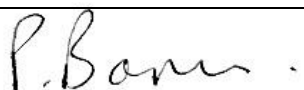


# Laboratory Accreditation Programmes

Schedule to

## CERTIFICATE OF ACCREDITATION

<b>Laboratory</b>	RF Test Solutions Limited	
<b>Address</b>	Electrical & Communications Equipment PO Box 6844, Marion Square, Wellington, 6141 409 Cuba Street, Alicetown, Lower Hutt, 5010	
<b>Telephone</b>	04 939-0635	
<b>URL</b>	www.rftest.co.nz	
<b>Authorised Representative</b>	Mr Lex Grubner Director	
<b>Client No.</b>	2434	
<b>Programme</b>	Metrology & Calibration Laboratory	
<b>Accreditation Number</b>	492	
<b>Initial Accreditation Date</b>	5 July 1993	
<b>Conformance Standard</b>	ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories	
<b>Testing Services Summary</b>	5.55 Speed Measuring Devices 5.61 Temperature Measuring Equipment 5.82 Resistors, Resistance Boxes and Potential Dividers 5.88 Calibrators for Instrumentation 5.89 Indicating Instruments and Recording Instruments 5.91 Frequency Measurement and Time Measurement 5.92 Waveform Measurement 5.93 Signal Sources 5.95 Communications Equipment 5.97 High Voltage Testing	
<b>Signatories</b>	Mr Tristan Gibbs 5.55, 5.61, 5.82, 5.88, 5.89, 5.91, 5.92, 5.93, 5.95, 5.97 Mr Ronald Phillips 5.55 Mr Michael Taylor 5.55, 5.61, 5.82, 5.88, 5.89, 5.91, 5.92, 5.93, 5.95, 5.97 Mr Michael Tecofsky 5.55, 5.61, 5.82, 5.88, 5.89, 5.91, 5.92, 5.93, 5.95, 5.97	

Authorised: General Manager		Issue 35	Date: 05/08/19	Page 1 of 16
--------------------------------	---	----------	----------------	--------------

Schedule to

**CERTIFICATE OF ACCREDITATION**

RF Test Solutions Limited  
Metrology & Calibration Laboratory  
**SCOPE OF ACCREDITATION**

Accreditation No 492

Calibration temperature  $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ , Relative Humidity 20 % to 80 %.

Calibration and Measurement Capability (CMC) Uncertainties are expressed as an expanded uncertainty with a level of confidence of approximately 95 % ( $k = 2$ ) <sup>Note1</sup>.

Measurement results are traceable to the International System of Units (SI) via an unbroken chain of comparisons to the New Zealand National Standards or to the National Standards of other Signatories to the CIPM MRA.

Calibrations can be performed at the premises of the accredited laboratory or at the customer's premises using a mobile calibration facility or in the field.

**5.55 Speed Measuring Devices**

## (b) Speedometers

Laser and Lidar speed measuring instruments by simulation (frequency) to an in-house method based on manufacturer's recommendations

Lidar laser measurements	CMC Uncertainty
5 km/h to 100 km/h	0.6 km/h
150 km/h	0.6 km/h
200 km/h	0.6 km/h
250 km/h	0.6 km/h
300 km/h	0.6 km/h
Radar measurements	
5 km/h	0.2 km/h
50 km/h	0.3 km/h
100 km/h	0.5 km/h
150 km/h	0.6 km/h
200 km/h	0.8 km/h
250 km/h	0.9 km/h
300 km/h	1.0 km/hr

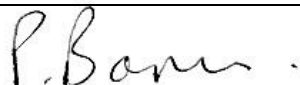
**5.61 Temperature Measuring Equipment**

## (o) Indicators, recorders and controllers

Electrical simulation of thermocouple (types J, K and T) output to an in-house method based on manufacturer's recommendations

Measurand	CMC Uncertainty
-200 $^{\circ}\text{C}$ to 1200 $^{\circ}\text{C}$	0.4 $^{\circ}\text{C}$

Authorised:  
General Manager



Issue 35

Date: 05/08/19

Page 2 of 16

Schedule to

**CERTIFICATE OF ACCREDITATION**

RF Test Solutions Limited  
Metrology & Calibration Laboratory  
**SCOPE OF ACCREDITATION**

Accreditation No 492

**5.82 Resistors, Resistance Boxes and Potential Dividers**

- (a) Precision resistors, resistance boxes and conductance boxes
- (b) Volt ratio boxes and potential dividers
- (c) DC shunts
- (d) AC shunts

In accordance with in-house methods based on manufacturer's recommendations  
Measurand and CMC Uncertainties as for 5.88(e) to maximum 20 A

