

# Schedule

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#05-20 Midview Building  
Singapore 659578

Certificate No. : LA-2006-0361-C

Issue No. : 10

Date : 14 October 2016

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FIELD OF TESTING : Calibration and Measurement

| MEASURED QUANTITIES/INSTRUMENTS/ RANGE TO BE CALIBRATED   | METHOD / FREQUENCY  | CALIBRATION AND MEASUREMENT CAPABILITY (CMC *)   |
|---|---|--|
| <p><b>ELECTRICAL</b></p> <p>1. DC Voltage - Measure</p> <p>0 – 329.999 9 mV<br/>0.33 V – 3.299 999 V<br/>3.3 V – 32.999 99 V<br/>33 V – 329.999 9 V<br/>330 V – 1000.000 V</p> <p>2. DC Current - Measure</p> <p>0 – 329.999 <math>\mu</math>A<br/>0.33 mA – 3.299 99 mA<br/>3.3 mA – 32.9999 mA<br/>33 mA – 329.999 mA<br/>0.33 A – 1.099 99 A<br/>1.1 A – 2.999 99 A<br/>3 A – 10.999 9 A</p> | <p>SOP – MDCV – 01, Rev B (17/7/06)</p> <p>SOP – MDCC – 02, Rev B (17/7/06)</p> | <p>16 ppm + 1.1 <math>\mu</math>V<br/>9 ppm + 6 <math>\mu</math>V<br/>10 ppm + 60 <math>\mu</math>V<br/>14 ppm + 600 <math>\mu</math>V<br/>14 ppm + 1300 <math>\mu</math>V</p> <p>120 ppm + 0.02 <math>\mu</math>A<br/>78 ppm + 0.07 <math>\mu</math>A<br/>78 ppm + 0.3 <math>\mu</math>A<br/>78 ppm + 3.0 <math>\mu</math>A<br/>160 ppm + 35 <math>\mu</math>A<br/>300 ppm + 35 <math>\mu</math>A<br/>390 ppm + 700 <math>\mu</math>A</p> |



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|---|---|---|
| 33 $\mu$ F – 109.999 $\mu$ F<br>0.33 $\mu$ F – 1.099 99 mF<br>3.3 mF – 10.999 9 mF  | 10 Hz - 80 Hz<br>0 - 20 Hz<br>0 - 2 Hz  | 0.35 % + 100 nF<br>0.35 % + 1000 nF<br>0.35 % + 10 000 nF   |
| 5. AC Voltage – Measure<br><br>1 mV – 32.999 mV<br>33 mV – 329.999 mV<br>0.33 V – 3.299 99 V<br>3.3 V – 32.9999 V<br>33 V – 329.999 V<br>330 V – 1020.00 V  | SOP – MACV – 04, Rev B (17/7/06)<br><br>}<br>}<br>45 Hz - 1 kHz<br>}<br>}<br>}  | 120 ppm + 5 $\mu$ V<br>120 ppm + 7 $\mu$ V<br>120 ppm + 50 $\mu$ V<br>120 ppm + 500 $\mu$ V<br>150 ppm + 1700 $\mu$ V<br>240 ppm + 8000 $\mu$ V   |
| 6. AC Current – Measure<br><br>29 $\mu$ A – 329.99 $\mu$ A<br>0.33 mA – 3.299 9 mA<br>3.3 mA – 32.999 mA<br>33 mA – 329.999 mA<br>0.33 A – 1.099 99 A<br>1.1 A – 2.999 99 A<br><br>3 A – 10.999 9 A<br>3 A – 10.999 9 A | SOP – MACC – 05, Rev B (17/7/06)<br><br>}<br>}<br>45 Hz - 1 kHz<br>}<br>}<br>}<br>}<br>45 Hz - 100 Hz<br>100 Hz - 1 kHz | 0.10 % + 0.08 $\mu$ A<br>0.08 % + 0.13 $\mu$ A<br>0.04 % + 2 $\mu$ A<br>0.04 % + 20 $\mu$ A<br>0.04 % + 80 $\mu$ A<br>0.05 % + 80 $\mu$ A<br><br>0.05 % + 2000 $\mu$ A<br>0.08 % + 2000 $\mu$ A |
| 7. AC Power - Measure<br><br>100 mW to 11.000 kW<br>(3.3 mA to 11.000 0 A)  | SOP – MACW-22, Rev A (17/1/13)<br><br>45 Hz to 65 Hz, PF=1  | 0.11 %  |
| 8. DC Power – Measure<br><br>10 mW – 6.000 kW<br>(3.3 mA – 11.000 0 A)  | SOP – MDCW-24, Rev A (17/1/14)  | 0.08 %  |

