

NCL CALIBRATION LABORATORIES

Calibration File No.: IDXB-CAL-0051

CERTIFICATE OF CALIBRATION

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/IDX Robotics Inc

Model No.: E-010

Serial No.: 146

Customer: IDX Robotics Inc

Asset No.:

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

Cal. Date: 04 January, 2002 Cal. Due Date: 03 January, 2003

Remarks: None

Calibrated By: _____

NCL CALIBRATION LABORATORIES

51 SPECTRUM WAY
NEPEAN, ONTARIO
CANADA K2R 1E6

Division of APREL Lab.
TEL: (613) 820-4988
FAX: (613) 820-4161

NCL Calibration Laboratories

Division of APREL Lab.

CALIBRATION RECORD

Customer: IDX Robotics Inc
Asset No: N/A
Equipment Type: Miniature Isotropic RF Probe
Manufacturer: APREL Laboratories / IDX Robotics Inc.
Model No: E-010
Serial No: 146
Date: 4-January-2002 Cal. Due: 3-January-2003
Project No: IDXB-E010 Probe -3855
Calibration Procedure: SSI/DRB-TP-D01-032
Environmental Conditions: Temp: 24.7°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. ALIDX-500 Near-Field Broadband Measurement System, asset #301471
6. APREL Microwave Power Amplifier 800-4200 MHz, AL-RFA-A, asset # 301467
7. 83640B Signal Generator, Hewlett Packard, s/n 3844A00689, asset #301468
8. Aprel Flat Phantom, model P-V-G2
9. Aprel 835 MHz Dipole, asset# 301463
10. Aprel 1900 MHz Dipole, asset# 301459
11. Aprel 2450 MHz Dipole, asset# 301470

CALIBRATION DATA

PHYSICAL PROBE DATA	
OFFSET [cm]	ANGLE [°]
0.24	54.73

TISSUE TYPE [MHz]	FREQUENCY	DIELECTRIC CONSTANT	CONDUCTIVITY [S/m]	CONVERSION FACTOR [W/kg]
Head	835	40.7	0.89	5.3
Head	1900	37.2	1.36	6.5
Head	2450	37.1	1.84	16.4
Body	835	51.4	1.02	7.6
Body	1900	49.9	1.48	4.9
Body	2450	49.2	1.95	16.5

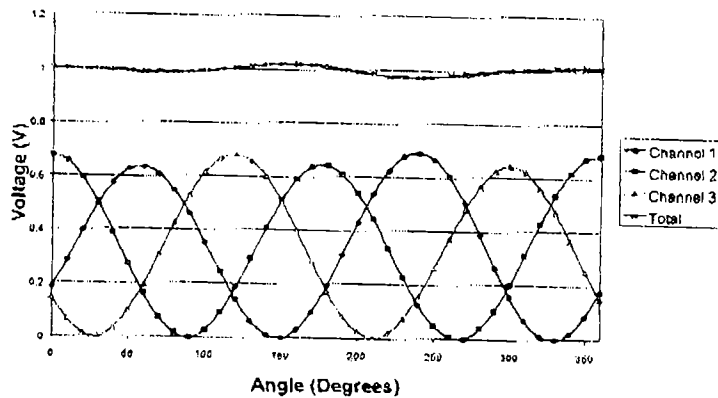
FREQUENCY MHz	ISOTROPICITY	
	[%]	[dB]
835	2.28	0.098
1900	2.33	0.100
2450	3.06	0.130

NCL Calibration Laboratories

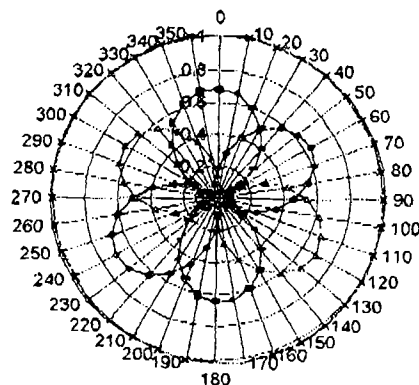
Division of APREL Lab.

Media Type	Frequency [MHz]	Sensitivity One	Sensitivity Two	Sensitivity Three
Air	835	2.607	2.525	2.310
	1900	1.717	1.651	1.539
	2450	0.753	0.726	0.683

