

NCL CALIBRATION LABORATORIES

Calibration File No.: 301485

C E R T I F I C A T E O F C A L I B R A T I O N

It is certified that the equipment identified below has been calibrated in the
NCL CALIBRATION LABORATORIES by qualified personnel following recognized
procedures and using transfer standards traceable to NRC/NIST.

Equipment: Miniature Isotropic RF Probe

Manufacturer: APREL Laboratories

Model No.: E-010

Serial No.: 154

Customer: APREL

Asset No.: 301485

Calibration Procedure: SSI/DRB-TP-D01-032

Calibrated: October 15, 2001

Recalibration required: October 14, 2002

Remarks: Additional Calibration: 5.24 GHz

Calibrated By: _____

NCL **CALIBRATION LABORATORIES**

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Division of APREL Lab.
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CALIBRATION RECORD

Customer: APREL
Asset No: 301485
Equipment Type: Miniature Isotropic RF Probe
Manufacturer: APREL Laboratories
Model No: E-010
Serial No: 154
Date: 15-Oct-01 Cal. Due: 14-Oct-02
Project No: APREL-WCB5000-802.11a
Calibration Procedure: SSI/DRB-TP-D01-032-NEW
Environmental Conditions: Temp: 22.9°C Humidity: 30% - 55%

REFERENCES:

1. Directional Coupler, Hewlett Packard, model 767D, asset # 100251
2. RF Power Meter, Rohde & Schwarz, model NRVs, asset # 100851
3. RF Power Sensor, Rohde & Schwarz, model NRV-Z7, asset # 301461
4. Precision Guildline, Thermometer, asset # 301414
5. APREL-CRS Near-Field Measurement System
6. ALIDX-500 Near-Field Broadband Measurement System
7. APREL RF Power Amplifier, model M:AL-RFA-8
8. Signal Generator, Hewlett Packard, model 83640B
9. APREL Flat Phantom, model P-V-G2
10. APREL 5.24 GHz Dipole, asset#301460
11. EMCO 1-18 GHz High Frequency Horn Antenna, Asset Number 100553

CALIBRATION DATA

PHYSICAL PROBE DATA	
OFFSET	ANGLE
[cm]	[°]
0.25	54.73

TISSUE TYPE	FREQUENCY	DIELECTRIC CONSTANT	CONDUCTIVITY	CONVERSION FACTOR
[MHz]	[GHz]	ϵ_r	[S/m]	[W/kg]
Brain	5.24	45.0	5.85	10.7

Media Type	Frequency [GHz]	Sensitivity One	Sensitivity Two	Sensitivity Three
Air	5.24	1.475	1.535	1.464