**5.88 Calibrators for Instrumentation**

In accordance with in-house methods based on manufacturer's recommendations

Measurand	CMC Uncertainty
-----------	-----------------

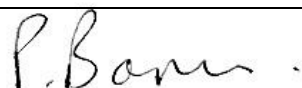
**(a) DC voltage**

0 V	340 nV
0.001 V to 0.01 V	42 $\mu$ V/V
0.01 V to 0.1 V	14 $\mu$ V/V
0.1 V to 1 V	8 $\mu$ V/V
1 V to 10 V	7 $\mu$ V/V
10 V to 100 V	11 $\mu$ V/V
100 V to 1 kV	11 $\mu$ V/V
1 kV to 10 kV	1900 $\mu$ V/V
10 kV to 20 kV	1600 $\mu$ V/V
20 kV to 25 kV	1500 $\mu$ V/V
25 kV to 30 kV	1500 $\mu$ V/V
30 kV to 40 kV	1400 $\mu$ V/V

**(b) AC voltage**

0.01 mV to 10 mV	1 Hz to 1 kHz	0.07 %
	1.1 kHz to 20 kHz	0.14 %
	21 kHz to 100 kHz	0.60 %
	101 kHz to 1 MHz	1.4 %
10 mV to 100 mV	1.1 MHz to 4 MHz	8.7 %
	1 Hz to 1 kHz	0.03 %
	1.1 kHz to 20 kHz	0.04 %
	21 kHz to 100 kHz	0.11 %
	101 kHz to 1 MHz	0.37 %
	1.1 MHz to 4 MHz	4.7 %
	4.1 MHz to 8 MHz	4.7 %
	8.1 MHz to 10 MHz	17 %

Authorised:  
General Manager



Issue 35

Date: 05/08/19

Page 3 of 16

Schedule to

**CERTIFICATE OF ACCREDITATION**
 RF Test Solutions Limited  
 Metrology & Calibration Laboratory  
**SCOPE OF ACCREDITATION**

Accreditation No 492

0.1 V to 1 V	1 Hz to 1 kHz	0.03 %
	1.1 kHz to 20 kHz	0.04 %
	21 kHz to 100 kHz	0.10 %
	101 kHz to 1 MHz	0.36 %
	1.1 MHz to 4 MHz	4.7 %
	4.1 MHz to 8 MHz	4.7 %
	8.1 MHz to 10 MHz	17 %
1 V to 10 V	1 Hz to 1 kHz	0.03 %
	1.1 kHz to 20 kHz	0.04 %
	21 kHz to 100 kHz	0.05 %
	101 kHz to 1 MHz	0.36 %
	1.1 MHz to 4 MHz	2.1 %
	4.1 MHz to 8 MHz	4.8 %
	8.1 MHz to 10 MHz	18 %
10 V to 100 V	1 Hz to 1 kHz	0.04 %
	1.1 kHz to 20 kHz	0.04 %
	21 kHz to 100 kHz	0.05 %
100 V to 1 kV	1 Hz to 1 kHz	0.08 %
1 kV to 5 kV	50 Hz	1.2 %
5 kV to 10 kV	50 Hz	1.4 %
10 kV to 15 kV	50 Hz	1.5 %

## (c) DC current

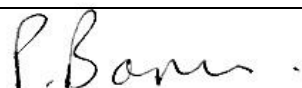
0 A	2 nA
0.01 $\mu$ A to 100 $\mu$ A	38 $\mu$ A/A
0.1 mA to 1 mA	32 $\mu$ A/A
1 mA to 10 mA	32 $\mu$ A/A
10 mA to 100 mA	50 $\mu$ A/A
0.1 A to 1 A	140 $\mu$ A/A
1 A to 10 A	160 $\mu$ A/A
10 A to 20 A	160 $\mu$ A/A

## (d) AC current

1 $\mu$ A to 100 $\mu$ A	1 kHz	0.11 %
0.1 mA to 1 mA	1 kHz	0.06 %
1 mA to 10 mA	1 kHz	0.06 %
10 mA to 100 mA	1 kHz	0.06 %
0.1 A to 1 A	1 kHz	0.14 %
1 A to 10 A	50 Hz	0.09 %
1 A to 10 A	1 kHz	0.10 %
10 A to 20 A	50 Hz	0.09 %

## (e) Resistance

 Authorised:  
 General Manager



Issue 35

Date: 05/08/19

Page 4 of 16

Schedule to

**CERTIFICATE OF ACCREDITATION**
 RF Test Solutions Limited  
 Metrology & Calibration Laboratory  
**SCOPE OF ACCREDITATION**

