Assessment of Compliance

for

Hearing Aid Compatibility

Mobile phone, CDMA
TREO 700p

Palm Inc.

May 2005

APREL Project No.: PALB Treo 700P-CDMA- 5158

51 Spectrum Way Nepean ON K2R 1E6
Tel: (613) 820-2730 Fax: (613) 820-4161
email: info@aprel.com

Engineering Report

Subject: **Assessment of Compliance with respect to ANSI PC63.19-2005 D3.6 Hearing Aid Compatibility, RF Emissions**

FCC ID: **O8F93001**

Product: **Mobile Phone, CDMA**

Model: **TREO 700p**

Client: **Palm Inc**
950 West Maude Ave
Sunnyvale, CA 94085 USA

Project #: PALB-Treo 700p-CDMA-5158

Prepared by: **APREL Laboratories**
Regulatory Compliance Divisions
51 Spectrum Way
Nepean, Ontario
K2R 1E6, Canada

Approved by: Jay Sarkar Date: July 29, 2005
Jay Sarkar
Director, Standards & Certification

51 Spectrum Way
Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161

HAC Report Contents

51 Spectrum Way
Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161

ENGINEERING SUMMARY

This report contains the results of the engineering evaluation performed on the PALM CDMA mobile phone model TREO 700p. The analysis was carried out in accordance with the requirements of ANSI/IEEE C63.19-2005, Rev 3.6, "American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids"

PALM provided APREL laboratories with one prototype model of the Mobile Phone. The TREO 700p Mobile Phone is hereby referred to as the DUT (Device Under Test).

The TREO 700p Mobile Phone was evaluated for RF emissions and in both CDMA and PCS bands. Three channels for each band, CDMA and PCS, were tested. See the summary of the results.

In the **CDMA band**, the category for RF E-field emissions is M3 and for H-field Emissions is M3. The overall M category for the audio coupling is **M3**.

In the **PCS band**, the category for RF E-field emissions is M3 and for H-field Emissions is M3. The overall M category for the audio coupling mode is **M3**.

As such, the overall M category for the TREO 700p is **M3**.

Evaluation data and graphs are presented in this report.

This wireless portable device has been shown to be compatible with hearing aids under the category shown below. In accordance with FCC rule 47 CFR 2.033(d) these test results demonstrate compliance with FCC 47CFR section 20.19 and with PC63.19 – 2005 rd3.6.

ANSI/IEEE C63.19 – 2005 HAC Rated Category: M 3 (RF Emission)

The results presented in this report relate only to the sample evaluated.

51 Spectrum Way
Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161

INTRODUCTION

General

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HAC (Hearing Aid Compatibility) is an industry term introduced in the late 1970's to describe an audio frequency magnetic output of a wireline telephone for the purpose of making it possible to couple a telephone with a hearing aid. In the mid 1990's it was found that the required audio frequency magnetic field may not be usable if excessive RF interference is masking this audio signal. Therefore, new standards for wireless devices HAC, such as IEEE C63.19, which in addition to specification of the audio magnetic field for T-coil coupling also specify the allowable RF interference level for E-field and H-field as a function of hearing aid and RF susceptibility.

The purpose of the categorization (M1, M2 etc.) is to establish categories for hearing aids and for telephones that can indicate to health care practitioners and hearing aid users which hearing aids are compatible with which telephone. Tests are performed to assess the electromagnetic characteristics of hearing aids and telephones and assign them to these categories. In this case, the telephone is tested for the E-field and H-field emissions while the hearing aid is tested for E-field and H-field immunity and based on the results they are categorized. For telephone, Category M4 has lower emission levels than the M1 which means less interference to the hearing aid. For hearing aid, Category M4 has higher immunity level than the M1 which means it can endure higher interference signal level. When this category number of telephone is summed up with the category number of the hearing aid, it provides a total system performance classification. A "M" category sum greater than or equal to 6 provides an excellent performance.

Measurement Facility

The evaluation for compliance was performed for Palm**.** by APREL Laboratories at APREL's EMI facility located in Nepean, Ontario, Canada. The laboratory operates an (3m and 10m) Open Area Test Site (OATS). The measurement facility is calibrated in accordance with ANSI C63.4-1992.

A description of the measurement facility in accordance with the radiated and AC line conducted test site criteria per ANSI C63.4-1992 is on file with the Federal Communications Commission and is in compliance with the requirements of Section 2.948 of the Commissions rules and regulations. *APREL's registration number is: 90416*

APREL is accredited by Standard Council of Canada ISO 17025..

51 Spectrum Way
Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161

Standard

The evaluation and analysis were conducted in accordance with **Hearing Aid Standard ANSI PC63.19 2005 D3.6**

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Report: This report was written by Jay Sarkar, Technical Director, Standards and Certification. Tests were performed by J. Lokaj.

Test Equipment

The test equipment used during the evaluation is listed in Appendix with calibration due dates.

Environmental Conditions

- Temperature:	25 °C ± 2
- Relative Humidity:	30 - 50 %
- Air Pressure:	101 kPa ± 3

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Product Information

FCC ID:	O8F93001
EUT type:	Dual Band CDMA phone
Serial Number;	Prototype, no S/N
Prototype or Production:	Prototype
Mode of Operation:	CDMA, PCS (with EVDO)
Tx Frequencies:	824.70-848.31 MKz (CDMA) 1851.25-1909.08 MHz (PCS)
Maximum Conducted RF Power (Nominal):	24dBm
FCC Classification:	Licensed Transmitter Held to Ear (PCE)

Battery

Type:	LiOn
Model No.:	700p
Rated Capacity:	1800maH

Antenna

Type:	Integral
Location:	Top of Unit

51 Spectrum Way
Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161

Test System: Hearing Aid Compatibility (HAC)

The scanning and positioning requirements of HAC measurement performed by the ALSAS 10-U HAC system, the use of HAC specific hardware and software allows APREL to meet the existing ANSI C63.19 and its anticipated revision. HAC testing utilizes E and H field probes as they meet the requirements of a diameter less than 10mm and are fully isotropic. These probes are calibrated “in air” for scanning in air.

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Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161

Axis Articulated Robot

ALSAS-10U utilizes a six axis articulated robot, which is controlled using a Pentium based real-time movement controller. The movement kinematics engine utilizes proprietary (Thermo CRS) interpolation and extrapolation aPalmorithms, which allow full freedom of movement for each of the six joints within the working envelope. Utilization of joint 6 allows for full probe rotation with a tolerance better than 0.05mm around the central axis.

Robot/Controller Manufacturer	Thermo CRS
Number of Axis	Six independently controlled axis
Positioning Repeatability	0.05mm
Controller Type	Single phase Pentium based C500C
Robot Reach	710mm
Communication	RS232 and LAN compatible

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Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161

Universal Device Positioner

The APREL Laboratories universal device positioner has been developed so as to allow complete freedom of movement of the DUT. Developed to hold a DUT in a free-space scenario any additional loading attributable to the material used in the construction of the positioner has been eliminated. Repeatability has been enhanced through the linear scales which form the design used to indicate positioning for any given test scenario in all major axes. A tilt indicator has been included for accurate positioning. Overall uncertainty for measurements have been reduced due to the design of the Universal device positioner, which allows positioning of a device in as near to a free-space scenario as possible, and by providing the means for complete repeatability.

Length	201mm
Width	140mm
Height	222mm
Weight	1.95kg
Number of Axis	6 axis freedom of movement
Translation Along MB Line	+/- 76.2mm
Translation Along NF Line	+/- 38.1mm
Translation Along Z Axis	+/- 25.4mm (expandable to 500mm)
Rotation Around MB Line (yaw)	+/- 10°
Rotation Around NF Line (pitch)	+/- 30°
Rotation Around Z Axis (roll)	360° full circle
Minimum Grip Range	0mm
Maximum Grip	152mm
Maximum Distance from Device to Positioner Material	40mm
Tilt Movement	Full movement with predefined 15° guide

51 Spectrum Way
Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161

Performance Criteria ANSI C63.19

The following Tables show the M-rating categories providing the requirements that will allow classification of the wireless devices for RF emissions: Tables 2 and 3 provide telephone near-field categories in linear units and Articulation weighting factor (AWF) which provides the standard transmission protocols. Table 1 provides telephone near field categories in logarithmic units.

Table 1

Category	Telephone RF Parameters				
Near Field	AWF	E-Field Emissions (Peak)		H-Field Emissions (Peak)	
Category M1	0	46 – 51	dB (V/m)	-4.4 – 0.6	dB (A/m)
	-5	43.5 – 48.5	dB (V/m)	-6.9 – -1.9	dB (A/m)
Category M2	0	41 – 46	dB (V/m)	-9.4 – -4.4	dB (A/m)
	-5	38.5 – 43.5	dB (V/m)	-11.9 – -6.9	dB (A/m)
Category M3	0	36 – 41	dB (V/m)	-14.4 – -9.4	dB (A/m)
	-5	33.5 – 38.5	dB (V/m)	-16.9 – -11.9	dB (A/m)
Category M4	0	<36	dB (V/m)	<-14.4	dB (A/m)
	-5	<33.5	dB (V/m)	<-16.9	dB (A/m)

Telephone near-field categories in logarithmic units

Table 2

Category	Telephone RF Parameters				
Near Field	AWF	E-Field Emissions (Peak)		H-Field Emissions (Peak)	
Category M1	0	199.5 – 354.8	V/m	0.60 – 1.07	A/m
	-5	149.6 – 266.1	V/m	0.45 – 0.80	A/m
Category M2	0	112.2 – 199.5	V/m	0.34 – 0.60	A/m
	-5	84.1 – 149.6	V/m	0.25 – 0.45	A/m
Category M3	0	63.1 – 112.2	V/m	0.19 – 0.34	A/m
	-5	47.3 – 84.1	V/m	0.14 – 0.25	A/m
Category M4	0	<63.1	V/m	<0.19	A/m
	-5	<47.3	V/m	<0.14	A/m

Telephone near-field categories in linear units

Table 3

Standard	Technology	AWF (dB)
TIA/EIA/IS-2000	CDMA	0
TIA/EIA-136	TDMA (50 Hz)	0
J-STD-007	GSM (217)	-5
T1/T1P1/3GPP	UMTS (WCDMA)	0
iDEN™	TDMA (22 and 11 Hz)	0

Articulation Weighting Factor (AWF)

51 Spectrum Way
Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161

Test Methodology

Dipole Validation Procedure

1. Dipole antenna was placed in the position that would be occupied by the WD.
2. The dipole was energized with a 20 dBm un-modulated continuous-wave signal.
3. The length of the dipole was scanned with both E-field and H-field probes and the maximum value for each scan was recorded.
4. The readings were compared to the target values (FDTD simulated values) and were found to be within the allowed tolerance of 10%

Note: System validation data for all three signal types (CW, WD & 80% AM) are provided. The target values for CW signal had been derived by APREL using FDTD numerical method which is now part of the C63.19. The CW validation data are within 10% of the target value. The measured values for the WD and 80% modulation could not be compared against any theoretical target values as there are none defined. The source for the WD signal was the WD itself. The substitution signal for probe modulation response measurement was generated by a WD with the real time power loop activated and controlled by the Mobile Service Tester.