FREQUENCY	ISOTROPICITY	
GHz	[%]	[dB]
5.24	2.24	0.10

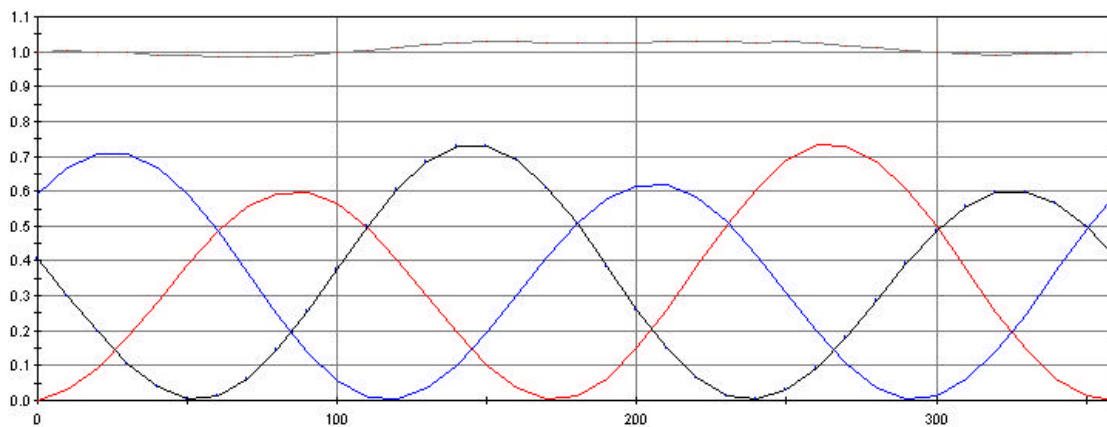
NCL Calibration Laboratories

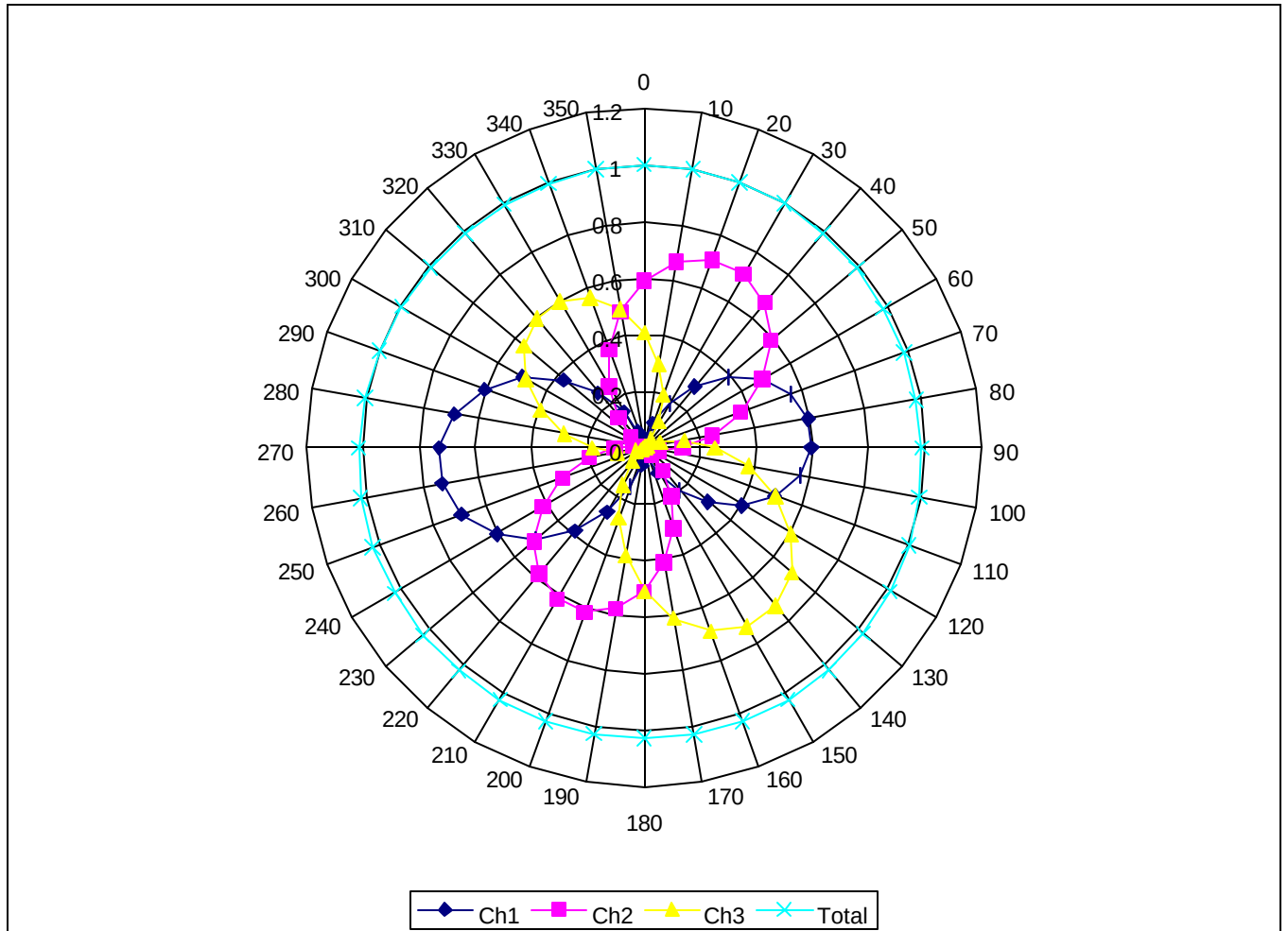
Division of APREL Lab.

Validation Results:

Freq (GHz)	Power fed to dipole (mW)	Distance from dipole to liquid (mm)	1 gram measured (W/Kg)	1 gram target (W/Kg)	Delta (%)
5.24	85	10	2.81	2.75	1.5%

TEM Calibration Plot
Date: 15-Oct-01 10:42:48 am
Probe Name: 154
Frequency: 5240
Sensitivity: Ch1: 1.475 Ch2: 1.535 Ch3: 1.464 mV/(mW/cm²)
Isotropy: 2.24% 0.10 db Min=0.985 Max=1.030





Receiving Pattern 5.24 GHz