Accreditation No 492

0 $\Omega$	250 $\mu\Omega$
10 $\Omega$	34 $\mu\Omega/\Omega$
100 $\Omega$	29 $\mu\Omega/\Omega$
1 k $\Omega$	19 $\mu\Omega/\Omega$
10 k $\Omega$	19 $\mu\Omega/\Omega$
100 k $\Omega$	19 $\mu\Omega/\Omega$
1 M $\Omega$	31 $\mu\Omega/\Omega$
10 M $\Omega$	100 $\mu\Omega/\Omega$
100 M $\Omega$	840 $\mu\Omega/\Omega$

**5.89 Indicating Instruments and Recording Instruments**

In accordance with in-house methods based on manufacturer's recommendations

Measurand	CMC Uncertainty
-----------	-----------------

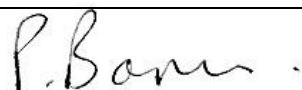
**(a) DC voltmeters**

1 mV to 220 mV	11 $\mu\text{V/V}$
0.22 V to 2.2 V	6 $\mu\text{V/V}$
2.2 V to 11 V	7 $\mu\text{V/V}$
11 V to 22 V	6 $\mu\text{V/V}$
22 V to 220 V	7 $\mu\text{V/V}$
220 V to 1.1 kV	7 $\mu\text{V/V}$

**(b) AC voltmeters**

0.001 mV to 2.2 mV	10 Hz to 20 Hz	2100 $\mu\text{V/V}$
	20 Hz to 40 Hz	2000 $\mu\text{V/V}$
	40 Hz to 20 kHz	2000 $\mu\text{V/V}$
	20 kHz to 50 kHz	2000 $\mu\text{V/V}$
	50 kHz to 100 kHz	2200 $\mu\text{V/V}$
	100 kHz to 300 kHz	3800 $\mu\text{V/V}$
	300 kHz to 500 kHz	6800 $\mu\text{V/V}$
	500 kHz to 2 MHz	7900 $\mu\text{V/V}$
	2 MHz to 5 MHz	7900 $\mu\text{V/V}$
	5 MHz to 10 MHz	8200 $\mu\text{V/V}$
2.2 mV to 22 mV	10 MHz to 20 MHz	8200 $\mu\text{V/V}$
	20 MHz to 30 MHz	8700 $\mu\text{V/V}$
	10 Hz to 20 Hz	410 $\mu\text{V/V}$
	20 Hz to 40 Hz	320 $\mu\text{V/V}$
	40 Hz to 20 kHz	320 $\mu\text{V/V}$
	20 kHz to 50 kHz	320 $\mu\text{V/V}$
	50 kHz to 100 kHz	550 $\mu\text{V/V}$

 Authorised:  
 General Manager



Issue 35

Date: 05/08/19

Page 5 of 16

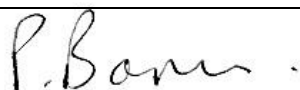
Schedule to

**CERTIFICATE OF ACCREDITATION**
 RF Test Solutions Limited  
 Metrology & Calibration Laboratory  
**SCOPE OF ACCREDITATION**

Accreditation No 492

	100 kHz to 300 kHz	1000 $\mu\text{V/V}$
	300 kHz to 500 kHz	1500 $\mu\text{V/V}$
	500 kHz to 2 MHz	2500 $\mu\text{V/V}$
	2 MHz to 5 MHz	6200 $\mu\text{V/V}$
	5 MHz to 10 MHz	6300 $\mu\text{V/V}$
	10 MHz to 20 MHz	6300 $\mu\text{V/V}$
	20 MHz to 30 MHz	6500 $\mu\text{V/V}$
22 mV to 220 mV	10 Hz to 20 Hz	220 $\mu\text{V/V}$
	20 Hz to 40 Hz	120 $\mu\text{V/V}$
	40 Hz to 20 kHz	120 $\mu\text{V/V}$
	20 kHz to 50 kHz	120 $\mu\text{V/V}$
	50 kHz to 100 kHz	310 $\mu\text{V/V}$
	100 kHz to 300 kHz	810 $\mu\text{V/V}$
	300 kHz to 500 kHz	970 $\mu\text{V/V}$
	500 kHz to 2 MHz	1500 $\mu\text{V/V}$
	2 MHz to 5 MHz	6000 $\mu\text{V/V}$
	5 MHz to 10 MHz	6100 $\mu\text{V/V}$
	10 MHz to 20 MHz	6100 $\mu\text{V/V}$
	20 MHz to 30 MHz	6200 $\mu\text{V/V}$
0.22 V to 2.2 V	10 Hz to 20 Hz	150 $\mu\text{V/V}$
	20 Hz to 40 Hz	69 $\mu\text{V/V}$
	40 Hz to 20 kHz	69 $\mu\text{V/V}$
	20 kHz to 50 kHz	69 $\mu\text{V/V}$
	50 kHz to 100 kHz	110 $\mu\text{V/V}$
	100 kHz to 300 kHz	240 $\mu\text{V/V}$
	300 kHz to 500 kHz	430 $\mu\text{V/V}$
	500 kHz to 2 MHz	1000 $\mu\text{V/V}$
	2 MHz to 5 MHz	4100 $\mu\text{V/V}$
	5 MHz to 10 MHz	4200 $\mu\text{V/V}$
	10 MHz to 20 MHz	4200 $\mu\text{V/V}$
	20 MHz to 30 MHz	4400 $\mu\text{V/V}$
2.2 V to 22 V	10 Hz to 20 Hz	150 $\mu\text{V/V}$
	20 Hz to 40 Hz	69 $\mu\text{V/V}$
	40 Hz to 20 kHz	69 $\mu\text{V/V}$
	20 kHz to 50 kHz	69 $\mu\text{V/V}$
	50 kHz to 100 kHz	110 $\mu\text{V/V}$
	100 kHz to 300 kHz	230 $\mu\text{V/V}$
	300 kHz to 500 kHz	530 $\mu\text{V/V}$
	500 kHz to 2 MHz	1200 $\mu\text{V/V}$
	2 MHz to 5 MHz	3200 $\mu\text{V/V}$
	5 MHz to 10 MHz	3300 $\mu\text{V/V}$
	10 MHz to 20 MHz	3300 $\mu\text{V/V}$
	20 MHz to 30 MHz	3500 $\mu\text{V/V}$

