

HAC RF EMISSIONS REPORT

For

Mobile Phone

Model Number: NXL6C

FCC ID: COYI6CP

Report Number : WT138003383

Test Laboratory : Shenzhen Academy of Metrology and Quality
Inspection
National Digital Electronic Product Testing Center
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Test report declaration

Applicant : JSR Limited

Address : Room 8, 12/F, Lucida Industrial Building, No.43-47 Wang Lung Street, Tsuen Wan, NT, Hong Kong.

Manufacturer : Shenzhen JSR Technology Co., LTD.

Address : 2-3F,E building, Yu Jianfeng science and industry park, Huafan road, Tongheng community, Dalang, Baoan district, Shenzhen city, Guangdong

EUT : Mobile Phone

Description

Model No : NXL6C

Trade mark : innos

Serial No. : --

FCC ID : **COYI6CP**

Test Standards:

FCC 47 CFR §20.19 ANSI C63.19-2007

The EUT described above is tested by Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory to determine the maximum emissions from the EUT. Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory is assumed full responsibility for the accuracy of the test results. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.19- 2007 and the EUT tested as described in this report is in compliance with recommendations and guidelines per FCC 47 CFR §20.19.

The test report is valid for above tested sample only and shall not be reproduced in part without written approval of the laboratory.

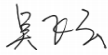
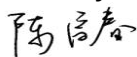
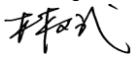
Project Engineer:	 _____ (Wu Feiyun)	Date:	<u>Nov.4,2013</u>
Checked by:	 _____ (Chen QiChun)	Date:	<u>Nov.4,2013</u>
Approved by:	 _____ (Lin Bin)	Date:	<u>Nov.4,2013</u>

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1. TEST RESULTS SUMMARY

Table 1 Test Results Summary

Maximum E/H-Field Emissions	
Max. E-Field Emissions	Part 22 - Cellular band 86.338 V/m (M4)_CDMA 850 Part 24 - PCS band 28.354 V/m (M4)_CDMA 1900
Max. H-Field Emissions	Part 22 - Cellular band 0.092 A/m (M4)_CDMA 850 Part 24 - PCS band 0.024 A/m (M4)_CDMA 1900
Hearing Aid Near-Field Category:	M4

Remark: “ N/A” means “ Not applicable.”

The tests documented in this report were performed in accordance with ANSI C63.19-2007 Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids and FCC KDB 285076 D01 HAC Guidance v02r01

2. GENERAL INFORMATION

2.1. Report information

2.1.1. This report is not a certificate of quality; it only applies to the sample of the specific product/equipment given at the time of its testing. The results are not used to indicate or imply that they are application to the similar items. In addition, such results must not be used to indicate or imply that SMQ approves recommends or endorses the manufacture, supplier or use of such product/equipment, or that SMQ in any way guarantees the later performance of the product/equipment.

2.1.2. The sample/s mentioned in this report is/are supplied by Applicant, SMQ therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture or any information supplied.

2.1.3. Additional copies of the report are available to the Applicant at an additional fee. No third part can obtain a copy of this report through SMQ, unless the applicant has authorized SMQ in writing to do so.

2.2. Laboratory Accreditation and Relationship to Customer

The testing report were performed by the Shenzhen Academy of Metrology and quality Inspection EMC Laboratory (Guangdong EMC compliance testing center), in their facilities located at Bldg. of Metrology & Quality Inspection, Longzhu Road, Nanshan District, Shenzhen, Guangdong, China. At the time of testing, Laboratory is accredited by the following organizations:

China National Accreditation Service for Conformity Assessment (CNAS) accredits the Laboratory for conformance to FCC standards, EMC international standards and EN standards. The Registration Number is CNAS L0579.

The Laboratory is listed in the United States of American Federal Communications Commission (FCC), and the registration number are 446246 806614 994606(semi anechoic chamber).

The Laboratory is listed in Voluntary Control Council for Interference by Information Technology Equipment (VCCI), and the registration number are R-1974(open area test site) , R-1966(semi anechoic chamber),C-2117(mains ports conducted interference measurement) and T-180(telecommunication ports conducted interference measurement).

The Laboratory is registered to perform emission tests with Industry Canada (IC), and the registration number is 11177A-1 11177A-2.

TUV Rhineland accredits the Laboratory for conformance to IEC and EN standards, the registration number is E2024086Z02.

2.3.Measurement Uncertainty

Contribution	Data (dB)	Data Type	Probability Distribution	Weight	Std. Uncertainty (dB)
Measurement					
RF Reflection	0.75	Spec	rectangular	0.58	0.435
Positioning Accuracy	1.5	Accy	rectangular	0.58	0.87
System Repeatability	1.4	Spec	rectangular	1	1.4
Probe					
Probe Calibration (Conversion factor)	1.3	Spec	rectangular	0.58	0.754
Field Probe Isotropy	0.3	Spec	rectangular	0.58	0.174
Probe Cable Placement	0.3	Spec	rectangular	0.58	0.174
DUT					
DUT Repeatability	0.5	Standard Deviation	normal	1	0.5
Combined Standard Uncertainty			normal	1	4.3

Expanded Uncertainty (coverage factor =2) U			normal (k=2)	1	8.6	

3. PRODUCT DESCRIPTION

3.1.EUT Description

Description : Mobile Phone

Manufacturer : Shenzhen JSR Technology Co., LTD.

Model Number : NXL6C

Mode(s) of Operation	Transmitting Frequency	Supports Simultaneous	C63.19 Tested	Reduced Power 20.19 (c)
CDMA 800	824.70 – 848.31 MHz	Wi-Fi, Bluetooth	Yes	N/A
CDMA 1900	1851.20 – 1908.75 MHz	Wi-Fi, Bluetooth	Yes	N/A
Wi-Fi 802.11b/g/n	2412.0 - 2462.0 MHz	CDMA, Bluetooth	No	N/A
Bluetooth	2402.0 – 2480.0 MHz	CDMA, Wi-Fi	No	N/A

Remark: No Bluetooth profile exists in this phone that will allow a Bluetooth link while in a cellular call that passes audio to the earpiece. If the user had Bluetooth enabled and a link established, they could not be listening to the phone through the earpiece.

Wi-Fi capability is included in this phone without measurements for hearing aid compatibility based on the interim ruling by the FCC according to paragraph 37 of the Federal Register, Volume 3, Number 89, as of May 7, 2008. Users shall be informed of this via the product user guide per the same FCC ruling.

3.2.Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: COYI6CP, filing to comply with Section 20.19.

3.3.Operating Condition of EUT

The transmitter has a maximum peak conducted output power of Basic rate GFSK modulation and EDR mode 8DPSK modulation. Tests were performed with Basic

rate GFSK modulation and EDR mode 8DPSK modulation.

3.4. Test Conditions

Date of test : Oct 31-Nov 1, 2013

Date of EUT Receive : Oct 12, 2013

Temperature: 23-24 °C

Relative Humidity: 53-56%

3.5. Special Accessories

Not available for this EUT intended for grant.

3.6. Equipment Modifications

Not available for this EUT intended for grant.

4. TEST EQUIPMENT USED

Table 2 Test Equipment

Equipment	Manufacturer	Model No.	Serial	Last Cal.	Cal. Interval
E-Field Probe	APREL	E020H	420-00106	07-May-2013	1 year
APREL HAC ADC	APREL	ALS-HAC-ADC	HAC-ADC-07	15-Aug-2013	1 year
H-Field Probe	APREL	H040	400-00108	15-Aug-2013	1 year
835 MHz Dipole	APREL	ALS-D-835-S-2H	185-00576	15-Aug-2013	1 year
1880 MHz Dipole	APREL	ALS-D-1900-S-H	215-00725	15-Aug-2013	1 year
Signal Generator	R&S	SMV03	100356	19-Feb-2013	1 year
Amplifier	Mini Circuit	ZHL-42W	N/A	N/A	N/A
3 dB Attenuator	Agilent	8491A	MY39266348	N/A	N/A
Directional Coupler	Agilent	778D	MY48220198	N/A	N/A
Power Meter	R&S	NRVD	100041	26-Jun-2013	1 year
Power Sensor	R&S	URV5-Z2	100012	26-Jun-2013	1 year
Power Sensor	R&S	URV5-Z2	100013	26-Jun-2013	1 year
Spectrum Analyzer	R&S	FSL	100611	15-May-2013	1 year

5. VALIDATION

5.1. Test Standard and Limit

Validations were performed to verify that measured E-field and H-field values are within $\pm 25\%$ from the target reference values provided by the manufacturer. Per Section 4.3.2.1 of the C63.19 standard, “Values within $\pm 25\%$ are acceptable, of which 12% is deviation and 13% is measurement uncertainty” .

5.2. Test Procedure

Validations of the HAC test system were performed using the measurement equipment listed in Section 4. All validations occur in free space using the HAC test arch. The maximum E-field or H-field were evaluated and compared to the target values provided by APREL. Validations were performed at 835 MHz and/or 1880 MHz.

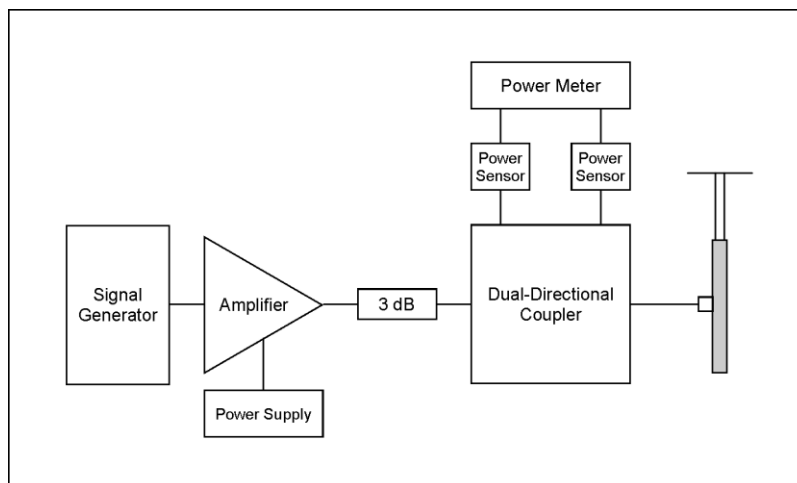


Figure 1: Setup for Validation measurements

5.3.Validation Result

F (MHz)	Protocol	Input Power (mW)	E-Field Results (V/m)	Target for Dipole (V/m)	% Deviation
835	CW	100	181.422	185.9	-2.41%
1880	CW	100	155.214	156.2	-0.63%

F (MHz)	Protocol	Input Power (mW)	H-Field Results (A/m)	Target for Dipole (A/m)	% Deviation
835	CW	100	0.489	0.469	4.26%
1880	CW	100	0.386	0.443	-12.87%

6. PROBE MODULATION FACTOR (PMF)

6.1. Test Standard and Limit

The HAC Standard requires measurement of the peak envelope E- and H-fields of the wireless device (WD). Para. 4.2.2.1, and C.3.1 of the standard describes the Probe Modulation Response Factor that shall be applied to convert the probe reading to Peak Envelope Field.

6.2. Test Procedure

According to APREL application note, RF Field Probe Modulation Response was measured with the field probe and associated measurement equipment. The PMF was measured using a signal generator as follows:

1. Connect a dipole with a CW signal at the intended measured frequency.
2. Fix the probe at a set location relative to the dipole, typically located at the field reference point.
3. Run a normal measurement scan of the CW signal, record the maximum field strength.
4. Adjust the Signal generator output to similar as the intended wireless device with same peak level of CW signal.
5. Manually Adjust the Mod. Factor value in test software MiniHAC, and run the measurement scan again, until a Mod. Factor value that can get a same field strength level comparing to the CW signal.
6. The Mod. Factor value is then used for measurements on EUT with the modulation type.

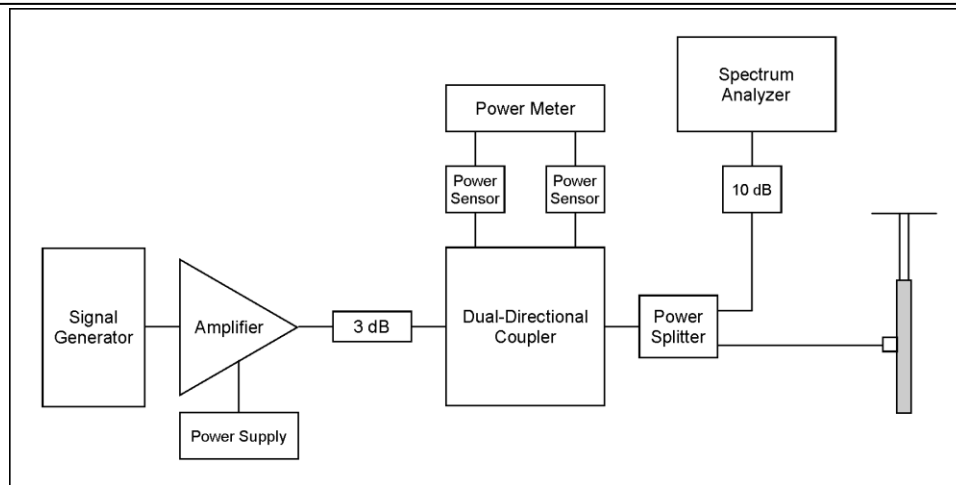


Figure 2: Setup for PMF measurements

6.3.PMF Measurement Results

f (MHz)	Protocol	E-Field Probe	H-Field Probe
		E-Field Modulation Factor dB	H-Field Modulation Factor dB
835	CDMA	0.0	0.0
1880	CDMA	0.17	0.0

7. HAC RF EMISSIONS TEST RESULT

7.1. Test Standard and Limit

7.1.1. Test Standard

ANSI C63.19-2007

7.1.2. Test Limit

DUT Emissions Limits (AWF = 0) $f < 960$ MHz	
Rating	E-Field
M3	199.5 – 354.8 V/m
M4	< 199.5 V/m

DUT Emissions Limits (AWF = 0) $f > 960$ MHz	
Rating	E-Field
M3	63.1 – 112.2 V/m
M4	< 63.1 V/m

7.2. Test Procedure

1. Confirm proper operation of the field probe, probe measurement system and other instrumentation and the positioning system.
2. Position the WD in its intended test position.
3. Configure the WD normal operation for maximum rated RF output power, at the desired channel and other operating parameters, (e.g. test mode) as intended for the test.
4. The center sub-grid shall be centered on the center of the WD output (acoustic or

T-coil output), as appropriate. Locate the field probe at the initial test position in the 5 x 5 cm grid, which is contained in the measurement plane

5. Record the reading.

6. Scan the entire 5 x 5 cm region in equally spaced increments and record the reading at each measurement point. The distance between measurement points shall be sufficient to assure the identification of the peak reading.

7. Identify the five contiguous sub-grids around the center sub-grid with the lowest maximum strength readings. Thus the 6 areas to be used to determine the WD' s peak emissions are identified and outlined for the final manual scan. Please note that a maximum of five blocks can be excluded for both E- and H-field measurements for the WD output being measured. State another way, the center sub-grid and 3 other must be common to both the E- and H-field measurements.

8. Identify the highest field reading within the non-excluded sub-grids identified in step 7.

9. Convert the highest field reading within identified in step 8 to peak V/m or A/m, as appropriate.

10. Repeat steps 1-10 for both the E- and H-field measurements.

11. Compare this reading to the categories in ANSI-C63.19 and record the resulting category. The lowest category number listed in ANSI-C63.19 obtained in step 10 for either E or H field determines the M category for the audio coupling mode assessment. Record the WD category rating.

7.3. Test Result

E-Field Emission

	Channel	Peak Field V/m	M Rating
800CDMA SO55	1013	67.542	M4
	384	86.338	M4
	777	83.552	M4
1900CDMA SO55	25	28.354	M4
	600	10.025	M4
	1175	9.922	M4

H-Field Emission

	Channel	Peak Field A/m	M Rating
800CDMA SO55	1013	0.092	M4
	384	0.093	M4
	777	0.082	M4
1900CDMA SO55	25	0.024	M4
	600	0.024	M4
	1175	0.024	M4

APPENDIX 1 TEST PLOTS

HAC Test Report

Test Data

Test Date : 31-Oct-2013, 15:07:36

Device Data

Device Name : innos6c
Device Serial No. : 1
Device Frequency : 835.00 MHz
Device Mode : Non-GSM
Device Channel : Low

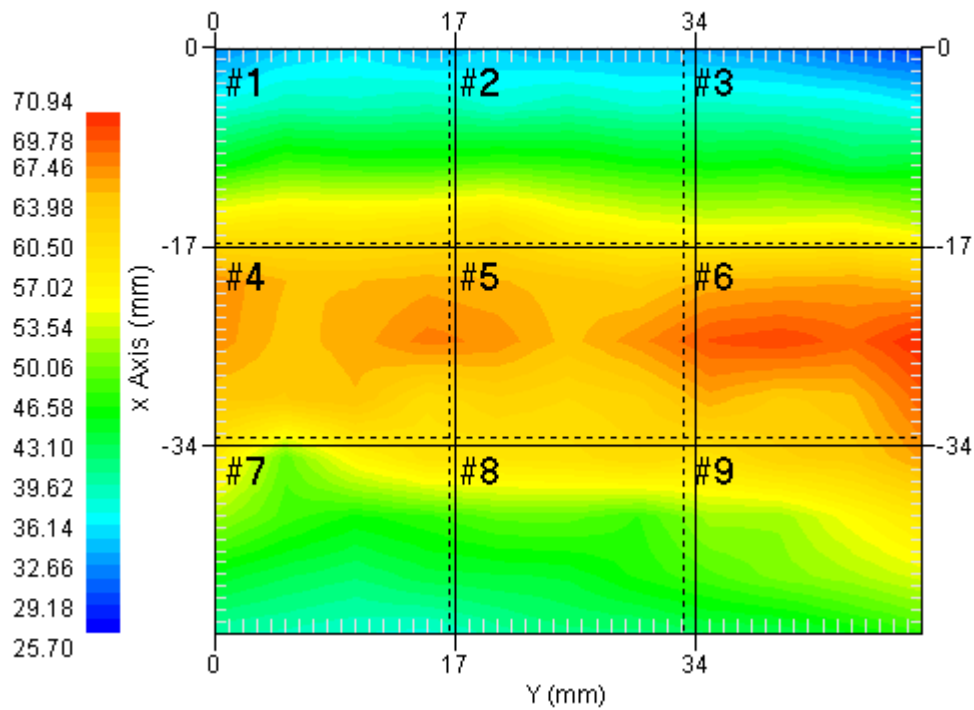
Probe Serial No. : 420-106_CW
Probe Name : ALS-E-Field
Probe Type : E-Field Triangle
Probe Model : E-020
Date Calibrated : 15-Aug-2013
Probe Frequency : 835 MHz
Probe Duty Cycle : 1
Probe Mod. Factor : 0 dB
Probe Sensitivity : 1.15 1.15 1.15 $\mu\text{V}/(\text{V/m})^2$
Compression Point : 95 mV
Offset : 1.56 mm
Probe Height : 10 mm
Scan Size : 11x11x1 : Measurement x=5mm, y=5mm, z=10mm
E-Field (Peak) : 67.542 V/m
dB (Peak) : 36.591 db(V/m)
Standard : ANSI c63.19 2007
Category : M4
Contiguous sub-grids shaded red are excluded.

