

# Schedule

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Certificate No. : LA-2000-0175-C

Issue No. : 25

Date : 29 June 2019

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FIELD OF TESTING : Calibration and Measurement

MEASURED QUANTITIES/INSTRUMENTS/RANGE TO BE CALIBRATED	METHOD/FREQUENCY	CALIBRATION AND MEASUREMENT CAPABILITY (CMC*)
1 DC Voltage		
1.1 Source	TS-08	
0 ~ ± 100 mV	Direct measurement with	17 ppm + 0.35 µV
± 0.1 V ~ ± 1 V	Precision multimeter	8 ppm + 0.35 µV
± 1 V ~ ± 10 V		8 ppm + 1 µV
± 10 V ~ ± 100 V		10 ppm + 36 µV
± 10 V ~ ± 1000 V		25 ppm + 0.2 mV
1.2 Measurement	TS-41	
1 V	Comparison with a calibrated	3 µV
10 V	Standard zener diode,	7 µV
	Potentiometric Measurement	
0 ~ ± 220 mV	TS-08	8 ppm + 0.5 µV
± 0.22 V ~ ± 2.2 V	Direct measurement of DC	6 ppm + 1 µV
± 2.2 V ~ ± 11 V	Voltage sourced by Multifunction	4 ppm + 3 µV
± 11 V ~ ± 22 V	Calibrator	4 ppm + 6 µV
± 22 V ~ ± 220 V		6 ppm + 50 µV
± 220 V ~ ± 1000 V		7 ppm + 500 µV

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<p>2. AC Voltage</p> <p>2.1 Source</p> <p>30 mV</p> <p>30 mV</p> <p>0.3 V</p> <p>3 V</p> <p>3 V</p> <p>3 V</p> <p>30 V</p> <p>30 V</p> <p>300 V</p> <p>300 V</p> <p>1000 V</p> <p>1000 V</p> <p>1000 V</p> <p>1000 V</p> <p>1000 V</p> <p>1 ~ 10 mV</p> <p>10 mV ~ 100 mV</p>	<p>TS-42</p> <p>Comparison with DC voltage Source through calibrated AD/DC transfer unit</p> <p>100 Hz</p> <p>500 kHz</p> <p>100 Hz</p> <p>10 Hz</p> <p>100 Hz</p> <p>500 kHz</p> <p>100 Hz</p> <p>100 kHz</p> <p>20 kHz</p> <p>100 kHz</p> <p>45 Hz</p> <p>100 Hz</p> <p>1 kHz</p> <p>5 kHz</p> <p>7 kHz</p> <p>TS-42</p> <p>Direct measurement with Precision multimeter</p> <p>10 Hz ~ 20 Hz</p> <p>20 Hz ~ 40 Hz</p> <p>40 Hz ~ 100 Hz</p> <p>100 Hz ~ 20 kHz</p> <p>20 kHz ~ 50 kHz</p> <p>50 kHz ~ 100 kHz</p> <p>100 kHz ~ 250 kHz</p> <p>10 Hz ~ 20 Hz</p> <p>20 Hz ~ 40 Hz</p> <p>40 Hz ~ 100 Hz</p> <p>100 Hz ~ 20 kHz</p> <p>20 kHz ~ 50 kHz</p> <p>50 kHz ~ 100 kHz</p> <p>100 kHz ~ 250 kHz</p> <p>500 kHz ~ 1 MHz</p> <p>1 MHz ~ 2 MHz</p>	 <p>37 ppm</p> <p>181 ppm</p> <p>13 ppm</p> <p>16 ppm</p> <p>11 ppm</p> <p>19 ppm</p> <p>16 ppm</p> <p>26 ppm</p> <p>15 ppm</p> <p>61 ppm</p> <p>18 ppm</p> <p>14 ppm</p> <p>14 ppm</p> <p>27 ppm</p> <p>27 ppm</p> <p>(% reading + floor)</p> <p>0.47 % + 37 <math>\mu</math>V</p> <p>0.18 % + 29 <math>\mu</math>V</p> <p>0.07 % + 29 <math>\mu</math>V</p> <p>0.03 % + 29 <math>\mu</math>V</p> <p>0.18 % + 29 <math>\mu</math>V</p> <p>0.81 % + 41 <math>\mu</math>V</p> <p>4.7 % + 81 <math>\mu</math>V</p> <p>0.47 % + 0.024 mV</p> <p>0.18 % + 0.024 mV</p> <p>0.07 % + 0.012 mV</p> <p>0.03 % + 0.012 mV</p> <p>0.18 % + 0.047 mV</p> <p>0.69 % + 0.093 mV</p> <p>2.4 % + 0.58 mV</p> <p>6 % + 2.4 mV</p> <p>12 % + 6 mV</p>

