

# Schedule of Accreditation

issued by

## United Kingdom Accreditation Service

21 - 47 High Street, Feltham, Middlesex, TW13 4UN, UK



4353

Accredited to  
ISO/IEC 17025:2005

### Alpha Electronics (Southern) Ltd

Issue No: 006 Issue date: 03 February 2012

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Calibration performed at the above address only

#### DETAIL OF ACCREDITATION

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty ( $k = 2$ )	Remarks
ELECTRICAL			
DC Voltage			
Generation	0 V to 202 mV 202 mV to 1.1 V 1.1 V to 2.02 V 2.02 V to 20.2 V 20.2 V to 202 V 202 V to 1 kV	32 ppm + 4.0 $\mu$ V 32 ppm + 5.3 $\mu$ V 32 ppm + 15.0 $\mu$ V 26 ppm + 110 $\mu$ V 32 ppm + 1.50 mV 32 ppm + 5.0 mV	
Measurement	1 kV to 20 kV 20 kV to 40 kV	0.030 % + 6.0 V 0.030 % + 35 V	
DC Current			
Generation	0 $\mu$ A to 100 $\mu$ A 100 $\mu$ A to 200 $\mu$ A 0.2 mA to 1 mA 1 mA to 2 mA 2 mA to 10 mA 10 mA to 20 mA 20 mA to 100 mA 100 mA to 200 mA 0.2 A to 1 A 1 A to 2 A 2 A to 10 A 10 A to 20 A 20 A to 30 A	99 ppm + 35 nA 95 ppm + 35 nA 83 ppm + 47 nA 83 ppm + 55 nA 58 ppm + 350 nA 81 ppm + 1.3 $\mu$ A 68 ppm + 3.5 $\mu$ A 61 ppm + 4.6 $\mu$ A 100 ppm + 41 $\mu$ A 90 ppm + 42 $\mu$ A 350 ppm + 450 $\mu$ A 350 ppm + 450 $\mu$ A 350 ppm + 450 $\mu$ A	
	30 A to 500 A 500 A to 1000 A 1000 A to 1500 A	0.05 % + 0.50 A 0.05 % + 0.6 A 0.05 % + 1.5 A	For the calibration of clampmeters only



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DC Current (cont'd)			
Measurement	0 µA to 10 µA 10 µA to 100 µA 100 µA to 1 mA 1 mA to 10 mA 10 mA to 100 mA 100 mA to 1 A 1 A to 10 A 10 A to 30 A	11 ppm + 0.020 nA 11 ppm + 0.44 nA 13 ppm + 10 nA 13 ppm + 30 nA 13 ppm + 0.12 µA 13 ppm + 2 µA 12 ppm + 17 µA 12 ppm + 180 µA	
DC Resistance			
Sourcing			
Specific Values	100 µΩ 500 µΩ 1 mΩ 2 mΩ 4 mΩ  0.01 Ω 0.1 Ω 1 Ω 10 Ω 100 Ω 1 kΩ 10 kΩ 100 kΩ 1 MΩ  10 MΩ 100 MΩ 1 GΩ  400 µΩ 4 mΩ 40 mΩ 400 mΩ 4 Ω 40 Ω 400 Ω 4 kΩ 40 kΩ 400 kΩ	60 ppm 60 ppm 60 ppm 60 ppm 60 ppm  6 ppm + 0.30 µΩ 15 ppm + 0.90 µΩ 8 ppm + 0.30 µΩ 8 ppm + 0.70 µΩ 8 ppm + 25 µΩ 8 ppm + 130 µΩ 10 ppm + 1.7 mΩ 8 ppm + 15 mΩ 24 ppm + 9.0 Ω  28 ppm + 130 Ω 0.050 % + 4.0 kΩ 0.24 % + 520 kΩ  1.0 µΩ 3.0 µΩ 7.0 µΩ 70 µΩ 5.0 mΩ 6.0 mΩ 55 mΩ 580 mΩ 6.0 Ω 55 Ω	For the calibration of low resistance ohmmeters up to 10 A
Other Values	1 kΩ to 100 kΩ 100 kΩ to 1 MΩ 1 MΩ to 10 MΩ 10 MΩ to 100 MΩ 100 MΩ to 1 GΩ 1 GΩ to 10 GΩ 10 GΩ to 100 GΩ 100 GΩ to 500 GΩ	0.010 % 0.070 % 0.010 % 0.11 % 0.090 % 0.18 % 0.60 % 1.6 % to 5.0 %	For the measurement of insulation testers up to 5 kV