#1 59.600	#2 60.359	#3 56.119
#4 66.755	#5 67.542	#6 70.884
#7 58.816	#8 60.527	#9 65.897

V/m

HAC E-Field

2D Plot



HAC Test Report

Test Data

Test Date : 31-Oct-2013, 15:19:09

Device Data

Device Name : innos6c
Device Serial No. : 1
Device Frequency : 835.00 MHz
Device Mode : Non-GSM
Device Channel : Low

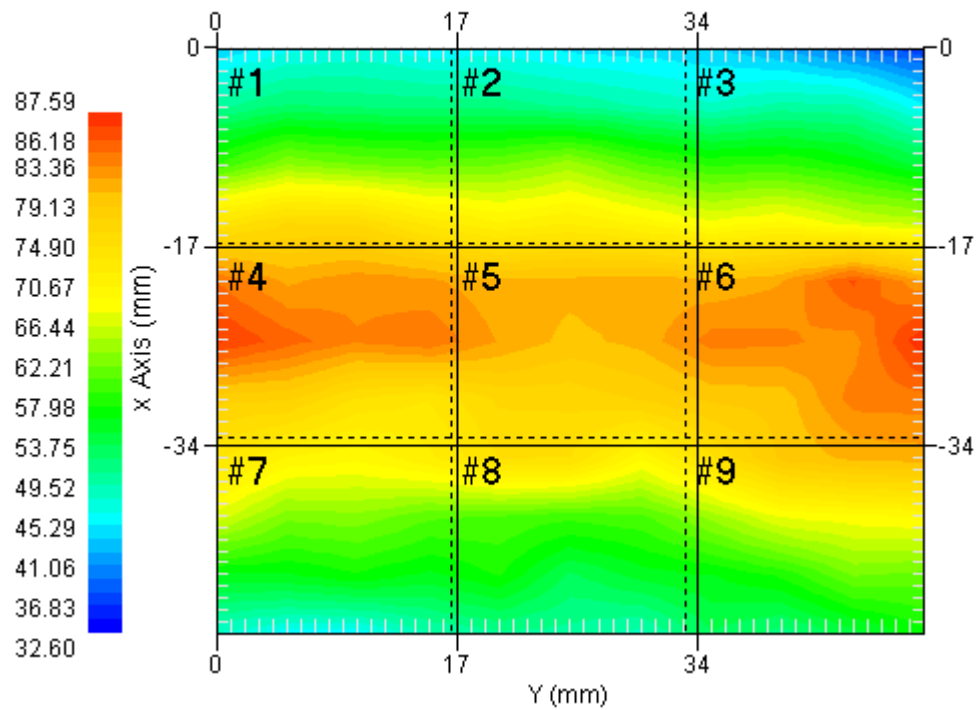
Probe Serial No. : 420-106_CW
Probe Name : ALS-E-Field
Probe Type : E-Field Triangle
Probe Model : E-020
Date Calibrated : 07-May-2013
Probe Frequency : 835 MHz
Probe Duty Cycle : 1
Probe Mod. Factor : 0 dB
Probe Sensitivity : 1.15 1.15 1.15 $\mu\text{V}/(\text{V/m})^2$
Compression Point : 95 mV
Offset : 1.56 mm
Probe Height : 10 mm
Scan Size : 11x11x1 : Measurement x=5mm, y=5mm, z=10mm
E-Field (Peak) : 86.338 V/m
dB (Peak) : 38.724 db(V/m)
Standard : ANSI c63.19 2007
Category : M4
Contiguous sub-grids shaded red are excluded.

#1 76.118	#2 72.552	#3 70.700
#4 86.338	#5 82.017	#6 87.467
#7 73.195	#8 73.841	#9 80.457

V/m

HAC E-Field

2D Plot



HAC Test Report

Test Data

Test Date : 31-Oct-2013, 15:25:46

Device Data

Device Name : innos6c
Device Serial No. : 1
Device Frequency : 835.00 MHz
Device Mode : Non-GSM
Device Channel : High

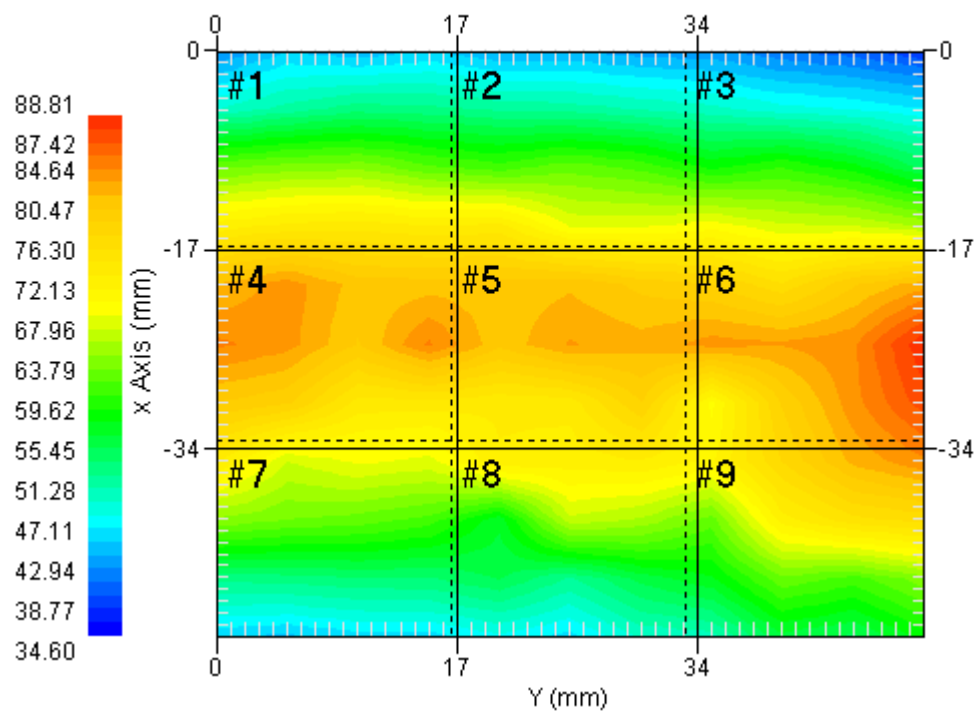
Probe Serial No. : 420-106_CW
Probe Name : ALS-E-Field
Probe Type : E-Field Triangle
Probe Model : E-020
Date Calibrated : 07-May-2013
Probe Frequency : 835 MHz
Probe Duty Cycle : 1
Probe Mod. Factor : 0 dB
Probe Sensitivity : 1.15 1.15 1.15 $\mu\text{V}/(\text{V/m})^2$
Compression Point : 95 mV
Offset : 1.56 mm
Probe Height : 10 mm
Scan Size : 11x11x1 : Measurement x=5mm, y=5mm, z=10mm
E-Field (Peak) : 83.552 V/m
dB (Peak) : 38.439 db(V/m)
Standard : ANSI c63.19 2007
Category : M4
Contiguous sub-grids shaded red are excluded.

#1 74.635	#2 73.991	#3 70.572
#4 83.552	#5 81.960	#6 88.493
#7 73.674	#8 73.191	#9 83.766

V/m

HAC E-Field

2D Plot



HAC Test Report

Test Data

Test Date : 31-Oct-2013, 15:43:28

Device Data

Device Name : innos6c
Device Serial No. : 1
Device Frequency : 1880.00 MHz
Device Mode : Non-GSM
Device Channel : Low

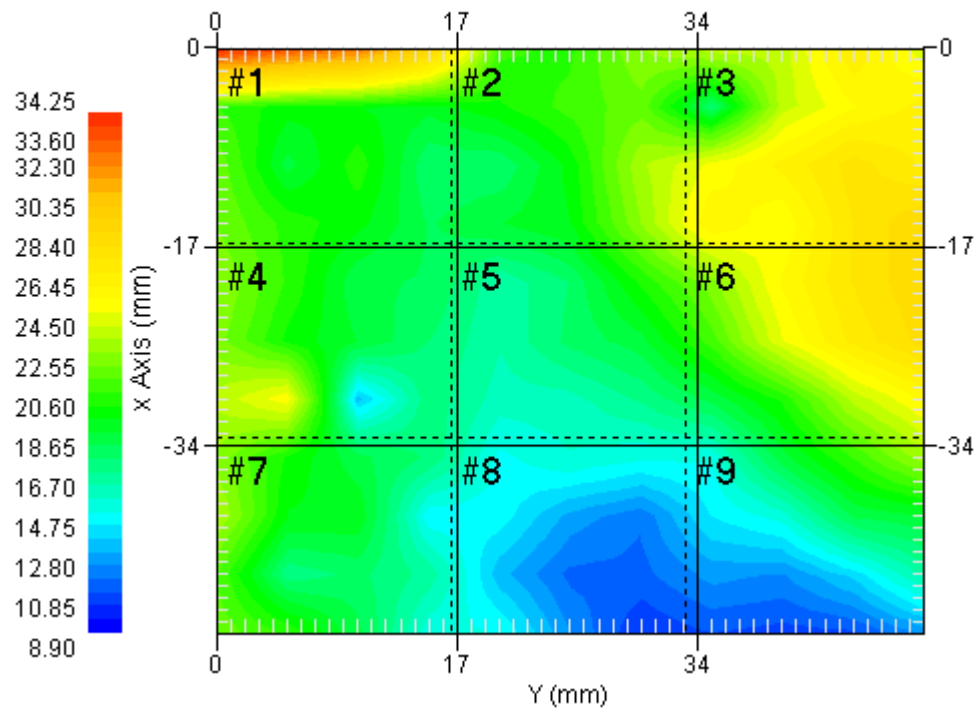
Probe Serial No. : 420-106_CW
Probe Name : ALS-E-Field
Probe Type : E-Field Triangle
Probe Model : E-020
Date Calibrated : 07-May-2013
Probe Frequency : 835 MHz
Probe Duty Cycle : 1.02
Probe Mod. Factor : 0.17 dB
Probe Sensitivity : 1.15 1.15 1.15 $\mu\text{V}/(\text{V/m})^2$
Compression Point : 95 mV
Offset : 1.56 mm
Probe Height : 10 mm
Scan Size : 11x11x1 : Measurement x=5mm, y=5mm, z=10mm
E-Field (Peak) : 28.354 V/m
dB (Peak) : 29.052 db(V/m)
Standard : ANSI c63.19 2007
Category : M4
Contiguous sub-grids shaded red are excluded.

#1 34.137	#2 25.911	#3 28.340
#4 24.862	#5 23.296	#6 28.354
#7 23.200	#8 16.270	#9 23.369

V/m

HAC E-Field

2D Plot



HAC Test Report

Test Data

Test Date : 01-Nov-2013, 08:12:22

Device Data

Device Name : innos6c
Device Serial No. : 1
Device Frequency : 1880.00 MHz
Device Mode : Non-GSM
Device Channel : Mid

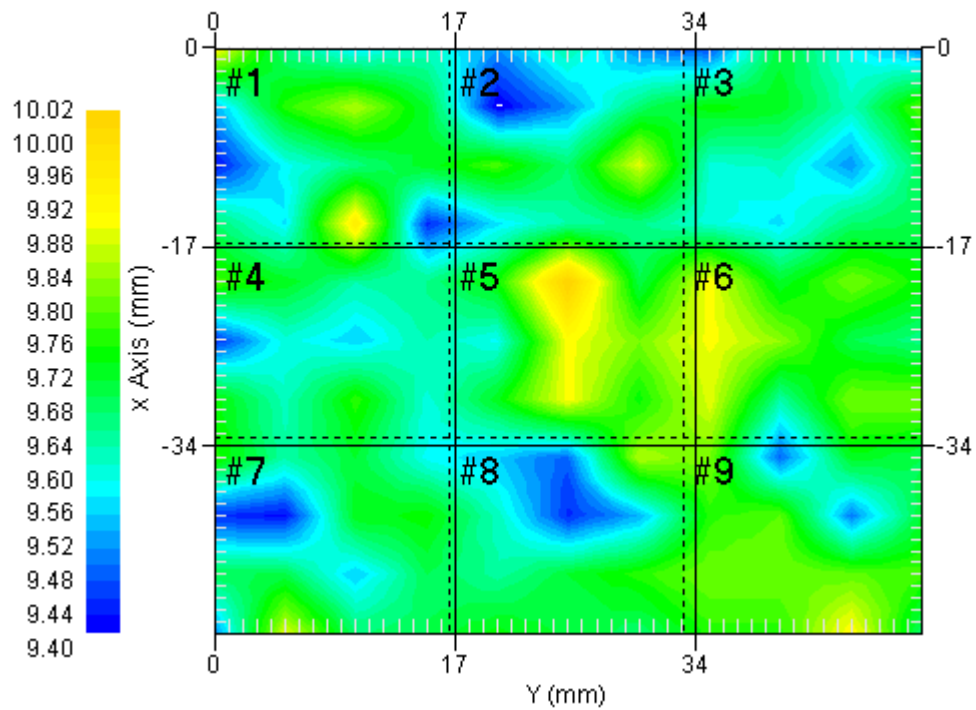
Probe Serial No. : 420-106_CW
Probe Name : ALS-E-Field
Probe Type : E-Field Triangle
Probe Model : E-020
Date Calibrated : 07-May-2013
Probe Frequency : 835 MHz
Probe Duty Cycle : 1.02
Probe Mod. Factor : 0.17 dB
Probe Sensitivity : 1.15 1.15 1.15 $\mu\text{V}/(\text{V/m})^2$
Compression Point : 95 mV
Offset : 1.56 mm
Probe Height : 10 mm
Scan Size : 11x11x1 : Measurement x=5mm, y=5mm, z=10mm
E-Field (Peak) : 10.025 V/m
dB (Peak) : 20.021 db(V/m)
Standard : ANSI c63.19 2007
Category : M4
Contiguous sub-grids shaded red are excluded.

#1 9.939	#2 9.870	#3 9.784
#4 9.815	#5 10.025	#6 9.888
#7 9.870	#8 9.836	#9 9.905

V/m

HAC E-Field

2D Plot



HAC Test Report

Test Data

Test Date : 01-Nov-2013, 09:16:57

Device Data

Device Name : innos6c
Device Serial No. : 1
Device Frequency : 1880.00 MHz
Device Mode : Non-GSM
Device Channel : High

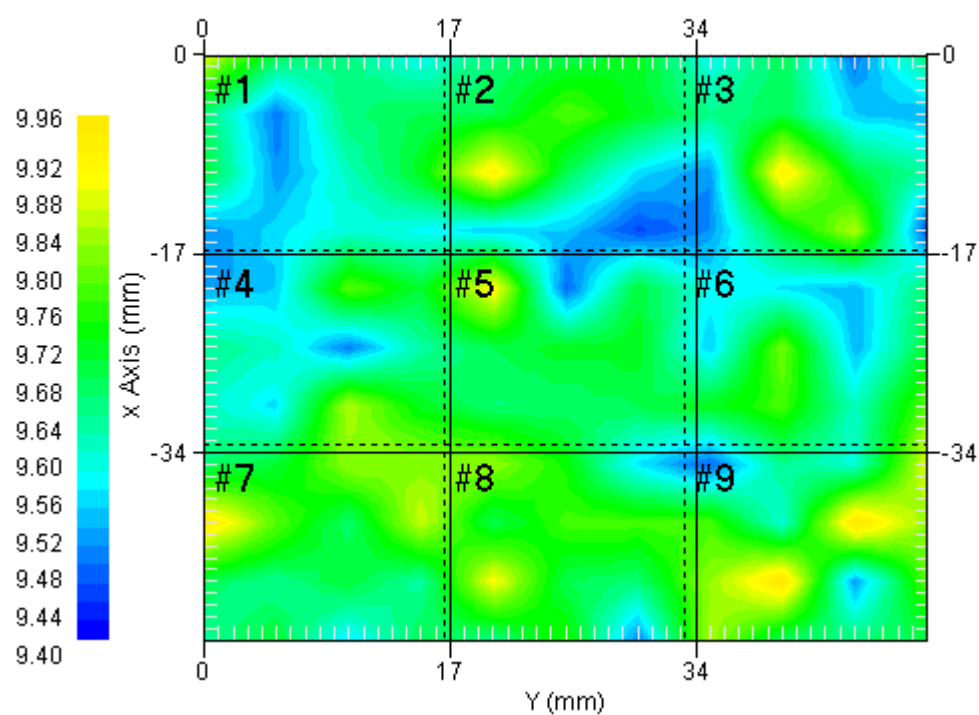
Probe Serial No. : 420-106_CW
Probe Name : ALS-E-Field
Probe Type : E-Field Triangle
Probe Model : E-020
Date Calibrated : 07-May-2013
Probe Frequency : 835 MHz
Probe Duty Cycle : 1.02
Probe Mod. Factor : 0.17 dB
Probe Sensitivity : 1.15 1.15 1.15 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point : 95 mV
Offset : 1.56 mm
Probe Height : 10 mm
Scan Size : 11x11x1 : Measurement x=5mm, y=5mm, z=10mm
E-Field (Peak) : 9.922 V/m
dB (Peak) : 19.932 db(V/m)
Standard : ANSI c63.19 2007
Category : M4
Contiguous sub-grids shaded red are excluded.

