

Schedule

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Certificate No. : LA-2014-0575-C

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FIELD OF TESTING : Calibration and Measurement

MEASURED QUANTITIES / INSTRUMENT / RANGE TO BE CALIBRATED	FREQUENCY	CALIBRATION AND MEASUREMENT CAPABILITY (CMC *)
<p>1. DC Voltage (Measure) Range</p> <p>0 mV – 220 mV 0.22 V – 2.2 V 2.2 V – 11 V 11 V – 22 V 22 V – 220 V 220 V – 1100 V</p>		<p>ppm of reading + μV</p> <p>7.5 ppm + 0.4 μV 5.0 ppm + 0.7 μV 3.5 ppm + 2.5 μV 3.5ppm + 4 μV 5.0 ppm + 40 μV 6.5 ppm + 400 μV</p>
<p>2. DC Voltage (Measure) Specific Value</p> <p>0 V 0.1 V -0.1 V 1 V -1 V 10 V -10 V 100 V -100 V 1000 V -1000 V</p>		<p>ppm of reading + μV</p> <p>14 nV 0.79 μV 0.79 μV 3.1 μV 3.1 μV 6.5 μV 25 μV 0.50 mV 0.50 mV 6.9 mV 6.9 mV</p>

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<p>3. DC Voltage (Source) Range</p> <p>0 mV – 100 mV 0.1 V – 1 V 1 V – 10 V 10 V – 100 V 100 V – 1000 V</p>		<p>ppm of reading + ppm of range</p> <p>6.5 ppm + 4.2 ppm 6 ppm + 0.42 ppm 5.4 ppm + 0.093 ppm 7.6 ppm + 0.42 ppm 7.6 ppm + 0.15 ppm</p>
<p>4. DC Current (Measure) Range</p> <p>0 to 220 µA 0.22 mA to 2.2 mA 2.2 mA to 22 mA 22 mA to 100 mA 100 mA to 220 mA 0.22 A to 1 A 1 A to 2.2 A 2.2 A to 5 A 5 A to 10 A</p>		<p>ppm of reading + nA/µA</p> <p>40 ppm + 6 nA 35 ppm + 7 nA 35 ppm + 40 nA 45 ppm + 0.7 µA 45 ppm + 0.7 µA + 200*I² ppm 80 ppm + 12 µA 80 ppm + 12 µA + 10*I² ppm 360 ppm + 480 µA 360 ppm + 580 µA</p>
<p>5. DC Current (Measure) Specific Value</p> <p>0 A 100 µA -100 µA 1 mA - 1 mA 10 mA -10 mA 100 mA -100 mA 1 A -1 A</p>		<p>22 pA 2.3 nA 2.3 nA 19 nA 19 nA 0.18 µA 0.18 µA 2.5 µA 2.5 µA 51 µA 51 µA</p>

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<p>6. DC Current (Source) Range</p> <p>0 μA to 100 μA 0.1 mA to 1 mA 1 mA to 10 mA 10 mA to 100 mA 0.1 A to 1 A</p> <p>1 A to 15 A 15 A to 100 A</p>		<p>ppm of reading + ppm of range</p> <p>24 ppm + 11 ppm 24 ppm + 7.5 ppm 24 ppm + 7.5 ppm 41 ppm + 7.5 ppm 120 ppm + 14 ppm</p> <p>78 ppm + 0.52 μA 78 ppm + 4.2 μA</p>
<p>7. DC Current (Source/Measure)</p> <p>0.1 pA 0.19 pA 0.5 pA 0.9 pA 1 pA 1.9 pA 5 pA 9 pA 10 pA 19 pA 50 pA 90 pA – 19 nA 19 nA – 190 nA 190 nA – 1.9 μA 1.9 μA – 100 μA</p>		<p>1.1 % 0.51 % 0.25 % 0.24 % 0.23 % 0.18 % 0.17 % 0.16 % 0.16 % 0.041 % 0.038 % 0.034 % 68 ppm 56 ppm 32 ppm</p>

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8. DC Resistance (Measure) Specific Value 0 Ω 1 Ω 1.9 Ω 10 Ω 19 Ω 100 Ω 190 Ω 1 k Ω 1.9 k Ω 10 k Ω 19 k Ω 100 k Ω 190 k Ω 1 M Ω 1.9 M Ω 10 M Ω 19 M Ω 100 M Ω		ppm 3.6 $\mu\Omega$ 13 ppm 95 ppm 10 ppm 23 ppm 7.6 ppm 10 ppm 6.8 ppm 8.5 ppm 2.6 ppm 8.5 ppm 7.7 ppm 11 ppm 8.3 ppm 21 ppm 19 ppm 50 ppm 100 ppm
9. DC Resistance (Source) Range (0 to 10) Ω (10 to 100) Ω (0.1 to 100) k Ω (1 to 10) k Ω (10 to 100) k Ω (0.1 to 1) M Ω (1 to 10) M Ω (10 to 100) M Ω (0.1 to 1) G Ω		ppm of reading + ppm of range 21 ppm + 8 ppm 15 ppm + 8 ppm 13 ppm + 0.79 ppm 13 ppm + 0.79 ppm 13 ppm + 0.79 ppm 18 ppm + 2.6 ppm 62 ppm + 12 ppm 580 ppm + 37 ppm 0.58 % + 260 ppm