Validation measurement have been performed for two modulated signals as well: 80% AM modulated with 1 kHz tone and CDMA signal. Only measurement results are presented as no target values exist for modulated signals,

Note: Mobile Service Tester Willtek 4300 was used to register the WD, make a call and then to control the WD, i.e. the WD was not used in the test mode.
In order to establish the call it was set to the appropriate SIN (System ID) and NID (Network ID) numbers. The instrument was equipped with the appropriate antenna to communicate with the WD over the air.
The instrument was used to set both, the uplink channels and output power level of the WD

For all channels tested Willtek 4300 was set to "ALL UPS" what automatically sets the maximum output power on the WD.
The WD was capable of using the standard IS-95.

Both, zero-span and wideband plots are attached.

Note: The substitution signal for probe modulation response measurement was generated by a WD with the real time power loop activated and controlled by the Mobile Service Tester. The peak level at the dipole antenna feed point was adjusted to match the CW signal level and then in was monitored continuously with a spectrum analyzer. No drift was detected.

Note: Modulation factor was derived as ratio of scan result of reference CW signal to scan result of CDMA signal. Both, reference CW and CDMA (IS-95) signals were fed to a dipole antenna with its feed point monitored with a directional coupler and a spectrum analyzer.

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Both, RBW and VBW of the spectrum analyzer were set to full 3MHz as needed to cover the 20dB bandwidth of the IS-95 signal.
Zero-span peak amplitude CDMA signal was adjusted to match the reference CW signal level and it was monitored during measurement.

Note: As shown in figure 1 (next page of this report), the 10 mm separation distance is defined from the nearest point of the probe sensor element. This is also mentioned on page 17, step 1 of the probe modulation response measurement procedure, that figure 1 is the setup used for the measurement. For the automated scanning software automatically sets the separation distance according to the definition in figure 1, using the sensor offset stated in the corresponding probe calibration certificates.

Note: Each probe is comprised of 3 electric (E-field probe) or magnetic (H-field probe) dipoles used as field sensors and positioned at 90 degree to each other in XYZ arrangement. Their electric centre makes the calibrated centre of the probe. The centre is aligned with the main axis of the probe. For constructional reasons it is located small distance, specified as the vertical offset, above the tip of the probe. The actual offset is specified in the probe's calibration certificate to allow for proper referencing to the probe's calibrated centre when the probe's position is set be touching an object with the probe's tip.

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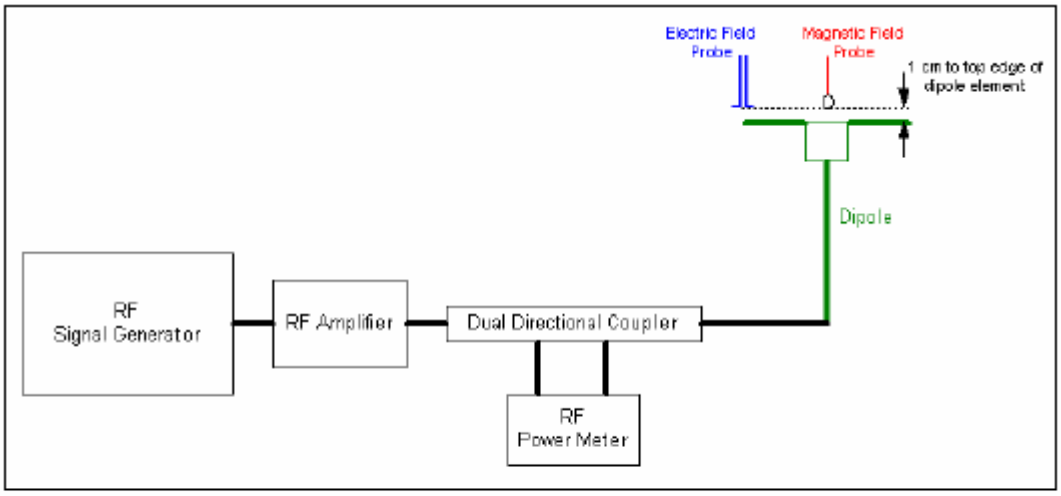
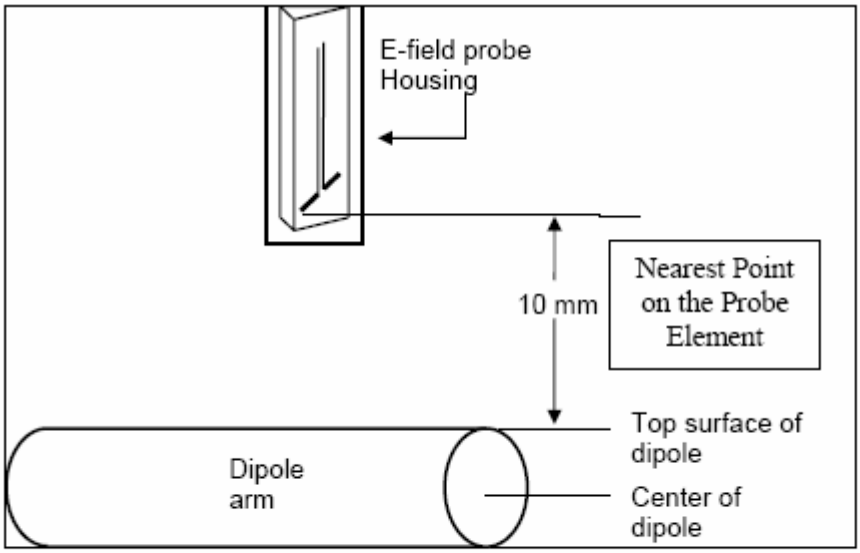
Figure 1, Setup



WD dipole calibration procedure



Probe location for WD dipole calibration

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Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
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System Validation Results

Dipole target Values

Frequency (MHz)	E-Field Calculated (Target)Values Peak v/m	H-Field Calculated (Target) Values Peak A/m
835	265	0.673
1880	211	0.645

Dipole FDTD Simulated values
Thick Dipoles

Dipole Validation Results

Signal Type	Frequency	Average Input Power	Measured E-field	Measured Peak E-Field	Target E-Field Value	Deviation	Modulation Factor
-	(MHz)	(mW)	(V/m)	(V/m)	(V/m)	%	-
CW	835	100	172.534	244	265	-7.9	
CW	1880	100	138.593	196	211	-7.1	
80%AM	835	31	104.652	148	-	-	
80%AM	1880	31	84.146	119	-	-	
CDMA	835	31	173.948	246	-	-	0.992
CDMA	1880	31	137.178	194	-	-	1.010

Signal Type	Frequency	Average Input Power	Measured H-field	Measured Peak H-Field	Target H-field Value	Deviation	Modulation Factor
-	(MHz)	(mW)	(A/m)	(V/m)	(V/m)	%	-
CW	835	100	0.500	0.707	0.673	5.1	
CW	1880	100	0.486	0.687	0.645	6.5	
80%AM	835	31	0.304	0.430	-	-	
80%AM	1880	31	0.296	0.418	-	-	
CDMA	835	31	0.475	0.672	-	-	1.052
CDMA	1880	31	0.454	0.642	-	-	1.070

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Ottawa ON Canada K2R 1E6

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info@aprel.com
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Signal Type	Freq	Average Input Power	Average Input Power	Peak Input Power	Peak Input Power	Peak to Average Ratio
	(MHz)	(mW)	(dBm)	(mW)	(dBm)	(dB)
CW	835	100	20.0	100	20.0	0.0
CW	1880	100	20.0	100	20.0	0.0
80% AM	835	31	14.9	100	20.0	5.1
80% AM	1880	31	14.9	100	20.0	5.1
CDMA	835	31	14.9	100	20.0	5.1
CDMA	1880	31	14.9	100	20.0	5.1

Note: The 100 mW for CW and 31 mW for AM and CDMA signals shown in the two tables under the title “Dipole Validation Results”, are the average input power levels. The corresponding peak input power is 100 mW for all three types of signals. This is with respect to the requirements of ANSI PC63.19-2005 Rev. 3.6 Standard. The detailed information is in the table above.

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Ottawa ON Canada K2R 1E6
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info@aprel.com
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RF Field Probe Modulation Response

In addition, a calibration shall be made of the modulation response of the probe and its instrumentation chain. This calibration shall be performed with the field probe, attached to the instrumentation that is to be used with it during the measurement. The response of the probe system to a CW field at the frequency(s) of interest is compared to its response to a modulated signal with equal peak amplitude. The field level of the test signals shall be more than 10 dB above the ambient level and the noise floor of the instrumentation being used. The ratio of the CW reading to that taken with a modulated field shall be applied to the readings taken of modulated fields of the specified type. This may be done using the following procedure:

1. Fixing the probe in a set location relative to a field generating device, such as a reference dipole antenna or WB TEM, as illustrated in Figure 1.
2. Illuminate the probe with a CW signal at the intended measurement frequency.
3. Record the reading of the probe measurement system of the CW signal.
4. Determine the level of the CW signal being used to drive the field generating device.
5. Substitute a signal using the same modulation as that used by the intended WD for the CW signal.
6. Set the peak amplitude during transmission of the modulated signal to equal the amplitude of the CW signal.
7. Record the reading of the probe measurement system of the modulated signal.
8. The ratio of the CW to modulated signal reading is the modulation factor.

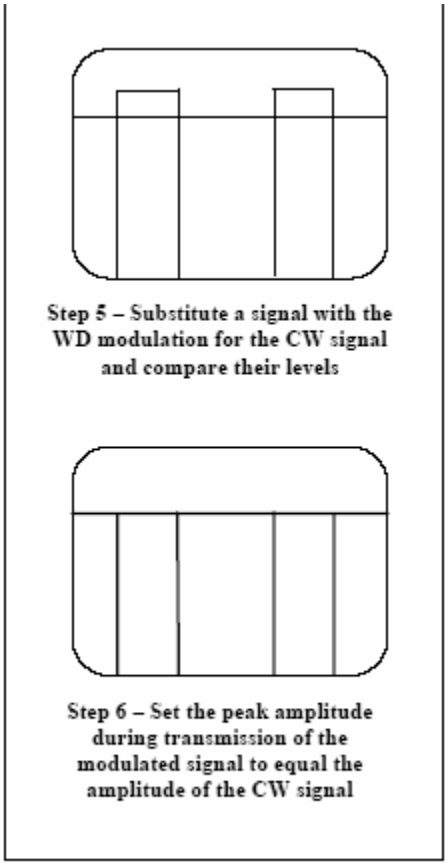

Figure C-1 – Setting the RF levels for the probe modulation response procedure. Adjusting the peak amplitude to match a WD modulation to a CW signal.