 Authorised:  
 General Manager



Issue 35

Date: 05/08/19

Page 6 of 16

Schedule to

**CERTIFICATE OF ACCREDITATION**
 RF Test Solutions Limited  
 Metrology & Calibration Laboratory  
**SCOPE OF ACCREDITATION**

Accreditation No 492

22 V to 220 V	10 Hz to 20 Hz	150 $\mu\text{V/V}$
	20 Hz to 40 Hz	74 $\mu\text{V/V}$
	40 Hz to 20 kHz	74 $\mu\text{V/V}$
	20 kHz to 50 kHz	74 $\mu\text{V/V}$
	50 kHz to 100 kHz	210 $\mu\text{V/V}$
	100 kHz to 300 kHz	500 $\mu\text{V/V}$

220 V to 1100 V	50 Hz to 1 MHz	73 $\mu\text{V/V}$
-----------------	----------------	--------------------

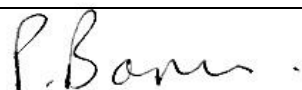
## (c) DC ammeters

0.1 $\mu\text{A}$ to 220 $\mu\text{A}$	89 $\mu\text{A/A}$
0.22 mA to 2.2 mA	58 $\mu\text{A/A}$
2.2 mA to 22 mA	60 $\mu\text{A/A}$
22 mA to 220 mA	88 $\mu\text{A/A}$
0.22 A to 2.2 A	130 $\mu\text{A/A}$
2.2 A to 11 A	310 $\mu\text{A/A}$
11 A to 100 A	3000 $\mu\text{A/A}$
100 A to 150 A	3100 $\mu\text{A/A}$
150 A to 250 A	3000 $\mu\text{A/A}$
250 A to 500 A	2900 $\mu\text{A/A}$

## (d) AC ammeters

10 $\mu\text{A}$ to 220 $\mu\text{A}$	10 Hz to 1 kHz	200 $\mu\text{A/A}$
1 $\mu\text{A}$ to 220 $\mu\text{A}$	1 kHz to 5 kHz	730 $\mu\text{A/A}$
	5 kHz to 10 kHz	1700 $\mu\text{A/A}$
	10 kHz to 1 kHz	140 $\mu\text{A/A}$
0.22 mA to 2.2 mA	1 kHz to 5 kHz	140 $\mu\text{A/A}$
	5 kHz to 10 kHz	730 $\mu\text{A/A}$
	10 Hz to 1 kHz	150 $\mu\text{A/A}$
2.2 mA to 22 mA	1 kHz to 5 kHz	150 $\mu\text{A/A}$
	5 kHz to 10 kHz	740 $\mu\text{A/A}$
	10 Hz to 1 kHz	160 $\mu\text{A/A}$
22 mA to 220 mA	1 kHz to 5 kHz	160 $\mu\text{A/A}$
	5 kHz to 10 kHz	740 $\mu\text{A/A}$
	40 Hz to 1 kHz	600 $\mu\text{A/A}$
0.22 A to 2.2 A	1 kHz to 5 kHz	600 $\mu\text{A/A}$
	5 kHz to 10 kHz	700 $\mu\text{A/A}$
	40 Hz to 1 kHz	770 $\mu\text{A/A}$
2.2 A to 11 A	1 kHz to 5 kHz	780 $\mu\text{A/A}$
	5 kHz to 10 kHz	2800 $\mu\text{A/A}$
	45 Hz	3000 $\mu\text{A/A}$
11 A to 100 A	440 Hz	8100 $\mu\text{A/A}$
	45 Hz	6600 $\mu\text{A/A}$
	300 Hz	9000 $\mu\text{A/A}$