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10. AC Voltage (Measure) Range		ppm/% of reading + $\mu\text{V}/\text{mV}$
(0.22 to 2.2) mV_{rms}	10 – 20 20 – 40 40 – 20 k 20 k – 50 k 50 k – 100 k 100 k – 300 k 300 k – 500 k 500 k – 1 M	240 ppm + 4 μV 90 ppm + 4 μV 80 ppm + 4 μV 200 ppm + 4 μV 500 ppm + 5 μV 0.11 % + 10 μV 0.14 % + 20 μV 0.27 % + 20 μV
(2.2 to 22) mV_{rms}	10 – 20 20 – 40 40 – 20 k 20 k – 50 k 50 k – 100 k 100 k – 300 k 300 k – 500 k 500 k – 1 M	240 ppm + 4 μV 90 ppm + 4 μV 80 ppm + 4 μV 200 ppm + 4 μV 500 ppm + 5 μV 0.11 % + 10 μV 0.14 % + 20 μV 0.27 % + 20 μV
(22 to 220) mV_{rms}	10 – 20 20 – 40 40 – 20 k 20 k – 50 k 50 k – 100 k 100 k – 300 k 300 k – 500 k 500 k – 1 M	240 ppm + 12 μV 90 ppm + 7 μV 80 ppm + 7 μV 200 ppm + 7 μV 460 ppm + 17 μV 900 ppm + 20 μV 0.14 % + 25 μV 0.27 % + 45 μV
(0.22 to 2.2) V_{rms}	10 – 20 20 – 40 40 – 20 k 20 k – 50 k 50 k – 100 k 100 k – 300 k 300 k – 500 k 500 k – 1 M	240 ppm + 40 μV 90 ppm + 15 μV 45 ppm + 8 μV 75 ppm + 10 μV 110 ppm + 30 μV 420 ppm + 80 μV 0.10 % + 200 μV 0.17 % + 300 μV

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(2.2 to 22) V _{rms}	10 – 20	240 ppm + 400 μV
	20 – 40	90 ppm + 150 μV
	40 – 20 k	45 ppm + 50 μV
	20 k – 50 k	75 ppm + 100 μV
	50 k – 100 k	100 ppm + 200 μV
	100 k – 300 k	280 ppm + 600 μV
	300 k – 500 k	0.10 % + 2.0 mV
	500 k – 1 M	0.15 % + 3.2 mV
(22 to 120) V _{rms}	10 – 20	240 ppm + 4 mV
	20 – 40	90 ppm + 1.5 mV
	40 – 20 k	52 ppm + 0.6 mV
	20 k – 50 k	80 ppm + 1 mV
	50 k – 100 k	150 ppm + 2.5 mV
(22 to 2.2E7/Freq) V _{rms}	100 k – 300 k	900 ppm + 16 mV
	300 k – 500 k	0.44 % + 40 mV
	500 k – 1 M	0.80 % + 80 mV
(120 to 220) V _{rms}	10 – 20	240 ppm + 4 mV
	20 – 40	90 ppm + 1.5 mV
	40 – 20 k	52 ppm + 0.6 mV
	20 k – 50 k	80 ppm + 1 mV
	50 k – 100 k	150 ppm + 2.5 mV
(220 to 250) V _{rms}	15 – 50	300 ppm + 16 mV
(220 to 700) V _{rms}	40 – 50	90 ppm + 4 mV
	50 – 1 k	70 ppm + 3.5 mV
	1 k – 20 k	170 ppm + 6 mV
	20 k – 50 k	600 ppm + 11 mV
	50 k – 100 k	0.23 % + 45 mV
(700 to 750) V _{rms}	50 - 1 k	1.2 V

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11. AC Voltage (Measure) Specific Value	0.01 V _{rms}	(V _{rms})	
		1 k	0.79 μV
		20 k	1.2 μV
		100 k	9.4 μV
		300 k	21 μV
		1 M	44 μV
		4 M	0.14 mV
	0.1 V _{rms}	1 k	5.6 μV
		20 k	8.3 μV
		100 k	37 μV
		300 k	69 μV
		1 M	0.18 mV
		4 M	0.71 mV
		8 M	0.76 mV
		10 M	2.3 mV
	1 V _{rms}	1 k	52 μV
		20 k	53 μV
		50 k	85 μV
		100 k	0.14mV
		300 k	0.50 mV
		500 k	1.2 mV
		1 M	1.7 mV
		4 M	7.1 mV
		8 M	7.6 mV
		10 M	25 mV
	3 V _{rms}	100 k	0.50 mV
		2 M	22 mV
		4 M	22 mV
		8 M	30 mV
		10 M	76 mV

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10 V _{rms}	10	0.61 mV
	20	0.51 mV
	40	0.45 mV
	200	0.50 mV
	500	0.50 mV
	1 k	0.50 mV
	10 k	0.50 mV
	20 k	0.50 mV
	50 k	0.85 mV
	100 k	1.2 mV
	300 k	3.4 mV
	500 k	12 mV
1 M	18 mV	
100 V _{rms}	1 k	5.8 mV
	20 k	5.8 mV
	50 k	9 mV
	100 k	18 mV
700 V _{rms}	1 k	53 mV
12. AC Voltage (Source) Range		% of reading + % of range
(1 to 10) mV _{rms}	10 – 40	0.035 % + 0.035 %
	40 – 1 k	0.023 % + 0.013 %
	1 k – 20 k	0.035 % + 0.013 %
	20 k – 50 k	0.12 % + 0.013 %
	50 k – 100 k	0.58 % + 0.013 %
	100 k – 300 k	4.6 % + 0.023 %