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Modulation Factors

Frequency (MHz)	Protocol	E-Field Modulation Factor	H-Field Modulation Factor
835	CDMA	0.992	1.052
835	CW		
1880	CDMA	1.01	1.07
1880	CW		

Note: Modulation factor was derived as ratio of scan result of reference CW signal to scan result of CDMA signal.

Both, reference CW and CDMA (IS-95) signals were fed to a dipole antenna with its feed point monitored with a directional coupler and a spectrum analyzer.

Both, RBW and VBW of the spectrum analyzer were set to full 3MHz as needed to cover the 20dB bandwidth of the IS-95 signal.

Zero-span peak amplitude CDMA signal was adjusted to match the reference CW signal level and it was monitored during measurement.

Calculation of PMF

The PMF can be calculated as follows:

PMF = [fx 835]CW / [fx 835]CDMA = 244/246 Ratio = 0.992
and,
PMF = [fx 1880]CW / [fx 1880]CDMA = 196/194 Ratio = 1.01

For E-field, the PMFs are 0.992 for 835 MHz and 1.01 for 1880 MHz
For H-Field, PMFs are 10.52 for 835 MHz and 1.07 for 1880 MHz.

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Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161

RF Emissions Test Procedure

This section describes the procedures used to measure the near field RF emissions performance of the WD. Both E-field and H-field emissions levels have to be measured.

The following summarizes the basic test flow:

1. Confirm proper operation of the field probe, probe measurement system, other instrumentation, and the positioning system.

2. Position the WD in its intended test position.

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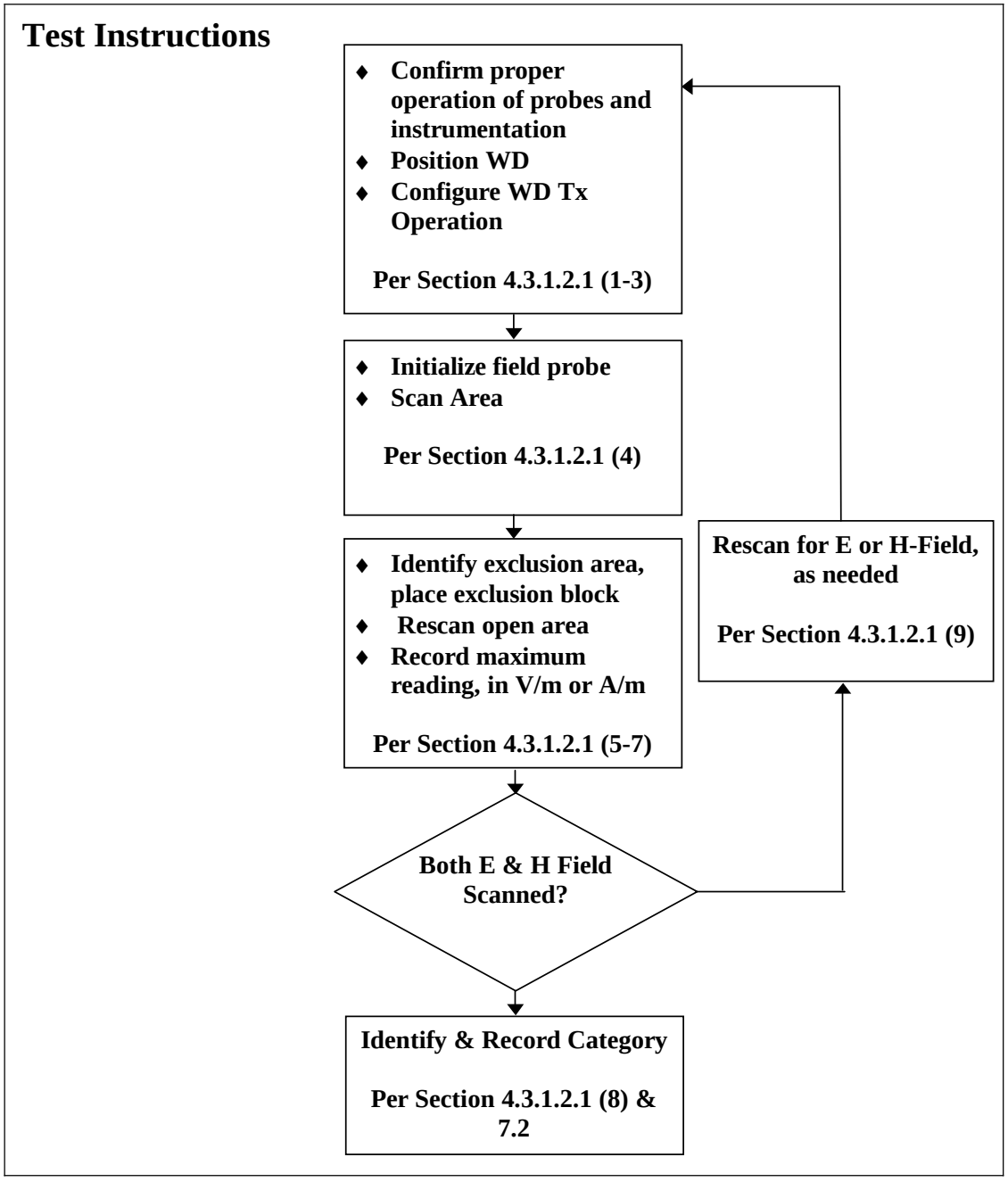

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info@aprel.com
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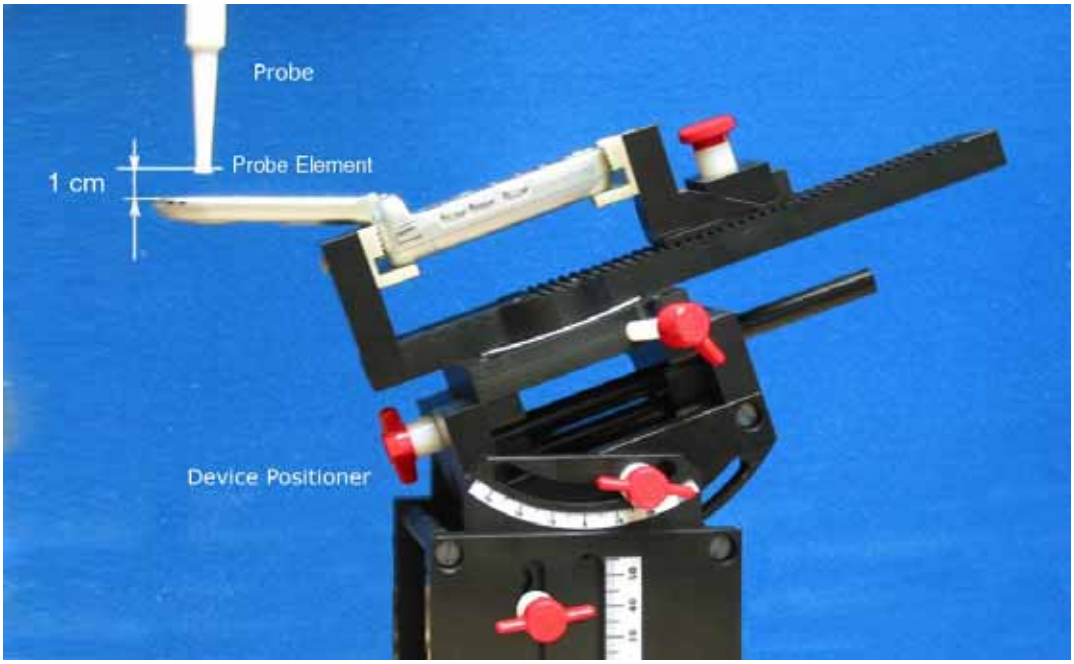

Figure 2 WD test Fixture

3. Configure the WD operation for maximum rated RF output power, at the desired channel and other normal 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 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 locations 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 field strength readings. Please note that a maximum of five sub-grids can be excluded for E-field and H-field.

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

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

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10. Repeat steps 1-10 for both the E and H-Field measurements. The highest field strength reading identified was converted to peak V/m or A/m as appropriate. This conversion was done using the appropriate factors derived from the probe modulation factor.

11. The Peak field value from the measured field strength is calculated using the formula: Peak = Raw * PMF where Peak is the calculated peak field as the output of the software, Raw is the measured field value and PMF is the Probe Modulation Factor. This calculation is performed by the software algorithm of the automated measurement system and the Peak is directly exported to the report as Peak value. As an example:If measured Raw field = 78.008 V/m and PMF = 0.992, then calculated peak field is: Peak = 78.008 * 0.992 = 77.384 V/m

12. Compare this reading to the categories in Section 7 of ANSI/IEEE C63.19 and record the resulting category. The lowest category number 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.

Probe Rotation

The highest reading reported includes the probe rotation performed at the peak after exclusion.

Applicable Documents

The following documents are applicable to the evaluation performed:

1) ANSI/IEEE C63.19, American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids.

2) AISP.4-HACTS v 8.2, Test Plan & Technical Specification for Wireless Phone Compliance Baseline.

3) IEEE 1309-1996, IEEE Standard for Calibration Electromagnetic Field Sensors and Probes, Excluding Antennas, form 9kHz to 40GHz.

51 Spectrum Way
Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
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Test Results – E-field

Mode	Channel	Freq.	Cond. Pwr	Peak E-field	Peak E-field	Reference position	Battery	Cat.
		[MHz]	[dBm]	[V/m]	[dB(V/m)]			
CDMA	991	824	24	87.54	38.8	speaker	1	M3
CDMA	384	836.5	24	106.8	40.6	speaker	1	M3
CDMA	799	849	24	109.8	38.8	speaker	1	M3
CDMA	001	1850	24	66.5	36.5	speaker	1	M3
CDMA	600	1880	24	64.78	36.2	speaker	1	M3
CDMA	1199	1910	24	64.45	36.2	speaker	1	M3

Test Results – H-field

Mode	Channel	Freq.	Cond. Pwr	Peak H-field	Peak H-field	Reference position	Battery	Cat.
		[MHz]	[dBm]	[A/m]	[dB(A/m)]			
CDMA	991	824	24	0.198	-14.1	speaker	1	M3
CDMA	384	836.5	24	0.236	-12.5	speaker	1	M3
CDMA	799	849	24	0.252	-12.0	speaker	1	M3
CDMA	001	1850	24	0.291	-10.7	speaker	1	M3
CDMA	600	1880	24	0.292	-10.7	speaker	1	M3
CDMA	1199	1910	24	0.296	-10.6	speaker	1	M3

Power Drift: The drift was monitored using two methods:

Method 1:
Via air-interface using a combination of horn antenna and a spectrum analyzer. Drift was measured before the start of the test, when the WD started transmitting (for reference purpose), during the test and after the test. There was no drift observed on the spectrum analyzer. The horn antenna was used as a receiver permanently placed aiming towards the WD under test at a safe distance of 3 feet where no reflection is created. The antenna was placed in such a manner such that no obstruction was present in its receiving path. The spectrum analyzer was situated outside the test chamber. It was ensured that during the drift measurement there was no moving object as well as the test engineer was absent inside the test chamber. No object inside the chamber was moved from their original position during the complete test process of the WD.