#1 9.870	#2 9.922	#3 9.922
#4 9.836	#5 9.905	#6 9.836
#7 9.939	#8 9.888	#9 9.956

V/m

HAC E-Field

2D Plot



HAC Test Report

Test Data

Test Date : 01-Nov-2013, 10:08:23

Device Data

Device Name : innos6c
Device Serial No. : 1
Device Frequency : 835.00 MHz
Device Mode : Non-GSM
Device Channel : Low

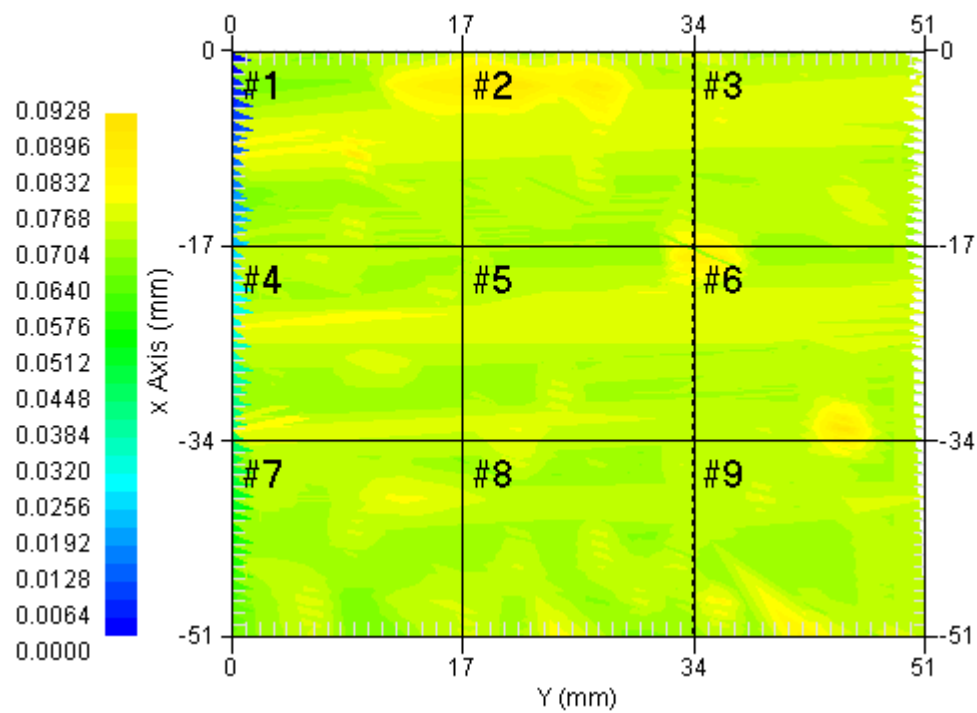
Probe Serial No. : 400-108_MOD
Probe Name : ALS-H-Field
Probe Type : H-Field Isotropic
Probe Model : H-040
Date Calibrated : 01-Nov-2013
Probe Frequency : 835 MHz
Probe Duty Cycle : 1.0
Probe Mod. Factor : 0.0 dB
Probe Sensitivity : 140.00 140.00 140.00 mV/(A/m)²
Compression Point : 75 mV
Offset : 3.5 mm
Probe Height : 10 mm
Scan Size : 18x18x1 : Measurement x=3mm, y=3mm, z=10mm
H-Field (Peak) : 0.092 A/m
dB (Peak) : -20.699 db(A/m)
Standard : ANSI c63.19 2007
Category : M4
Contiguous sub-grids shaded red are excluded.

#1 0.089	#2 0.087	#3 0.090
#4 0.087	#5 0.092	#6 0.082
#7 0.077	#8 0.079	#9 0.084

A/m

HAC H-Field

2D Plot



HAC Test Report

Test Data

Test Date : 01-Nov-2013, 10:19:44

Device Data

Device Name : innos6c
Device Serial No. : 1
Device Frequency : 835.00 MHz
Device Mode : Non-GSM
Device Channel : Mid

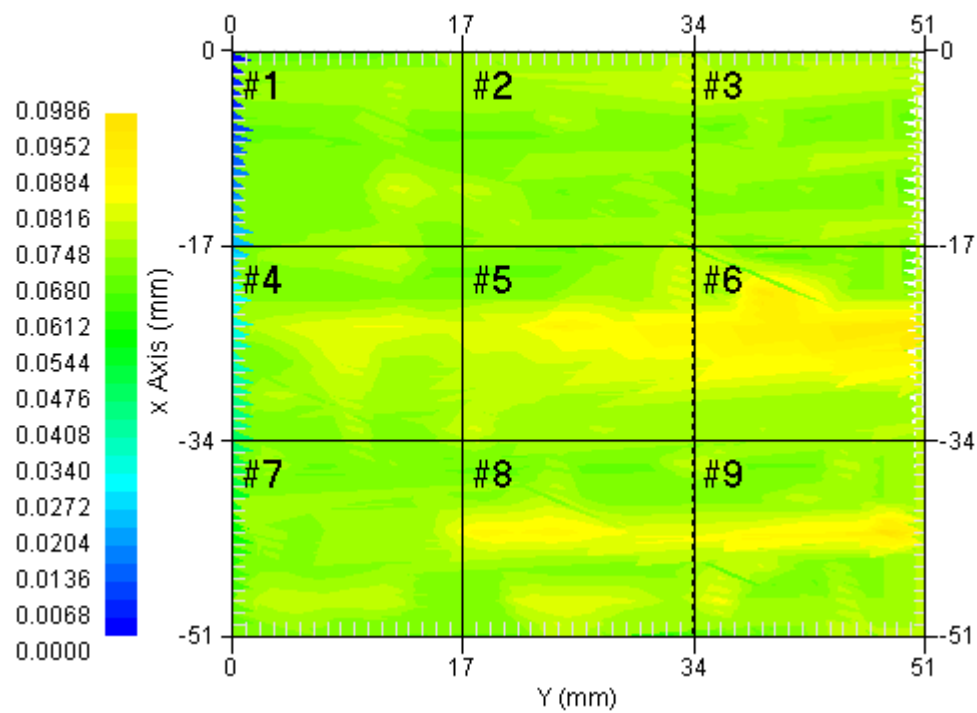
Probe Serial No. : 400-108_MOD
Probe Name : ALS-H-Field
Probe Type : H-Field Isotropic
Probe Model : H-040
Date Calibrated : 01-Nov-2013
Probe Frequency : 835 MHz
Probe Duty Cycle : 1.0
Probe Mod. Factor : 0.0 dB
Probe Sensitivity : 140.00 140.00 140.00 mV/(A/m)²
Compression Point : 75 mV
Offset : 3.5 mm
Probe Height : 10 mm
Scan Size : 18x18x1 : Measurement x=3mm, y=3mm, z=10mm
H-Field (Peak) : 0.093 A/m
dB (Peak) : -20.593 db(A/m)
Standard : ANSI c63.19 2007
Category : M4
Contiguous sub-grids shaded red are excluded.

#1 0.077	#2 0.080	#3 0.080
#4 0.095	#5 0.089	#6 0.093
#7 0.087	#8 0.098	#9 0.087

A/m

HAC H-Field

2D Plot



HAC Test Report

Test Data

Test Date : 01-Nov-2013, 10:24:56

Device Data

Device Name : innos6c
Device Serial No. : 1
Device Frequency : 835.00 MHz
Device Mode : Non-GSM
Device Channel : High

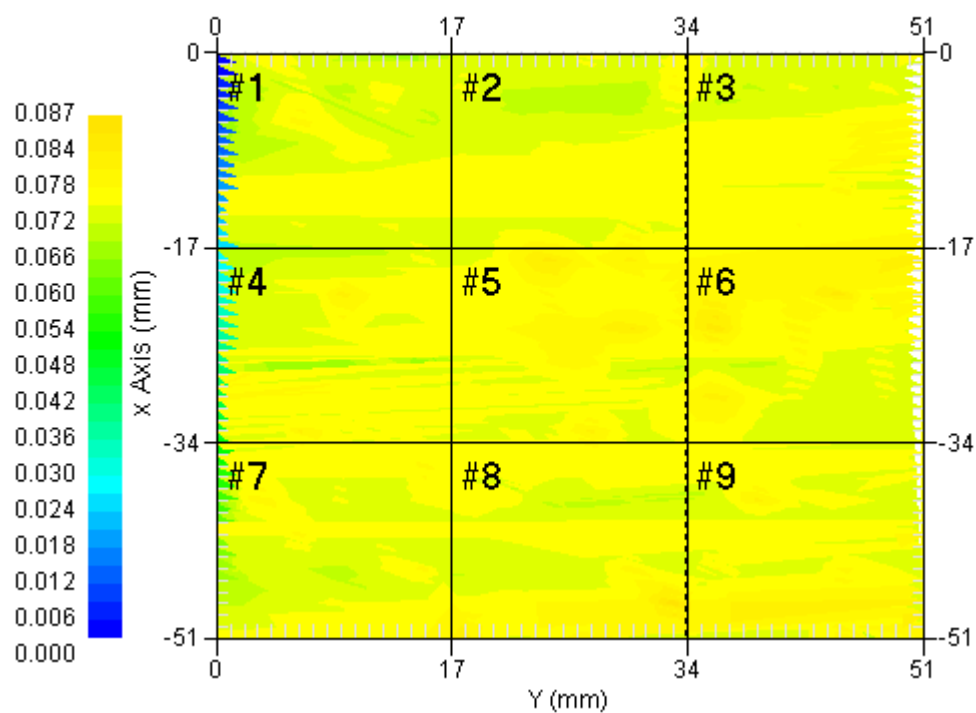
Probe Serial No. : 400-108_MOD
Probe Name : ALS-H-Field
Probe Type : H-Field Isotropic
Probe Model : H-040
Date Calibrated : 01-Nov-2013
Probe Frequency : 835 MHz
Probe Duty Cycle : 1.0
Probe Mod. Factor : 0.0 dB
Probe Sensitivity : 140.00 140.00 140.00 mV/(A/m)²
Compression Point : 75 mV
Offset : 3.5 mm
Probe Height : 10 mm
Scan Size : 18x18x1 : Measurement x=3mm, y=3mm, z=10mm
H-Field (Peak) : 0.082 A/m
dB (Peak) : -21.676 db(A/m)
Standard : ANSI c63.19 2007
Category : M4
Contiguous sub-grids shaded red are excluded.

#1 0.077	#2 0.078	#3 0.082
#4 0.082	#5 0.080	#6 0.083
#7 0.081	#8 0.079	#9 0.086

A/m

HAC H-Field

2D Plot



HAC Test Report

Test Data

Test Date : 01-Nov-2013, 09:48:46

Device Data

Device Name : innos6c
Device Serial No. : 1
Device Frequency : 1880.00 MHz
Device Mode : Non-GSM
Device Channel : Low

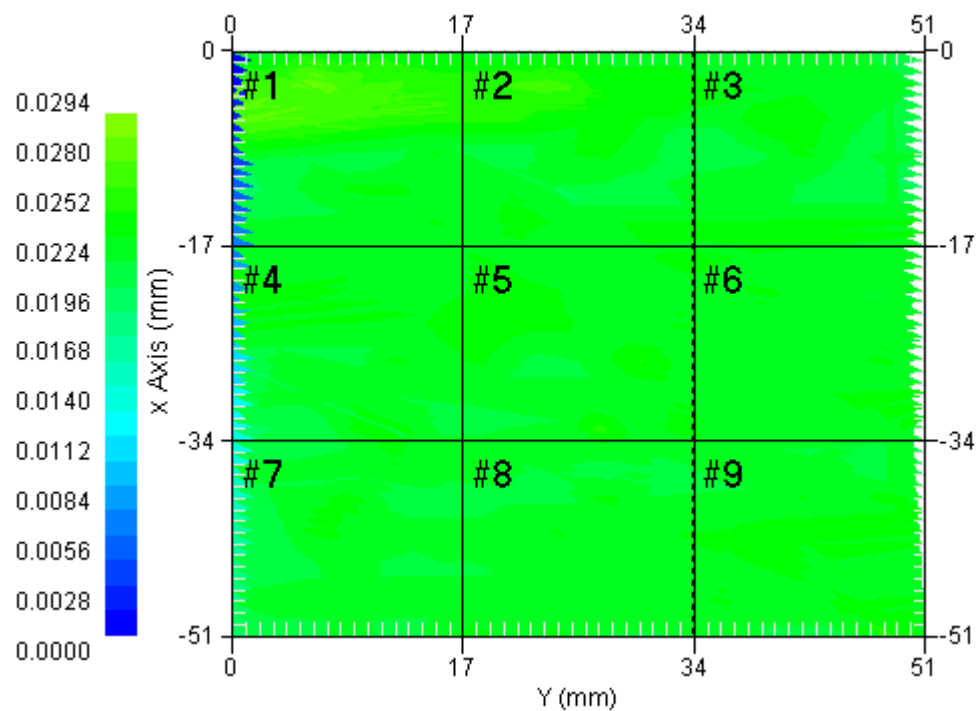
Probe Serial No. : 400-108_MOD
Probe Name : ALS-H-Field
Probe Type : H-Field Isotropic
Probe Model : H-040
Date Calibrated : 01-Nov-2013
Probe Frequency : 1880 MHz
Probe Duty Cycle : 1.0
Probe Mod. Factor : 0.0 dB
Probe Sensitivity : 2985.00 2985.00 2985.00 mV/(A/m)²
Compression Point : 75 mV
Offset : 3.5 mm
Probe Height : 10 mm
Scan Size : 18x18x1 : Measurement x=3mm, y=3mm, z=10mm
H-Field (Peak) : 0.024 A/m
dB (Peak) : -32.265 db(A/m)
Standard : ANSI c63.19 2007
Category : M4
Contiguous sub-grids shaded red are excluded.

#1 0.028	#2 0.026	#3 0.027
#4 0.024	#5 0.024	#6 0.023
#7 0.024	#8 0.023	#9 0.023

A/m

HAC H-Field

2D Plot



HAC Test Report

Test Data

Test Date : 01-Nov-2013, 09:56:02

Device Data

Device Name : innos6c
Device Serial No. : 1
Device Frequency : 1880.00 MHz
Device Mode : Non-GSM
Device Channel : Mid

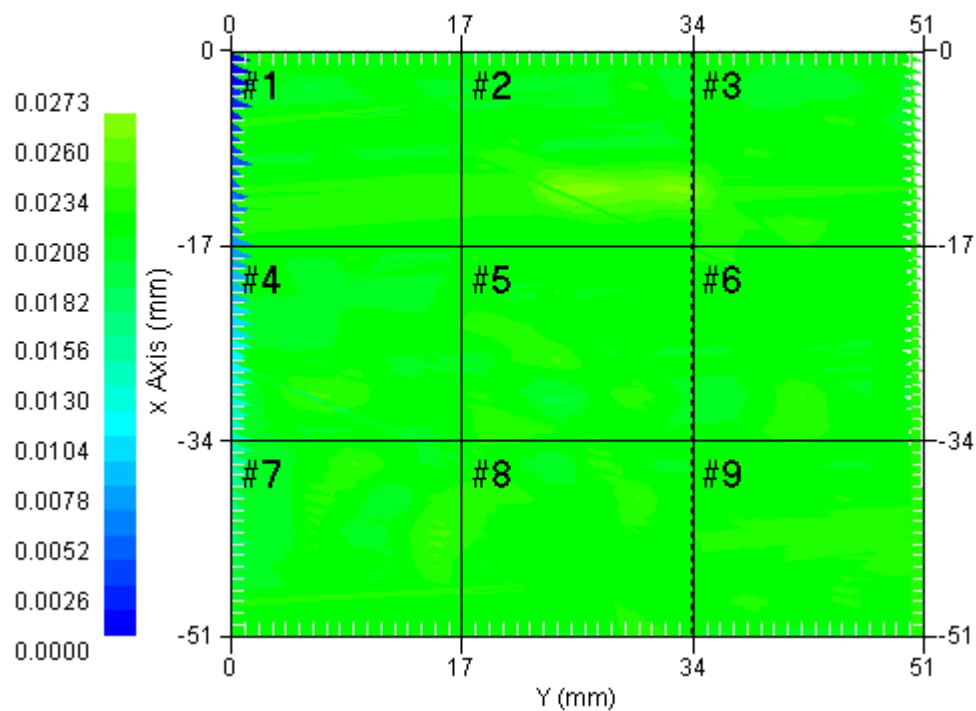
Probe Serial No. : 400-108_MOD
Probe Name : ALS-H-Field
Probe Type : H-Field Isotropic
Probe Model : H-040
Date Calibrated : 01-Nov-2013
Probe Frequency : 1880 MHz
Probe Duty Cycle : 1.0
Probe Mod. Factor : 0.0 dB
Probe Sensitivity : 2985.00 2985.00 2985.00 mV/(A/m)²
Compression Point : 75 mV
Offset : 3.5 mm
Probe Height : 10 mm
Scan Size : 18x18x1 : Measurement x=3mm, y=3mm, z=10mm
H-Field (Peak) : 0.024 A/m
dB (Peak) : -32.435 db(A/m)
Standard : ANSI c63.19 2007
Category : M4
Contiguous sub-grids shaded red are excluded.