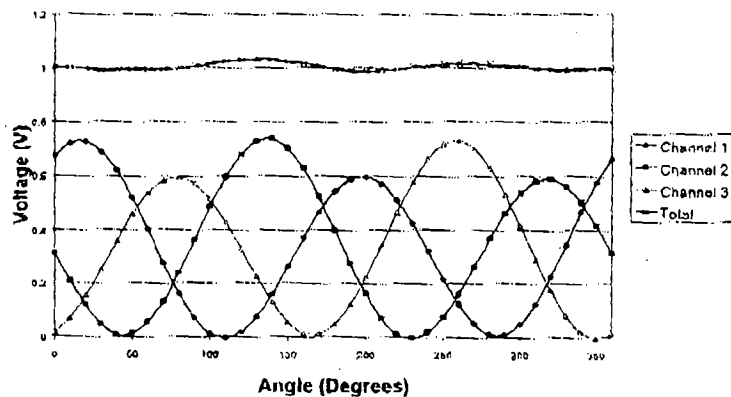
Probe Sensitivity @ 835 MHz



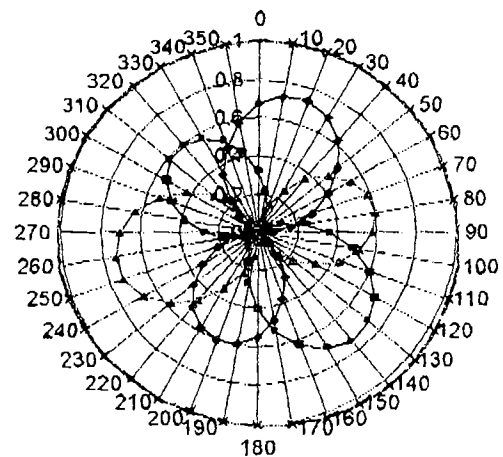
Probe Isotropy @ 835 MHz



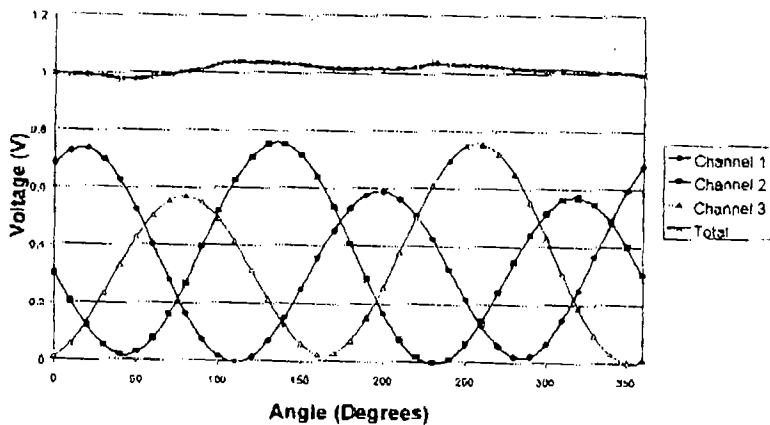
Probe Sensitivity @ 1900 MHz



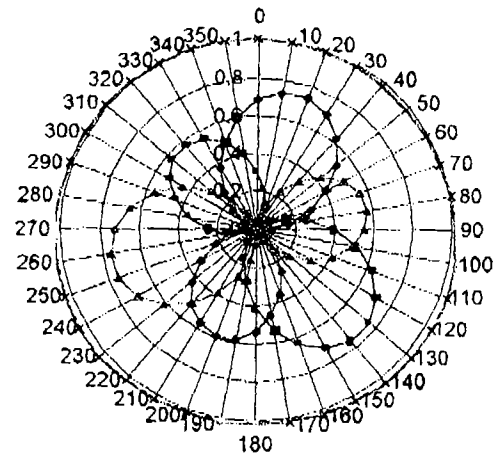
Probe Isotropy @ 1900 MHz



Probe Sensitivity @ 2450 MHz



Probe Isotropy @ 1900 MHz



NCL Calibration Laboratories

Division of APREL Lab.

Diode Coefficients:**Head @ 835 MHz:**

Channel	Cn 1	Cn2	Cn3	Cn4	Mn	Bn
Ch 1	17647.6932	2369.9381	75.3044	0.000	0.0114	0.000
Ch 2	10832.1943	2342.2166	72.3226	0.000	0.0118	0.000
Ch 3	9414.6867	2022.8348	70.5819	0.000	0.0122	0.000

Head @ 1900 MHz:

Channel	Cn 1	Cn2	Cn3	Cn4	Mn	Bn
Ch 1	-2362.0677	637.0043	28.2909	0.000	0.0277	0.000
Ch 2	-1982.8538	638.6514	29.9573	0.000	0.0266	0.000
Ch 3	-1734.1836	521.2650	26.2919	0.000	0.0300	0.000

Head @ 2450 MHz:

Channel	Cn 1	Cn2	Cn3	Cn4	Mn	Bn
Ch 1	-109.001	117.023	13.316	0.000	0.0605	0.000
Ch 2	-119.2711	147.7542	16.5049	0.000	0.0505	0.000
Ch 3	-82.0453	141.6560	16.9832	0.000	0.0497	0.000

Body @ 835 MHz:

Channel	Cn 1	Cn2	Cn3	Cn4	Mn	Bn
Ch 1	21601.9208	2341.4606	78.4357	0.000	0.0110	0.000
Ch 2	20199.6316	2324.5954	77.3192	0.000	0.0112	0.000
Ch 3	16725.4970	1934.4608	72.9045	0.000	0.0119	0.000

NCL Calibration Laboratories

Division of APREL Lab.

Body @ 1900 MHz:

Channel	Cn 1	Cn2	Cn3	Cn4	Mn	Bn
Ch 1	-1886.1061	634.6289	30.3410	0.000	0.0264	0.000
Ch 2	-1361.7386	609.2873	29.8092	0.000	0.0269	0.000
Ch 3	-1332.9929	530.4801	28.5545	0.000	0.0283	0.000

Body @ 2450 MHz:

Channel	Cn 1	Cn2	Cn3	Cn4	Mn	Bn
Ch 1	100.3391	136.3802	18.5429	0.000	0.0466	0.000
Ch 2	-119.2711	147.7542	16.5049	0.000	0.0505	0.000
Ch 3	-82.0453	141.6560	16.9832	0.000	0.0497	0.000