 Authorised:  
 General Manager



Issue 35

Date: 05/08/19

Page 7 of 16

Schedule to

**CERTIFICATE OF ACCREDITATION**
 RF Test Solutions Limited  
 Metrology & Calibration Laboratory  
**SCOPE OF ACCREDITATION**

Accreditation No 492

## (e) Wattmeters

The CMC Uncertainty of measurement for power is calculated as the root sum of squares of the uncertainties for the voltage listed in 5.89, the current listed in 5.88 and 152 parts per million (ppm) for possible load phase error. Testing Performed at Unity Power Factor.

## (g) Phase angle indicators

-90°, -180°, 90°, 180° & 0° (at 2.5 V) 1.2°

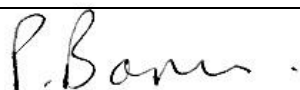
## (i) Ohmmeters

0 $\Omega$	50 $\mu\Omega$
1 $\Omega$	76 $\mu\Omega/\Omega$
1.9 $\Omega$	74 $\mu\Omega/\Omega$
10 $\Omega$	24 $\mu\Omega/\Omega$
19 $\Omega$	23 $\mu\Omega/\Omega$
100 $\Omega$	15 $\mu\Omega/\Omega$
190 $\Omega$	15 $\mu\Omega/\Omega$
1 k $\Omega$	13 $\mu\Omega/\Omega$
1.9 k $\Omega$	13 $\mu\Omega/\Omega$
10 k $\Omega$	14 $\mu\Omega/\Omega$
19 k $\Omega$	14 $\mu\Omega/\Omega$
100 k $\Omega$	15 $\mu\Omega/\Omega$
190 k $\Omega$	15 $\mu\Omega/\Omega$
1 M $\Omega$	32 $\mu\Omega/\Omega$
1.9 M $\Omega$	32 $\mu\Omega/\Omega$
10 M $\Omega$	49 $\mu\Omega/\Omega$
19 M $\Omega$	53 $\mu\Omega/\Omega$
100 M $\Omega$	380 $\mu\Omega/\Omega$

## (j) LCR meters

1 pF	1 kHz	12 %
10 pF	300 Hz	11 %
10 pF	1 kHz	1.2 %
100 pF	50 Hz to 100 Hz	11 %
100 pF	300 Hz	1.1 %
100 pF	1 kHz	0.14 %
1 nF	50 Hz to 100 Hz	1.1 %
1 nF	300 Hz to 1 kHz	0.13 %
10 nF	50 Hz to 1 kHz	0.13 %
100 nF	50 Hz to 1 kHz	0.13 %
1 $\mu\text{F}$	50 Hz to 1 kHz	0.13 %

 Authorised:  
 General Manager



Issue 35

Date: 05/08/19

Page 8 of 16



Schedule to

# CERTIFICATE OF ACCREDITATION

RF Test Solutions Limited  
Metrology & Calibration Laboratory  
**SCOPE OF ACCREDITATION**

Accreditation No 492

10 $\mu$ H	1 kHz	11 %
100 $\mu$ H	100 Hz to 300 Hz	11 %
100 $\mu$ H	1 kHz	1.1 %
1 mH	50 Hz	11 %
1 mH	100 Hz to 300 Hz	1.1 %
1 mH	1 kHz	0.15 %
10 mH	50 Hz to 100 Hz	1.1 %
10 mH	300 Hz to 1 kHz	0.15 %
100 mH	50 Hz to 1 kHz	0.15 %
1 H	50 Hz to 1 kHz	0.15 %
10 $\Omega$	100 Hz	30 m $\Omega$
100 k $\Omega$	100 Hz	170 $\Omega$
1 $\Omega$	1 kHz	6.3 m $\Omega$
100 $\Omega$	1 kHz	150 m $\Omega$
10 k $\Omega$	1 kHz	15 $\Omega$
100 k $\Omega$	1 kHz	170 $\Omega$
2 M $\Omega$	1 kHz	17 k $\Omega$
10 $\Omega$	10 kHz	30 m $\Omega$
100 k $\Omega$	10 kHz	170 $\Omega$