Method 2:
Immediately before the scan the sensor is positioned 10mm above the ERP. E-field level is recorded as “BEFORE”. When the sensor is stopped at the same spot after completing the scan E-field level is again recorded as “AFTER”. The difference is then calculated in terms of radiated power drift.

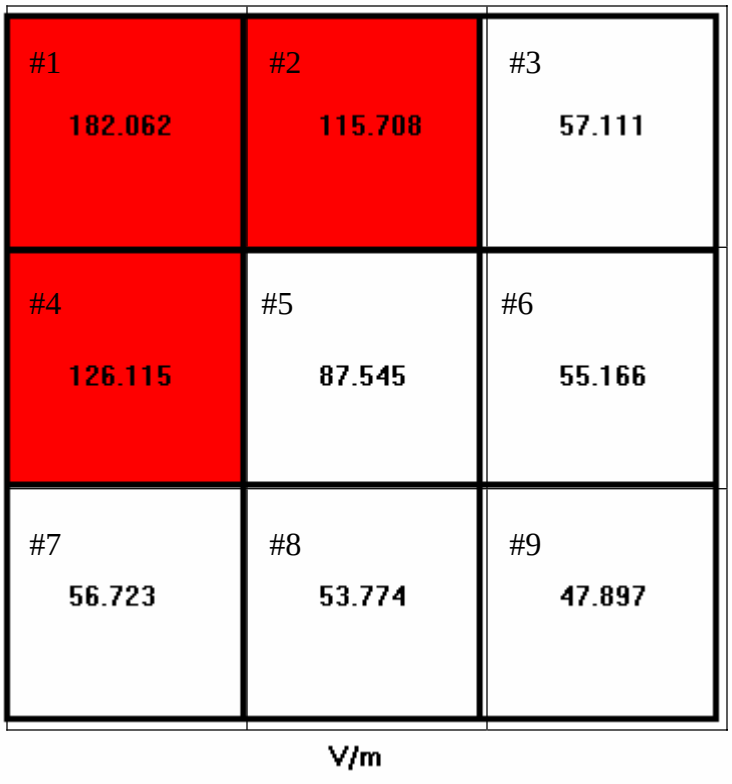
Note: The substitution signal for probe modulation response measurement was generated by a WD with the real time power loop activated and controlled by the Mobile Service Tester. The peak level at the dipole antenna feed point was adjusted to match the CW signal level and then in was monitored continuously with a spectrum analyzer. No drift was detected.

51 Spectrum Way
Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161

HAC Test Report

Device Type : CDMA
Device Name : Treo 700P
Device S/N : E5225
Probe Serial No. : 212
Probe Name : E probe
Probe Type : E-Field Triangle
Probe Model : ALS-E020
Date Calibrated : 21-May-2005

Test Frequency : 824 MHz
Channel number : 991
Probe Mod. Factor : 0.992 dB
Probe Sensitivity : 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point : 95 mV
Offset : 1.56 mm
HAC Test (26x26X1): Measurement grid dx=2, dy=2, dz=10
E-Field : 87.545 V/m Peak
dB : 38.845 db(V/m) Peak
Category : M3
contiguous sub-grids shaded red are excluded



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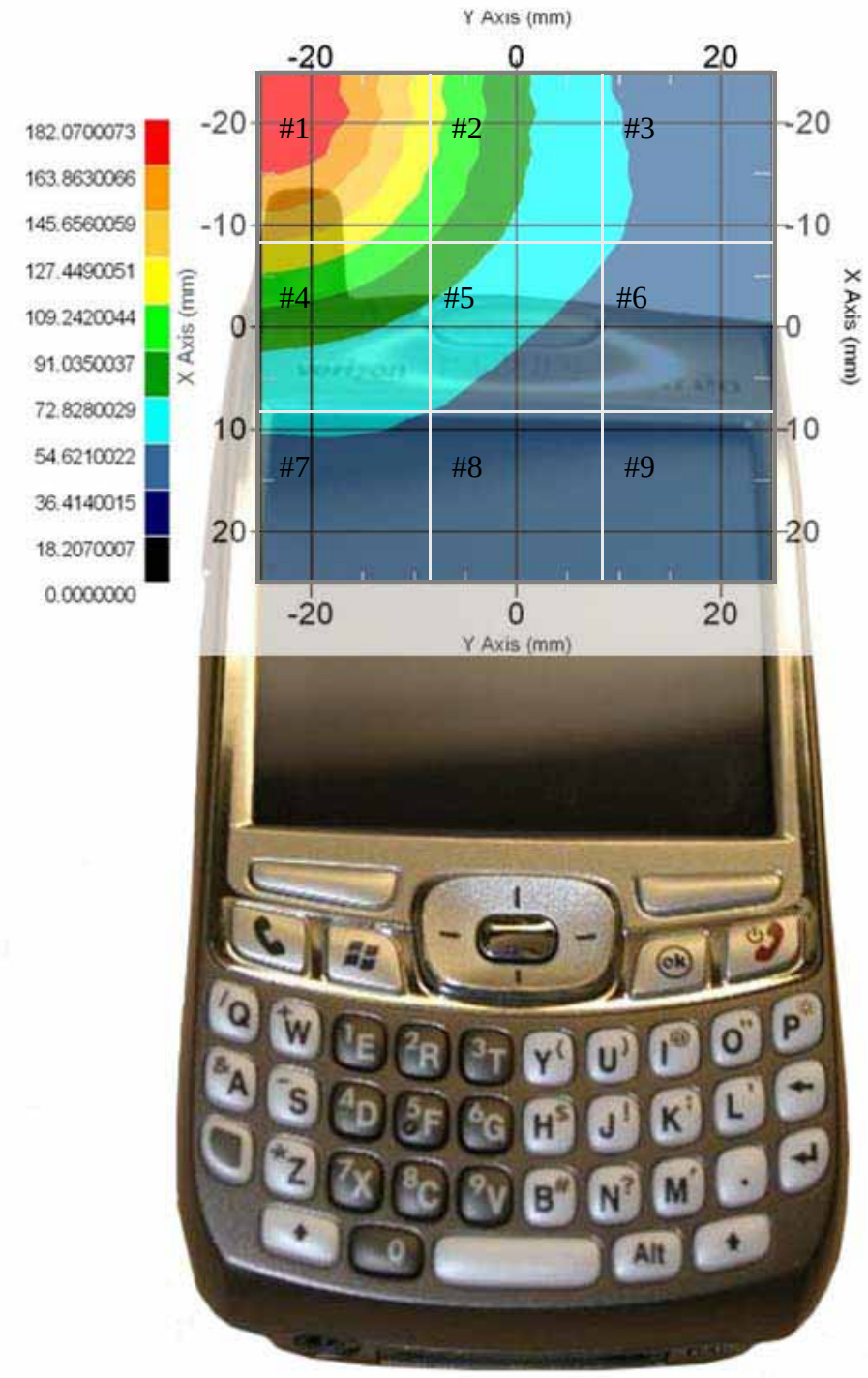

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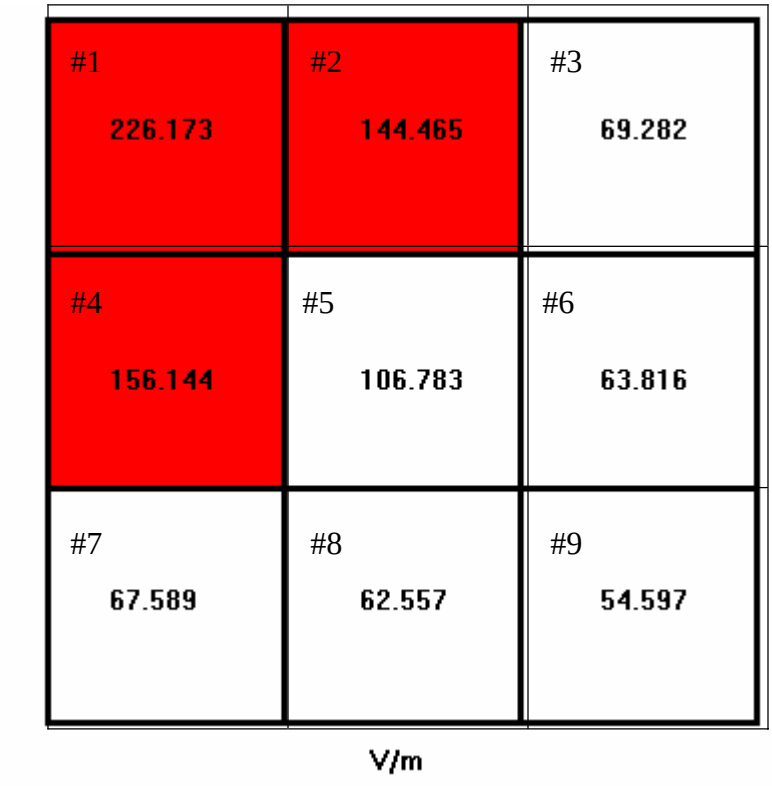
HAC Test Report

Device Type : CDMA
Device Name : Treo 700P
Device S/N : E5225
Probe Serial No. : 212
Probe Name : E probe
Probe Type : E-Field Triangle
Probe Model : ALS-E020
Date Calibrated : 21-May-2005

Test Frequency : 836.5 MHz
Channel number : 384
Probe Mod. Factor : 0.992 dB
Probe Sensitivity : 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point : 95 mV
Offset : 1.56 mm
HAC Test (26x26X1): Measurement grid dx=2, dy=2, dz=10
E-Field : 106.783 V/m Peak
dB : 40.570 db(V/m) Peak
Category : M3
contiguous sub-grids shaded red are excluded