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DC Resistance (cont'd) Sourcing (cont'd) Measurement	0 $\Omega$ to 100 m $\Omega$ 100 m $\Omega$ to 10 $\Omega$ 10 $\Omega$ to 100 $\Omega$ 100 $\Omega$ to 1 k $\Omega$ 1 k $\Omega$ to 10 k $\Omega$ 10 k $\Omega$ to 100 k $\Omega$ 100 k $\Omega$ to 1 M $\Omega$ 1 M $\Omega$ to 10 M $\Omega$ 10 M $\Omega$ to 100 M $\Omega$ 100 M $\Omega$ to 1 G $\Omega$	60 ppm 20 ppm + 60 $\mu\Omega$ 16 ppm + 0.60 m $\Omega$ 13 ppm + 0.70 m $\Omega$ 13 ppm + 7.0 m $\Omega$ 14 ppm + 60 m $\Omega$ 23 ppm + 2.4 $\Omega$ 63 ppm + 120 $\Omega$ 0.60 % + 4.0 k $\Omega$ 0.70 % + 520 k $\Omega$	
AC Voltage Generation	40 Hz to 45 Hz 10 mV to 200 mV 200 mV to 2 V 2 V to 20 V 20 V to 200 V  45 Hz to 1 kHz 10 mV to 200 mV 200 mV to 2 V 2 V to 20 V 20 V to 200 V 200 V to 1 kV  1 kHz to 20 kHz 10 mV to 200 mV 200 mV to 2 V 2 V to 20 V 20 V to 200 V  20kHz to 50kHz 2V to 20V  1 kHz to 5 kHz 200 V to 700 V	0.21 % + 62 $\mu$ V 0.21 % + 410 $\mu$ V 0.21 % + 3.5 mV 0.050 % + 24 mV  0.043 % + 31 $\mu$ V 0.043 % + 110 $\mu$ V 0.036 % + 1.1 mV 0.040 % + 8.7 mV 0.040 % + 87 mV  0.085 % + 46 $\mu$ V 0.080 % + 160 $\mu$ V 0.062 % + 2 mV 0.090 % + 50 mV  0.21 % + 38 mV  0.15 % + 500 mV	
Measurement	40 Hz to 1 kHz 1 mV to 10 mV 10 mV to 100 mV 100 mV to 1 V 1 V to 10 V 10 V to 100 V 100 V to 700 V	0.040 % + 3.0 $\mu$ V 0.020 % + 2.0 $\mu$ V 0.010 % + 30 $\mu$ V 0.010 % + 300 $\mu$ V 0.020 % + 4.0 mV 0.050 % + 40 mV	