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(10 to 100) mV _{rms}	10 – 40	0.0084 % + 0.0047 %
	40 – 1 k	0.0084 % + 0.0023 %
	1 k – 20 k	0.017 % + 0.0023 %
	20 k – 50 k	0.035 % + 0.0023 %
	50 k – 100 k	0.093 % + 0.0023 %
	100 k – 300 k	0.35 % + 0.012 %
	300 k – 1 M	1.2 % + 0.012 %
(0.1 to 1) V _{rms}	10 – 40	0.0084 % + 0.0046 %
	40 – 1 k	0.0084 % + 0.0023 %
	1 k – 20 k	0.017 % + 0.0023 %
	20 k – 50 k	0.035 % + 0.0023 %
	50 k – 100 k	0.093 % + 0.0023 %
	100 k – 300 k	0.35 % + 0.012 %
	300 k – 1 M	1.2 % + 0.012 %
(1 to 10) V _{rms}	10 – 40	0.0084 % + 0.0046 %
	40 – 1 k	0.0084 % + 0.0023 %
	1 k – 20 k	0.017 % + 0.0023 %
	20 k – 50 k	0.035 % + 0.0023 %
	50 k – 100 k	0.093 % + 0.0023 %
	100 k – 300 k	0.35 % + 0.012 %
	300 k – 1 M	1.2 % + 0.012 %
(10 to 100) V _{rms}	10 – 40	0.024 % + 0.0046 %
	40 – 1 k	0.024 % + 0.0023 %
	1 k – 20 k	0.024 % + 0.0023 %
	20 k – 50 k	0.041 % + 0.0023 %
	50 k – 100 k	0.14 % + 0.0023 %
	100 k – 200 k	0.46 % + 0.012 %
(100 to 700) V _{rms}	40 – 1 k	0.047 % + 0.0023 %

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13 AC Current (Measure)	(9 to 220) μA_{rms}	ppm of reading + nA/μA	
		250 ppm + 16 nA	
		160 ppm + 10 nA	
		120 ppm + 8 nA	
		280 ppm + 12 nA	
	0.11 % + 65 nA		
	(0.22 to 2.2) mA _{rms}	10 – 20	250 ppm + 40 nA
		20 – 40	160 ppm + 35 nA
		40 – 1 k	120 ppm + 35 nA
		1 k – 5 k	200 ppm + 110 nA
		5 k – 10 k	0.11 % + 650 nA
	(2.2 to 22) mA _{rms}	10 – 20	250 ppm + 400nA
		20 – 40	160 ppm + 350 nA
		40 – 1 k	120 ppm + 350 nA
		1 k – 5 k	200 ppm + 550 nA
		5 k – 10 k	0.11 % + 5 μA
	(22 to 220) mA _{rms}	10 – 20	250 ppm + 4 μA
		20 – 40	160 ppm + 3.5 μA
		40 – 1 k	120 ppm + 2.5 μA
		1 k – 5 k	200 ppm + 3.5 μA
		5 k – 10 k	0.11 % + 10 μA
	(0.22 to 2.2) A _{rms}	20 – 1 k	260 ppm + 35 μA
		1 k – 5 k	450 ppm + 80 μA
		5 k – 10 k	0.7 % + 160 μA
(2.2 to 5.0) A _{rms}	40 – 1 k	460ppm + 170 μA	
	1 k – 5 k	950 ppm + 380 μA	
	5 k – 10 k	0.36 % + 750 μA	
(5.0 to 10) A _{rms}	40 – 1 k	460 ppm + 260 μA	
	1 k – 5 k	950 ppm + 420 μA	
	5 k – 10 k	0.36 % + 750 μA	

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14. AC Current (Measure) Specific Value		
10 μ A	1 k	8.1 nA _{rms}
100 μ A	1 k	20 nA _{rms}
1 m A _{rms}	1 k	0.12 μ A _{rms}
10 mA _{rms}	1 k	1.6 μ A _{rms}
100 mA _{rms}	1 k	15 μ A _{rms}
1 A _{rms}	1 k	0.21 mA _{rms}
15. AC Current (Source) <u>Range</u>		% of reading + % of range
(10 to 100) μ A _{rms}	10 – 20	0.47 % + 0.035 %
	20 – 45	0.18 % + 0.035 %
	45 – 1 k	0.07 % + 0.035 %
(0.1 to 100) mA _{rms}	10 – 20	0.47 % + 0.023 %
	20 – 45	0.18 % + 0.023 %
	45 – 100	0.07 % + 0.023 %
	100 – 5 k	0.036 % + 0.023 %
(0.1 to 1) A _{rms}	10 – 20	0.47 % + 0.023 %
	20 – 45	0.19 % + 0.023 %
	45 – 100	0.093 % + 0.023 %
	100 – 5 k	0.12 % + 0.023 %
16. 4T Capacitance (Measure)		
1 pF	1 k	0.055 %
	1 k – 1 M	0.069 %
	1 M	0.056 %
	1 M – 2 M	0.071 %
	2 M	0.050 %