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0.1 V ~ 1 V	10 Hz ~ 20 Hz	0.47 % + 0.25 mV
	20 Hz ~ 40 Hz	0.18 % + 0.24 mV
	40 Hz ~ 100 Hz	0.07 % + 0.12 mV
	100 Hz ~ 20 kHz	0.03 % + 0.12 mV
	20 kHz ~ 50 kHz	0.18 % + 0.47 mV
	50 kHz ~ 100 kHz	0.69 % + 0.93 mV
	100 kHz ~ 250 kHz	2.4 % + 5.8 mV
	250 kHz ~ 500 kHz	3.5 % + 7 mV
	500 kHz ~ 1 MHz	6 % + 24 mV
	1 MHz ~ 2 MHz	12 % + 60 mV
1 V ~ 10 V	10 Hz ~ 20 Hz	0.47 % + 2.4 mV
	20 Hz ~ 40 Hz	0.18 % + 2.4 mV
	40 Hz ~ 100 Hz	0.07 % + 1.2 mV
	100 Hz ~ 20 kHz	0.04 % + 1.2 mV
	20 kHz ~ 50 kHz	0.18 % + 4.7 mV
	50 kHz ~ 100 kHz	0.69 % + 9.3 mV
	100 kHz ~ 250 kHz	2.4 % + 58 mV
	250 kHz ~ 500 kHz	3.5 % + 70 mV
	500 kHz ~ 1 MHz	6 % + 240 mV
	1 MHz ~ 2 MHz	12 % + 600 mV
10 V ~ 100 V	10 Hz ~ 20 Hz	0.47 % + 0.024 V
	20 Hz ~ 40 Hz	0.18 % + 0.024 V
	40 Hz ~ 100 Hz	0.07 % + 0.012 V
	100 Hz ~ 20 kHz	0.04 % + 0.012 V
	20 kHz ~ 50 kHz	0.18 % + 0.047 V
	50 kHz ~ 100 kHz	0.69 % + 0.093 V
	100 kHz ~ 250 kHz	2.4 % + 0.58 V
	250 kHz ~ 500 kHz	3.5 % + 0.7 V
	500 kHz ~ 1 MHz	6 % + 2.4 V
100 V ~ 1000 V	10 Hz ~ 20 Hz	0.5 % + 0.35 V
	20 Hz ~ 40 Hz	0.2 % + 0.35 V
	40 Hz ~ 100 Hz	0.1 % + 0.24 V
	100 Hz ~ 20 kHz	0.07 % + 0.24 V
	20 kHz ~ 50 kHz	0.18 % + 0.47 V
	50 kHz ~ 100 kHz	0.69 % + 2.4 V

