CERTIFICATE OF ACCREDITATION

In terms of section 22(2) (b) of the Accreditation for Conformity Assessment, Calibration and Good Laboratory Practice Act, 2006 (Act 19 of 2006), read with sections 23(1), (2) and (3) of the said Act, I hereby certify that:-

PRECISION MEASUREMENTS (PTY) LTD

Co. Reg. No.: 2015/168932/07

Accreditation Number: **750**

is a South African National Accreditation System accredited Calibration laboratory provided that all SANAS conditions and requirements are complied with

This certificate is valid as per the scope as stated in the accompanying scope of accreditation Annexure "A", bearing the above accreditation number for

RADIO FREQUENCY METROLOGY

The facility is accredited in accordance with the recognised International Standard

ISO/IEC 17025:2017

The accreditation demonstrates technical competency for a defined scope and the operation of a laboratory quality management system

While this certificate remains valid, the Accredited Facility named above is authorised to use the relevant SANAS accreditation symbol to issue facility reports and/or certificates

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Mr T Baleni
Acting Chief Executive Officer

Effective Date: 30 September 2021
Certificate Expires: 29 September 2026

ANNEXURE A

SCOPE OF ACCREDITATION

RADIO FREQUENCY METROLOGY

Accreditation Number: 750

Permanent Address of Laboratory:
Precision Measurements (Pty) Ltd
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Meiring Naude Road
Lynnwood
0081

Postal Address:
P O Box 39203
Moreleta Park
0044

Tel: (012) 035-0219
Fax: (086) 768-0366
E-mail: willemb@precisiongroupsa.com

Technical Signatory: Mr E Föck

Nominated Representative: Mr W Botha

Issue No.: 04
Date of Issue: 30 September 2021
Expiry Date: 29 September 2026

ITEM	MEASURED QUANTITY OR TYPE OF GAUGE OR INSTRUMENT AND NOMINAL RANGE	NOMINAL FREQUENCY/ IMPEDANCE/ CONNECTOR	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	METHOD / PROCEDURE
11	**RADIO FREQUENCY MEASUREMENTS**			
11.1	**Radio Frequency Power**			
11.1.1	**Absolute Power in Coaxial Line: Power Meter, Power Source**			
11.1.1.1	Power 50 Ω			Direct measurement using a power sensor or comparative measurement using a reference standard or indirect method through a direct coupler or splitter.
	0 dBm (1 mW)	50 MHz	0,1 dB	
	-30 dBm to +20 dBm (1 µW to 100 mW)	10 MHz to 1 GHz 1 GHz to 12 GHz 12 GHz to 18 GHz	0,2 dB 0,3 dB 0,4 dB	
	+20 dBm to +44 dBm (100 mW to 25 W)	50 MHz to 220 MHz	0,4 dB	
	-110 dBm to -30 dBm (1 pW to 1 µW)	10 MHz to 1 GHz 1 GHz to 12 GHz	0,2 dB + 0,003 dB / dBm 0,3 dB + 0,007 dB / dBm	
	-90 dBm to -30dBm (1 pW to 1 µW)	12 GHz to 18 GHz	0,4 dB + 0,01 dB / dBm	

The CMC, expressed as an expanded uncertainty of measurement, is stated as the standard uncertainty of measurement multiplied by a coverage factor $k = 2$, corresponding to a confidence level of approximately 95%

Accreditation Manager

Accreditation No.: 750
Date of Issue: 30 September 2021
Expiry Date: 29 September 2026

ITEM	MEASURED QUANTITY OR TYPE OF GAUGE OR INSTRUMENT AND NOMINAL RANGE	NOMINAL FREQUENCY/ IMPEDANCE/ CONNECTOR	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	METHOD / PROCEDURE
11.1.3	**Calibration Factor and Effective Efficiency in Coaxial Line**			
11.1.3.1	Calibrator Factor 1 % to 150 %	10 MHz to 1 GHz 1 GHz to 12 GHz 12 GHz to 18 GHz	4 % 7 % 9 %	Comparison against a standard power sensor.
11.2	**Scalar RF Reflection Coefficient and Attenuation**			
11.2.1	**Reflection Coefficient in Coaxial line (value linear terms) passive device**			
11.2.1.1	Voltage Reflection Coefficient Ratio 0 to 0,5 0,5 to 1	 10 MHz to 18 GHz 10 MHz to 18 GHz 50 Ω	 0,01 0,04	Calibration against a standard by using a directional bridge and or ripple extraction method and or direct measurement method.
11.2.3	**Attenuation in Coaxial line (values in dB): passive device**			
11.2.3	0 dB to 60 dB 60 dB to 80 dB 0 dB to 10 dB 10 dB to 100 dB 110 dB 0 dB to 10 dB 10 dB to 90 dB 90 dB to 110 dB 0 dB to 10 dB 10 dB to 90 dB 90 dB to 110 dB 0 dB to 10 dB 10 dB to 90 dB 90 dB to 100 dB	DC DC 10 MHz to 1 GHz 10 MHz to 1 GHz 10 MHz to 1 GHz 1 GHz to 8 GHz 1 GHz to 8 GHz 1 GHz to 8 GHz 8 GHz to 12 GHz 8 GHz to 12 GHz 8 GHz to 12 GHz 12 GHz to 18 GHz 12 GHz to 18 GHz 12 GHz to 18 GHz 50 Ω	0,004 dB 0,02 dB 0,03 dB 0,003 dB / dB 0,5 dB 0,07 dB 0,007 dB / dB 1 dB 0,1 dB 0,01 dB / dB 1,5 dB 0,12 dB 0,012 dB / dB 2 dB	Voltage ratio, substitution or direct method.

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Accreditation Manager

ANNEXURE A

Accreditation No.: 750
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ITEM	MEASURED QUANTITY OR TYPE OF GAUGE OR INSTRUMENT AND NOMINAL RANGE	NOMINAL FREQUENCY/ IMPEDANCE/ CONNECTOR	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	METHOD / PROCEDURE
11.6	**Signal and Pulse Characteristics**			
11.6.3	**Modulation, AM and FM: Signal generator, spectrum analyser, modulation meter Jitter meter**			
11.6.3.1	Amplitude Modulation 50 Ω Modulation Depth 0 % to 95 % 0 % to 95 %	Carrier 100 kHz to 1 GHz 5 MHz to 1 GHz Modulation 300 Hz to 10 kHz 10 kHz to 100 kHz	 $2 \cdot 10^{-2} \cdot M + 0{,}01$ % $2 \cdot 10^{-2} \cdot M + 0{,}01$ %	Calibration using direct measurement method with selective detector (e.g. spectrum analyser) modulation meter or calibration using Bessel function
11.6.3.2	Frequency Modulation 50 Ω Peak Deviation 0 Hz to 100 kHz 0 Hz to 100 kHz	Carrier 100 kHz 5 MHz to 1 GHz Modulation 300 Hz to 10 kHz 10 Hz to 100 kHz	 $1 \cdot 10^{-2} \cdot \Delta f + 1$ Hz $1 \cdot 10^{-2} \cdot \Delta f + 1$ Hz	
12	On-site calibration for all items			

The CMC, expressed as an expanded uncertainty of measurement, is stated as the standard uncertainty of measurement multiplied by a coverage factor $k = 2$, corresponding to a confidence level of approximately 95%

ISSUED BY THE SOUTH AFRICAN ACCREDITATION SYSTEM

Accreditation Manager