


# Schedule of Accreditation

issued by

## United Kingdom Accreditation Service

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

 <p><b>0439</b></p> <p>Accredited to <b>ISO/IEC 17025:2005</b></p>	<h3>Microlease PLC</h3> <p><b>Issue No: 013    Issue date: 6 January 2011</b></p>	
	<p><b>Calibration Services</b></p> <p>Unit F1, Little Heath Industrial Estate Old Church Road Coventry West Midlands CV6 7ND</p>	<p><b>Contact: Mr Barry Wenmouth</b></p> <p>Tel: +44 (0) 2476 668388 Fax: +44 (0) 2476 667561 E-Mail: Barry.Wenmouth@microlease.co.uk Website: www.microlease.com</p>
<p><b>Calibration performed at the above address only</b></p>		

### DETAIL OF ACCREDITATION

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty ( $k = 2$ )	Remarks
DC RESISTANCE			
Measurement	0.001 $\Omega$ to 12 $\Omega$ 12 $\Omega$ to 120 $\Omega$ 120 $\Omega$ to 1.2 k $\Omega$ 1.2 k $\Omega$ to 12 k $\Omega$ 12 k $\Omega$ to 120 k $\Omega$ 120 k $\Omega$ to 1.2 M $\Omega$ 1.2 M $\Omega$ to 12 M $\Omega$ 12 M $\Omega$ to 120 M $\Omega$ 120 M $\Omega$ to 1.2 G $\Omega$	14 ppm + 50 $\mu\Omega$ 12 ppm + 500 $\mu\Omega$ 11 ppm + 500 $\mu\Omega$ 8.7 ppm + 5 m $\Omega$ 12 ppm + 50 m $\Omega$ 19 ppm + 2.0 $\Omega$ 57 ppm + 100 $\Omega$ 560 ppm + 1.0 k $\Omega$ 0.78 % + 10 k $\Omega$	
Generation (specific values)	1 m $\Omega$ 10 m $\Omega$ 100 m $\Omega$ 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 $\Omega$	50 ppm 20 ppm 10 ppm 4.0 ppm 95 ppm 4.0 ppm 23 ppm 5.0 ppm 10 ppm 4.0 ppm 10 ppm 4.0 ppm 8.5 ppm 4.0 ppm 13 ppm 7.0 ppm 24 ppm 20 ppm 60 ppm 31 ppm	



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Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty ( $k=2$ )	Remarks
DC VOLTAGE			
Measurement	1.0 mV to 120 mV 120 mV to 1.2 V 1.2 V to 12 V 12 V to 120 V 120 V to 1000 V	6.5 ppm + 0.30 $\mu$ V 5.0 ppm + 0.30 $\mu$ V 5.0 ppm + 0.50 $\mu$ V 7.0 ppm + 30 $\mu$ V 7.0 ppm + 0.10 mV	Additional error for inputs greater than 100 V:  $12 \text{ ppm} \times (V_m / 1000)^2$
Generation	1.0 mV to 220 mV 220 mV to 2.2 V 2.2 V to 11 V 11 V to 22 V 22 V to 220 V 100 V to 1100 V	7.5 ppm + 0.40 $\mu$ V 5.0 ppm + 0.70 $\mu$ V 3.5 ppm + 2.5 $\mu$ V 3.5 ppm + 4.0 $\mu$ V 5.0 ppm + 4.0 $\mu$ V 6.5 ppm + 400 $\mu$ V	
DC CURRENT			
Measurement	10 nA to 1.2 $\mu$ A 1.2 $\mu$ A to 12 $\mu$ A 12 $\mu$ A to 120 $\mu$ A 120 $\mu$ A to 1.2 mA 1.2 mA to 12 mA 12 mA to 120 mA 120 mA to 1.2 A	60 ppm + 80 pA 28 ppm + 100 pA 27 ppm + 800 pA 28 ppm + 5.0 nA 28 ppm + 50 nA 43 ppm + 500 nA 130 ppm + 10 $\mu$ A	
Generation	10 $\mu$ A to 220 $\mu$ A 220 $\mu$ A to 2.2 mA 2.2 mA to 22 mA 22 mA to 220 mA	40 ppm + 6.0 nA 35 ppm + 7.0 nA 35 ppm + 40 nA 45 ppm + 0.70 $\mu$ A	Additional error for values greater than 100 mA:  $200 \times I^2 \text{ ppm}$ Additional error for values greater than 1 A:  $10 \times I^2 \text{ ppm}$
	220 mA to 2.2 A	80 ppm + 12 $\mu$ A	
	2.2 A to 11 A	700 ppm + 0.48 mA	