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2.2 Measurement	TS-08 Direct measurement of AC Voltage sourced by Multifunction Calibrator	
0.22 mV ~ 2.2 mV	10 Hz ~ 20 Hz 20 Hz ~ 40 Hz 40 Hz ~ 20 kHz 20 kHz ~ 50 kHz 50 kHz ~ 100 kHz 100 kHz ~ 300 kHz 300 kHz ~ 500 kHz 500 kHz ~ 1 MHz	0.024 % + 5 $\mu$ V 0.009 % + 5 $\mu$ V 0.008 % + 5 $\mu$ V 0.02 % + 5 $\mu$ V 0.05 % + 6 $\mu$ V 0.11 % + 11 $\mu$ V 0.14 % + 21 $\mu$ V 0.27 % + 21 $\mu$ V
2.2 mV ~ 22 mV	10 Hz ~ 20 Hz 20 Hz ~ 40 Hz 40 Hz ~ 20 kHz 20 kHz ~ 50 kHz 50 kHz ~ 100 kHz 100 kHz ~ 300 kHz 300 kHz ~ 500 kHz 500 kHz ~ 1 MHz	0.024 % + 5 $\mu$ V 0.009 % + 5 $\mu$ V 0.008 % + 5 $\mu$ V 0.02 % + 5 $\mu$ V 0.05 % + 6 $\mu$ V 0.11 % + 11 $\mu$ V 0.14 % + 21 $\mu$ V 0.27 % + 21 $\mu$ V
22 mV ~ 220 mV	10 Hz ~ 20 Hz 20 Hz ~ 40 Hz 40 Hz ~ 20 kHz 20 kHz ~ 50 kHz 50 kHz ~ 100 kHz 100 kHz ~ 300 kHz 300 kHz ~ 500 kHz 500 kHz ~ 1 MHz	0.024 % + 13 $\mu$ V 0.009 % + 8 $\mu$ V 0.008 % + 8 $\mu$ V 0.02 % + 8 $\mu$ V 0.046 % + 18 $\mu$ V 0.1 % + 21 $\mu$ V 0.14 % + 26 $\mu$ V 0.27 % + 46 $\mu$ V
0.22 V ~ 2.2 V	10 Hz ~ 20 Hz 20 Hz ~ 40 Hz 40 Hz ~ 20 kHz 20 kHz ~ 50 kHz 50 kHz ~ 100 kHz 100 kHz ~ 300 kHz 300 kHz ~ 500 kHz 500 kHz ~ 1 MHz	0.024 % + 41 $\mu$ V 0.009 % + 16 $\mu$ V 0.0045 % + 9 $\mu$ V 0.0075 % + 11 $\mu$ V 0.011 % + 31 $\mu$ V 0.042 % + 81 $\mu$ V 0.1 % + 210 $\mu$ V 0.17 % + 310 $\mu$ V

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2.2 V ~ 22 V	10 Hz ~ 20 Hz 20 Hz ~ 40 Hz 40 Hz ~ 20 kHz 20 kHz ~ 50 kHz 50 kHz ~ 100 kHz 100 kHz ~ 300 kHz 300 kHz ~ 500 kHz 500 kHz ~ 1 MHz	0.024 % + 0.41 mV 0.009 % + 0.16 mV 0.0045 % + 0.06 mV 0.0075 % + 0.11 mV 0.01 % + 0.21 mV 0.028 % + 0.7 mV 0.1 % + 2.1 mV 0.15 % + 3.3 mV
22 V ~ 220 V	10 Hz ~ 20 Hz 20 Hz ~ 40 Hz 40 Hz ~ 20 kHz 20 kHz ~ 50 kHz 50 kHz ~ 100 kHz	0.024 % + 4.1 mV 0.009 % + 1.6 mV 0.0052 % + 0.7 mV 0.008 % + 1.1 mV 0.015 % + 2.6 mV
250 V ~ 700 V	50 Hz ~ 1 kHz	0.008 % + 20 mV
3. Resistance	TS-36	
3.1 Measurement (specific value)	Measurement of calibrated resistance values from standard resistors	
1 mΩ		0.2 %
10 mΩ		0.02 %
100 mΩ		0.02 %
0.1 Ω		3 μΩ
1 Ω		4 μΩ
10 Ω		0.04 mΩ
100 Ω		0.46 mΩ
1 kΩ		0.002 Ω
10 kΩ		0.03 Ω
100 kΩ		0.26 Ω
10 MΩ		0.014 MΩ
100 MΩ		0.3 MΩ
1 GΩ		0.002 GΩ
10 GΩ		1.0 %
100 GΩ		0.8 %
1 TΩ		2.0 %

