

CERTIFICATE OF ACCREDITATION

This is to certify that:

CONCILIUM TECHNOLOGIES (PTY) LTD

Facility Accreditation Number: **706**

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 on the accompanying schedule of accreditation bearing the above accreditation number for

RADIO FREQUENCY METROLOGY

The facility complies with the general requirements of

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

The management system requirements in ISO/IEC 17025 (Section 4) meet the principles of ISO 9001:2000 and are aligned with its pertinent requirements

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

Chief Executive Officer

Initial Accreditation: 1980

Certificate Commences: February 2007

Certificate Expires: February 2012

"Recognised as the official national accreditation body by the Department of Trade and Industry of the Republic of South Africa"

This certificate is only valid when accompanied by its schedule of accreditation.

SCHEDULE OF ACCREDITATION

RADIO FREQUENCY METROLOGY

Laboratory Accreditation Number 706

<p>Permanent Address of Laboratory: Concilium Technologies (Pty) Ltd Building No 3 Highgrove Office Park 50 Tegel Avenue Highveld Technopark Centurion 0157</p> <p>Postal Address: PO Box 67611 Highveld 0169</p> <p>Tel : (012) 678-9211 / 9215 Fax : (012) 665-4160 E-mail : bart_bremmer@concilium.co.za</p>		<p>Technical Signatories : Mr B J H Bremmer : Mr G D Schuster : Mr P Hugo</p> <p>Nominated Representative : Mr B J H Bremmer</p> <p>Issue No. : 08 Date of issue : February 2007 Expiry date : February 2012</p>		
ITEM	FUNCTION	NOMINAL RANGE	NOMINAL FREQUENCY	MEASUREMENT CAPABILITIES EXPRESSED AS AN UNCERTAINTY (\pm)
1	Power 50 Ω	0 dBm (1 mW) -60 dBm to -20 dBm (1 nW to 10 μ W) -30 dBm to +20 dBm (1 μ W to 100 mW) -60 dBm to +20 dBm* (1 nW to 100 mW) -60 dBm to +20 dBm* (1 nW to 100 mW) -30 dBm to +20 dBm* (1 μ W to 100 mW) -30 dBm to +20 dBm** -30 dBm to +20 dBm** (1 μ W to 100 mW) -110 dBm to -30 dBm (10 fW to 1 μ W) -110 dBm to -60 dBm (10 fW to 1 nW) -110 dBm to -60 dBm (10 fW to 1 nW) -100 dBm to -30 dBm (100 fW to 1 μ W) -100 dBm to -30 dBm -100 dBm to -30 dBm (100 fW to 1 μ W)	50 MHz 10 MHz to 1 GHz 100 kHz to 1 GHz 1 GHz to 10 GHz 10 GHz to 18 GHz 18 GHz to 26,5 GHz 26,5 GHz to 40 GHz 40 GHz to 50 GHz 100 kHz to 1 GHz 1 GHz to 10 GHz 10 GHz to 18 GHz 18 GHz to 26,5 GHz 26,5 GHz to 40 GHz 40 GHz to 50GHz	0,08 dB 0,2 dB 0,2 dB 0,3 dB 0,4 dB 0,4 dB 0,4 dB 0,5 dB 0,2 dB + 0,005 dB per dBm 0,3 dB + 0,010 dB per dBm 0,4 dB + 0,015 dB per dBm 0,4 dB + 0,015 dB per dBm 0,4 dB + 0,015 dB per dBm 0,5 dB + 0,020 dB per dBm

Original date of accreditation: 1980

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* Generation Limitation: 100 kHz to 26,5 GHz: +13dBm

** Generation Limitation: 26,5 GHz to 50 GHz: +4dBm

The MC, 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%

ITEM	FUNCTION	NOMINAL RANGE	NOMINAL FREQUENCY	MEASUREMENT CAPABILITIES EXPRESSED AS AN UNCERTAINTY (\pm)
1	Power 75 Ω	-30 dBm to +20 dBm* (1 μ W to 100 mW)	100 kHz to 2 GHz	0,2 dB
		-110 dBm to -30 dBm (1 fW to 1 μ W)	100 kHz to 2 GHz	0,02 dB + 0,005 dB
2	Attenuation 50 Ω	0 dB to 60 dB	DC	0,002 dB
		60 dB to 80 dB	DC	0,01 dB
		80 dB o 110 dB	DC	0,15 dB
		0 dB to 100 dB	100 kHz to 1 GHz	0,04 dB + 0,005 dB per dB
			1 GHz to 10 GHz	0,10 dB + 0,010 dB per dB
			10 GHz to 18 GHz	0,15 dB + 0,015 dB per dB
			18 GHz to 26,5 GHz	0,2 dB + 0,015 dB per dB
			26,5 to 40 GHz	0,4 dB + 0,015 dB per dB
		40 GHz to 50 GHz	0,5 dB + 0,025 dB per dB	
	75 Ω	100 dB to 120 dB	100 kHz to 1 GHz	1 dB
			1 GHz to 10 GHz	2 dB
			10 GHz to 18 GHz	3 dB
			DC	0,002 dB
		0 dB to 60 dB	DC	0,01 dB
		60 dB to 80 dB	DC	0,15 dB
		80 dB to 110 dB		
		0 dB to 100 dB	100 kHz to 2 GHz	0,04 dB + 0,005 dB per dB