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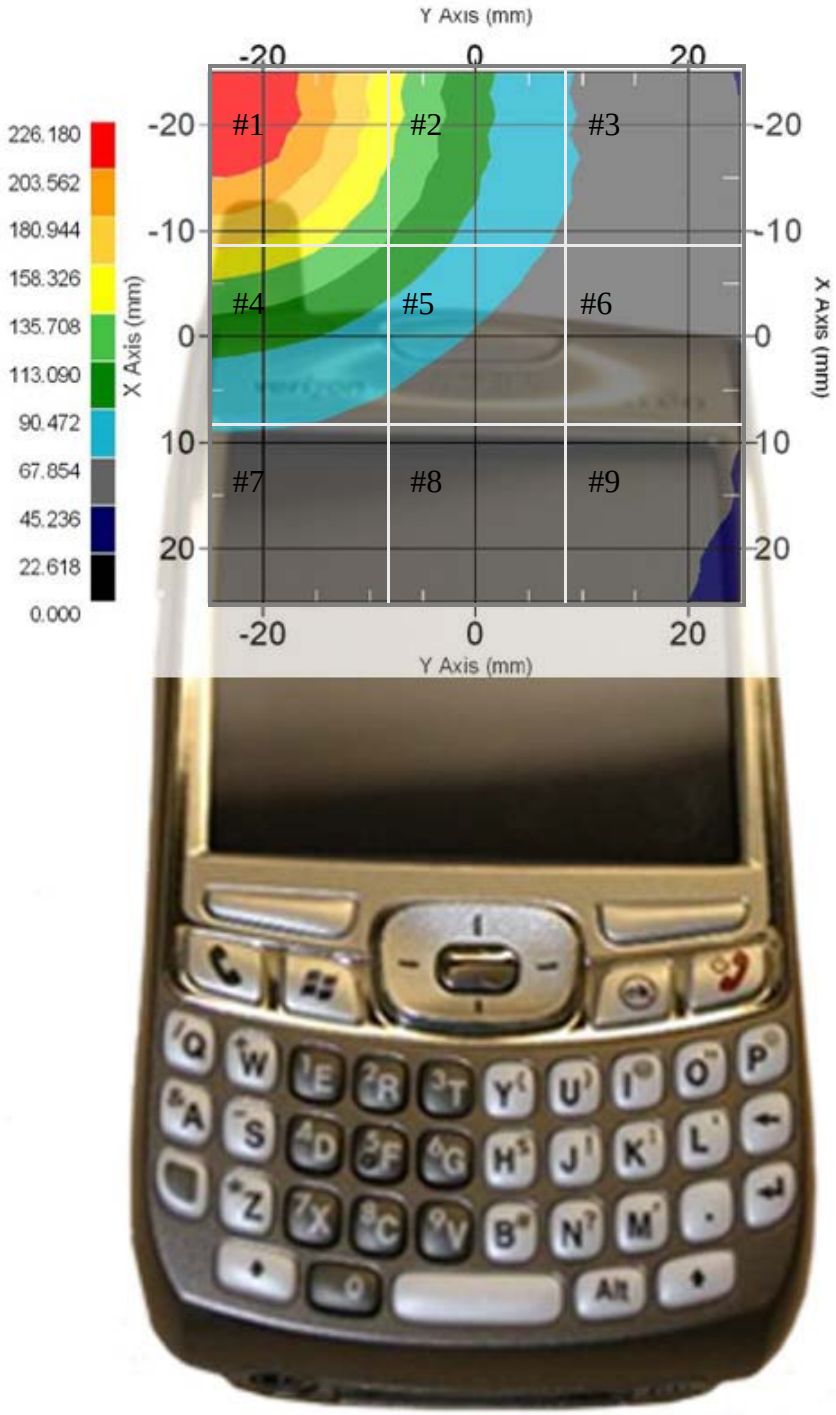

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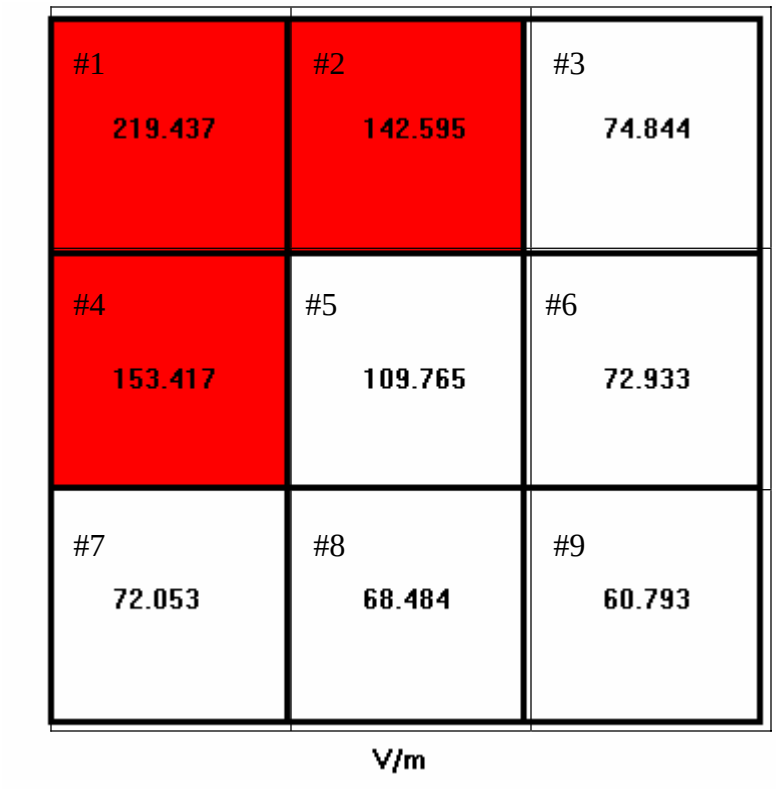
HAC Test Report

Device Type : CDMA
Device Name : Treo 700P
Device S/N : E5225
Probe Serial No. : 212
Probe Name : E probe
Probe Type : E-Field Triangle
Probe Model : ALS-E020
Date Calibrated : 21-May-2005

Test Frequency : 849 MHz
Channel number : 799
Probe Mod. Factor : 0.992 dB
Probe Sensitivity : 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point : 95 mV
Offset : 1.56 mm
HAC Test (26x26X1): Measurement grid dx=2, dy=2, dz=10
E-Field : 109.765 V/m Peak
dB : 40.809 db(V/m) Peak
Category : M3
Contiguous sub-grids shaded red are excluded



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info@aprel.com
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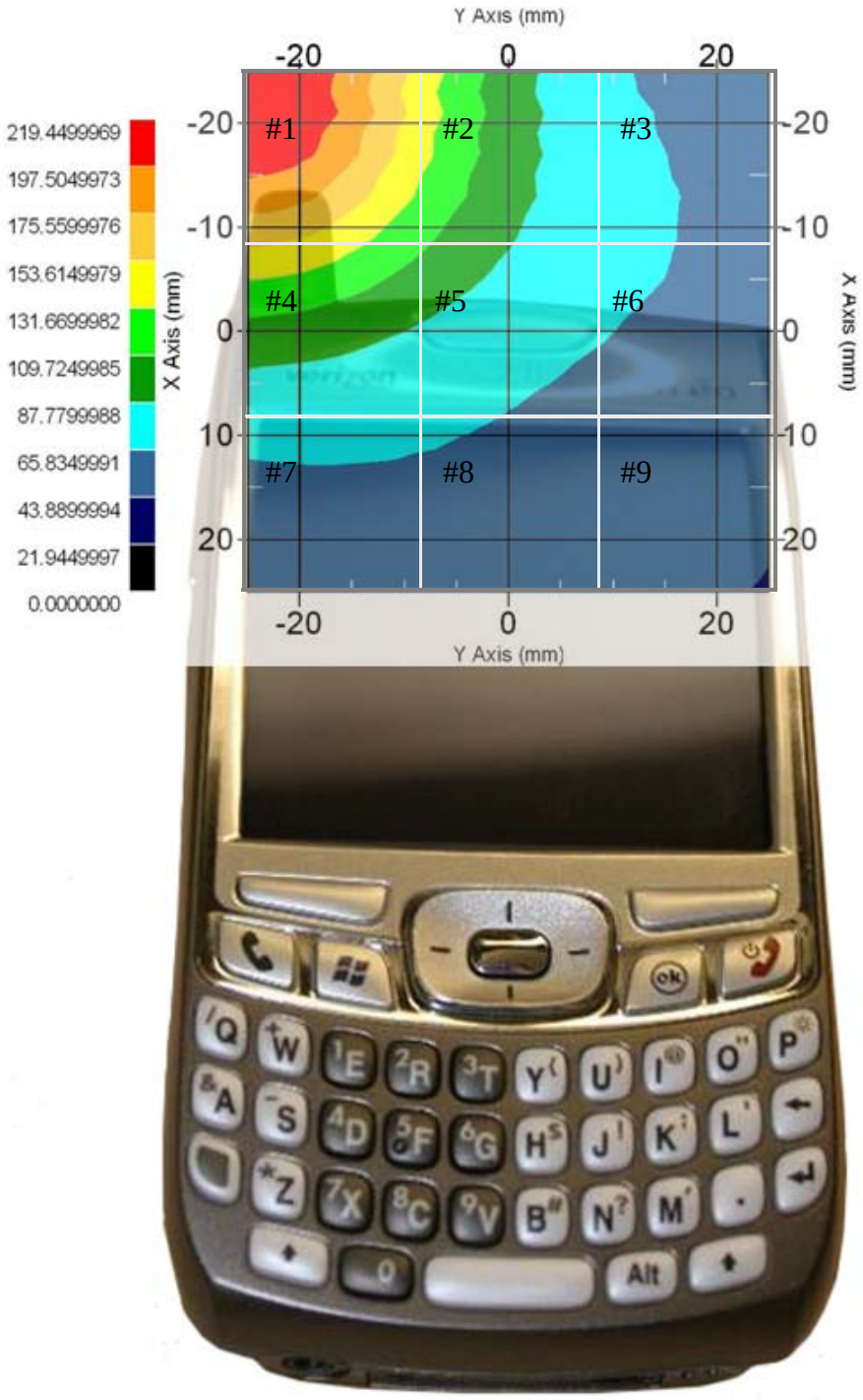
Fax (613) 820-4161



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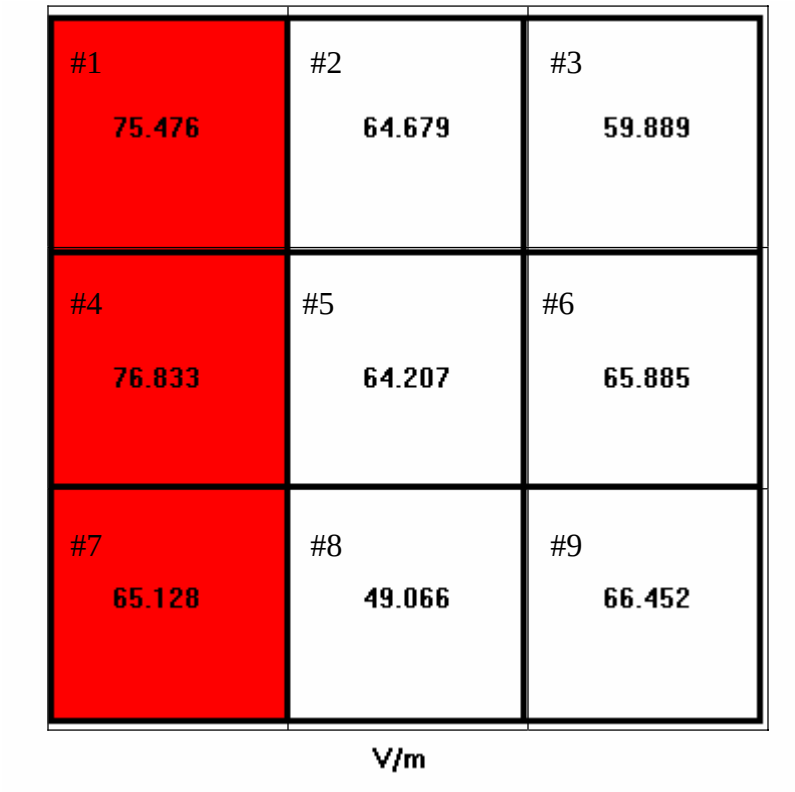
Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161