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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 $\Omega$	Measurement of calibrated resistance values from multifunction calibrator	0.11 m $\Omega$ 0.2 m $\Omega$ 0.25 m $\Omega$ 0.55 m $\Omega$ 1.3 m $\Omega$ 2.1 m $\Omega$ 0.010 $\Omega$ 0.018 $\Omega$ 0.10 $\Omega$ 0.18 $\Omega$ 1.2 $\Omega$ 2.2 $\Omega$ 0.020 k $\Omega$ 0.041 k $\Omega$ 0.42 k $\Omega$ 0.0012 M $\Omega$ 0.012 M $\Omega$
3.2 Measurement (variable value) 0 ~ 11 $\Omega$ 11 ~ 33 $\Omega$ 33 ~ 1100 $\Omega$ 1.1 ~ 11 k $\Omega$ 11 ~ 110 k $\Omega$ 110 ~ 1100 k $\Omega$ 1.1 ~ 3.3 M $\Omega$ 3.3 ~ 11 M $\Omega$ 11 ~ 33 M $\Omega$ 33 ~ 110 M $\Omega$ 110 ~ 330 M $\Omega$ 330 ~ 1000 M $\Omega$	Measurement of resistance values generated by multifunction calibrator	47 ppm + 12 m $\Omega$ 35 ppm + 18 m $\Omega$ 33 ppm + 30 m $\Omega$ 33 ppm + 0.3 $\Omega$ 33 ppm + 2 $\Omega$ 37 ppm + 20 $\Omega$ 70 ppm + 0.2 k $\Omega$ 0.015 % + 0.3 k $\Omega$ 0.03 % + 3 k $\Omega$ 0.06 % + 3.5 k $\Omega$ 0.35 % + 0.2 M $\Omega$ 1.75 % + 0.7 M $\Omega$