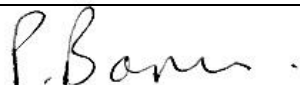
(q) Other specified devices

## RCD Testers

Timing	
1 ms to 1000 ms	0.08 %
Test current	
3 mA	0.19 %
5 mA	0.11 %
6 mA	0.09 %
10 mA	0.08 %
15 mA	0.05 %
30 mA	0.19 %
50 mA	0.11 %
100 mA	0.08 %
150 mA	0.05 %
250 mA	0.22 %
300 mA	0.19 %
500 mA	0.11 %
1000 mA	0.08 %

## Insulation Testers

Authorised:  
General Manager



Issue 35

Date: 05/08/19

Page 9 of 16

Schedule to

**CERTIFICATE OF ACCREDITATION**
 RF Test Solutions Limited  
 Metrology & Calibration Laboratory  
**SCOPE OF ACCREDITATION**

Accreditation No 492

## Insulation test voltage

1 kV	0.18 %
10 kV	0.19 %
20 kV	0.16 %
25 kV	0.15 %
30 kV	0.15 %
40 kV	0.14 %

## Insulation resistance

1 MΩ	33 μΩ/Ω
10 MΩ	0.11 %
100 MΩ	0.24 %

## Loop Resistance Testers

1 Ω to 10 Ω	150 μΩ/Ω
10 Ω to 100 Ω	150 μΩ/Ω

## AC Source Power

20 Hz to 1 kHz	150 μW/W
Testing performed at unity power factor up to 4.8 kVA or 4.8 kW	

CMC Uncertainty of measurement for power is calculated as the root sum of squares of the uncertainties for the voltage and current listed in 5.88 and 150 ppm for possible load phase error.

**5.91 Frequency Measurement and Time Measurement**

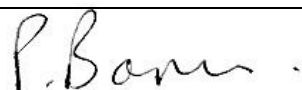
In accordance with in-house methods based on manufacturer's recommendations

- (a) Frequency meters
- (c) Counters
- (d) Time interval meters

DC to 46.6 GHz with reference uncertainty of 6.2 parts in  $10^{11}$  at 10 MHz. Typical CMCs for a good frequency meter as below

Measurand	CMC Uncertainty
1 MHz	0.0001 Hz
100 MHz	0.0068 Hz
880 MHz	0.050 Hz
5 GHz	0.39 Hz
12.4 GHz	0.97 Hz
20 GHz	6.7 Hz

 Authorised:  
 General Manager



Issue 35

Date: 05/08/19

Page 10 of 16

Schedule to

**CERTIFICATE OF ACCREDITATION**

RF Test Solutions Limited  
Metrology & Calibration Laboratory  
**SCOPE OF ACCREDITATION**

Accreditation No 492

30 GHz	6.4 Hz
40 GHz	6.7 Hz
46 GHz	7.3 Hz

**5.92 Waveform Measurement**

In accordance with in-house methods based on manufacturer's recommendations

Measurand	CMC Uncertainty
-----------	-----------------

(a) Frequency characteristics

Measurand and CMC Uncertainties as for 5.91(d)

(b) Input characteristics

Reflection coefficient Frequency range	VRC range	CMC Uncertainty
---	-----------	-----------------

0.1 MHz to 10 MHz	0 to 0.1	0.037 VRC
0.01 GHz to 20 GHz	0 to 0.1	0.012 VRC
20 GHz to 26.5 GHz	0 to 0.1	0.019 VRC

0.1 MHz to 10 MHz	0.1 to 0.5	0.12 VRC
0.01 GHz to 20 GHz	0.1 to 0.5	0.067 VRC
20 GHz to 26.5 GHz	0.1 to 0.5	0.086 VRC

VSWR frequency range	VSWR range	
0.1 MHz to 10 MHz	1 to 1.2	0.088 VSWR
0.01 GHz to 20 GHz	1 to 1.2	0.029 VSWR
20 GHz to 26.5 GHz	1 to 1.2	0.045 VSWR

0.1 MHz to 10 MHz	1.2 to 3	0.78 VSWR
0.01 GHz to 20 GHz	1.2 to 3	0.47 VSWR
20 GHz to 26.5 GHz	1.2 to 3	0.58 VSWR

Note: The reflection coefficient of the device under test will influence the associated uncertainty

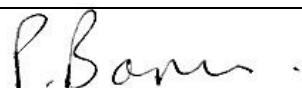
(c) Timing characteristics

Measurand and CMC Uncertainties as for 5.91(d)

(d) Distortion

Distortion range	Frequency range
------------------	-----------------

Authorised:  
General Manager



Issue 35

Date: 05/08/19

Page 11 of 16

Schedule to

**CERTIFICATE OF ACCREDITATION**
 RF Test Solutions Limited  
 Metrology & Calibration Laboratory  
**SCOPE OF ACCREDITATION**