HAC Test Report

Device Type : CDMA
Device Name : Treo 700P
Device S/N : E5225
Probe Serial No. : 212
Probe Name : E probe
Probe Type : E-Field Triangle
Probe Model : ALS-E020
Date Calibrated : 21-May-2005

Test Frequency : 1850 MHz
Channel number : 001
Probe Mod. Factor : 1.01 dB
Probe Sensitivity : 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point : 95 mV
Offset : 1.56 mm
HAC Test (26x26X1): Measurement grid dx=2, dy=2, dz=10
E-Field : 66.452 V/m Peak
dB : 36.450 db(V/m) Peak
Category : M3
contiguous sub-grids shaded red are excluded



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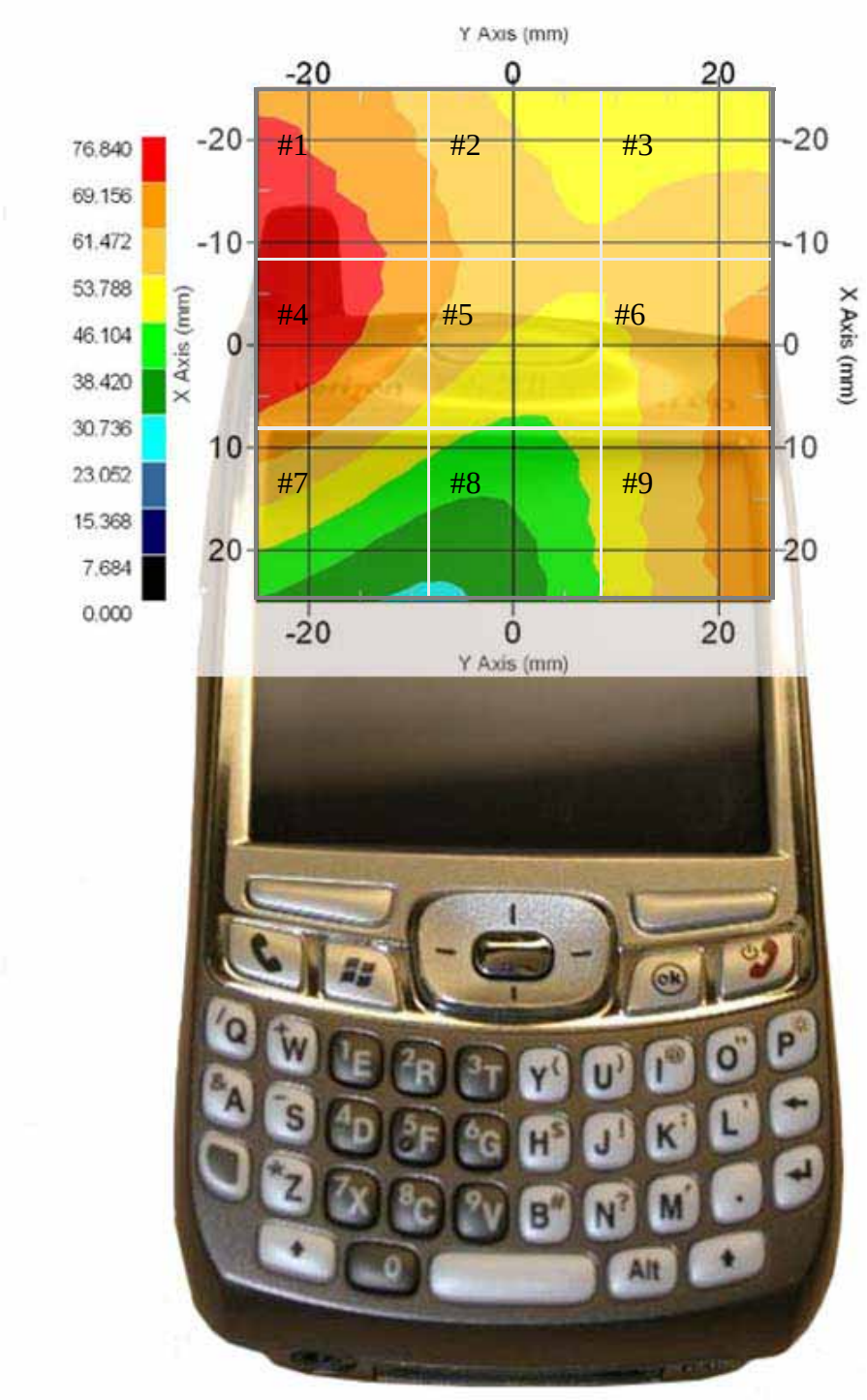
Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161



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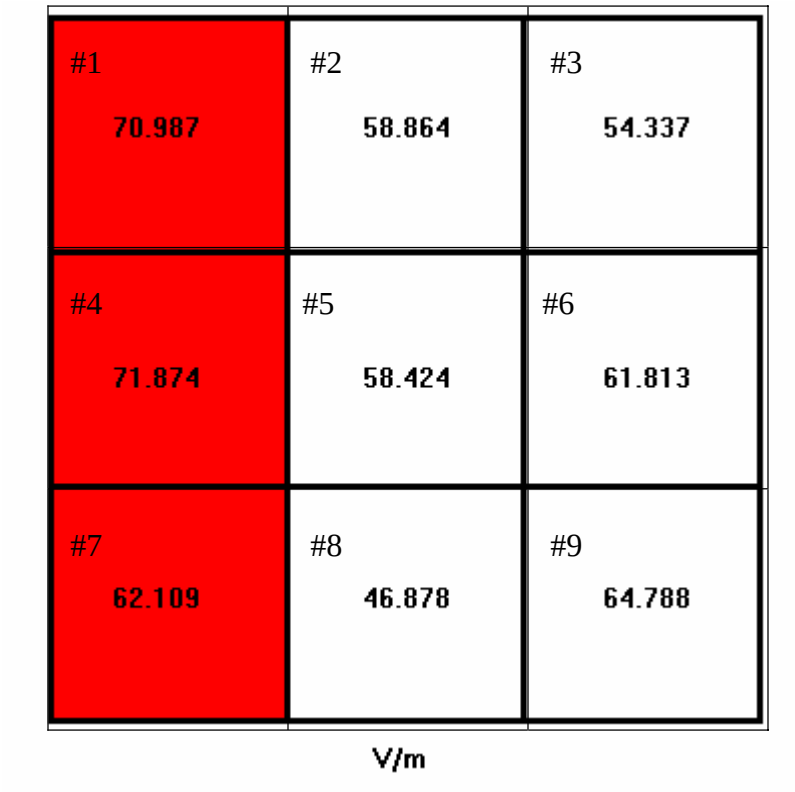
Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161

HAC Test Report

Device Type : CDMA
Device Name : Treo 700P
Device S/N : E5225
Probe Serial No. : 212
Probe Name : E probe
Probe Type : E-Field Triangle
Probe Model : ALS-E020
Date Calibrated : 21-May-2005

Test Frequency : 1880 MHz
Channel number : 600
Probe Mod. Factor : 1.01 dB
Probe Sensitivity : 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point : 95 mV
Offset : 1.56 mm
HAC Test (26x26X1): Measurement grid dx=2, dy=2, dz=10
E-Field : 64.788 V/m Peak
dB : 36.230 db(V/m) Peak
Category : M3
contiguous sub-grids shaded red are excluded



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www.aprel.com
info@aprel.com
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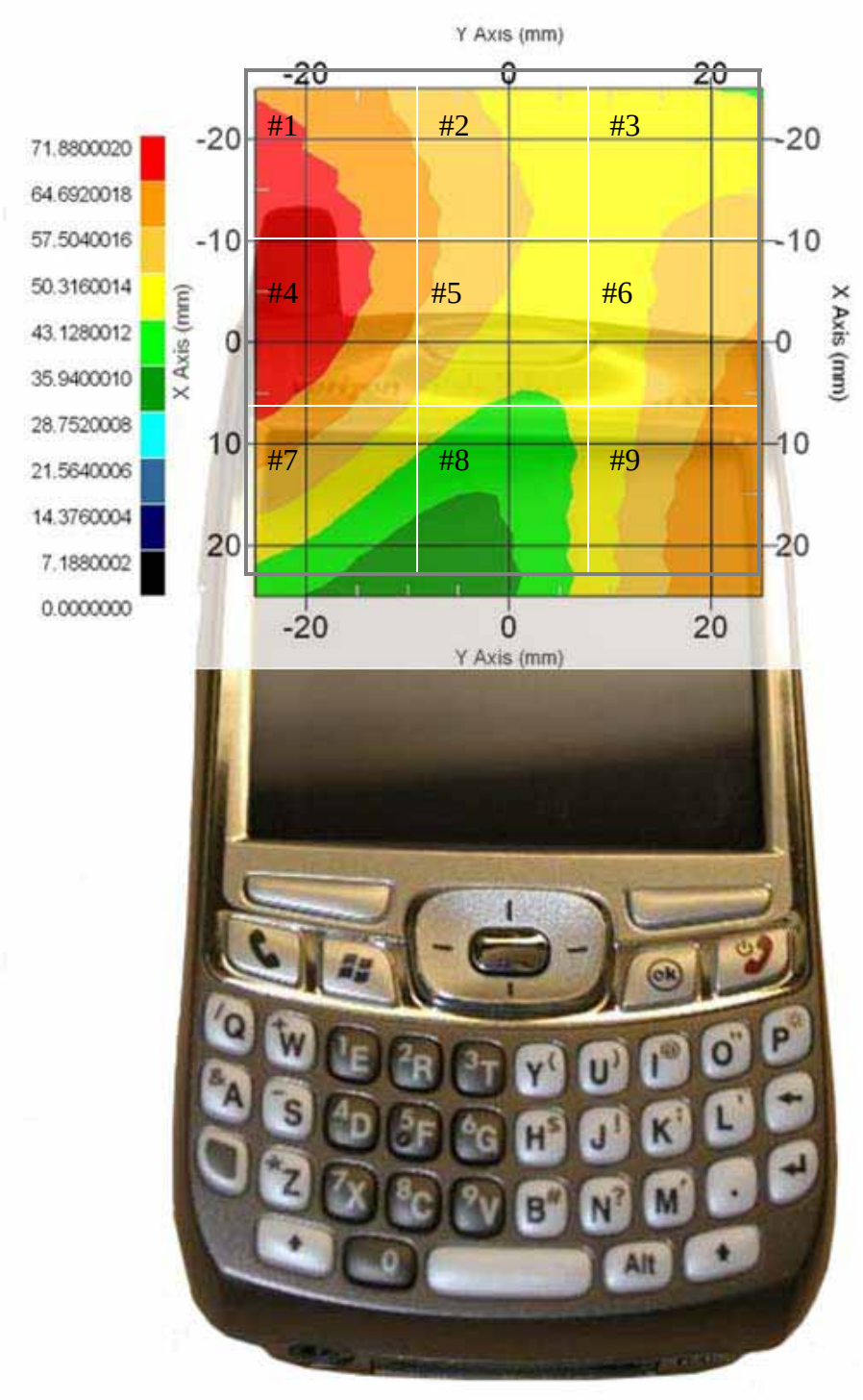
Fax (613) 820-4161