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	2 M – 3 M	0.073 %
	3 M	0.060 %
	3 M – 4 M	0.087 %
	4 M	0.077 %
	4 M – 5 M	0.11 %
	5 M	0.096 %
	5 M – 10 M	0.26 %
	10 M – 13 M	0.38 %
10 pF	1 k – 2 M	0.039 %
	2 M – 5 M	0.037 %
	5 M – 10 M	0.039 %
	10 M – 13 M	0.041 %
	13 M	0.040 %
100 pF	1 k – 2 M	0.036 %
	2 M – 4 M	0.037 %
	4 M – 5 M	0.039 %
	5 M – 10 M	0.050 %
	10 M – 13 M	0.062 %
1000 pF	1 k	0.041 %
	1 k – 1 M	0.072 %
	1 M	0.042 %
	1 M – 2 M	0.073 %
	2 M	0.041 %
	2 M – 3 M	0.075 %
	3 M	0.047 %
	3 M – 4 M	0.081 %
	4 M	0.058 %
	4 M – 5 M	0.092 %
	5 M	0.073 %
	5 M – 10 M	0.21 %
	10 M	0.20 %
	10 M – 13 M	0.29 %

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10 nF	120	0.0080 %
	1 k – 10 k	0.0078 %
	100 k	0.0079 %
100 nF	120	0.0073 %
	1 k	0.0074 %
	10 k	0.0073 %
	100 k	0.0074 %
1 µF	120	0.0080 %
	1 k – 10 k	0.0075 %
	100 k	0.011 %
10 µF	120	0.0097 %
	1 k	0.0096 %
	10 k	0.019 %
	100 k	0.071 %
17. 4T Dissipation (Measure)		
1pF	1 k – 1 M	0.00046
	2 M	0.00044
	3 M – 4 M	0.00042
	5 M	0.00024
	10 M	0.00059
	13 M	0.00084
10 pF	1 k – 1 M	0.00024
	2 M – 4 M	0.00011
	5 M	0.00012
	10 M	0.00016
	13 M	0.00017

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100 pF	1 k – 2 M	0.000087
	3 M	0.000089
	4 M	0.000097
	5 M	0.00015
	10 M	0.00021
	13 M	0.00028
1000 pF	1 k	0.000083
	1 k – 1 M	0.000085
	1 M	0.00013
	2 M	0.00014
	3 M	0.00021
	4 M	0.00024
	5 M	0.00032
	10 M	0.00083
	13 M	0.0013
10 nF	120	0.000063
	1 k - 100 k	0.000062
100 nF	120	0.000066
	1 k – 10 k	0.000062
	100 k	0.000066
1 μF	120	0.000072
	1 k	0.000062
	10 k	0.000066
	100 k	0.00024
10 μF	120	0.000071
	1 k	0.00012
	10 k	0.00031
	100 k	0.00079

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18. 4T Resistance (Measure)		
1 Ω	DC	0.11 %
10 Ω	DC	0.039 %
	20 – 1 M	0.040 %
	1 M	0.033 %
	1 M – 2 M	0.10 %
	2 M – 3 M	0.11 %
	3 M	0.10 %
	3 M – 4 M	0.11 %
	4 M – 5 M	0.13 %
	5 M – 10 M	0.41 %
	10 M – 13 M	0.61 %
100 Ω	DC	0.020 %
	20 – 1 M	0.045 %
	1 M	0.033 %
	1 M - 2 M	0.052 %
	2 MHz	0.043 %
100 Ω	2 M - 3 M	0.060 %
	3 M	0.052 %
	3 M - 4 M	0.060 %
	4 M	0.052 %
	4 M - 5 M	0.060 %
	5 M	0.052 %
	5 M - 10 M	0.21 %
	10 M - 13 M	0.31 %
1 kΩ	DC	0.043 %
	20 - 100	0.052 %
	100 - 100 k	0.039 %
	100 k	0.034 %
	100 k - 1 M	0.038 %
	1 M	0.033 %

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	1 M - 2 M	0.038 %	
	2 M	0.033 %	
	2 M - 3 M	0.038 %	
	3 M	0.033 %	
	3 M - 4 M	0.038 %	
	4 M	0.033 %	
	4 M - 5 M	0.046 %	
	5 M	0.043 %	
	5 M - 10 M	0.057 %	
	10 M	0.054 %	
	10 M - 13 M	0.21 %	
	10 k Ω	DC	0.050 %
		20 - 100 k	0.17 %
100 k		0.024 %	
100 k - 1 M		0.13 %	
1 M		0.033 %	
100 k Ω	DC	0.038 %	
	20 - 100 k	0.026 %	
	100 k	0.014 %	
	100 k - 1 M	0.026 %	
	1 M	0.014 %	
19. 2T Resistance (Measure)			
1 M Ω	DC	0.063 %	
10 M Ω		0.13 %	
100 M Ω		0.14 %	
1 G Ω		0.15 %	
10 G Ω		0.27 %	
100 G Ω		0.70 %	