Accreditation No 492

0.01 % to 1 %	25 Hz to 100 kHz	0.009 %
1 % to 10 %	25 Hz to 100 kHz	0.30 %
10 % to 50 %	25 Hz to 100 kHz	1.5 %
50 % to 100 %	25 Hz to 100 kHz	1.5 %

(e) Other characteristics

 Power Measurement  
 Measurand and CMC Uncertainties as for 5.95 (h)

 Modulation Characteristics  
 Measurand and CMC Uncertainties as for 5.93 (c)
**5.93 Signal Sources**

In accordance with in-house methods based on manufacturer's recommendations

Measurand	CMC Uncertainty
-----------	-----------------

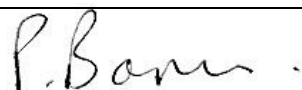
(a) Frequency characteristics

Measurand and CMC Uncertainties as for 5.91(d)

(b) Output characteristics

Frequency ranges	Amplitude range	
3 Hz to 3 GHz	-10 dBc	0.15 dB
	-20 dBc	0.15 dB
	-30 dBc	0.081 dB
	-40 dBc	0.081 dB
	-50 dBc	0.081 dB
	-60 dBc	0.081 dB
	-70 dBc	0.081 dB
	-80 dBc	0.081 dB
	-90 dBc	0.081 dB
	-100 dBc	0.081 dB
	-110 dBc	0.083 dB
	-120 dBc	0.10 dB
	-130 dBc	0.21 dB
	-140 dBc	0.62 dB
	-150 dBc	1.9 dB
3 GHz to 6.6 GHz	-10 dBc	0.15 dB
	-20 dBc	0.15 dB
	-30 dBc	0.081 dB

 Authorised:  
 General Manager



Issue 35

Date: 05/08/19

Page 12 of 16

Schedule to

**CERTIFICATE OF ACCREDITATION**
 RF Test Solutions Limited  
 Metrology & Calibration Laboratory  
**SCOPE OF ACCREDITATION**

Accreditation No 492

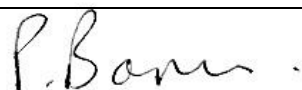
	-40 dBc	0.081 dB
	-50 dBc	0.081 dB
	-60 dBc	0.081 dB
	-70 dBc	0.081 dB
	-80 dBc	0.081 dB
	-90 dBc	0.082 dB
	-100 dBc	0.088 dB
	-110 dBc	0.13 dB
	-120 dBc	0.35 dB
	-130 dBc	1.1 dB
	-140 dBc	3.4 dB
	-150 dBc	10 dB
6.6 GHz to 22 GHz	-10 dBc	0.15 dB
	-20 dBc	0.15 dB
	-30 dBc	0.081 dB
	-40 dBc	0.081 dB
	-50 dBc	0.081 dB
	-60 dBc	0.081 dB
	-70 dBc	0.081 dB
	-80 dBc	0.081 dB
	-90 dBc	0.083 dB
	-100 dBc	0.10 dB
	-110 dBc	0.21 dB
	-120 dBc	0.62 dB
	-130 dBc	1.9 dB
	-140 dBc	6.1 dB
22 GHz to 26.5 GHz	-10 dBc	0.15 dB
	-20 dBc	0.15 dB
	-30 dBc	0.081 dB
	-40 dBc	0.081 dB
	-50 dBc	0.081 dB
	-60 dBc	0.081 dB
	-70 dBc	0.081 dB
	-80 dBc	0.082 dB
	-90 dBc	0.090 dB
	-100 dBc	0.14 dB
	-110 dBc	0.39 dB
	-120 dBc	1.2 dB
	-130 dBc	3.8 dB
	-140 dBc	12 dB

Spurious Signals within 1 MHz from the fundamental

Note: For offsets greater than 1 MHz, an additional uncertainty due to frequency response will be included.

(c) Modulation characteristics

 Authorised:  
 General Manager



Issue 35

Date: 05/08/19

Page 13 of 16

Schedule to

**CERTIFICATE OF ACCREDITATION**
 RF Test Solutions Limited  
 Metrology & Calibration Laboratory  
**SCOPE OF ACCREDITATION**

Accreditation No 492

## Amplitude Modulation

0.1 MHz to 10 MHz	0.87 %
10 MHz to 3 GHz	0.58 %
3 GHz to 26.5 GHz	1.7 %

## Frequency Modulation

0.25 GHz to 26.5 GHz	1.1 %
----------------------	-------

## Phase Modulation

100 kHz to 26.5 GHz	1.1 %
---------------------	-------

(e) Other characteristics

50 MHz, 1 mW Reference Source

Range 1 mW	3.7 $\mu$ W
------------	-------------

**5.95 Communications Equipment**

In accordance with in-house methods based on manufacturer's recommendations

Measurand	CMC Uncertainty
-----------	-----------------

(b) Radio transmission measuring equipment

(f) Spectrum analysis measuring equipment

Measurand and CMC Uncertainties as for 5.91(d), 5.95(h) and 5.95(i)