#1 0.027	#2 0.023	#3 0.025
#4 0.024	#5 0.024	#6 0.024
#7 0.024	#8 0.024	#9 0.024

A/m

HAC H-Field

2D Plot



HAC Test Report

Test Data

Test Date : 01-Nov-2013, 10:02:28

Device Data

Device Name : innos6c
Device Serial No. : 1
Device Frequency : 1880.00 MHz
Device Mode : Non-GSM
Device Channel : High

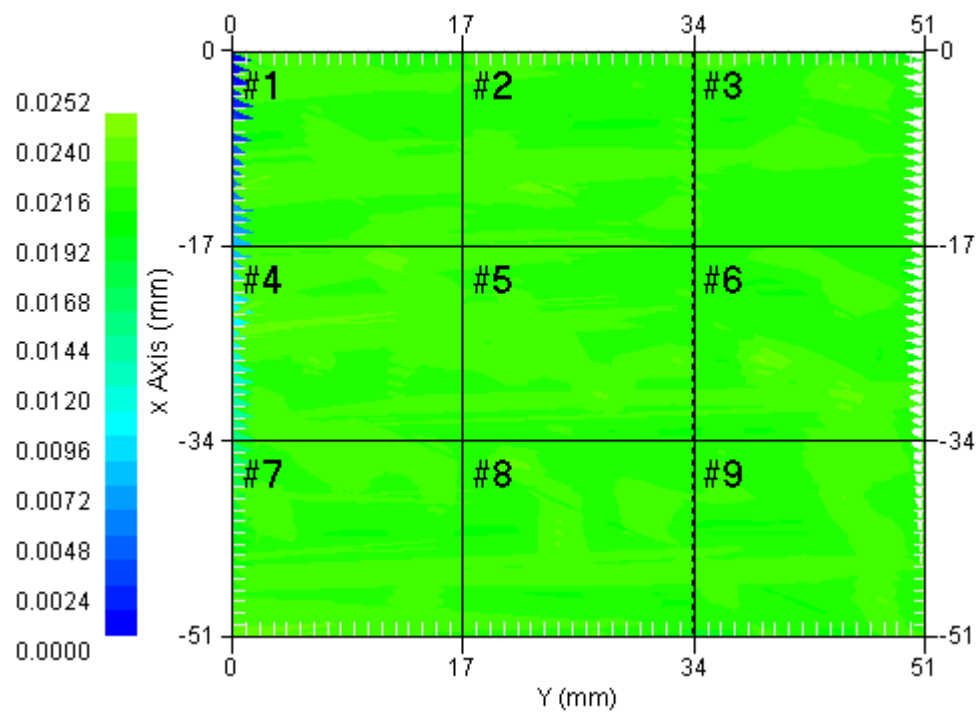
Probe Serial No. : 400-108_MOD
Probe Name : ALS-H-Field
Probe Type : H-Field Isotropic
Probe Model : H-040
Date Calibrated : 01-Nov-2013
Probe Frequency : 1880 MHz
Probe Duty Cycle : 1.0
Probe Mod. Factor : 0.0 dB
Probe Sensitivity : 2985.00 2985.00 2985.00 mV/(A/m)²
Compression Point : 75 mV
Offset : 3.5 mm
Probe Height : 10 mm
Scan Size : 18x18x1 : Measurement x=3mm, y=3mm, z=10mm
H-Field (Peak) : 0.024 A/m
dB (Peak) : -32.435 db(A/m)
Standard : ANSI c63.19 2007
Category : M4
Contiguous sub-grids shaded red are excluded.

#1 0.023	#2 0.024	#3 0.023
#4 0.024	#5 0.023	#6 0.024
#7 0.023	#8 0.023	#9 0.023

A/m

HAC H-Field

2D Plot



APPENDIX 2 VALIDATION PLOTS

HAC Test Report

Test Data

Test Date : 31-Oct-2013, 15:20:27

Device Data

Device Name : 835 MHz dipole
Device Serial No. : ALS-835-D
Device Frequency : 835.00 MHz
Device Mode : Non-GSM
Device Channel : High

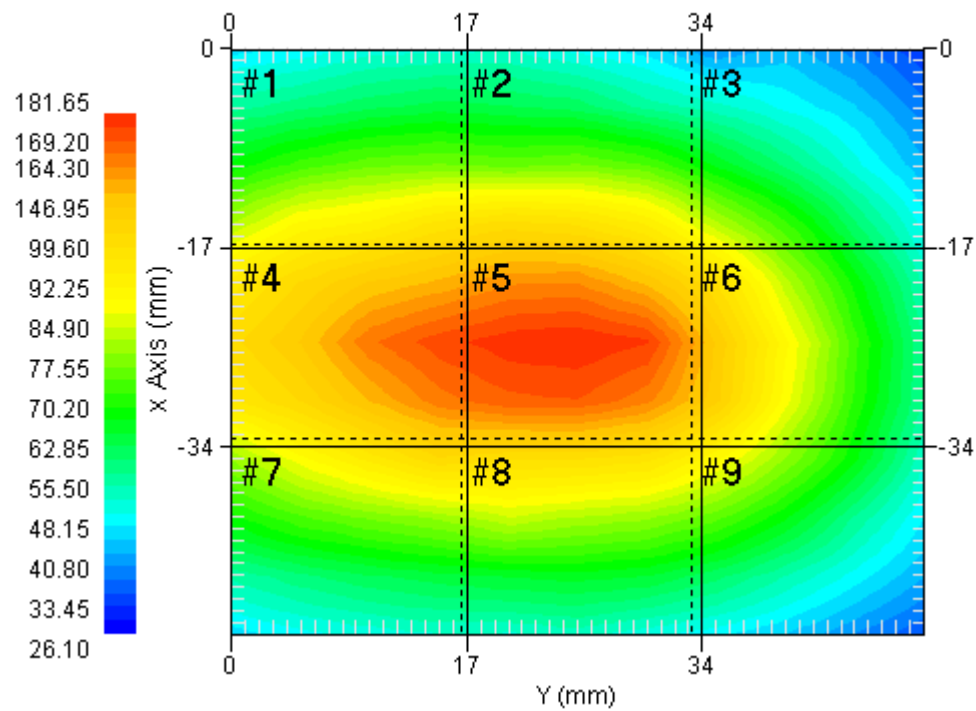
Probe Serial No. : 420-106_CW
Probe Name : ALS-E-Field
Probe Type : E-Field Triangle
Probe Model : E-020
Date Calibrated : 07-May-2013
Probe Frequency : 835 MHz
Probe Duty Cycle : 1
Probe Mod. Factor : 0 dB
Probe Sensitivity : 1.15 1.15 1.15 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point : 95 mV
Offset : 1.56 mm
Probe Height : 10 mm
Scan Size : 11x11x1 : Measurement x=5mm, y=5mm, z=15mm
E-Field (Peak) : 181.422 V/m
dB (Peak) : 41.686 db(V/m)
Standard : ANSI c63.19 2007
Category : M3
Contiguous sub-grids shaded red are excluded.

#1 146.626	#2 160.954	#3 146.283
#4 178.646	#5 181.422	#6 167.148
#7 161.945	#8 161.673	#9 92.724

V/m

HAC E-Field

2D Plot



HAC Test Report

Test Data

Test Date : 31-Oct-2013, 16:23:50

Device Data

Device Name : 1880 MHz dipole
Device Serial No. : ALS-1880-D
Device Frequency : 1800.00 MHz
Device Mode : Non-GSM
Device Channel : High

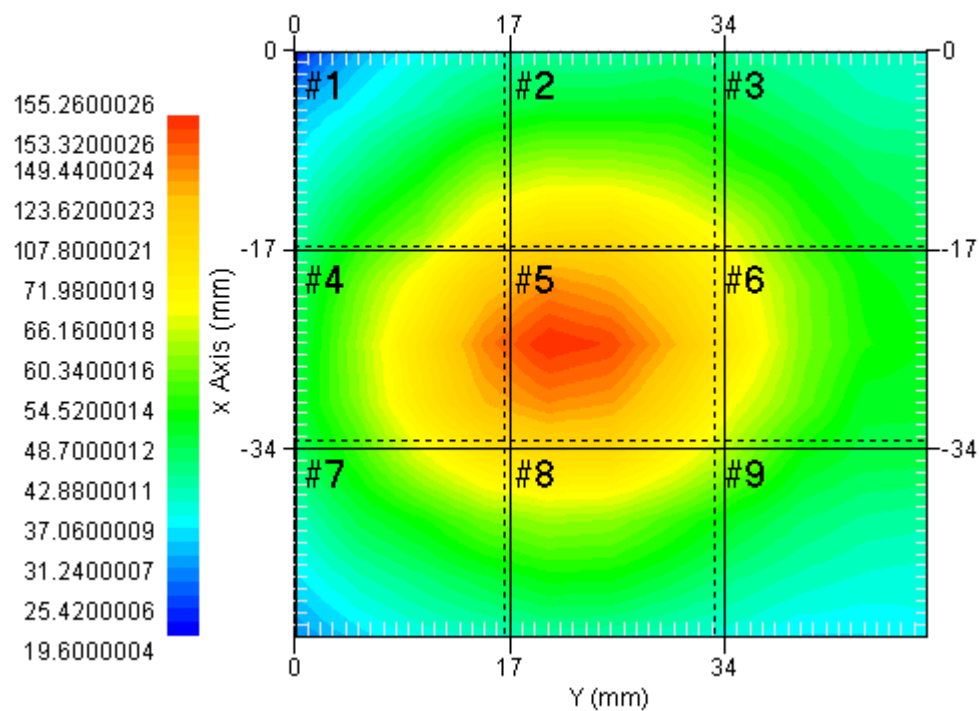
Probe Serial No. : 420-106_CW
Probe Name : ALS-E-Field
Probe Type : E-Field Triangle
Probe Model : E-020
Date Calibrated : 07-May-2011
Probe Frequency : 1880 MHz
Probe Duty Cycle : 1
Probe Mod. Factor : 0 dB
Probe Sensitivity : 1.25 1.25 1.25 $\mu\text{V}/(\text{V/m})^2$
Compression Point : 95 mV
Offset : 1.56 mm
Probe Height : 10 mm
Scan Size : 11x11x1 : Measurement x=5mm, y=5mm, z=15mm
E-Field (Peak) : 95.214 V/m
dB (Peak) : 39.574 db(V/m)
Standard : ANSI c63.19 2011
Category : M2
Contiguous sub-grids shaded red are excluded.

#1 113.306	#2 125.347	#3 114.251
#4 150.500	#5 155.214	#6 134.491
#7 125.459	#8 128.185	#9 106.955

V/m

HAC E-Field

2D Plot



HAC Test Report

Test Data

Test Date : 31-Oct-2013, 15:07:03

Device Data

Device Name : 835 MHz dipole
Device Serial No. : ALS-835-D
Device Frequency : 835.00 MHz
Device Mode : Non-GSM
Device Channel : High

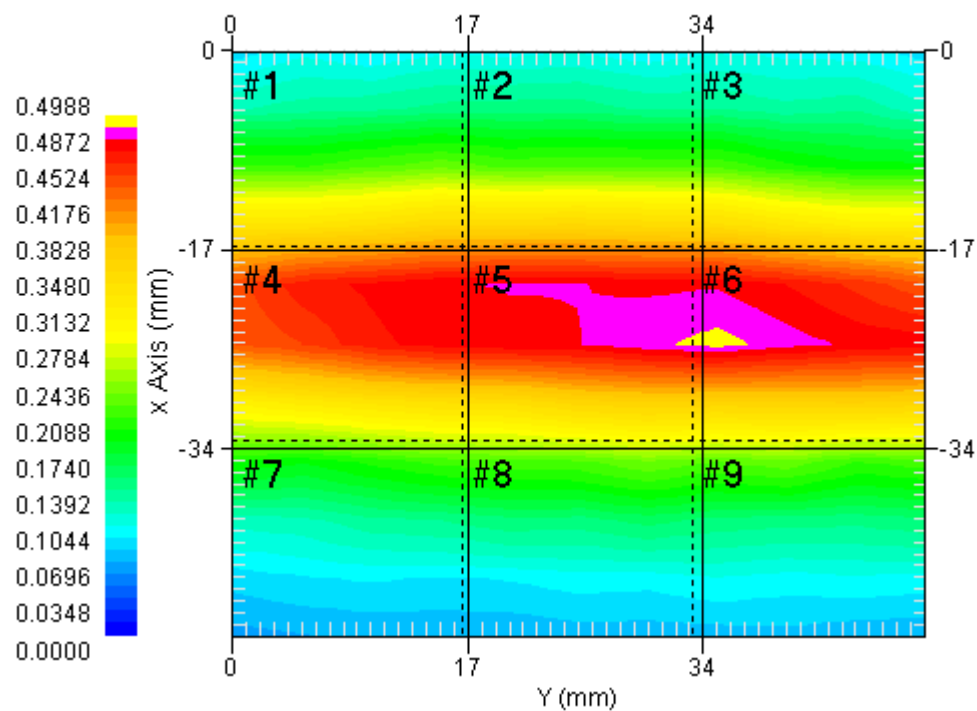
Probe Serial No. : 400-108_CW
Probe Name : ALS-H-Field
Probe Type : H-Field Isotropic
Probe Model : H-040
Date Calibrated : 05-Jul-2013
Probe Frequency : 835 MHz
Probe Duty Cycle : 1
Probe Mod. Factor : 0 dB
Probe Sensitivity : 140.00 140.00 140.00 mV/(A/m)²
Compression Point : 75 mV
Offset : 3.5 mm
Probe Height : 10 mm
Scan Size : 11x11x1 : Measurement x=5mm, y=5mm, z=10mm
H-Field (Peak) : 0.489 A/m
dB (Peak) : -6.220 db(A/m)
Standard : ANSI c63.19 2007
Category : M4
Contiguous sub-grids shaded red are excluded.

#1 0.377	#2 0.379	#3 0.372
#4 0.475	#5 0.489	#6 0.492
#7 0.243	#8 0.262	#9 0.260

A/m

HAC H-Field

2D Plot



HAC Test Report

Test Data

Test Date : 31-Oct-2013, 16:57:00

Device Data

Device Name : 1880 MHz dipole
Device Serial No. : ALS-1880-D
Device Frequency : 1800.00 MHz
Device Mode : Non-GSM
Device Channel : High

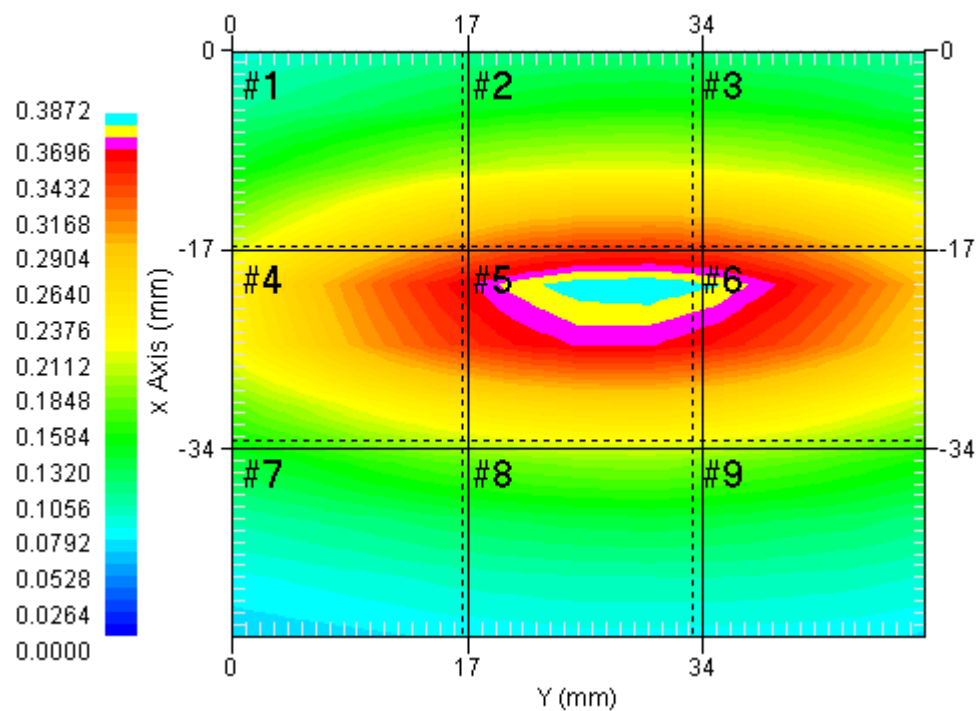
Probe Serial No. : 400-108_CW
Probe Name : ALS-H-Field
Probe Type : H-Field Isotropic
Probe Model : H-040
Date Calibrated : 05-Jul-2013
Probe Frequency : 1880 MHz
Probe Duty Cycle : 1
Probe Mod. Factor : 0 dB
Probe Sensitivity : 2985.00 2985.00 2985.00 mV/(A/m)²
Compression Point : 75 mV
Offset : 3.5 mm
Probe Height : 10 mm
Scan Size : 11x11x1 : Measurement x=5mm, y=5mm, z=10mm
H-Field (Peak) : 0.386 A/m
dB (Peak) : -8.275 db(A/m)
Standard : ANSI c63.19 2007
Category : M2
Contiguous sub-grids shaded red are excluded.

#1 0.295	#2 0.324	#3 0.319
#4 0.354	#5 0.386	#6 0.380
#7 0.186	#8 0.203	#9 0.198

A/m

HAC H-Field

2D Plot



APPENDIX 3 RELEVANT CALIBRATION

NCL CALIBRATION LABORATORIES

Calibration 1522

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.

HAC Validation Dipole

Manufacturer: APREL Laboratories

Part number: ALS-D-835-S-2-H

Frequency: 835 MHz

Serial No: 185-00576

Customer: APREL LABORATORIES

Calibrated: 15 August 2013

Released on: 15 August 2013

This Calibration Certificate is Incomplete Unless Accompanied with the Calibration Results Summary

Released By: _____

NCL CALIBRATION LABORATORIES

303 Terry Fox Drive, Suite 102
Kanata, Ontario
CANADA K2K 3J1

Division of APREL
TEL: (613) 435-8300
FAX: (613) 435-8306

NCL Calibration Laboratories

Division of APREL Laboratories.

Conditions

Dipole 185-00573 was re-calibration.

Ambient Temperature of the Laboratory: 22 °C +/- 0.5°C

Temperature of the Tissue: 21 °C +/- 0.5°C

Calibration Results Summary

This dipole has been found to comply with the calibration requirements detailed in the "Experimental Investigation into the Frequency Response for the APREL Laboratories IEEE C63.19 Hearing Aid Compatibility Validation Dipole Tuned for Air [2007/8 version]".

Electrical Results

Frequency: 835 MHz

SWR: 1.595 U

Return Loss: -12.796 dB

Impedance: 31.742 Ω

Dipole Complies: 790 to 850 MHz

We the undersigned attest that to the best of our knowledge the calibration of this device has been accurately conducted and that all information contained within this report has been reviewed for accuracy.