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AC VOLTAGE Measurement	<i>20 Hz to 40 Hz</i>		
	120 mV to 1.2 V 1.2 V to 12 V 12 V to 120 V	0.013 % + 40 $\mu$ V 0.013 % + 400 $\mu$ V 0.026 % + 4.0 mV	
	<i>40 Hz to 1 kHz</i>		
	120 mV to 1.2 V 1.2 V to 12 V 12 V to 120 V 120 V to 700 V	0.013 % + 20 $\mu$ V 0.013 % + 200 $\mu$ V 0.026 % + 2.0 mV 0.060 % + 20 mV	
	<i>1 kHz to 20 kHz</i>		
	120 mV to 1.2 V 1.2 V to 12 V 12 V to 120 V 120 V to 700 V	0.020 % + 20 $\mu$ V 0.020 % + 200 $\mu$ V 0.026 % + 2.0 mV 0.080 % + 20 mV	
	<i>20 kHz to 50 kHz</i>		
	120 mV to 1.2 V 1.2 V to 12 V 12 V to 120 V	0.031 % + 20 $\mu$ V 0.031 % + 200 $\mu$ V 0.041 % + 2.0 mV	
	<i>50 kHz to 100 kHz</i>		
	120 mV to 1.2 V 1.2 V to 12 V 12 V to 120 V	0.089 % + 20 $\mu$ V 0.089 % + 200 $\mu$ V 0.13 % + 2.0 mV	
	<i>100 kHz to 300 kHz</i>		
	120 mV to 1.2 V 1.2 V to 12 V	0.33 % + 100 $\mu$ V 0.33 % + 1.0 mV	
	<i>300 kHz to 1 MHz</i>		
	120 mV to 1.2 V 1.2 V to 12 V	1.0 % + 100 $\mu$ V 1.2 % + 1.0 mV	
	<i>1 kHz</i>		
	100 $\mu$ V to 10 mV 10 mV to 120 mV	0.030% + 1.1 $\mu$ V 0.013% + 2.0 $\mu$ V	



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AC VOLTAGE Generation	0.1 mV to 2.2 mV  10 Hz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 500 kHz 500 kHz to 1 MHz  2.2 mV to 22 mV  10 Hz to 40 Hz 40 Hz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 500 kHz 500 kHz to 1 MHz  22 mV to 220 mV  10 Hz to 40 Hz 40 Hz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 500 kHz 500 kHz to 1 MHz  220 mV to 2.2 V  10 Hz to 40 Hz 40 Hz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 500 kHz 500 kHz to 1 MHz  2.2 V to 22 V  10 Hz to 40 Hz 40 Hz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 500 kHz 500 kHz to 1 MHz	240 ppm + 4.0 $\mu$ V 500 ppm + 5.0 $\mu$ V 0.11 % + 10 $\mu$ V 0.14 % + 20 $\mu$ V 0.27 % + 20 $\mu$ V  240 ppm + 4.0 $\mu$ V 80 ppm + 4.0 $\mu$ V 200 ppm + 4.0 $\mu$ V 500 ppm + 5.0 $\mu$ V 0.11 % + 10 $\mu$ V 0.14 % + 20 $\mu$ V 0.27 % + 20 $\mu$ V  240 ppm + 12 $\mu$ V 80 ppm + 7.0 $\mu$ V 200 ppm + 7.0 $\mu$ V 460 ppm + 17 $\mu$ V 900 ppm + 20 $\mu$ V 0.14 % + 25 $\mu$ V 0.27 % + 45 $\mu$ V  240 ppm + 40 $\mu$ V 45 ppm + 8.0 $\mu$ V 75 ppm + 10 $\mu$ V 110 ppm + 30 $\mu$ V 420 ppm + 80 $\mu$ V 0.10 % + 200 $\mu$ V 0.17 % + 300 $\mu$ V  240 ppm + 400 $\mu$ V 45 ppm + 50 $\mu$ V 75 ppm + 100 $\mu$ V 150 ppm + 200 $\mu$ V 280 ppm + 600 $\mu$ V 0.10 % + 2.0 mV 0.30 % + 3.2 mV	