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<p>20. Frequency (Source) <u>Range</u> 0.1 Hz to 1 Hz 1 Hz to 10 Hz 10 Hz to 100 Hz 100 Hz to 12.4 GHz 12.4 GHz to 40 GHz</p>		<p>67 pHz 0.88 nHz 4.7 nHz 2.4E-11*Freq (Hz) 2.3E-11*Freq (Hz) + 1.2 Hz</p>
<p>21. Time Interval (Source) <u>Range</u> 0.8 ns to 1 µs 1 µs to 10 ms 10 ms to 1s 1 s to 10 s 10 s to 100 s</p>		<p>1.2E-3*TI (ns) + 0.0095 ns 2.1 ns 2.3 ns 7.9 ns 6.9E-12*TI (s) + 7.8 ns</p>
<p>22. Frequency (Measure) Specific Values 10 MHz</p>		<p>(unitless) 2 E-11</p>
<p>23. Frequency (Measure) <u>Range</u> 0.1 Hz to 1 Hz 1 Hz to 250 kHz 250 kHz to 1 MHz 1 MHz to 40 GHz</p>		<p>2.0E-6*Freq (Hz) + 0.43 µHz 2.4E-6*Freq (Hz) 5.2E-9*Freq (Hz) + 0.14 mHz 5.3E-9*Freq (Hz)</p>

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24. Voltage Reflection Coefficient APC 2.4		45 M to 50 G			
Reflection	Calibration and Measurement Capability (unitless) for Voltage Reflection Coefficient Magnitude at the frequency shown				
	45 MHz to 2 GHz	2 GHz to 20 GHz	20 GHz to 40 GHz	40 GHz to 50 GHz	
0	0.0055	0.0057	0.0090	0.011	
0.1	0.0060	0.0062	0.0099	0.012	
0.2	0.0064	0.0068	0.011	0.014	
0.3	0.0069	0.0076	0.012	0.015	
0.4	0.0075	0.0085	0.014	0.017	
0.5	0.0082	0.0096	0.016	0.020	
0.6	0.0090	0.011	0.018	0.022	
0.7	0.010	0.012	0.020	0.025	
0.8	0.011	0.014	0.023	0.028	
0.9	0.012	0.015	0.026	0.032	
1	0.013	0.017	0.029	0.036	
APC 3.5		45 M to 26.5 G			
Reflection	Calibration and Measurement Capability (unitless) for Voltage Reflection Coefficient Magnitude at the frequency shown				
	45 MHz to 2 GHz	2 GHz to 8 GHz	8 GHz to 20 GHz	20 GHz to 26.5 GHz	
0	0.0028	0.0045	0.0046	0.0050	
0.1	0.0032	0.0050	0.0053	0.0060	
0.2	0.0037	0.0058	0.0062	0.0070	
0.3	0.0043	0.0068	0.0080	0.0080	
0.4	0.0049	0.0082	0.0092	0.010	
0.5	0.0057	0.0098	0.011	0.012	
0.6	0.0066	0.012	0.014	0.015	
0.7	0.0077	0.014	0.016	0.017	
0.8	0.0089	0.016	0.019	0.020	
0.9	0.010	0.019	0.023	0.024	
1	0.012	0.022	0.027	0.028	

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Type N (50 ohm)	45 MHz to 18 GHz			
Reflection	Calibration and Measurement Capability (unitless) for Voltage Reflection Coefficient Magnitude at the frequency shown			
	45 MHz to 2 GHz	2 GHz to 8 GHz	8 GHz to 18 GHz	
0	0.0031	0.0057	0.0060	
0.1	0.0036	0.0062	0.0067	
0.2	0.0040	0.0069	0.0077	
0.3	0.0045	0.0078	0.0090	
0.4	0.0050	0.0088	0.011	
0.5	0.0056	0.010	0.013	
0.6	0.0063	0.011	0.015	
0.7	0.0071	0.013	0.017	
0.8	0.0079	0.015	0.020	
0.9	0.0090	0.017	0.023	
1	0.010	0.019	0.027	
Type N (50 ohm)	9 k to 8.5 G			
Reflection	Calibration and Measurement Capability (unitless) for Voltage Reflection Coefficient Magnitude at the frequency shown			
	9KHz to 1.3 GHz	1.3 GHz to 3 GHz	3 GHz to 6 GHz	6 GHz to 8.5 GHz
0	0.0025	0.0034	0.0070	0.0089
0.1	0.0030	0.0040	0.0078	0.010
0.2	0.0035	0.0047	0.0087	0.011
0.3	0.0041	0.0057	0.010	0.012
0.4	0.0049	0.0068	0.011	0.014
0.5	0.0057	0.0078	0.013	0.016
0.6	0.0066	0.0090	0.014	0.018
0.7	0.0076	0.010	0.016	0.020
0.8	0.0087	0.012	0.018	0.022
0.9	0.010	0.013	0.021	0.025
1	0.011	0.015	0.023	0.028

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Type N (75 ohm) 0 to 0.2 0.2 to 0.4 0.4 to 0.6 0.6 to 0.8 0.8 to 1.0 APC 7	9 k to 3 G	0.0046 to 0.018 0.0062 to 0.022 0.0083 to 0.028 0.011 to 0.036 0.015 to 0.046		
	9 k to 6 G			
Reflection	Calibration and Measurement Capability (unitless) for Voltage Reflection Coefficient Magnitude at the frequency shown			
	9 kHz to 1.3 GHz	1.3 GHz to 3 GHz	3 GHz to 6 GHz	
0	0.0012	0.0020	0.0006	
0.1	0.0016	0.0024	0.0038	
0.2	0.0019	0.0028	0.0048	
0.3	0.0022	0.0032	0.0055	
0.4	0.0026	0.0037	0.0062	
Reflection	Calibration and Measurement Capability (unitless) for Voltage Reflection Coefficient Magnitude at the frequency shown			
	9 kHz to 1.3 GHz	1.3 GHz to 3 GHz	3 GHz to 6 GHz	
0.5	0.0029	0.0041	0.0070	
0.6	0.0033	0.0046	0.0055	
0.7	0.0037	0.0052	0.0063	
0.8	0.0041	0.0057	0.0072	
0.9	0.0046	0.0063	0.0082	
1	0.0051	0.0070	0.0092	