Stuart Nicol



C. Teodorian

This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories

Division of APREL Laboratories.

Introduction

The results contained within this calibration report are for HAC Validation Dipole 185-00576. The calibration routine consisted of a two step process. Step 1 involves a mechanical verification and inspection to ensure that the dipole meets the manufacturing tolerances. Step 2 involves a complete electrical calibration of the HAC validation dipole conducted within an ambient controlled environment, where the SWR, Impedance, and Return Loss are fully assessed.

References

Experimental Investigation into the Frequency Response for the APREL Laboratories IEEE C63.19 Hearing Aid Compatibility Validation Dipole Tuned for Air [2006 version]

C63.19 American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids 2007/8

Conditions

Dipole 185-00576 was used.

Ambient Temperature of the Laboratory: 22 °C +/- 0.5°C

This page has been reviewed for content and attested to by signature within this document.

3

NCL Calibration Laboratories

Division of APREL Laboratories.

Dipole Calibration Results

Electrical Calibration

Test	Result
S11 R/L	-12.796 dB
SWR	1.595 U
Impedance	31.742 Ω

Calibration Summary

This dipole has been found to comply with the calibration requirements detailed in the "Experimental Investigation into the Frequency Response for the APREL Laboratories IEEE C63.19 Hearing Aid Compatibility Validation Dipole Tuned for Air [2007/8 version]".

This page has been reviewed for content and attested to by signature within this document.

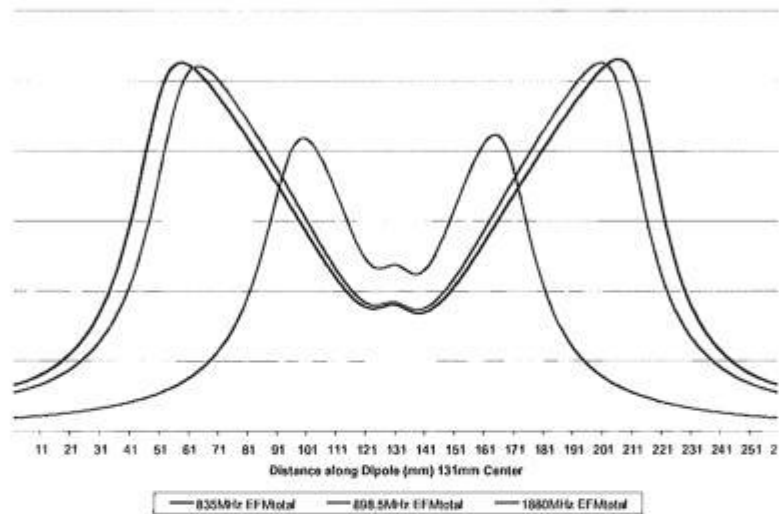
4

NCL Calibration Laboratories

Division of APREL Laboratories.

Target E-Field Measured:

The E-Field measured with probe Serial Number: E-020-H-420-00102 has been normalized to meet the target values within the standard C63.19 2007/8 to within 10%.



Target E-Field C63.19 2007:	265.9 V/m
Measured E-Field @ 10mm:	263 V/m
Delta E-Field:	2.9 V/m
Deviation from Target:	1%

Target E-Field @ 15mm: 172.68 V/m

This page has been reviewed for content and attested to by signature within this document.

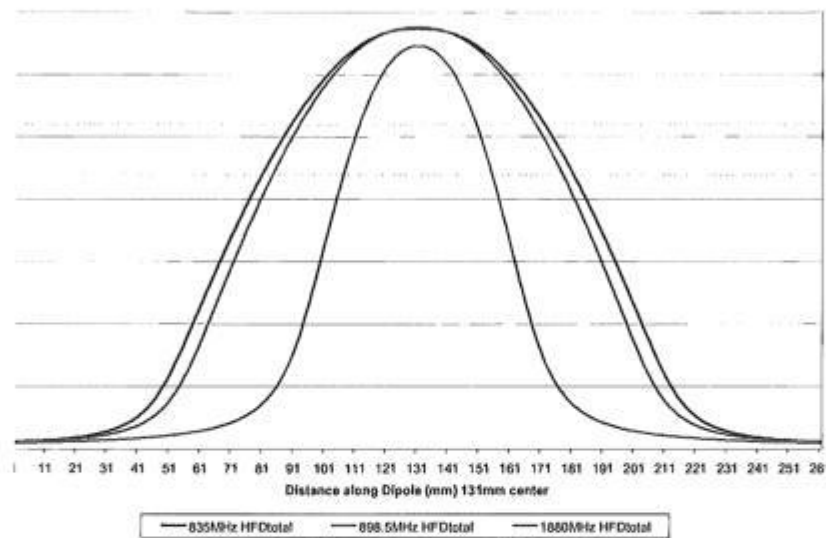
5

NCL Calibration Laboratories

Division of APREL Laboratories.

Target H-Field Measured:

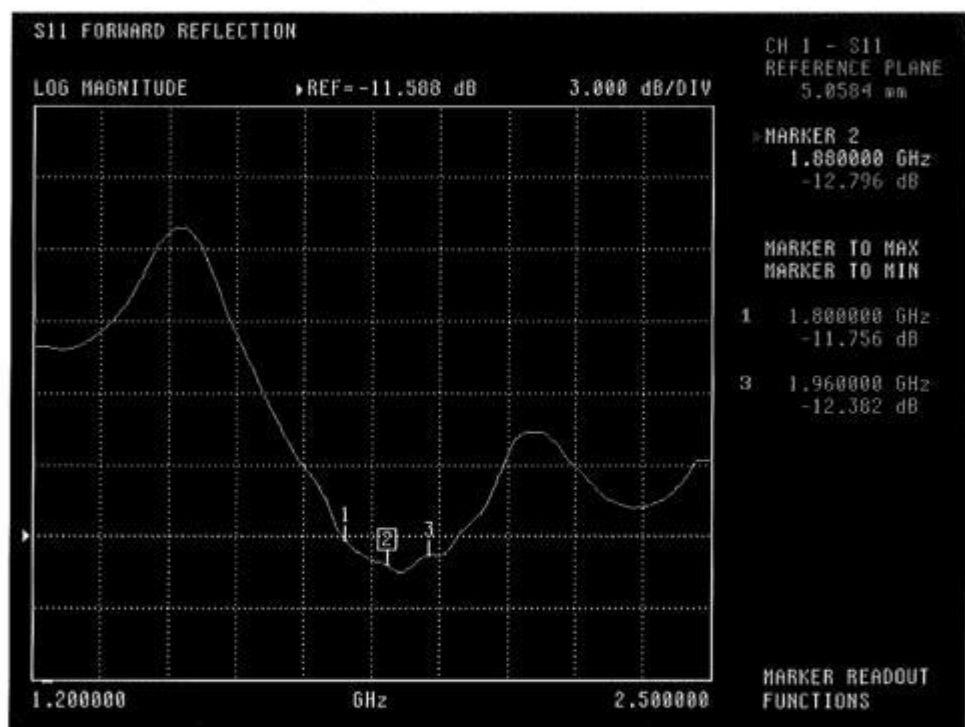
The H-Field measured with probe Serial Number: H-030-400-00104 has been normalized to meet the target values within the standard C63.19 2006 to within 10%.



Results (Graphical Plots)

The following graphs and plots are the results as displayed on the Vector Network Analyzer.

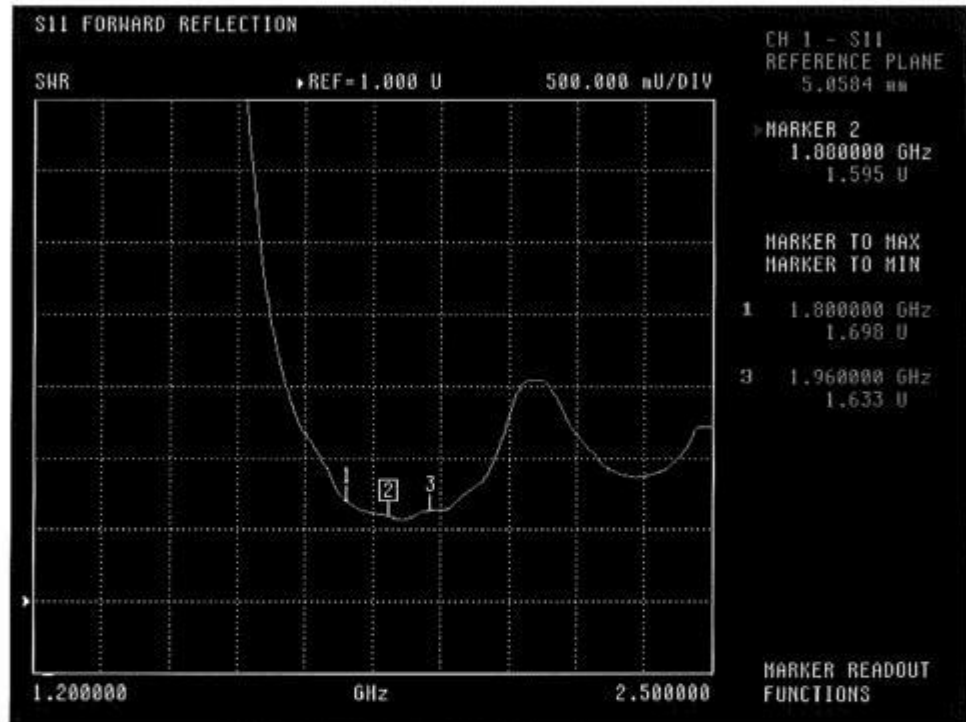
S11 Parameter Return Loss



This page has been reviewed for content and attested to by signature within this document.

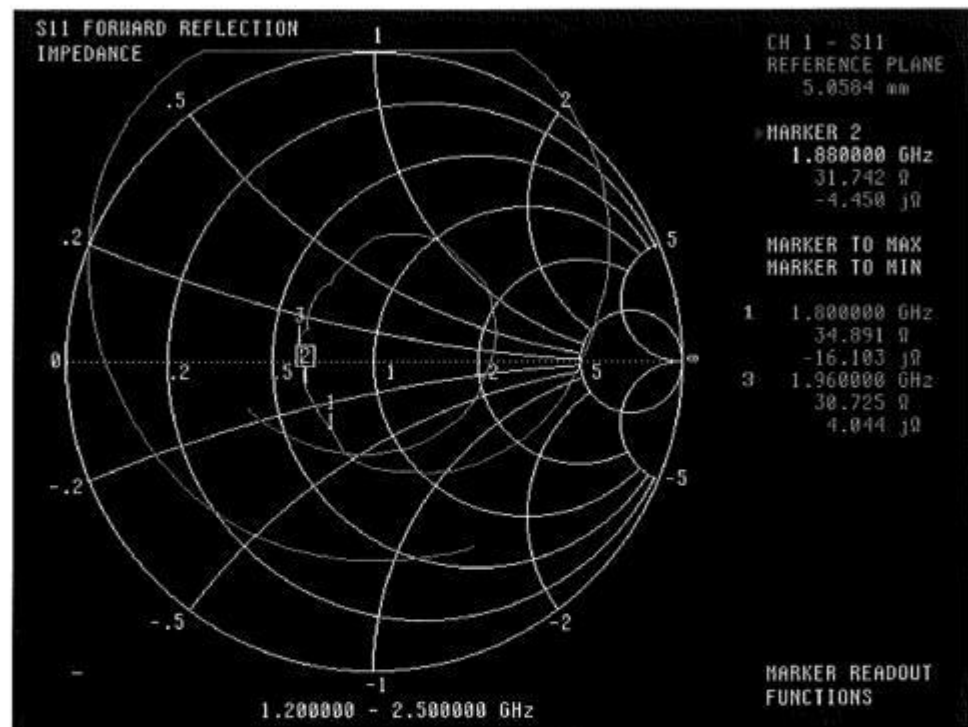
7

Standing Wave Ratio



This page has been reviewed for content and attested to by signature within this document.

Smith Chart Dipole Impedance



This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories

Division of APREL Laboratories.

Test Equipment

The test equipment used during Probe Calibration, manufacturer, model number and current calibration status are listed and located on the main APREL server R:\NCL\Calibration Equipment\Instrument List.

This page has been reviewed for content and attested to by signature within this document.

10

NCL CALIBRATION LABORATORIES

Calibration File No: 1521

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.

HAC Validation Dipole

Manufacturer: APREL Laboratories

Part number: ALS-D-1900-S-H

Frequency: 1880 MHz

Serial No: 215-00725

Customer: Schmidt

Calibrated: 15th August 2013
Released on: 15th August 2013

This Calibration Certificate is incomplete unless accompanied with the Calibration Results Summary

Released By: _____

NCL CALIBRATION LABORATORIES

303 Terry Fox Drive, Suite 102
Kanata, Ontario
CANADA K2K 3J1

Division of APREL
TEL: (613) 435-8300
FAX: (613) 435-8306

NCL Calibration Laboratories

Division of APREL Laboratories.

Conditions

Dipole 215-00725 was a re-calibration.

Ambient Temperature of the Laboratory: 22 °C +/- 0.5°C

Temperature of the Tissue: 21 °C +/- 0.5°C

Calibration Results Summary

This dipole has been found to comply with the calibration requirements detailed in the "Experimental Investigation into the Frequency Response for the APREL Laboratories IEEE C63.19 Hearing Aid Compatibility Validation Dipole Tuned for Air [2007/8 version]".

Electrical Results

Frequency: 1880MHz

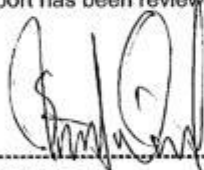
SWR: 1.595 U

Return Loss: -12.796 dB

Impedance: 31.742 Ω

Dipole Complies: 1745 to 1935MHz

We the undersigned attest that to the best of our knowledge the calibration of this device has been accurately conducted and that all information contained within this report has been reviewed for accuracy.



Stuart Nicol



C. Teodorian

This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories

Division of APREL Laboratories.

Introduction

The results contained within this calibration report are for HAC Validation Dipole 215-00725. The calibration routine consisted of a two step process. Step 1 involves a mechanical verification and inspection to ensure that the dipole meets the manufacturing tolerances. Step 2 involves a complete electrical calibration of the HAC validation dipole conducted within an ambient controlled environment, where the SWR, Impedance, and Return Loss are fully assessed.

References

Experimental Investigation into the Frequency Response for the APREL Laboratories IEEE C63.19 Hearing Aid Compatibility Validation Dipole Tuned for Air [2007 version]

C63.19 American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids 2007/8 version

Conditions

Ambient Temperature of the Laboratory: 22 °C +/- 0.5°C

This page has been reviewed for content and attested to by signature within this document.

3

NCL Calibration Laboratories

Division of APREL Laboratories.

Dipole Calibration Results

Electrical Calibration

Test	Result
S11 R/L	-12.796 dB
SWR	1.595 U
Impedance	31.742 Ω

Calibration Summary

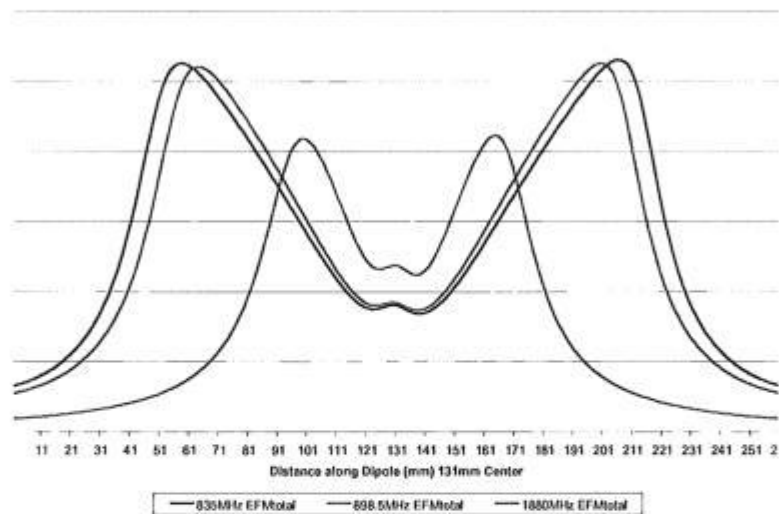
This dipole has been found to comply with the calibration requirements detailed in the "Experimental Investigation into the Frequency Response for the APREL Laboratories IEEE C63.19 Hearing Aid Compatibility Validation Dipole Tuned for Air [2007/8 version]".

This page has been reviewed for content and attested to by signature within this document.

4

Target E-Field Measured:

The E-Field measured with probe Serial Number: E-020-H-420-00102 has been normalized to meet the target values within the standard C63.19 2007/8 to within 10%.



Target E-Field C63.19 2007:	211 V/m
Measured E-Field @ 10mm:	209 V/m
Delta E-Field:	3 V/m
Deviation from Target:	< 2%

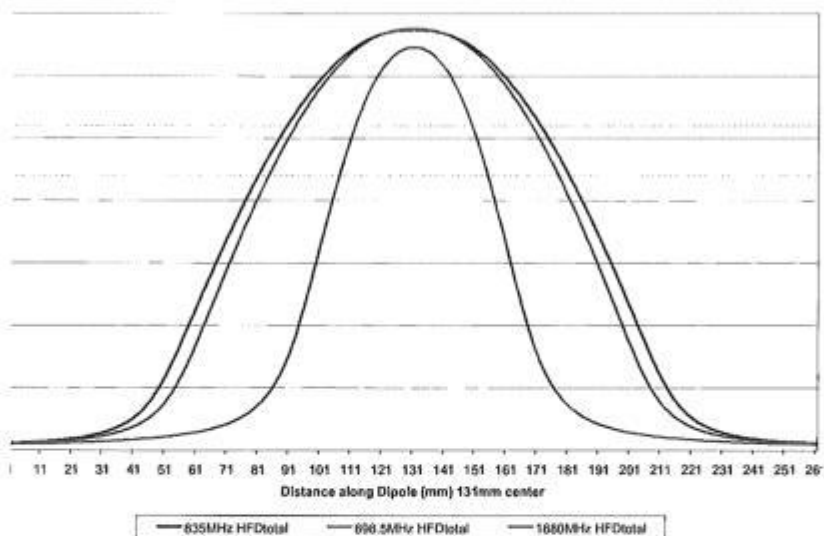
Target E-Field @ 15mm:	139.51 V/m
------------------------	------------

This page has been reviewed for content and attested to by signature within this document.