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<p>3.3 Source (specific value)</p> <p>0.1 <math>\Omega</math> 1 <math>\Omega</math> 10 <math>\Omega</math> 100 <math>\Omega</math> 1 k<math>\Omega</math> 10 k<math>\Omega</math> 100 k<math>\Omega</math></p>	Transfer of calibrated resistance values from standard resistors	<p>6 ppm + 35 <math>\mu\Omega</math> 6 ppm + 35 <math>\mu\Omega</math> 6 ppm + 44 <math>\mu\Omega</math> 4 ppm + 0.6 m<math>\Omega</math> 3 ppm + 0.0016 <math>\Omega</math> 3 ppm + 0.026 <math>\Omega</math> 3 ppm + 0.26 <math>\Omega</math></p>
<p>3.4 Source (variable value)</p> <p>0 <math>\Omega</math> ~ 10 <math>\Omega</math> 10 <math>\Omega</math> ~ 100 <math>\Omega</math> 100 <math>\Omega</math> ~ 1 k<math>\Omega</math> 1 k<math>\Omega</math> ~ 10 k<math>\Omega</math> 10 k<math>\Omega</math> ~ 100 k<math>\Omega</math> 100 k<math>\Omega</math> ~ 1 M<math>\Omega</math> 1 M<math>\Omega</math> ~ 10 M<math>\Omega</math> 10 M<math>\Omega</math> ~ 100 M<math>\Omega</math> 100 M<math>\Omega</math> ~ 1 G<math>\Omega</math></p>	Resistance value measured by Precision DMM	<p>18 ppm + 60 <math>\mu\Omega</math> 14 ppm + 0.6 m<math>\Omega</math> 12 ppm + 0.6 m<math>\Omega</math> 12 ppm + 7 m<math>\Omega</math> 12 ppm + 0.06 <math>\Omega</math> 18 ppm + 3 <math>\Omega</math> 58 ppm + 0.2 k<math>\Omega</math> 0.06 % + 1.2 k<math>\Omega</math> 0.67 % + 0.2 M<math>\Omega</math></p>
<p>4. DC Current</p> <p>4.1 Source</p> <p>0.1 <math>\mu\text{A}</math> ~ 10 <math>\mu\text{A}</math> 10 <math>\mu\text{A}</math> ~ 1 mA 1 mA ~ 1000 mA 1 A ~ 5 A 5 A ~ 50 A</p>	<p>TS-44</p> <p>Current calibrated using Ohm's Law</p>	<p>8 ppm + 0.02 nA 8 ppm + 0.2 nA 9 ppm + 120 nA 9 ppm + 3 <math>\mu\text{A}</math> 0.12 %</p>
<p>4.2 Measurement</p> <p>0 ~ <math>\pm</math> 220 <math>\mu\text{A}</math> <math>\pm</math> 0.22 mA ~ <math>\pm</math> 2.2 mA <math>\pm</math> 2.2 mA ~ <math>\pm</math> 22 mA <math>\pm</math> 22 mA ~ <math>\pm</math> 220 mA <math>\pm</math> 0.22 A ~ <math>\pm</math> 1 A <math>\pm</math> 1 ~ <math>\pm</math> 2.2 A <math>\pm</math> 2.2 A ~ <math>\pm</math> 11 A <math>\pm</math> 11 A ~ <math>\pm</math> 20 A</p>	Measurement of current sourced by multifunction calibrator	<p>41 ppm + 6 nA 36 ppm + 8 nA 36 ppm + 0.05 <math>\mu\text{A}</math> 46 ppm + 1 <math>\mu\text{A}</math> 81 ppm + 13 <math>\mu\text{A}</math> 81 ppm + 120 <math>\mu\text{A}</math> 0.06 % + 0.001 A 0.12 % + 0.001 A</p>

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<p>5. AC Current</p> <p>5.1 Source</p> <p>10 <math>\mu</math>A ~ 100 <math>\mu</math>A</p> <p>0.1 mA ~ 1 mA</p> <p>1 mA ~ 10 mA</p> <p>10 mA ~ 100 mA</p> <p>0.1 A ~ 1 A</p> <p>3 ~ 11 A</p>	<p>TS-44</p> <p>Calibration of AC current using precision multimeter</p> <p>10 Hz – 20 Hz 20 Hz – 45 Hz 45 Hz – 100 Hz 100 Hz – 5 kHz</p> <p>10 Hz – 20 Hz 20 Hz – 45 Hz 45 Hz – 100 Hz 100 Hz – 5 kHz 5 kHz – 20 kHz</p> <p>10 Hz – 20 Hz 20 Hz – 45 Hz 45 Hz – 100 Hz 100 Hz – 5 kHz 5 kHz – 20 kHz</p> <p>10 Hz – 20 Hz 20 Hz – 45 Hz 45 Hz – 100 Hz 100 Hz – 5 kHz 5 kHz – 20 kHz</p> <p>10 Hz – 20 Hz 20 Hz – 45 Hz 45 Hz – 100 Hz 100 Hz – 5 kHz 5 kHz – 20 kHz</p> <p>TS-44 Transfer of calibrated current value</p> <p>10 Hz ~ 100 Hz 100 Hz ~ 1 kHz 1 kHz ~ 5 kHz</p>	<p>0.47 % + 0.035 <math>\mu</math>A 0.18 % + 0.035 <math>\mu</math>A 0.07 % + 0.035 <math>\mu</math>A 0.07 % + 0.035 <math>\mu</math>A</p> <p>0.47 % + 0.24 <math>\mu</math>A 0.18 % + 0.24 <math>\mu</math>A 0.07 % + 0.24 <math>\mu</math>A 0.04 % + 0.24 <math>\mu</math>A 0.07 % + 0.24 <math>\mu</math>A</p> <p>0.47 % + 2.4 <math>\mu</math>A 0.18 % + 2.4 <math>\mu</math>A 0.07 % + 2.4 <math>\mu</math>A 0.04 % + 2.4 <math>\mu</math>A 0.07 % + 2.4 <math>\mu</math>A</p> <p>0.47 % + 24 <math>\mu</math>A 0.18 % + 24 <math>\mu</math>A 0.07 % + 24 <math>\mu</math>A 0.04 % + 24 <math>\mu</math>A 0.07 % + 24 <math>\mu</math>A</p> <p>0.47 % + 240 <math>\mu</math>A 0.19 % + 240 <math>\mu</math>A 0.1 % + 240 <math>\mu</math>A 0.12 % + 240 <math>\mu</math>A 0.35 % + 240 <math>\mu</math>A</p> <p>1.2 % + 0.01 A 0.12 % + 0.01 A 3.5 % + 0.01 A</p>