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* Generation Limitation: 100 kHz to 2 GHz: +13dBm

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Programme Manager

ITEM	FUNCTION	NOMINAL RANGE	NOMINAL FREQUENCY	MEASUREMENT CAPABILITIES EXPRESSED AS AN UNCERTAINTY (\pm)
3	Voltage Reflection Coefficient 50 Ω 75 Ω	Ratio 0 to 0,5 0,5 to 1	5 Hz to 10 MHz 5 Hz to 10 MHz	0,01 0,04
		0 to 0,3 0,3 to 1	10 MHz to 18 GHz 10 MHz to 18 GHz	0,007 0,015
		0 to 0,5 0,5 to 1	18 GHz to 26,5 GHz 18 GHz to 26,5 GHz	0,01 0,03
		0 to 0,5 0,5 to 1	26,5 GHz to 40 GHz 26,5 GHz to 40 GHz	0,03 0,04
		0 to 0,5 0,5 to 1	40 GHz to 50 GHz 40 GHz to 50 GHz	0,05 0,10
		0 to 0,5 0,5 to 1	5 Hz to 100 kHz 5 Hz to 100 kHz	0,01 0,04
		0 to 0,3 0,3 to 1	100 kHz to 100 MHz 100 kHz to 100 MHz	0,005 0,015
		0 to 0,5 0,5 to 1	100 MHz to 1 GHz 100 MHz to 1 GHz	0,03 0,05
		0 to 0,5 0,5 to 1	1 GHz to 2 GHz 1 GHz to 2 GHz	0,07 0,10
		4	Impedance (Magnitude) 50 Ω 75 Ω	25 Ω to 75 Ω
25 Ω to 100 Ω	500 MHz to 2 GHz 2 GHz to 18 GHz			$5 \cdot 10^{-2} \cdot Z$ $1 \cdot 10^{-1} \cdot Z$
50 Ω to 100 Ω	5 Hz to 200 MHz			$3 \cdot 10^{-2} \cdot Z$
5	RF Voltage 50 Ω	1 mV to 2 V	100 KHz to 100 MHz 100 MHz to 1 GHz	$6 \cdot 10^{-2} \cdot U$ $1 \cdot 10^{-1} \cdot U$

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Programme Manager

Laboratory Accreditation Number: 706
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ITEM	FUNCTION	NOMINAL RANGE	NOMINAL FREQUENCY		MEASUREMENT CAPABILITIES EXPRESSED AS AN UNCERTAINTY (\pm)
6	Amplitude Modulation 50 Ω	Modulation Depth 0 % to 99 % 0 % to 99 % 1 % to 95 % 5 % to 90 %	Carrier 100 kHz to 1 MHz 1 MHz to 1,3 GHz 1,3 GHz to 18 GHz 18 GHz to 50 GHz	Modulation 20 Hz to 50 kHz 20 Hz to 100 kHz 60 Hz to 100 kHz 60 Hz to 100 kHz	$2 \cdot 10^{-2} \cdot M + 0,01 \%$ $1 \cdot 10^{-2} \cdot M + 0,01 \%$ $3 \cdot 10^{-2} \cdot M$ $3 \cdot 10^{-2} \cdot M$
7	Frequency Modulation 50 Ω	Peak Deviation 0 Hz to 75 kHz 0 Hz to 75 kHz 480 Hz to 3 MHz 480 Hz to 10 MHz 480 Hz to 8 MHz 75 kHz to 8 MHz	Carrier 100 kHz to 1 MHz 1 MHz to 1,3 GHz 1,3 GHz to 7 GHz 7 GHz to 18 GHz 18 GHz to 26,5 GHz 26,5 GHz to 50 GHz	Modulation 20 Hz to 35 kHz 20 Hz to 416 kHz 200 Hz to 1,25 MHz 200 Hz to 4,16 MHz 200 Hz to 3,33 MHz 31,185 kHz to 3,33 MHz	$5 \cdot 10^{-3} \cdot f + 1 \text{ Hz}$ $5 \cdot 10^{-3} \cdot f + 1 \text{ Hz}$ $5 \cdot 10^{-3} \cdot f + 10 \text{ Hz}$ $5 \cdot 10^{-3} \cdot f + 10 \text{ Hz}$ $5 \cdot 10^{-3} \cdot f + 10 \text{ Hz}$ $5 \cdot 10^{-3} \cdot f$

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ISSUED BY THE SOUTH AFRICAN NATIONAL ACCREDITATION SYSTEM

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