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AC Voltage (cont'd) Measurement (cont'd)	<p><i>1 kHz to 10 kHz</i> 1 mV to 10 mV 10 mV to 100 mV 100 mV to 1 V 1 V to 10 V 10 V to 100 V 100 V to 700 V</p> <p><i>10 kHz to 20 kHz</i> 1 mV to 10 mV 10 mV to 100 mV 100 mV to 1 V 1 V to 10 V 10 V to 100 V</p> <p><i>20 kHz to 50 kHz</i> 1 mV to 10 mV 10 mV to 100 mV 100 mV to 1 V 1 V to 10 V 10 V to 100 V</p> <p><i>50 kHz to 100 kHz</i> 1 mV to 10 mV 10 mV to 100 mV 100 mV to 1 V 1 V to 10 V 10 V to 100 V</p> <p><i>40 Hz to 20 kHz</i> 700 V to 1 kV</p> <p><i>50 Hz</i> 1 kV to 20 kV 20 kV to 28 kV</p>	<p>0.050 % + 3.0 <math>\mu</math>V 0.020 % + 2.0 <math>\mu</math>V 0.020 % + 30 <math>\mu</math>V 0.020 % + 300 <math>\mu</math>V 0.020 % + 4.0 mV 0.070 % + 40 mV</p> <p>0.050 % + 3.0 <math>\mu</math>V 0.020 % + 2.0 <math>\mu</math>V 0.020 % + 30 <math>\mu</math>V 0.020 % + 300 <math>\mu</math>V 0.02 % + 4.0 mV</p> <p>0.13 % + 3.0 <math>\mu</math>V 0.050 % + 2.0 <math>\mu</math>V 0.040 % + 30 <math>\mu</math>V 0.040 % + 300 <math>\mu</math>V 0.040 % + 4.0 mV</p> <p>0.58 % + 3.0 <math>\mu</math>V 0.10 % + 2.0 <math>\mu</math>V 0.09 % + 30 <math>\mu</math>V 0.09 % + 300 <math>\mu</math>V 0.14 % + 4.0 mV</p> <p>0.80 % + 1.6 V</p> <p>0.40 % + 60 V 0.40 % + 120 V</p>	
AC Current Generation	<p><i>40 Hz to 45 Hz</i> 20 <math>\mu</math>A to 200 <math>\mu</math>A 200 <math>\mu</math>A to 2 mA 2 mA to 20 mA 20 mA to 200 mA 200 mA to 2 A 2 A to 20 A</p> <p><i>45 Hz to 1 kHz</i> 20 <math>\mu</math>A to 200 <math>\mu</math>A 200 <math>\mu</math>A to 2 mA 2 mA to 20 mA 20 mA to 200 mA 200 mA to 2 A</p>	<p>0.20 % + 300 nA 0.20 % + 600 nA 0.20 % + 6.0 <math>\mu</math>A 0.21 % + 6.7 <math>\mu</math>A 0.20 % + 21 <math>\mu</math>A 0.18 % + 6.0 mA</p> <p>0.11 % + 300 nA 0.10 % + 470 nA 0.10 % + 4.7 <math>\mu</math>A 0.10 % + 5.7 <math>\mu</math>A 0.11 % + 21 <math>\mu</math>A</p>	



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AC Current (cont'd)					
Generation (cont'd)	45 Hz to 100 Hz 2 A to 30 A	0.18 % + 6.0 mA	For the calibration of clampmeters only		
Measurement	50 Hz 30 A to 500 A 500 A to 1000 A	0.070 % + 0.50 A 0.070 % + 1.0 A			
	45 Hz to 100 Hz 10 µA to 100 µA 100 µA to 1 mA 1 mA to 10 mA 10 mA to 100 mA 100 mA to 1 A 1 A to 3 A 3 A to 10 A	0.071 % + 35 nA 0.071 % + 250 nA 0.071 % + 2.0 µA 0.070 % + 25 µA 0.10 % + 250 µA 0.80 % + 2.0 mA 0.80 % + 15 mA			
	100 Hz to 300 Hz 10 µA to 100 µA 100 µA to 1 mA 1 mA to 10 mA 10 mA to 100 mA 100 mA to 1 A	0.071 % + 35 nA 0.071 % + 250 nA 0.040 % + 2.0 µA 0.040 % + 25 µA 0.12 % + 250 µA			
	300 Hz to 1 kHz 10 µA to 100 µA	0.071 % + 35 nA			
	300 Hz to 5 kHz 100 µA to 1 mA 1 mA to 10 mA 10 mA to 100 mA 100 mA to 1 A	0.040 % + 250 nA 0.040 % + 2.0 µA 0.040 % + 25 µA 0.13 % + 250 µA			
	AC Power				At unity power factor
	Generation	40 Hz to 400 Hz 3 W to 40 W 40 W to 4 kW 4 kW to 20 kW		0.20 % 0.10 % 0.10 %	
	Capacitance	50 Hz to 60 Hz 20 kW to 100 kW 100 kW to 1 MW		0.40 % 0.40 %	
		Sourcing		1 kHz 10 pF to 900 pF 900 pF to 9 nF 9 nF to 90 nF 90 nF to 900 nF 900 nF to 9 µF 9 µF to 90 µF	