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25. Transmission		
APC 2.4		
0 dB to -10 dB	45 M to 50 G	0.045 to 0.25 dB
-10 dB to -20 dB		0.056 to 0.26 dB
-20 dB to -40 dB		0.066 to 0.29 dB
-40 dB to -60 dB		0.097 to 0.35 dB
-60 dB to -90 dB		0.16 to 0.68 dB
APC 3.5		
0 dB to -10 dB	45 M to 26.5 G	0.043 to 0.078 dB
-10 dB to -20 dB		0.050 to 0.080 dB
-20 dB to -40 dB		0.051 to 0.18 dB
-40 dB to -60 dB		0.055 to 0.27 dB
-60 dB to -90 dB		0.15 to 0.57 dB
Type N (50 ohm)		
0 dB to -10 dB	45 M to 18 G	0.042 to 0.065 dB
-10 dB to -20 dB		0.048 to 0.065 dB
-20 dB to -40 dB		0.048 to 0.079 dB
-40 dB to -60 dB		0.053 to 0.24 dB
-60 dB to -90 dB		0.15 to 0.46 dB
Type N (50 ohm)		
0 dB to -10 dB	9 k to 8.5 G	0.041 to 0.14 dB
-10 dB to -20 dB		0.051 to 0.15 dB
-20 dB to -40 dB		0.061 to 0.18 dB
-40 dB to -60 dB		0.084 to 0.24 dB
-60 dB to -90 dB		0.12 to 0.58 dB
Type N (75 ohm)		
0 dB to -10 dB	300 k to 3 G	0.042 to 0.071 dB
-10 dB to -20 dB		0.052 to 0.081 dB
-20 dB to -40 dB		0.062 to 0.11 dB
-40 dB to -60 dB		0.085 to 0.15 dB
-60 dB to -90 dB		0.13 to 0.64 dB

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APC 7 0 dB to -10 dB -10 dB to -20 dB -20 dB to -40 dB -40 dB to -60 dB -60 dB to -90 dB	300 k to 6 G	0.027 to 0.056 dB 0.038 to 0.067 dB 0.048 to 0.092 dB 0.071 to 0.15 dB 0.11 to 0.74 dB
26. RF Power (Source) Range 50 ohm 100 pW to 1 nW (-70 dBm to -60 dBm)	10 M to 18 G 18 G to 26.5 G 26.5 G to 40 G 40 G to 42 G 42 G to 49 G 49 G to 50 G	(P = Power in nW, μ W, mW, Was stated in the parenthesis) 2.9E-3P ² + 1.7E-2P + 5.7E-2 (nW) 2.9E-3P ² + 2.2E-2P + 5.7E-2 (nW) 2.9E-3P ² + 3.8E-2P + 5.7E-2 (nW) 2.9E-3P ² + 4.6E-2P + 5.7E-2 (nW) 2.9E-3P ² + 5.7E-2P + 5.7E-2 (nW) 2.9E-3P ² + 6.0E-2P + 5.7E-2 (nW)
1 nW to 10 nW (-60 dBm to -50 dBm)	10 M to 12.4 G 12.4 G to 18 G 18 G to 26.5 G 26.5 G to 34 G 34 G to 40 G 40 G to 42 G 42 G to 48 G 48 G to 50 G	5.0E-4P ² + 1.7E-2P + 4.7E-2 (nW) 5.0E-4P ² + 2.0E-2P + 4.7E-2 (nW) 5.0E-4P ² + 2.5E-2P + 4.7E-2 (nW) 5.0E-4P ² + 3.4E-2P + 4.7E-2 (nW) 5.0E-4P ² + 3.9E-2P + 4.7E-2 (nW) 5.0E-4P ² + 4.7E-2P + 4.7E-2 (nW) 5.0E-4P ² + 5.7E-2P + 4.7E-2 (nW) 5.0E-4P ² + 6.0E-2P + 4.7E-2 (nW)
10 nW to 100 nW (-50 dBm to -40 dBm)	9 k to 5 M 5 M to 10 G 10 G to 15 G 15 G to 18 G 18 G to 26.5 G 26.5 G to 34 G 34 G to 40 G 40 G to 42 G 42 G to 47 G 47 G to 50 G	1.0E-4P ² + 8.3E-3P + 1.0E1 (nW) 2.3E-2P + 6.0E-3 (nW) 2.4E-2P + 6.0E-3 (nW) 2.5E-2P + 6.0E-3 (nW) 2.9E-2P + 6.0E-3 (nW) 3.8E-2P + 6.0E-3 (nW) 4.2E-2P + 6.0E-3 (nW) 5.0E-2P + 6.0E-3 (nW) 5.8E-2P + 6.0E-3 (nW) 6.2E-2P + 6.0E-3 (nW)

