli, Bengaluru, Karnataka Bengaluru, India	IN	December 31, 2026





# Accredited Laboratory

A2LA has accredited

## NI GLOBAL CALIBRATION SERVICES

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 25<sup>th</sup> day of March 2024.

A blue ink signature of Mr. Trace McInturff, written in a cursive style.

Mr. Trace McInturff, Vice President, Accreditation Services  
For the Accreditation Council  
Certificate Number 3237.01  
Valid to: See Scope of Accreditation  
Revised December 10, 2024

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