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Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
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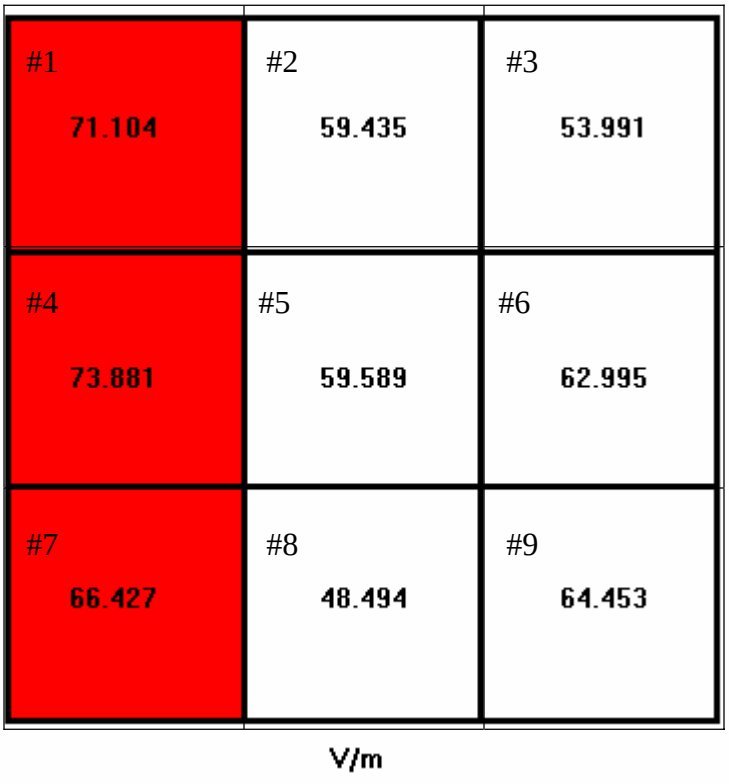
Fax (613) 820-4161

HAC Test Report

Device Type : CDMA
Device Name : Treo 700P
Device S/N : E5225
Probe Serial No. : 212
Probe Name : E probe
Probe Type : E-Field Triangle
Probe Model : ALS-E020
Date Calibrated : 21-May-2005

Test Frequency : 1910 MHz
Channel number : 1199
Probe Mod. Factor : 1.01 dB
Probe Sensitivity : 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point : 95 mV
Offset : 1.56 mm
HAC Test (26x26X1): Measurement grid dx=2, dy=2, dz=10
E-Field : 64.453 V/m Peak
dB : 36.185 db(V/m) Peak
Category : M3
contiguous sub-grids shaded red are excluded



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www.aprel.com
info@aprel.com
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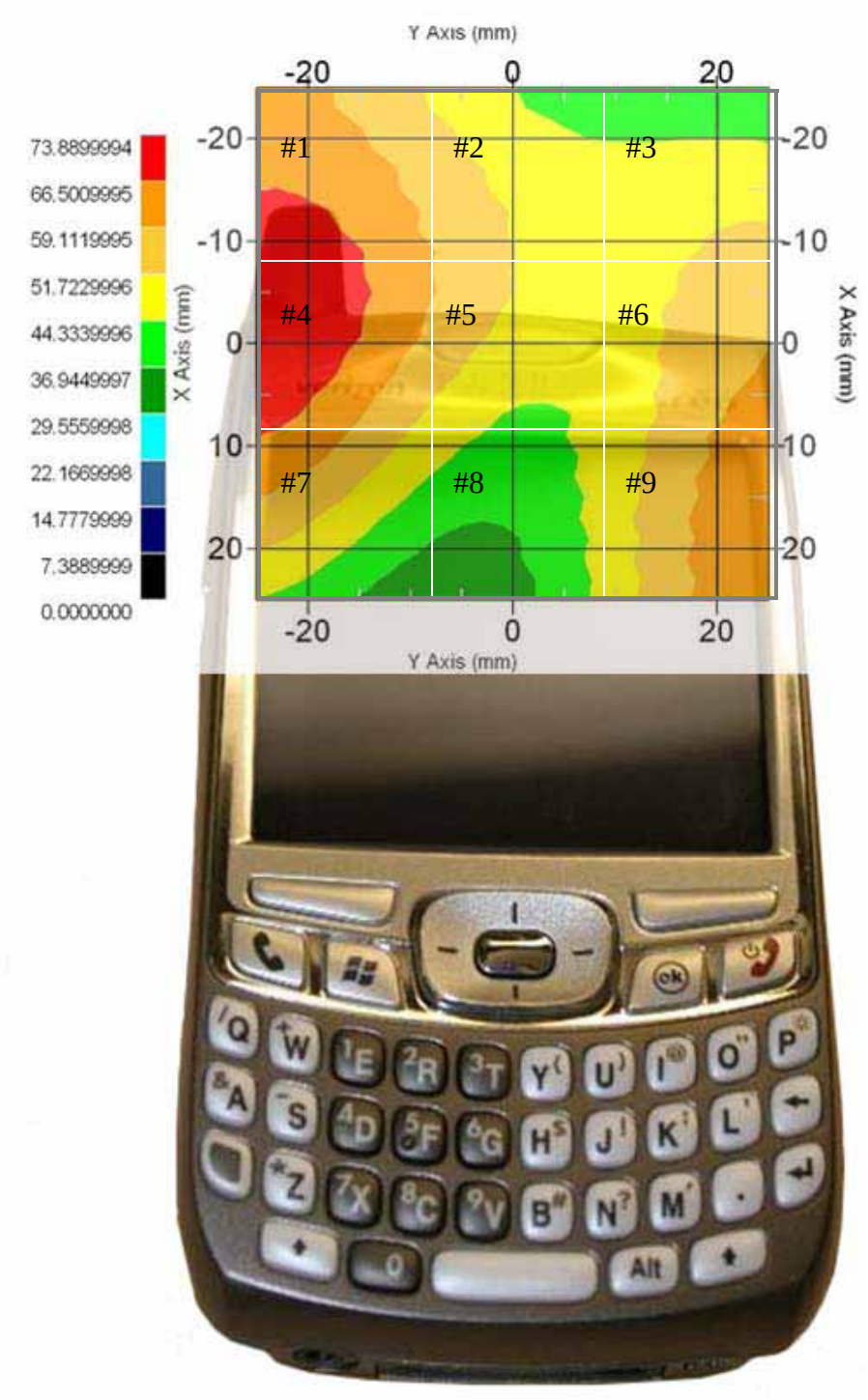

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Ottawa ON Canada K2R 1E6
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info@aprel.com
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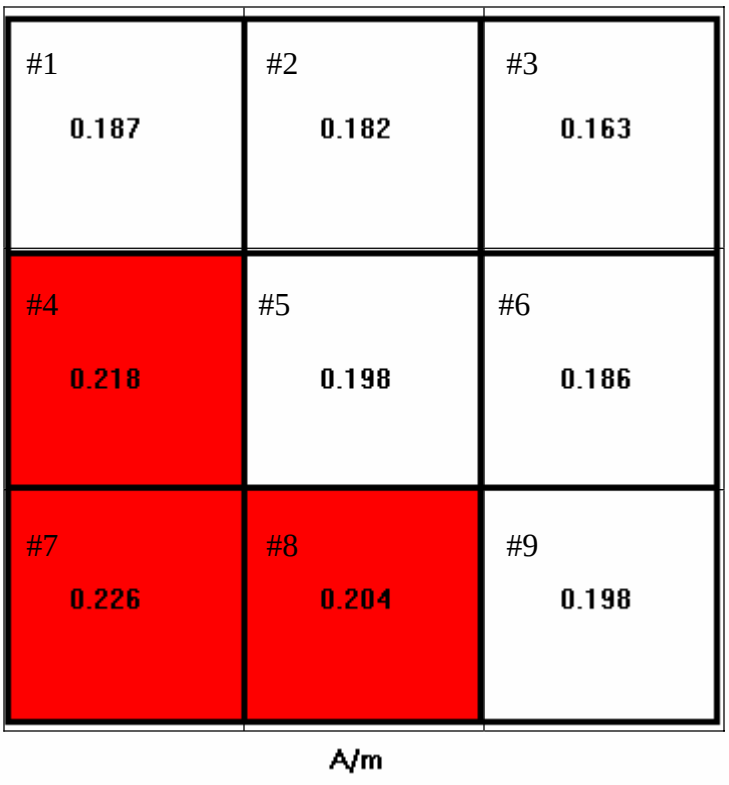
Fax (613) 820-4161

HAC Test Report

Device Type : CDMA
Device Name : Treo 700P
Device S/N : E5225
Probe Serial No. : 101
Probe Name : H-field probe
Probe Type : H-Field Sensor
Probe Model : ALS-H-020
Date Calibrated : 02-Oct-2004

Test Frequency : 824 MHz
Channel number : 991
Probe Mod. Factor : 1.052 dB
Probe Sensitivity : 84.1 mV/(A/m)
Compression Point : 95 mV
Offset : 3 mm
HAC Test (26x26X1): Measurement grid dx=2, dy=2, dz=10
H-Field : 0.198 A/m Peak
dB : -14.060 db(A/m) Peak
Category : M3
contiguous sub-grids shaded red are excluded