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11 ~ 20 A	10 Hz ~ 100 Hz 11 ~ 20 A 100 Hz ~ 1 kHz 1 kHz ~ 5 kHz	0.14 % + 0.03 A 10 Hz ~ 100 Hz 0.17 % + 0.02 A 3.5 % + 0.02 A
5.2 Measurement	TS-44 Measurement of AC current generated by multifunction calibrator	
10 µA ~ 220 µA	10 Hz - 20 Hz 20 Hz - 40 Hz 40 Hz - 1 kHz 1 kHz - 5 kHz 5 kHz - 10 kHz	250 ppm + 17 nA 160 ppm + 11 nA 120 ppm + 9 nA 280 ppm + 13 nA 0.11 % + 66 nA
0.22 mA ~ 2.2 mA	10 Hz - 20 Hz 20 Hz - 40 Hz 40 Hz - 1 kHz 1 kHz - 5 kHz 5 kHz - 10 kHz	250 ppm + 0.05 µA 160 ppm + 0.04 µA 120 ppm + 0.04 µA 200 ppm + 0.12 µA 0.11 % + 0.66 µA
2.2 mA ~ 22 mA	10 Hz - 20 Hz 20 Hz - 40 Hz 40 Hz - 1 kHz 1 kHz - 5 kHz 5 kHz - 10 kHz	250 ppm + 0.5 µA 160 ppm + 0.4 µA 120 ppm + 0.4 µA 200 ppm + 0.6 µA 0.11 % + 5.1 µA
22 mA ~ 220 mA	10 Hz - 20 Hz 20 Hz - 40 Hz 40 Hz - 1 kHz 1 kHz - 5 kHz 5 kHz - 10 kHz	250 ppm + 5 µA 160 ppm + 4 µA 120 ppm + 3 µA 200 ppm + 4 µA 0.11 % + 11 µA