5

Target H-Field Measured:

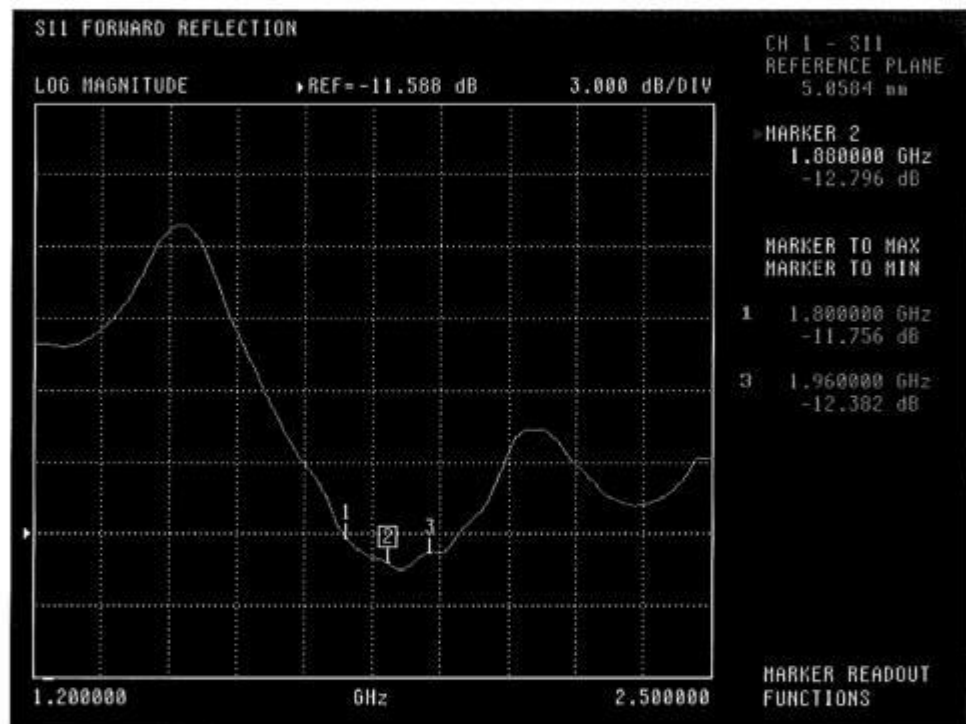
The H-Field measured with probe Serial Number: H-030-400-00104 has been normalized to meet the target values within the standard C63.19 2007/8 to within 10%.



Results (Graphical Plots)

The following graphs and plots are the results as displayed on the Vector Network Analyzer.

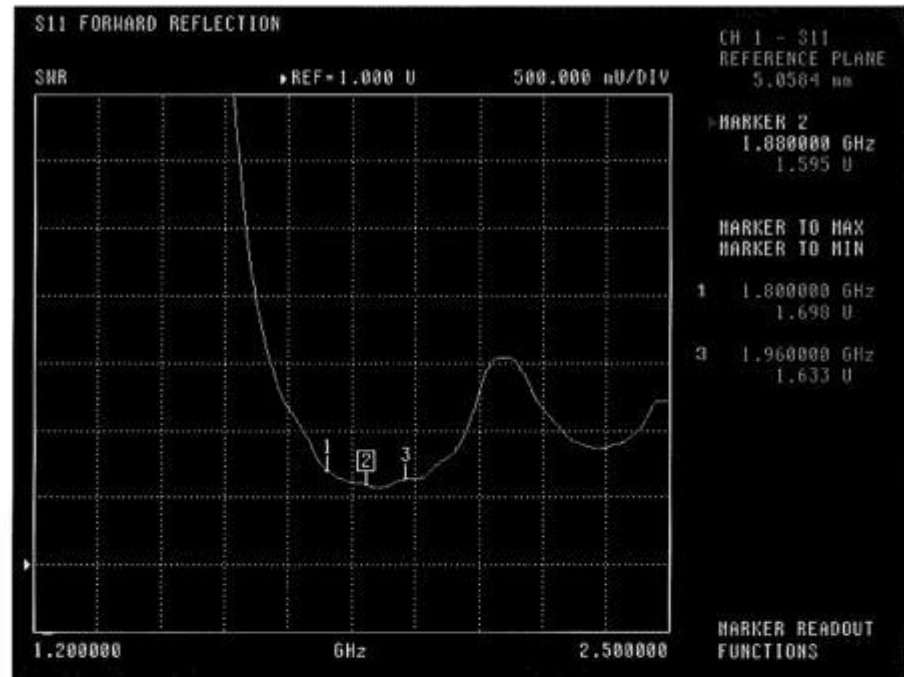
S11 Parameter Return Loss



This page has been reviewed for content and attested to by signature within this document.

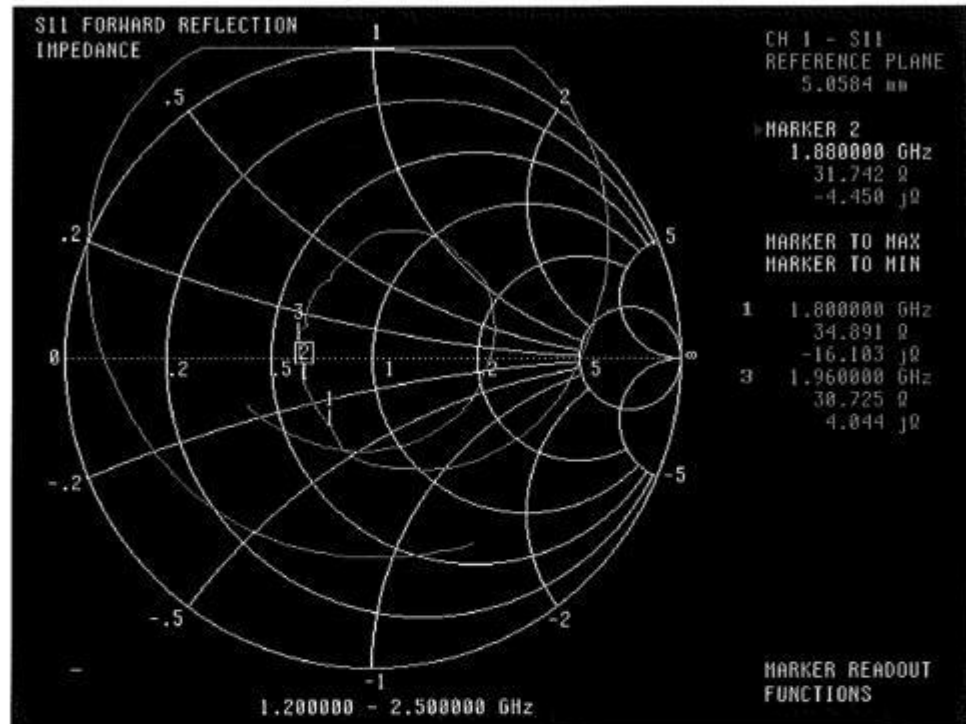
7

Standing Wave Ratio



This page has been reviewed for content and attested to by signature within this document.

Smith Chart Dipole Impedance



This page has been reviewed for content and attested to by signature within this document.

NCL Calibration Laboratories

Division of APREL Laboratories.

Test Equipment

The test equipment used during Calibration, manufacturer, model number and, current calibration status are listed and located on the main APREL server R:\NCL\Calibration Equipment\Instrument List.

This page has been reviewed for content and attested to by signature within this document.

10

NCL CALIBRATION LABORATORIES

Calibration File No.: CP-1516

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 835 MHz

Manufacturer: APREL Laboratories

Model No.: E020H

Serial No.: 420-00106

E-Field Hearing Aid Compatibility Certification Report

Calibration Procedure: SSI/DRB-TP-D01-038-E

Project No: ACIB-MINI-HAC-5352

Calibrated: 15th August 2013
Released on: 15th August 2013

This Calibration Certificate is incomplete unless accompanied with the Calibration Results Summary

Released By: _____

NCL CALIBRATION LABORATORIES

17 Bentley Avenue
Ottawa, ONTARIO
CANADA K2E 6T7

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

NCL Calibration Laboratories

Division of APREL Laboratories.

Introduction

This Calibration Report reproduces the results of the calibration performed in line with the SSI/DRB-TP-D01-038-E E-Field Probe Calibration Procedure. The results contained within this report are for APREL E-Field Probe E020H 420-00106.

References

SSI/DRB-TP-D01-038-E E-Field HAC Probe Calibration Procedure

IEEE Std 1309-2006 "Standard for Calibration of Electromagnetic Field Sensors and Probes, Excluding Antennas, from 9 kHz to 40GHz".

IEEE Std C63.19-2007 American National Standard Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids

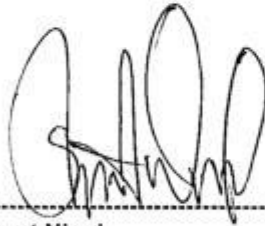
Conditions

Probe 420-00106 was re-calibration.

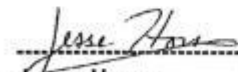
Ambient Temperature of the Laboratory: 22 °C +/- 0.5°C

Temperature of the Tissue: 21 °C +/- 0.5°C

We the undersigned attest that to the best of our knowledge the calibration of this probe has been accurately conducted and that all information contained within this report has been reviewed for accuracy.



Stuart Nicol


Jesse Hones

Page 2 of 9

This page has been reviewed for content and attested to on Page 2 of this document.

Calibration Results Summary

Probe Type:	E-Field Probe E020H
Serial Number:	420-00106
Frequency:	835 MHz
Sensor Offset:	1.56 mm
Sensor Length:	2.5 mm
Tip Enclosure:	Ertalyte*
Tip Diameter:	<5 mm
Tip Length:	60 mm
Total Length:	290 mm

Sensitivity in Air

Normalized for HAC testing.

Spatial Resolution:

The measured probe tip diameter is 5 mm (+/- 0.01 mm) and therefore meets the requirements of SSI/DRB-TP-D01-032 for spatial resolution.

Sensitivity for HAC Testing

Frequency: 835 MHz

Sensitivity Factors

Channel 1: 1.15

Channel 2: 1.15

Channel 3: 1.15

Diode Compression Point: 95 mV

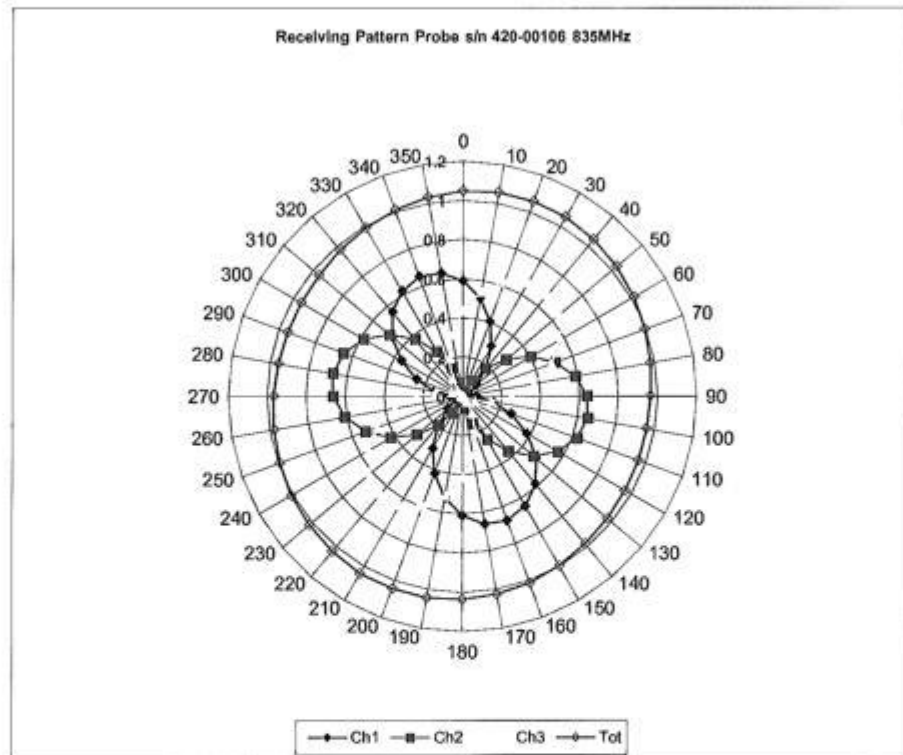
Target E-Field Measured:

The E-Field measured with probe Serial Number: E020H 420-00106 has been normalized to meet the target values below to within 10%.

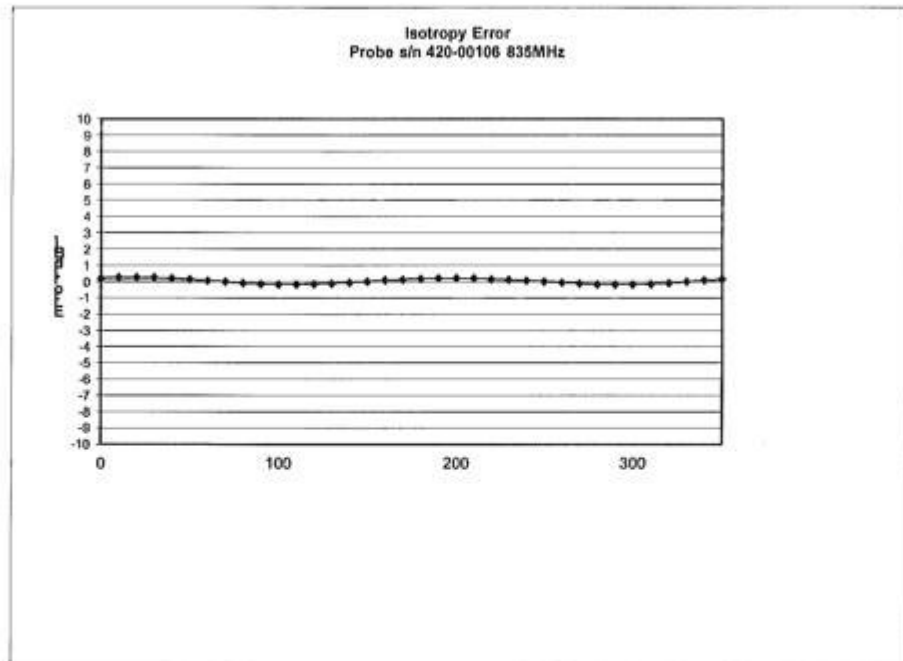
Target E-Field @10 mm:	185.9 V/m
Measured E-Field @ 10 mm:	181.7 V/m
Delta E-Field:	4.2 V/m
Deviation from Target:	2 %

Target E-Field @ 15 mm:	116.6 V/m
Measured E-Field @ 15 mm:	119.8 V/m
Delta E-Field:	3.2 V/m
Deviation from Target:	3%

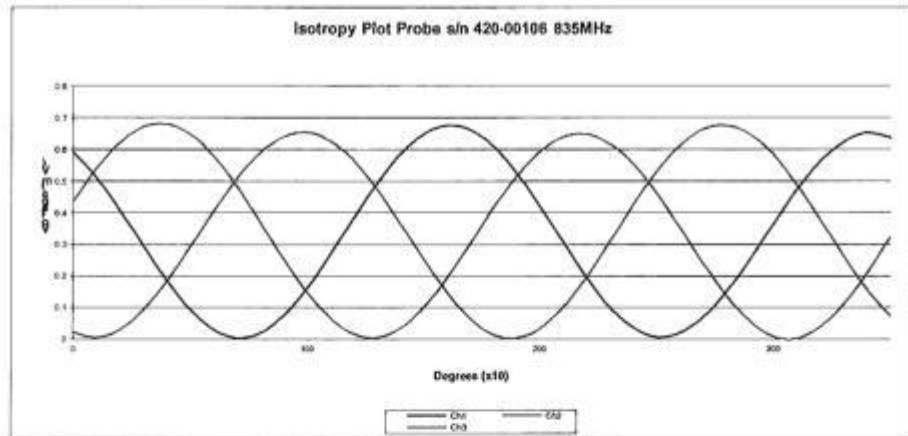
Receiving Pattern 835 MHz (Air)



Isotropy Error 835 MHz (Air)

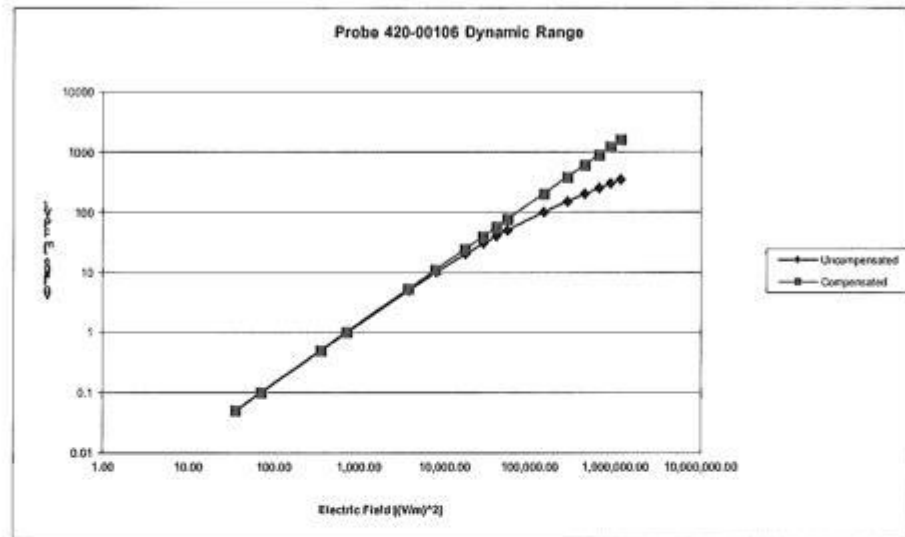


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Division of APREL Laboratories.