(h) Power measuring equipment

Flatness, +20 dBm to -30 dBm

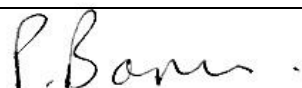
0.001 MHz to 1 MHz	1.1 %
1 MHz to 4.2 GHz	3.5 %
4.2 GHz to 18 GHz	9.1 %
18 GHz to 26.5 GHz	11 %

Flatness, 3 V<sub>rms</sub>, using a thermal converter

1 kHz to 1 MHz	0.84 %
1 MHz to 30 MHz	0.86 %
30 MHz to 80 MHz	1.0 %

(i) Attenuators and amplifiers

 Authorised:  
 General Manager



Issue 35

Date: 05/08/19

Page 14 of 16

Schedule to

**CERTIFICATE OF ACCREDITATION**
 RF Test Solutions Limited  
 Metrology & Calibration Laboratory  
**SCOPE OF ACCREDITATION**

Accreditation No 492

## 100 kHz to 3.05 GHz

10 dB	0.023 dB
20 dB	0.029 dB
30 dB	0.035 dB
40 dB	0.040 dB
50 dB	0.046 dB
60 dB	0.052 dB
70 dB	0.068 dB
80 dB	0.073 dB
90 dB	0.086 dB
100 dB	0.091 dB
110 dB	0.096 dB
120 dB	0.10 dB
130 dB	0.11 dB
140 dB	0.18 dB

## 3.05 GHz to 6.6 GHz

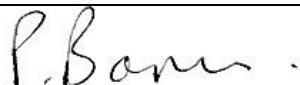
10 dB	0.023 dB
20 dB	0.029 dB
30 dB	0.035 dB
40 dB	0.040 dB
50 dB	0.046 dB
60 dB	0.052 dB
70 dB	0.068 dB
80 dB	0.073 dB
90 dB	0.086 dB
100 dB	0.091 dB
110 dB	0.097 dB
120 dB	0.11 dB
130 dB	0.18 dB
136 dB	0.18 dB

## 6.6 GHz to 13.2 GHz

10 dB	0.023 dB
20 dB	0.029 dB
30 dB	0.035 dB
40 dB	0.040 dB
50 dB	0.046 dB
60 dB	0.052 dB
70 dB	0.068 dB
80 dB	0.073 dB
90 dB	0.086 dB
100 dB	0.092 dB
110 dB	0.10 dB
120 dB	0.17 dB
127 dB	0.18 dB

## 13.2 GHz to 19.2 GHz

 Authorised:  
 General Manager



Issue 35

Date: 05/08/19

Page 15 of 16

Schedule to

**CERTIFICATE OF ACCREDITATION**

RF Test Solutions Limited  
Metrology & Calibration Laboratory  
**SCOPE OF ACCREDITATION**

Accreditation No 492

10 dB	0.023 dB
20 dB	0.029 dB
30 dB	0.035 dB
40 dB	0.040 dB
50 dB	0.046 dB
60 dB	0.052 dB
70 dB	0.068 dB
80 dB	0.073 dB
90 dB	0.087 dB
100 dB	0.10 dB
110 dB	0.17 dB
119 dB	0.17 dB

19.2 GHz to 26.5 GHz

10 dB	0.023 dB
20 dB	0.029 dB
30 dB	0.035 dB
40 dB	0.040 dB
50 dB	0.046 dB
60 dB	0.052 dB
70 dB	0.068 dB
80 dB	0.073 dB
90 dB	0.087 dB
100 dB	0.10 dB
110 dB	0.17 dB
112 dB	0.17 dB

**5.97 High Voltage Testing**

In accordance with in-house methods based on manufacturer's recommendations

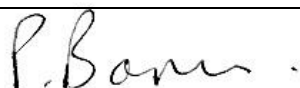
- (a) Direct voltage
- (b) Alternating voltage

Measurand and CMC Uncertainties as for 5.89(a) and 5.89(b)

Note 1:

Unless stated otherwise the CMC is based on the performance of the best available device and measurement uncertainties achieved for specific calibrations may be greater than the CMC Uncertainty. A laboratory may not report measurement uncertainties lower than its CMC. However, if the device under calibration has a greater accuracy than the device used to calculate the CMC the laboratory may be able to use the calibration data to lower its CMC Uncertainty. Please contact the laboratory to discuss your specific requirements.

Authorised:  
General Manager



Issue 35

Date: 05/08/19

Page 16 of 16