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100 nW to 1µW (-40 dBm to -30 dBm)	9 k to 10 M	$9.1E-6P^2 + 3.4E-2P + 7.3E0$ (nW)
	10 M to 9 G	$2.3E-2P + 6.1E-4$ (nW)
	9 G to 17 G	$2.5E-2P + 6.1E-4$ (nW)
	17 G to 23 G	$2.8E-2P + 6.1E-4$ (nW)
	23 G to 26.5 G	$2.9E-2P + 6.1E-4$ (nW)
	26.5 G to 34 G	$3.8E-2P + 6.1E-4$ (nW)
	34 G to 37 G	$4.1E-2P + 6.1E-4$ (nW)
	37 G to 40 G	$4.2E-2P + 6.1E-4$ (nW)
	40 G to 42 G	$5.0E-2P + 6.1E-4$ (nW)
	42 G to 48 G	$5.9E-2P + 6.1E-4$ (nW)
48 G to 50 G	$6.2E-2P + 6.1E-4$ (nW)	
1 µW to 10 µW (-30 dBm to -20 dBm)	9 k to 50 k	$1.9E-5P^2 + 4.8E-2P + 1.1E-3$ (µW)
	50 k to 100 k	$4.4E-4P^2 + 1.2E-2P + 1.4E-1$ (µW)
	100 k to 2 G	$4.4E-4P^2 + 5.9E-3P + 1.4E-1$ (µW)
	2 G to 18 G	$4.4E-4P^2 + 1.1E-2P + 1.4E-1$ (µW)
	18 G to 26.5 G	$4.4E-4P^2 + 1.8E-2P + 1.4E-1$ (µW)
	26.5 G to 38 G	$4.4E-4P^2 + 2.1E-2P + 1.4E-1$ (µW)
	38 G to 41 G	$4.4E-4P^2 + 2.3E-2P + 1.4E-1$ (µW)
	41 G to 43 G	$4.4E-4P^2 + 2.6E-2P + 1.4E-1$ (µW)
	43 G to 45 G	$4.4E-4P^2 + 3.1E-2P + 1.4E-1$ (µW)
	45 G to 48 G	$4.4E-4P^2 + 3.4E-2P + 1.4E-1$ (µW)
	48 G to 49 G	$4.4E-4P^2 + 3.7E-2P + 1.4E-1$ (µW)
	49 G to 50 G	$4.4E-4P^2 + 4.4E-2P + 1.4E-1$ (µW)
	10 µW to 100 µW (-20 dBm to -10 dBm)	9 k to 50 k
50 k to 100 k		$1.0E-5P^2 + 1.7E-2P + 6.6E-2$ (µW)
100 k to 4 G		$1.0E-5P^2 + 1.3E-2P + 6.6E-2$ (µW)
4 G to 15 G		$1.0E-5P^2 + 1.4E-2P + 6.6E-2$ (µW)

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100 μ W to 1 mW (-10 dBm to 0 dBm)	15 G to 17 G	$1.0E-5P^2 + 1.5E-2P + 6.6E-2$ (μ W)
	17 G to 18 G	$1.0E-5P^2 + 1.6E-2P + 6.6E-2$ (μ W)
	18 G to 22 G	$1.0E-5P^2 + 2.0E-2P + 6.6E-2$ (μ W)
	22 G to 26.5 G	$1.0E-5P^2 + 2.2E-2P + 6.6E-2$ (μ W)
	26.5 G to 38 G	$1.0E-5P^2 + 2.4E-2P + 6.6E-2$ (μ W)
	38 G to 42 G	$1.0E-5P^2 + 2.7E-2P + 6.6E-2$ (μ W)
	42 G to 45 G	$1.0E-5P^2 + 3.3E-2P + 6.6E-2$ (μ W)
	45 G to 48 G	$1.0E-5P^2 + 3.6E-2P + 6.6E-2$ (μ W)
	48 G to 49 G	$1.0E-5P^2 + 3.8E-2P + 6.6E-2$ (μ W)
	49 G to 50 G	$1.0E-5P^2 + 4.6E-2P + 6.6E-2$ (μ W)
	9 k to 50 k	$1.3E-6P^2 + 3.2E-2P + 1.9E-5$ (mW)
	50 k to 100 k	$1.8E-2P + 5.6E-7$ (mW)
	100 k to 2.0 G	$1.4E-2P + 5.6E-7$ (mW)
	2.0 G to 12.4 G	$1.5E-2P + 5.6E-7$ (mW)
12.4 G to 16 G	$1.6E-2P + 5.6E-7$ (mW)	
16 G to 18 G	$1.7E-2P + 5.6E-7$ (mW)	
18 G to 22 G	$2.1E-2P + 5.6E-7$ (mW)	
22 G to 26.5 G	$2.2E-2P + 5.6E-7$ (mW)	
26.5 G to 39 G	$2.5E-2P + 5.6E-7$ (mW)	
39 G to 43 G	$2.9E-2P + 5.6E-7$ (mW)	
43 G to 45 G	$3.4E-2P + 5.6E-7$ (mW)	
45 G to 48 G	$3.6E-2P + 5.6E-7$ (mW)	
48 G to 49 G	$3.9E-2P + 5.6E-7$ (mW)	
49 G to 50 G	$4.6E-2P + 5.6E-7$ (mW)	
1 mW to 10 mW (0 dBm to +10 dBm)	9 k to 50 k	$1.3E-6P^2 + 3.2E-2P + 1.9E-5$ (mW)
	50 k to 100 k	$1.8E-2P + 5.6E-7$ (mW)
	100 k to 2 G	$1.4E-2P + 5.6E-7$ (mW)
	2 G to 12.4 G	$1.5E-2P + 5.6E-7$ (mW)
	12.4 G to 16 G	$1.6E-2P + 5.6E-7$ (mW)
	16 G to 18 G	$1.7E-2P + 5.6E-7$ (mW)
	18 G to 22 G	$2.1E-2P + 5.6E-7$ (mW)
	22 G to 26.5 G	$2.2E-2P + 5.6E-7$ (mW)
	26.5 G to 39 G	$2.5E-2P + 5.6E-7$ (mW)
	39 G to 43 G	$2.9E-2P + 5.6E-7$ (mW)
	43 G to 45 G	$3.4E-2P + 5.6E-7$ (mW)
	45 G to 49 G	$3.9E-2P + 5.6E-7$ (mW)
	49 G to 50 G	$4.6E-2P + 5.6E-7$ (mW)