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|---|--|--|
| <p>9. DC Voltage -<br/>Source / Calibrator</p> <p>0 – 100.000 0 mV<br/>0.1 V – 1.000 000 V<br/>1 V – 10.000 00 V<br/>10 V – 100.000 0 V<br/>100 V – 350.000 V<br/>0.5 kV – 10.000 kV</p>  | <p>} SOP – SDCV – 06, Rev B (17/7/06)<br/>}<br/>}<br/>}<br/>}<br/>}<br/>SOP – HDCV – 15, Rev B, (18/10/10)</p>         | <p>0.0060 % + 5 μV<br/>0.0050 % + 8 μV<br/>0.0040 % + 64 μV<br/>0.0052 % + 710 μV<br/>0.0052 % + 600 000 μV<br/>0.6 % + 0.007 μV</p>   |
| <p>10. Temperature Indicator<br/>without sensor - Measure<br/>Thermocouple Input<br/>Type K (-190 °C to 1300 °C )<br/>Type T (-150.0 °C to 390.0 °C)</p>  | <p>SOP-MTEMP-25, Rev A (5/1/15)</p>  | <p>0.5 °C<br/>0.3 °C</p>   |
| <p>11. DC Current -<br/>Source / Calibrator</p> <p>0 – 10.000 00 mA<br/>10 mA – 100.0000 mA<br/>0.1 A – 1.000 000 A<br/>1 A – 3.000 00 A<br/>0 – 400.00 μA<br/>0.4 mA – 4.000 0 mA<br/>4 mA – 10.000 mA</p> <p>1 MΩ – 10.000 00 MΩ<br/>10 MΩ – 100.000 0 MΩ</p> | <p>} SOP – SDCC – 07, Rev C (17/10/07)<br/>}<br/>}<br/>}<br/>} SOP – HDCC – 16, Rev B (18/10/10)<br/>}<br/>}<br/>}</p> | <p>0.06 % + 2.5 μA<br/>0.06 % + 6 μA<br/>0.12 % + 120 μA<br/>0.14 % + 700 μA<br/>0.24 % + 0.1 μA<br/>0.24 % + 0.002 mA<br/>0.24 % + 0.02 mA</p> <p>0.050 % + 120 Ω<br/>0.95 % + 13 000 Ω</p> |

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| <p>12. Resistance -<br/>Source Instrument</p> <p>0 Ω – 100.000 0 Ω<br/>0.1 kΩ – 1.000 000 kΩ<br/>1 kΩ – 10.000 00 kΩ<br/>10 kΩ – 100.000 0 kΩ<br/>0.1 MΩ – 1.000 000 MΩ<br/>1 MΩ – 10.000 00 MΩ<br/>10 MΩ – 100.000 0 MΩ</p> | <p>SOP – SRES – 08, Rev C (17/10/07)</p>  | <p>0.012 % + 0.005 Ω<br/>0.012 % + 0.012 Ω<br/>0.012 % + 0.120 Ω<br/>0.012 % + 1.2 Ω<br/>0.012 % + 12 Ω<br/>0.050 % + 120 Ω<br/>0.95 % + 13 000 Ω</p> |
| <p>13. AC Voltage –<br/>Source / Calibrator</p> <p>0.1 V – 1.000 000 V<br/>1 V – 10.000 00 V<br/>10 V – 100.000 0 V<br/>100 V – 750.000 V</p> <p>0.5 kV – 10.000 kV</p>  | <p>SOP – SACV – 09, Rev B (17/7/06)</p> <p>} 45 Hz to 500 Hz<br/>}<br/>}<br/>}</p> <p>SOP – HACV – 17, Rev B (18/10/10)<br/>50 Hz</p>           | <p>0.07 % + 0.51 mV<br/>0.07 % + 5.1 mV<br/>0.07 % + 51 mV<br/>0.07 % + 380 mV</p> <p>1.2 % + 0.007 kV</p>  |
| <p>14. AC Current –<br/>Source / Calibrator</p> <p>0.01 A – 1.000 000 A<br/>1 A – 3.000 00 A</p> <p>29 μA – 400.00 μA<br/>0.4 mA – 4.000 0 mA<br/>4 mA – 40.000 mA<br/>40 mA – 100.00 mA</p>                                 | <p>SOP – SACC – 10, Rev B (17/7/06)</p> <p>} 45 Hz to 500 Hz<br/>}</p> <p>SOP – HACC -18, Rev B (18/10/10)</p> <p>}<br/>} 50 Hz<br/>}<br/>}</p> | <p>0.12 % + 0.5 mA<br/>0.18 % + 2.1 mA</p> <p>0.7 % + 0.4 μA<br/>0.7 % + 0.002 mA<br/>0.7 % + 0.04 mA<br/>0.7 % + 0.4 mA</p>                          |

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| 15. Test Time – Source<br><br>0.5 s - 30 s<br>30 s - 60 s | SOP – TIMER – 19, Rev B (18/10/10) | 0.1 s<br>0.2 s                                   |

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

#### Approved signatories

Mr Tan Hock Han

Mr Felix Yeoh Boon Kuan

Mr Nelson Lim Te Chiang

#### Note :

This laboratory is accredited in accordance with the recognised International Standard ISO/IEC 17025:2005. A laboratory's fulfilment of the requirements of ISO/IEC 17025:2005 means the laboratory meets both the technical competence requirements and **management system requirements** that are necessary for it to consistently deliver technically valid calibrations results. The **management system requirements** in ISO/IEC 17025:2005 (Section 4) are written in language relevant to laboratory operations and meet the principles of ISO 9001:2008 **Quality Management Systems — Requirements** and are aligned with its pertinent requirements.