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Capacitance (cont'd)			
Measurement	1 kHz 10 pF to 100 pF 100 pF to 1 nF 1 nF to 10 nF 10 nF to 100 nF 100 nF to 1 $\mu$ F 1 $\mu$ F to 10 $\mu$ F 10 $\mu$ F to 100 $\mu$ F	0.12 % + 0.42 pF 0.12 % + 0.48 pF 0.12 % + 0.50 pF 0.12 % + 2.5 pF 0.12 % + 25 pF 0.3 % + 300 pF 0.32 % + 2.0 nF	
Inductance			
Sourcing	1 kHz 1 mH 10 mH 100 mH 1 H	1.0 % + 10 $\mu$ H 1.0 % + 10 $\mu$ H 1.0 % + 18 $\mu$ H 1.0 % + 200 $\mu$ H	
Measurement	1 kHz 10 $\mu$ H to 100 $\mu$ H 100 $\mu$ H to 1 mH 1 mH to 10 mH 10 mH to 100 mH 100 mH to 1 H 1 H to 10 H	0.12 % + 42 nH 0.12 % + 48 nH 0.12 % + 450 nH 0.12 % + 2.5 $\mu$ H 0.12 % + 40 $\mu$ H 0.12 % + 300 $\mu$ H	
AC Resistance	1 kHz 1 $\Omega$ to 10 $\Omega$ 10 $\Omega$ to 100 $\Omega$ 100 $\Omega$ to 1 k $\Omega$ 1 k $\Omega$ to 10 k $\Omega$ 10 k $\Omega$ to 100 k $\Omega$ 100 k $\Omega$ to 1 M $\Omega$ 1 M $\Omega$ to 10 M $\Omega$	0.17 % + 3.0 m $\Omega$ 0.17 % + 55 m $\Omega$ 0.17 % + 200 m $\Omega$ 0.28 % + 330 m $\Omega$ 0.28 % + 11 $\Omega$ 0.28 % + 100 $\Omega$ 0.28 % + 1.1 k $\Omega$	
Frequency			
Generation	1 Hz, 10 Hz, 100 Hz, 1 kHz, 10 kHz, 100 kHz, 1 MHz and 10 MHz	25 ppm	
Measurement	1 Hz to 1 GHz 10 s to 1 $\mu$ s	1.0 ppm 1.0 ppm	
Time Interval	20 ms to 400 ms 400 ms to 900 ms	1.0 ms 8.2 ms	For the calibration of RCD timers
Loop Resistance	50 Hz 0.05 $\Omega$ to 5 $\Omega$ 10 $\Omega$ to 100 $\Omega$ 100 $\Omega$ to 1 k $\Omega$	0.58 % + 16 m $\Omega$ 0.58 % + 35 m $\Omega$ 0.58 % + 46 m $\Omega$	Suitable for AC Current up to 25A. The nominal values depend on the local loop impedance.
Optical Tachometers	60 rpm to 60000 rpm	60 ppm + 0.70 rpm	



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Temperature indicators, calibration by electrical simulation			
Resistance Thermometer (Pt100)	- 200 °C to + 850 °C	0.010 °C	
Base metal thermocouple	- 270 °C to + 1340 °C	0.20 °C	Including cold junction compensation
Noble metal thermocouple	- 50 °C to + 1820 °C	0.70 °C	Including cold junction compensation
END			