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10 mW to 100 mW (+10 to +20dBm)	9 k to 50 k 50 k to 12.4 G 12.4 G to 18 G 18 G to 24 G 24 G to 26.5 G 26.5 G to 41 G 41 G to 43 G 43 G to 45 G 45 G to 48 G 48 G to 49 G 49 G to 50 G	1.3E-6P ² + 3.2E-2P + 1.9E-5 (mW) 2.0E-2P – 7.3E-3 (mW) 2.2E-2P – 7.3E-3 (mW) 2.3E-10P ² + 3.6E-2P – 2.4E-5 (mW) 4.7E-12P ² + 4.1E-2P – 4.9E-7 (mW) 4.7E-12P ² + 4.4E-2P – 4.9E-7 (mW) 4.7E-12P ² + 4.5E-2P – 4.9E-7 (mW) 4.7E-12P ² + 4.8E-2P – 4.9E-7 (mW) 4.7E-12P ² + 5.0E-2P – 4.9E-7 (mW) 4.7E-12P ² + 5.2E-2P – 4.9E-7 (mW) 4.7E-12P ² + 5.8E-2P – 4.9E-7 (mW)
0.1 W to 0.316 W (+20 dBm to +25 dBm)	9 k to 100 k 100 k to 300 k 300 k to 4 G 4 G to 12.4 G 12.4 G to 16 G 16 G to 18 G 18 G to 24 G	1.6E-8P ² + 4.0E-2P – 1.7E-6 (W) 2.0E-2P -7.4E-6 (W) 1.9E-2P -7.4E-6 (W) 2.0E-2P -7.4E-6 (W) 2.1E-2P -7.4E-6 (W) 2.2E-2P -7.4E-6 (W) 2.3E-10P ² + 3.6E-2P – 2.4E-8 (mW)
0.316 W to 1.00W (+25 dBm to +30 dBm)	9 k to 50 M 50M to 3 G 3 G to 12.4 G 12.4 G to 20 G 20 G to 24 G	1.6E-8P ² + 3.9E-2P – 1.7E-6 (W) 2.3E-10P ² + 3.1E-2P – 2.4E-8 (mW) 2.3E-10P ² + 3.2E-2P – 2.4E-8 (mW) 2.3E-10P ² + 3.4E-2P – 2.4E-8 (mW) 2.3E-10P ² + 3.6E-2P – 2.4E-8 (mW)
1 W to 3.16 W (+30 dBm to +35 dBm)	100 k to 12.4 G 12.4 G to 18 G	4.8E-10P ² + 6.1E-2P – 2.7E-6 (W) 4.8E-10P ² + 6.2E-2P – 2.7E-6 (W)
27. RF Power (Measure) 1 mW	50 M	0.0031 mW
28. Flatness (Source) -1.4 to 23.90 dBm	100 kHz to 80 MHz	0.0028 dB to 0.053 dB

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29. Sensor Calfactors (Power Level: -30 to 15 dBm) 0 % to 100%	(MHz)	
	0.1	1.7 %
	0.3	1.6 %
	0.5	1.6 %
	1	1.6 %
	3	1.6 %
	5	1.6 %
	10	1.5 %
	30	1.5 %
	100	1.6 %
	300	1.6 %
	500	1.6 %
	1000	1.6 %
	1500	1.6 %
	2000	1.6 %
	2600	1.6 %
	3000	1.6 %
	4000	1.6 %
	4200	1.6 %
	5000	1.7 %
6000	1.7 %	
7000	1.7 %	
8000	1.7 %	
9000	1.7 %	
10000	1.7 %	
11000	1.7 %	
12000	1.7 %	
12400	1.7 %	
13000	1.7 %	
14000	1.7 %	
15000	1.7 %	
16000	1.8 %	
17000	1.8 %	

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	(MHz)	
	18000	1.9 %
	18500	2.3 %
	19000	2.3 %
	19500	2.4 %
	20000	2.4 %
	20500	2.4 %
	21000	2.4 %
	21500	2.4 %
	22000	2.4 %
	22500	2.5 %
	23000	2.5 %
	23500	2.5 %
	24000	2.5 %
	24500	2.5 %
	25000	2.5 %
	25500	2.5 %
	26000	2.5 %
	26500	2.6 %

* CMC is expressed as an expanded uncertainty estimated at a level of confidence of approximately 95 %.

The CMC is applicable for on-site calibration when the environmental condition is maintained at (23 ± 5) degree Celsius and relative humidity of 30 – 70 %.

Approved signatories:

Ms Lim Bee Choo) All Items
Mr Vilvarayanallore Kannan Ranganathan)
Mr Lu Jing)
Mr Matt Tiew)
Mr Yong En-Haur)

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Note :

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