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0.22 A ~ 2.2 A	20 Hz - 1 kHz 1 kHz - 5 kHz 5 kHz - 10 kHz	260 ppm + 40 $\mu$ A 450 ppm + 90 $\mu$ A 0.7 % + 170 $\mu$ A
3 A ~ 11 A	45 Hz ~ 100 Hz 100 Hz ~ 1 kHz 1 kHz ~ 5 kHz	0.07 % + 0.01 A 0.12 % + 0.01 A 3.5 % + 0.01 A
11 A ~ 20 A	45 Hz ~ 100 Hz 100 Hz ~ 1 kHz 1 kHz ~ 5 kHz	0.14 % + 0.01 A 0.17 % + 0.01 A 3.5 % + 0.01 A
6. Capacitance Measurement		
100 pF	TS-36	0.06 pF
1 nF	Direct measurement at 1 kHz using standard capacitors	0.6 pF
10 nF		3 pF
100 nF		29 pF
1 $\mu$ F		0.2 nF
0.19 nF ~ 3.3 nF		Direct measurement using Fluke 5520A
3.3 nF ~ 33 nF	0.23 nF	
33 nF ~ 330 nF	1.57 nF	
0.33 $\mu$ F ~ 3.3 $\mu$ F	0.02 $\mu$ F	
3.3 $\mu$ F ~ 33 $\mu$ F	0.24 $\mu$ F	
33 $\mu$ F ~ 330 $\mu$ F	2.24 $\mu$ F	
0.33 mF ~ 3.3 mF	0.03 mF	
3.3 mF ~ 33 mF	0.34 mF	
33 mF ~ 110 mF	1.67 mF	

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<p>7. Inductance Measurement</p> <p>100 <math>\mu</math>H 1 mH 10 mH 100 mH 1 H 5 H</p>	<p>TS-36 Direct measurement at 1 kHz using standard inductors</p>	<p>0.38 <math>\mu</math>H 2.01 <math>\mu</math>H 13 <math>\mu</math>H 93 <math>\mu</math>H 0.93 mH 5.4 mH</p>
<p>8. Frequency</p> <p>10 MHz Timebase Frequency Output</p> <p>0.1 Hz 1 kHz 1 MHz 100 MHz 225 MHz 1000 MHz – 26.5 GHz</p>	<p>TS-01 Comparison with Frequency Standard</p>	<p>5.8 E-10</p> <p>1.3 E-02 1.4 E-09 8.7 E-08 8.7 E-06 6.9 E-10 1.2 E-07</p>
<p>9. High Voltage</p> <p>1 kV to 10 kV</p>	<p>TS-06 Direct Measurement with a calibrated HV meter</p> <p>DC AC 50 Hz</p>	<p>0.6 % + 5 V 1.2 % + 7 V</p>

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10. Oscilloscope	TS-11	
a. Vertical Deflection	DC Voltage output from Scope Calibrator	
1 mV to 10 V **	50 Ω Input	0.9 % + 0.05 mV
1 mV to 60 V **	1 MΩ Input	1.2 % + 0.03 mV
b. Horizontal Deflection	TS-11	
10 msec (2 ns to 20 ms)	Time Marker output from Scope Calibrator	8.3 ppm
100 msec (50 ms to 5 s)		3.4 ppm
c. Vertical Bandwidth (Cut-off Frequency at 3 dB Bandwidth)	TS-11	
50 kHz to 100 MHz	Levelled Sine output from Scope Calibrator	4 %
100 MHz to 300 MHz		5 %
300 MHz to 500 MHz		8 %
500 MHz to 600 MHz		9 %
<b>B. TEMPERATURE</b>		
1.1 Thermal Couple Thermometer	TS-26	
<u>Type K</u> -200 °C to 1370 °C	Measurement of reference TC emf generated by precision voltage	0.2 °C
<u>Type J</u> -210 °C to 1200 °C	Source through ice point reference device	0.2 °C
<u>Type T</u> -270 °C to -200 °C		0.3 °C
-200 °C to 400 °C		0.2 °C
<u>Type E</u> -250 °C to 1000 °C		0.2 °C

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1.2 TC Thermometer Calibrator  <u>Type K</u> -200 °C to 1370 °C  <u>Type J</u> -210 °C to 1200 °C  <u>Type T</u> -210 °C to -200 °C -200 °C to 400 °C  <u>Type E</u> -250 °C to 1000 °C	TS-26 Measurement of emf sourced by Calibrator through external ice point and check against Corresponding reference TC emf	0.2 °C  0.2 °C  0.3 °C 0.2 °C  0.2 °C
1.3 RTD Thermometer  -190 °C to 500 °C	TS-26 Measure RTD resistance and convert to temperature based on ITS90	0.06 °C
1.4 RTD Simulator/Calibrator  -190 °C to -50 °C -50 °C to 50 °C 50 °C to 190 °C 190 °C to 500 °C	TS-26 Measure RTD simulated temperature based on ITS90 or simulator formula	0.004 °C 0.005 °C 0.007 °C 0.012 °C