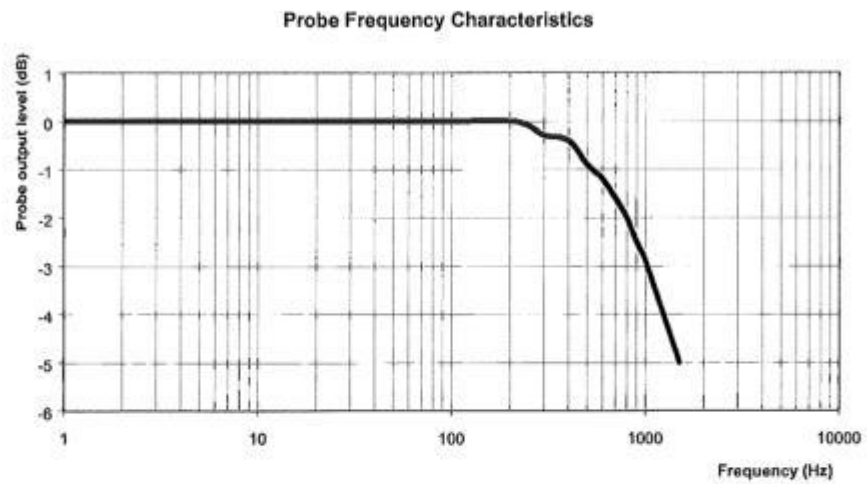


Isotropy Tissue: 0.10 dB

Dynamic Range



Video Bandwidth



Video Bandwidth at 500 Hz	1 dB
Video Bandwidth at 1.02 KHz:	3 dB

NCL Calibration Laboratories

Division of APREL Laboratories.

Test Equipment

The test equipment used during Probe Calibration, manufacturer, model number and, current calibration status are listed and located on the main APREL server R:\NCL\Calibration Equipment\Instrument List May 2013.

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This page has been reviewed for content and attested to on Page 2 of this document.

NCL CALIBRATION LABORATORIES

Calibration File No.: CP-1517

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 1880 MHz

Manufacturer: APREL Laboratories

Model No.: E020-H

Serial No.: 420-00106

E-Field Hearing Aid Compatibility Certification Report

Calibration Procedure: SSI/DRB-TP-D01-038-E

Project No: QTKB-WISB-ALS-E020-16CAL-5290

Calibrated: 15th August 2013

Released on: 15th August 2013

This Calibration Certificate is Incomplete Unless Accompanied with the Calibration Results Summary

Released By: _____

NCL CALIBRATION LABORATORIES

303 Terry Fox Drive, Suite 102
Kanata, Ontario
CANADA K2K 3J1

Division of APREL
TEL: (613) 435-8300
FAX: (613) 435-8306

NCL Calibration Laboratories

Division of APREL Laboratories.

Introduction

This Calibration Report reproduces the results of the calibration performed in line with the SSI/DRB-TP-D01-038-E E-Field Probe Calibration Procedure. The results contained within this report are for APREL E-Field Probe E020 420-00106.

References

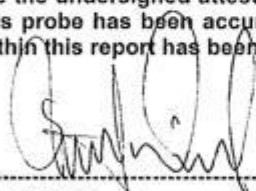
SSI/DRB-TP-D01-038-E E-Field HAC Probe Calibration Procedure
IEEE Std 1309-2006 "Standard for Calibration of Electromagnetic Field Sensors and Probes, Excluding Antennas, from 9 kHz to 40GHz".
IEEE Std C63.19-2007 American National Standard Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids

Conditions

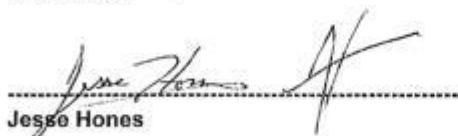
Probe 420-00104 was re-calibration.

Ambient Temperature of the Laboratory: 22 °C +/- 0.5°C
Temperature of the Tissue: 21 °C +/- 0.5°C

We the undersigned attest that to the best of our knowledge the calibration of this probe has been accurately conducted and that all information contained within this report has been reviewed for accuracy.



Stuart Nicol



Jesse Hones

Page 2 of 9

This page has been reviewed for content and attested to on Page 2 of this document.

NCL Calibration Laboratories

Division of APREL Laboratories.

Calibration Results Summary

Probe Type:	E-Field Probe E-020-H
Serial Number:	420-00106
Frequency:	1880 MHz
Sensor Offset:	1.56 mm
Sensor Length:	2.5 mm
Tip Enclosure:	Ertalyte*
Tip Diameter:	<5 mm
Tip Length:	60 mm
Total Length:	290 mm

Sensitivity in Air

Normalized for HAC testing.

Spatial Resolution:

The measured probe tip diameter is 5 mm (+/- 0.01 mm) and therefore meets the requirements of SSI/DRB-TP-D01-032 for spatial resolution.

Page 3 of 9

This page has been reviewed for content and attested to on Page 2 of this document.

Sensitivity for HAC Testing

Frequency: 1880 MHz

Sensitivity Factors

Channel 1: ~~1.55~~ 1.25 *A*

Channel 2: ~~1.55~~ 1.25 *A*

Channel 3: ~~1.55~~ 1.25 *A*

Diode Compression Point: 95 mV

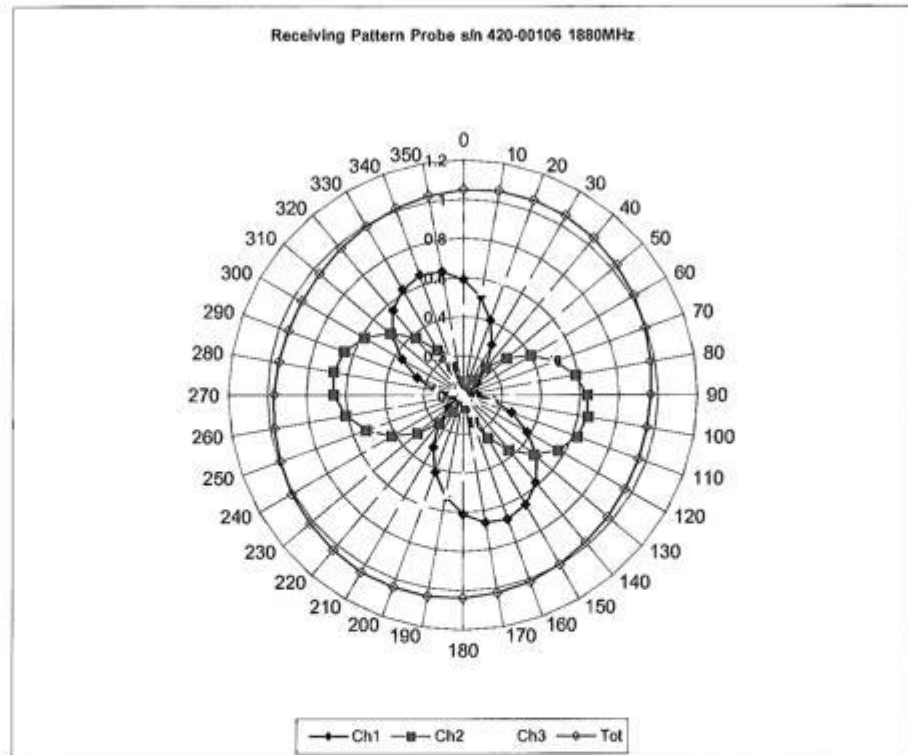
Target E-Field Measured:

The E-Field measured with probe Serial Number: E020H 420-00106 has been normalized to meet the following target values to within 10%.

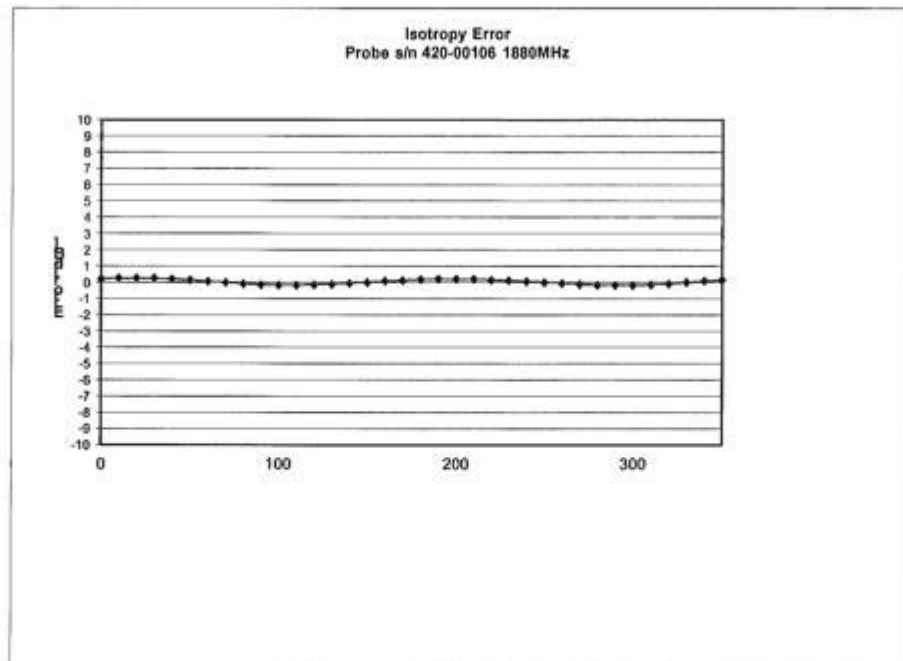
Target E-Field @ 10mm: 156.2 V/m
Measured E-Field @ 10 mm: 160.9 V/m
Delta E-Field: 4.7 V/m
Deviation from Target: 3.0%

Target E-Field @ 15mm: 96.1 V/m
Measured E-Field @ 15 mm: 102.9 V/m
Delta E-Field: 6.8 V/m
Deviation from Target: 7.0%

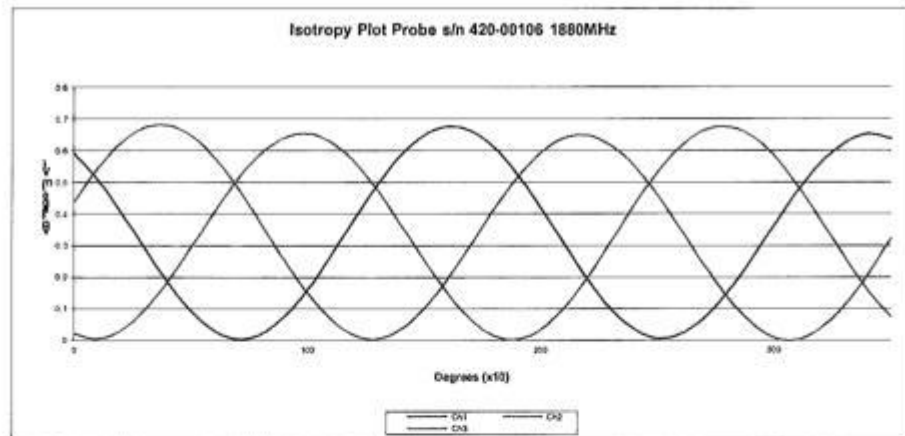
Receiving Pattern 1880 MHz (Air)



Isotropy Error 1880 MHz (Air)

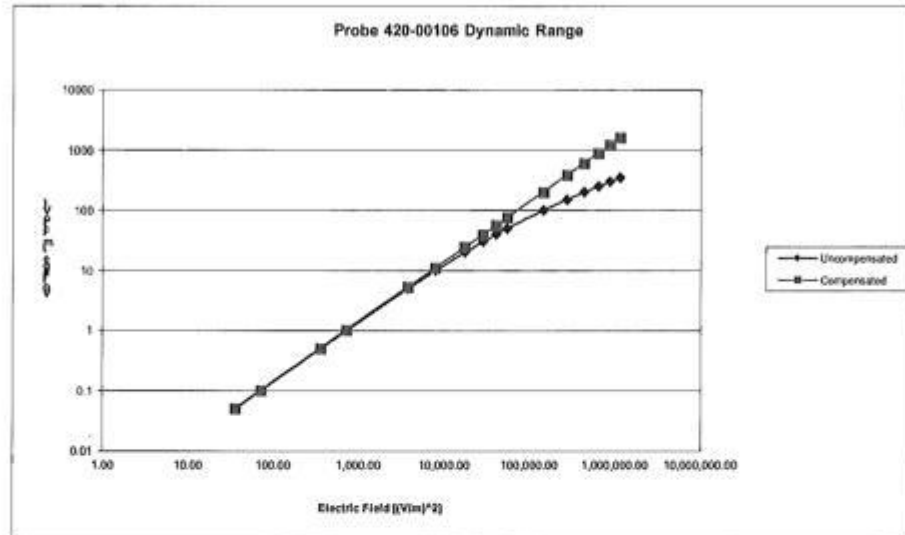


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Division of APREL Laboratories.

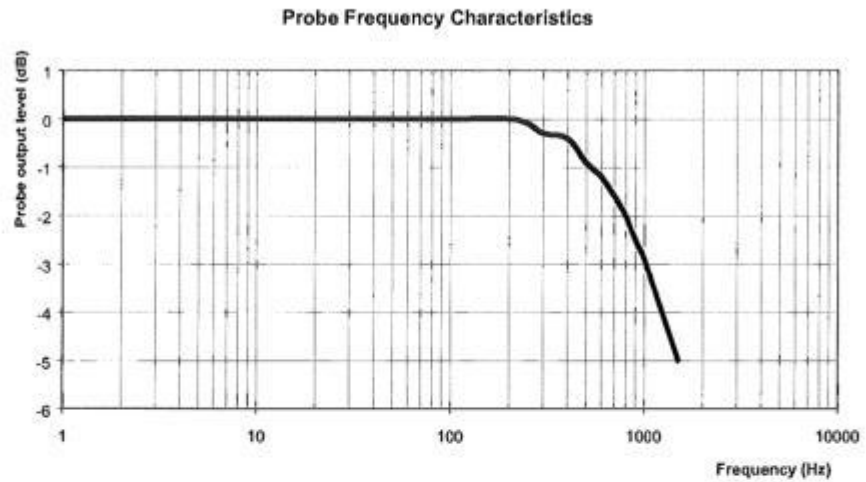


Isotropy Tissue: 0.10 dB

Dynamic Range



Video Bandwidth



Video Bandwidth at 500 Hz	1 dB
Video Bandwidth at 1.02 KHz:	3 dB

NCL Calibration Laboratories

Division of APREL Laboratories.

Test Equipment

The test equipment used during Probe Calibration, manufacturer, model number and, current calibration status are listed and located on the main APREL server R:\NCL\Calibration Equipment\Instrument List May 2013.

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This page has been reviewed for content and attested to on Page 2 of this document.

NCL CALIBRATION LABORATORIES

A Division of APREL Inc

Calibration File No.: CP-1520

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 3D H-field RF Probe

Manufacturer: APREL Laboratories

Model No.: H040

Serial No.: 400-00108

Calibration Type.: AIR Calibration

Calibration Frequency.: 835 MHz

Calibration Procedure: SSI/DRB-TP-D01-038

Project No: ACIB-MINI-HAC-5352

Calibrated: 15th August 2013

Released on: : 15th August 2013

This Calibration Certificate is Incomplete Unless Accompanied with the Calibration Results Summary

Released By: _____

NCL CALIBRATION LABORATORIES

303 Terry Fox Drive, Suite 102
Kanata, Ontario
CANADA K2K 3J1

Division of APREL
TEL: (613) 435-8300
FAX: (613) 435-8308

NCL Calibration Laboratories

Division of APREL Laboratories.

Introduction

This Calibration Report reproduces the results of the calibration performed in line with the SSI/DRB-TP-D01-038 H-Field Probe Calibration Procedure. The results contained within this report are for APREL H-Field Probe H040 400-00108.

References

SSI/DRB-TP-D01-038 H-Field Probe Calibration Procedure
IEEE Std 1309-2005 "Standard for Calibration of Electromagnetic Field Sensors and Probes, Excluding Antennas, from 9 kHz to 40GHz".
IEEE Std C63.19-2007 American National Standard Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids

Conditions

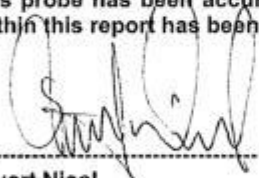
Probe 400-00108 was re-calibration.

Ambient Temperature of the Laboratory: 22 °C +/- 0.5°C

Sensor offset

Each probe is comprised of 3 magnetic sensors and positioned at 90 degree to each other in XYZ arrangement. Their electric center of the loop is the calibration field point of the probe and the reference for all subsequent sensitivities.

We the undersigned attest that to the best of our knowledge the calibration of this probe has been accurately conducted and that all information contained within this report has been reviewed for accuracy.



Stuart Nicol



Jesse Hones

Page 2 of 7

This page has been reviewed for content and attested to on Page 2 of this document.

NCL Calibration Laboratories

Division of APREL Laboratories.

Mechanical 3D H-Field Probe Properties

Probe Type:	H-Field Probe H040
Serial Number:	400-00108
Sensor Offset:	3.5 mm
Sensor Diameter:	3.8 mm
Tip Enclosure:	Etralyte
Tip Diameter:	8.5 mm
Total Length:	>300 mm

Sensitivity in Air at 835MHz

Channel 1:	140.00 mV/(A/m) ²
Channel 2:	140.00 mV/(A/m) ²
Channel 3:	140.00 mV/(A/m) ²
Diode Compression Point:	75 mV

Target H-Field Measured:

The H-Field measured with probe Serial Number: H040 400-00108 has been normalized to meet the target values below to within 5%.

Target H-Field @ 10 mm:	0.469 A/m
Measured H-Field @10 mm:	0.461 A/m
Delta H-Field:	0.008 A/m
Deviation from Target:	< 1%
Target H-Field @15 mm:	0.325 A/m
Measured H-Field @15 mm:	0.324 A/m
Delta H-Field:	0.001 A/m
Deviation from Target:	< 1%

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This page has been reviewed for content and attested to on Page 2 of this document.

NCL Calibration Laboratories

Division of APREL Laboratories.

NOTE:

Each sensor is assessed individually for sensitivity with the loop positioned vertically in the field.