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Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty ( $k=2$ )	Remarks
AC VOLTAGE Generation (continued)	22 V to 220 V  10 Hz to 40 Hz 40 Hz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz  220 V to 1100 V  40 Hz to 1 kHz 1 kHz to 20 kHz 20 kHz to 30 kHz  220 V to 750 V  30 kHz to 50 kHz 50 kHz to 100 kHz	240 ppm + 4 mV 52 ppm + 0.60 mV 80 ppm + 1.0 mV 150 ppm + 2.5 mV    90 ppm + 4.0 mV 170 ppm + 6.0 mV 600 ppm + 11 mV  600 ppm + 11 mV 0.23 % + 45 mV	
AC CURRENT Measurement	20 Hz to 50 Hz  500 $\mu$ A to 12 mA 12 mA to 120 mA 120 mA to 1.2 A  50 Hz to 1 kHz  5 $\mu$ A to 120 $\mu$ A 120 $\mu$ A to 1.2 mA 1.2 mA to 12 mA 12 mA to 120 mA 120 mA to 1.2 A  1 kHz only  5 $\mu$ A to 120 $\mu$ A 120 $\mu$ A to 1.2 mA 1.2 mA to 12 mA 12 mA to 120 mA 120 mA to 1.2 A  1 kHz to 5 kHz  500 $\mu$ A to 12 mA 12 mA to 120 mA 120 mA to 1.2 A	0.17 % + 2.0 $\mu$ A 0.17 % + 20 $\mu$ A 0.18 % + 200 $\mu$ A   0.085 % + 30 nA 0.085 % + 200 nA 0.075 % + 2.0 $\mu$ A 0.075 % + 20 $\mu$ A 0.12 % + 200 $\mu$ A   0.085 % + 30 nA 0.055 % + 200 nA 0.045 % + 2.0 $\mu$ A 0.045 % + 20 $\mu$ A 0.12 % + 200 $\mu$ A  0.045 % + 2.0 $\mu$ A 0.045 % + 20 $\mu$ A 0.12 % + 200 $\mu$ A	



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AC CURRENT			
Generation	<p><i>40 Hz to 1 kHz</i></p> <p>10 <math>\mu</math>A to 220 <math>\mu</math>A 220 <math>\mu</math>A to 2.2 mA 2.2 mA to 22 mA 22 mA to 220 mA 220 mA to 2.2 A 2.2 A to 11 A</p> <p><i>1 kHz to 5 kHz</i></p> <p>10 <math>\mu</math>A to 220 <math>\mu</math>A 220 <math>\mu</math>A to 2.2 mA 2.2 mA to 22 mA 22 mA to 220 mA 220 mA to 2.2 A 2.2 A to 11 A</p> <p><i>5 kHz to 10 kHz</i></p> <p>10 <math>\mu</math>A to 220 <math>\mu</math>A 220 <math>\mu</math>A to 2.2 mA 2.2 mA to 22 mA 22 mA to 220 mA 220 mA to 2.2 A 2.2 A to 11 A</p>	<p>170 ppm + 8.0 nA 120 ppm + 35 nA 120 ppm + 350 nA 120 ppm + 2.5 <math>\mu</math>A 260 ppm + 35 <math>\mu</math>A 900 ppm + 170 <math>\mu</math>A</p> <p>380 ppm + 12 nA 200 ppm + 110 nA 200 ppm + 550 nA 200 ppm + 3.5 <math>\mu</math>A 450 ppm + 80 <math>\mu</math>A 0.15 % + 380 <math>\mu</math>A</p> <p>0.11 % + 65 nA 0.11 % + 650 nA 0.11 % + 5.0 <math>\mu</math>A 0.11 % + 10 <math>\mu</math>A 0.70 % + 160 <math>\mu</math>A 0.36 % + 750 <math>\mu</math>A</p>	
FREQUENCY			
Generation	1 MHz, 5 MHz and 10 MHz	5.0 in $10^{11}$	
Measurement	1 MHz, 5 MHz and 10 MHz	5.5 in $10^{11}$	
END			