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<b>C. MECHANICAL</b>		
1.1 Weighing Scale  <i>Up to 6000 grams</i>  <i>6 kg – 15 kg</i>  <i>15 kg – 35 kg</i>	TS-102A The calibration method was carried out using TSI in-house procedure specification with reference to AS TG2 18/v 0.1 and OIML R 111-1. Direct measurement via placing the working standard mass on UUT	  <i>1.3g</i>  <i>2.7g</i>  <i>60g</i>
1.2 Pressure / Vacuum Gauge  <i>0 to +70.0 bar</i>  <i>0 to -0.9 bar</i>	TS-107 The calibration method was carried out using BS EN 837-1, 837-2 and 837-3 specification, as a guide. Direct measurement of UUT from the Pressure Calibrator	  <i>0.0018 % FS</i>  <i>0.015 % FS</i>
1.3 Torque Screwdrivers (0.04 – 0.14) Nm (0.14 – 0.50) Nm (0.50 – 2.00) Nm (2.0 – 13.6) Nm	TS-101B The calibration was carried out using ISO 6789:2017 specifications as a guide. Direct measurement of UUT from the Torque Measurement System.	  4.7% - 1.3% of reading 3.5% - 1.5% of reading 1.3% - 0.93% of reading 1.2% - 0.70% of reading
<b>D. DIMENSIONAL</b>		
1.1 Caliper <i>(Vernier / Dial / Digimatic)</i> 0 – 150 mm / 6 inch 0 – 300 mm / 12 inch 0 – 600 mm / 24 inch	TS-103A The calibration method was carried out using JIS B 7507-2016 specification, as a guide. Direct measurement to UUT from Caliper Checker	  6.0 μm / 0.0003 inch 6.0 μm / 0.0003 inch 6.0 μm / 0.0003 inch
1.2 Dial Gauge / Indicator  0 – 25 mm	TS-104A The calibration method was carried out using JIS B 7503-2017 specification, as a guide. Direct measurement of UUT from Calibrator Tester	  <i>0.8 μm</i>

# Schedule



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MEASURED QUANTITIES/INSTRUMENTS / RANGE TO BE CALIBRATED	METHOD	CALIBRATION AND MEASUREMENT CAPABILITY (CMC*)
1.3 Dial Test Gauge / Indicator 0 – 0.05 inch 0 – 0.2 mm 0 – 0.8 mm	TS-105A The calibration method was carried out using JIS B 7533-2015 specification, as a guide. Direct measurement of UUT from Calibrator Tester	0.00006 inch 1.0 µm 1.5 µm
1.4 Micrometer 0 – 25 mm	TS-106B The calibration method was carried out using JIS B 7502-2016 specification, as a guide. Direct measurement of UUT from Gauge Block	0.9 µm

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

#### Approved signatories :

Mr Lim Beng Soon - Items A1 to A9, B1 only.

Mr Bernard Chew Lit Min - Items A8 to A10 only

Mr Chin Wei Ming - Items C & D

Mr Andrew Chia Mu En - Items C & D

Mr Randy Gee - A1 – A7 only

#### Note :

This laboratory is accredited in accordance with the recognised International Standard ISO/IEC 17025. A laboratory's fulfilment of the requirements of ISO/IEC 17025 means the laboratory meets both the technical competence requirements and **management system requirements** that are necessary for it to consistently deliver technically valid calibrations. The **management system requirements** in ISO/IEC 17025 are written in language relevant to laboratory operations and operate generally in accordance with the principles of ISO 9001.