Sensitivity as measured and recorded above has been calculated for each sensor when fully assembled and positioned spatially around the 3D measurement space and has been normalized to reduce measurement uncertainty and enhance probe response for all three measurement locations and perceived vectors.

Spatial Resolution:

The measured probe tip diameter is 5 mm (+/- 0.01 mm) and therefore meets the requirements of SSI/DRB-TP-D01-032 for spatial resolution.

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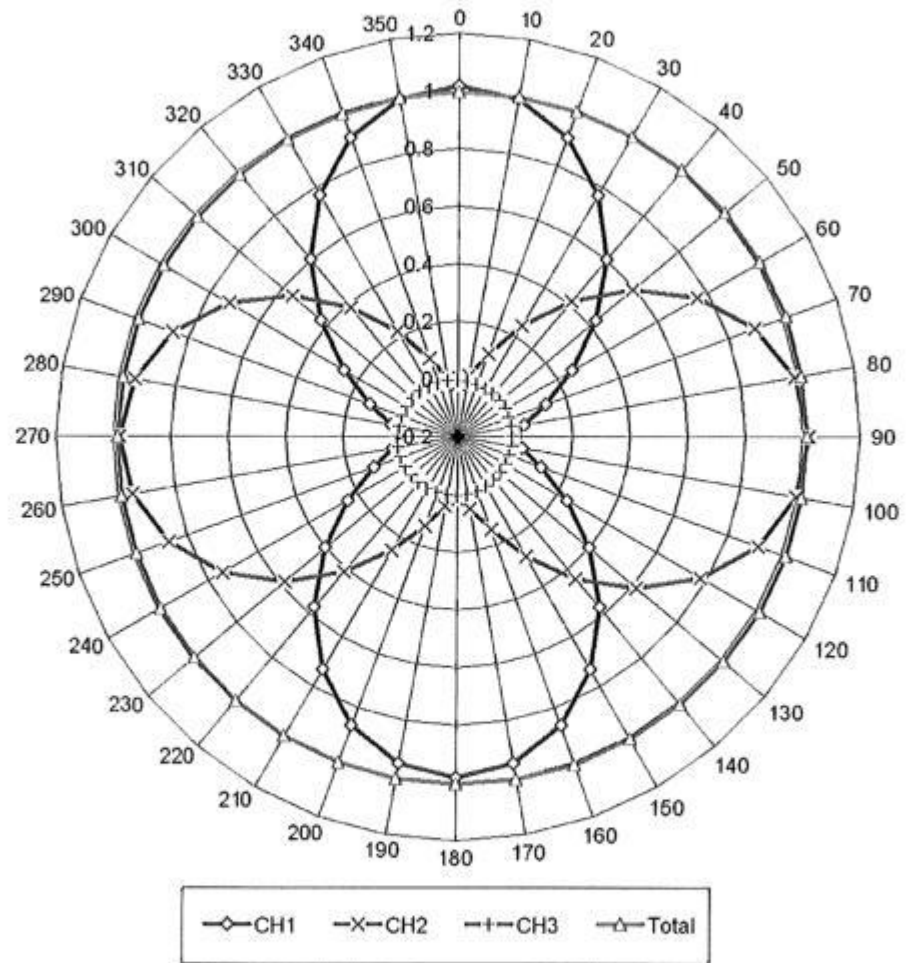
This page has been reviewed for content and attested to on Page 2 of this document.

NCL Calibration Laboratories

Division of APREL Laboratories.

Measured Receiving Pattern at 835 MHz

H040 400-00108



Measured at 90° Θ

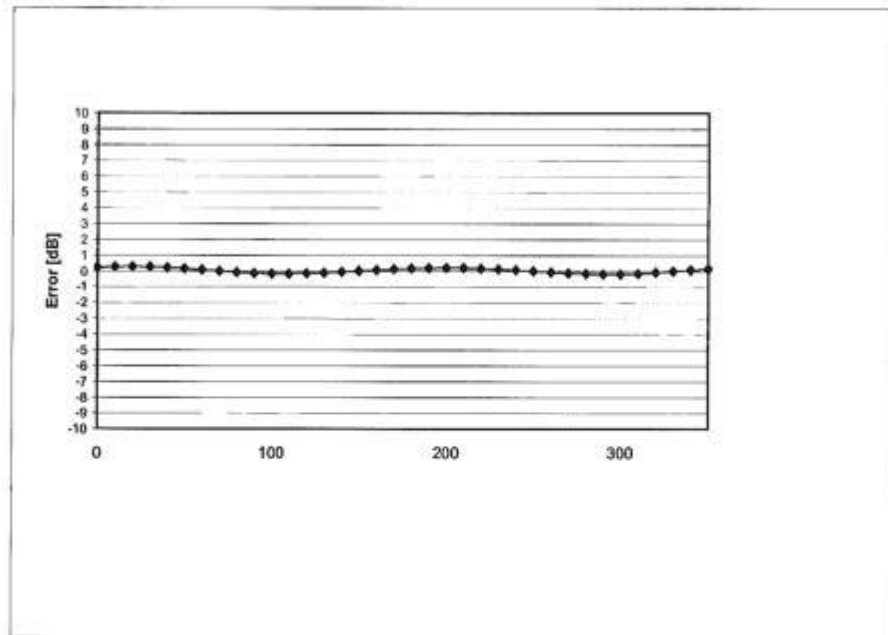
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This page has been reviewed for content and attested to on Page 2 of this document.

NCL Calibration Laboratories

Division of APREL Laboratories.

Loop Isotropy Error Normalized to Reference 835 MHz



Isotropy:

0.20 dB

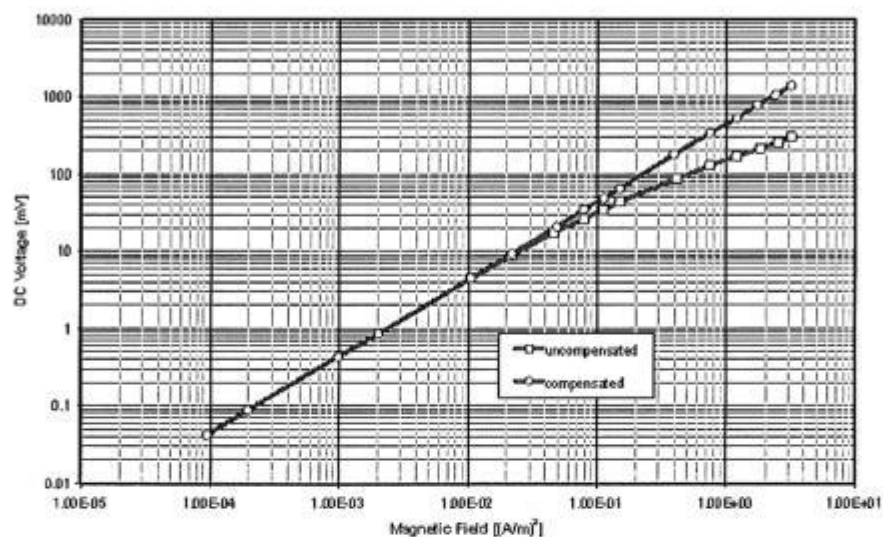
Page 6 of 7

This page has been reviewed for content and attested to on Page 2 of this document.

NCL Calibration Laboratories

Division of APREL Laboratories.

Dynamic Range Normalized to Reference



Measured at 90° Φ

Test Equipment

The test equipment used during Probe Calibration, manufacturer, model number and, current calibration status are listed and located on the main APREL server R:\NCL\Calibration Equipment\Instrument List May 2013

NCL CALIBRATION LABORATORIES

A Division of APREL Inc

Calibration File No.: CP-1519

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 3D H-field RF Probe

Manufacturer: APREL Laboratories

Model No.: H040

Serial No.: 400-00108

Calibration Type.: AIR Calibration

Calibration Frequency.: 1880MHz

Calibration Procedure: SSI/DRB-TP-D01-038

Project No: ACIB-MINI-HAC-5352

Calibrated: 15th August 2013

Released on: 15th August 2013

This Calibration Certificate is incomplete unless accompanied with the Calibration Results Summary

Released By: _____

NCL CALIBRATION LABORATORIES

303 Terry Fox Drive, Suite 102
Kanata, Ontario
CANADA K2K 3J1

Division of APREL
TEL: (613) 435-8300
FAX: (613) 435-8308

NCL Calibration Laboratories

Division of APREL Laboratories.

Introduction

This Calibration Report reproduces the results of the calibration performed in line with the SSI/DRB-TP-D01-038 H-Field Probe Calibration Procedure. The results contained within this report are for APREL H-Field Probe H040 400-00108.

References

SSI/DRB-TP-D01-038 H-Field Probe Calibration Procedure
IEEE Std 1309-2005 "Standard for Calibration of Electromagnetic Field Sensors and Probes, Excluding Antennas, from 9 kHz to 40GHz".
IEEE Std C63.19-2007 American National Standard Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids

Conditions

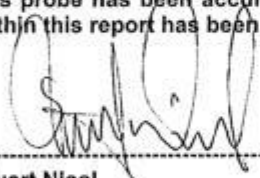
Probe 400-00108 was a re-calibration.

Ambient Temperature of the Laboratory: 22 °C +/- 0.5°C

Sensor offset

Each probe is comprised of 3 magnetic sensors and positioned at 90 degree to each other in XYZ arrangement. Their electric center of the loop is the calibration field point of the probe and the reference for all subsequent sensitivities.

We the undersigned attest that to the best of our knowledge the calibration of this probe has been accurately conducted and that all information contained within this report has been reviewed for accuracy.



Stuart Nicol



Jesse Hones

Page 2 of 7

This page has been reviewed for content and attested to on Page 2 of this document.

NCL Calibration Laboratories

Division of APREL Laboratories.

Mechanical 3D H-Field Probe Properties

Probe Type:	H-Field Probe H040
Serial Number:	400-00108
Sensor Offset:	3.5 mm
Sensor Diameter:	3.8 mm
Tip Enclosure:	Etralyte
Tip Diameter:	8.5 mm
Total Length:	>300 mm

Sensitivity in Air at 1880MHz

Channel 1:	2985.00 mV/(A/m) ²
Channel 2:	2985.00 mV/(A/m) ²
Channel 3:	2985.00 mV/(A/m) ²
Diode Compression Point:	75 mV

Target H-Field Measured:

The H-Field measured with probe Serial Number: H040 400-00108 has been normalized to meet the target values within the standard C63.19 2006 to within 5%.

Target H-Field C63.19 2007:	0.443 A/m
Measured H-Field @10 mm:	0.446 A/m
Delta H-Field:	0.003 A/m
Deviation from Target:	< 1%

Target H-Field @15 mm:	0.319 A/m
Measured H-Field @15 mm:	0.316 A/m
Delta H-Field:	0.003 A/m
Deviation from Target:	< 1%

Page 3 of 7

This page has been reviewed for content and attested to on Page 2 of this document.

NCL Calibration Laboratories

Division of APREL Laboratories.

NOTE:

Each sensor is assessed individually for sensitivity with the loop positioned vertically in the field.

Sensitivity as measured and recorded above has been calculated for each sensor when fully assembled and positioned spatially around the 3D measurement space and has been normalized to reduce measurement uncertainty and enhance probe response for all three measurement locations and perceived vectors.

Spatial Resolution:

The measured probe tip diameter is 5 mm (+/- 0.01 mm) and therefore meets the requirements of SSI/DRB-TP-D01-032 for spatial resolution.

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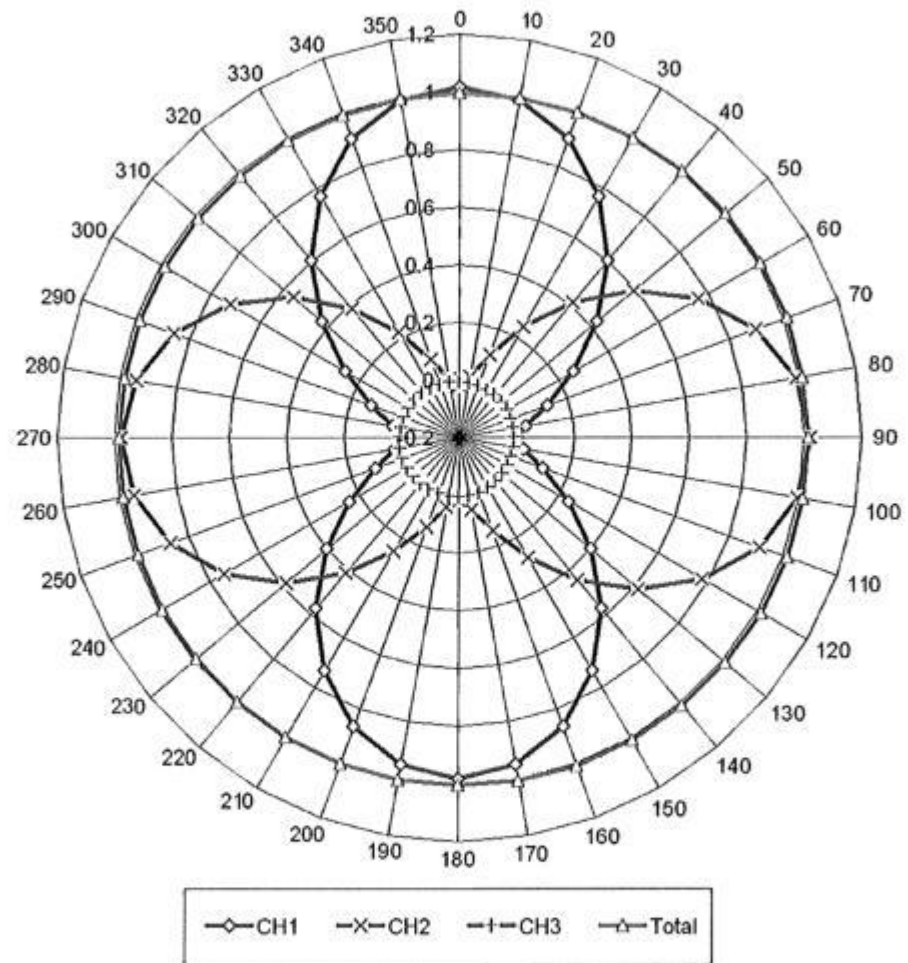
This page has been reviewed for content and attested to on Page 2 of this document.

NCL Calibration Laboratories

Division of APREL Laboratories.

Measured Receiving Pattern at 1880 MHz

H040 400-00108

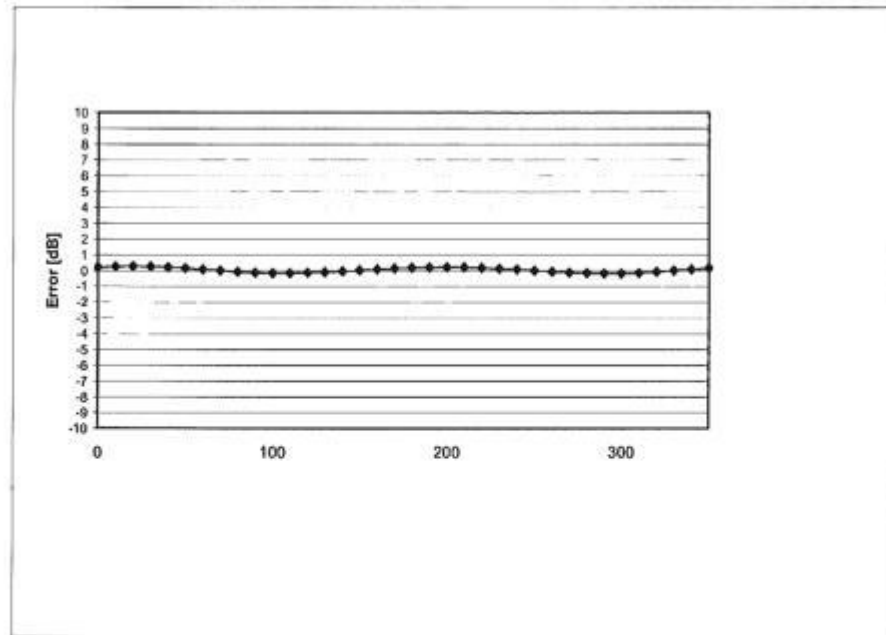


Measured at 90° Θ

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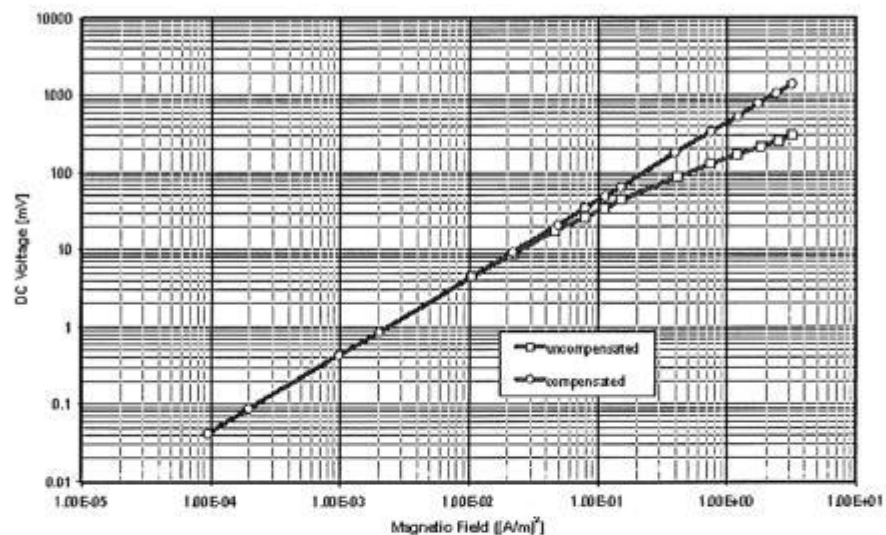
This page has been reviewed for content and attested to on Page 2 of this document.

Loop Isotropy Error Normalized to Reference 1880 MHz



Isotropy: 0.20 dB

Dynamic Range Normalized to Reference



Measured at 90° Φ

Test Equipment

The test equipment used during Probe Calibration, manufacturer, model number and, current calibration status are listed and located on the main APREL server R:\NCL\Calibration Equipment\Instrument List May 2013

APPENDIX 4 TEST SETUP