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info@aprel.com
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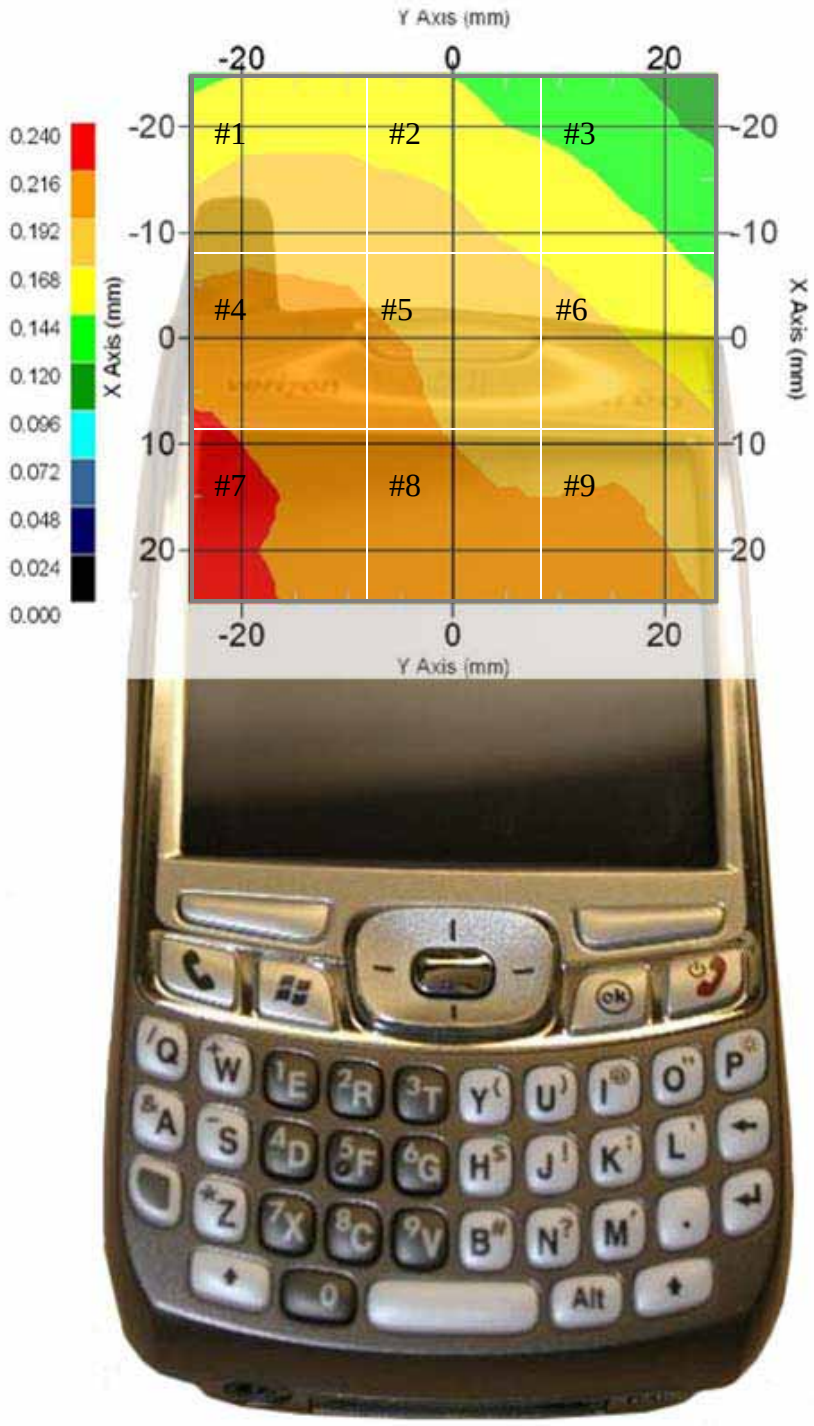
Fax (613) 820-4161



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www.aprel.com
info@aprel.com
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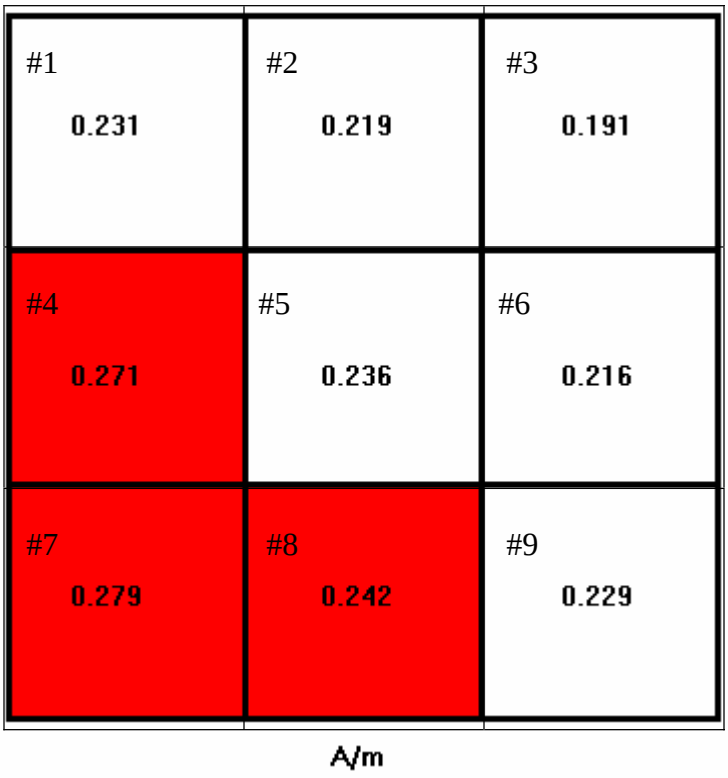
Fax (613) 820-4161

HAC Test Report

Device Type : CDMA
Device Name : Treo 700P
Device S/N : E5225
Probe Serial No. : 101
Probe Name : H-field probe
Probe Type : H-Field Sensor
Probe Model : ALS-H-020
Date Calibrated : 02-Oct-2004

Test Frequency : 836.5 MHz
Channel number : 384
Probe Mod. Factor : 0.992 dB
Probe Sensitivity : 86.7 mV/(A/m)
Compression Point : 95 mV
Offset : 3 mm
HAC Test (26x26X1): Measurement grid dx=2, dy=2, dz=10
H-Field : 0.236 A/m Peak
dB : -12.527 db(A/m) Peak
Category : M3
contiguous sub-grids shaded red are excluded



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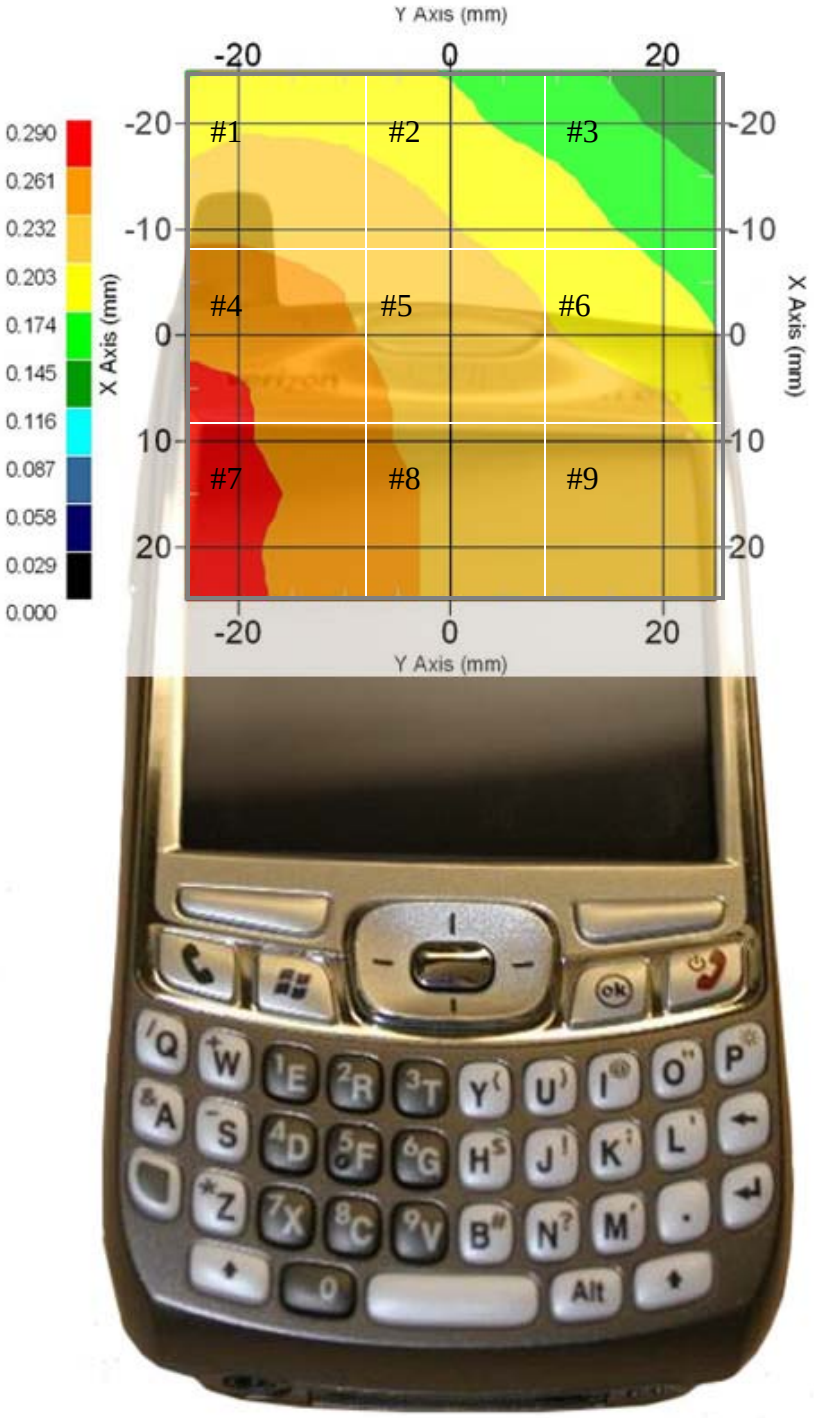
Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161

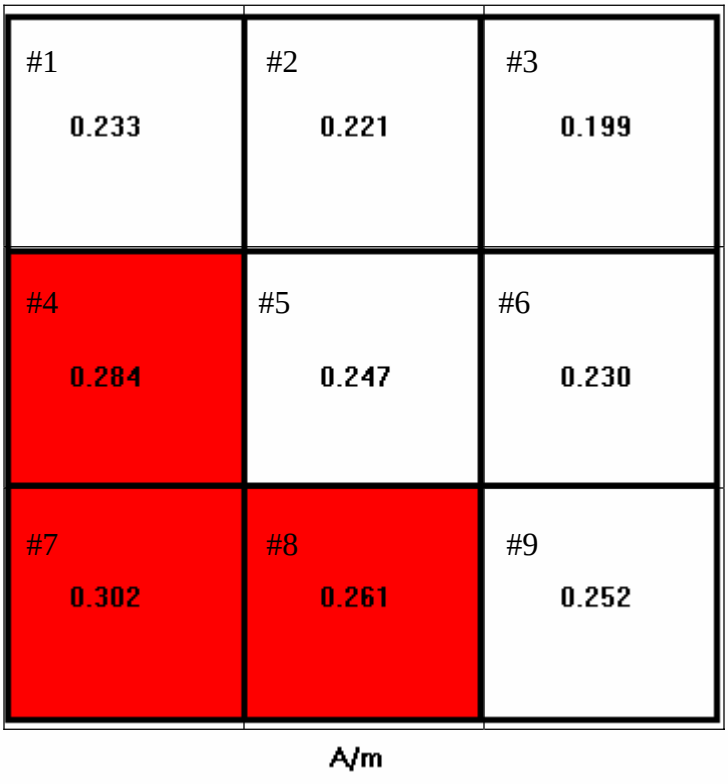


51 Spectrum Way
Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161

HAC Test Report

Device Type : CDMA
Device Name : Treo 700P
Device S/N : E5225
Probe Serial No. : 101
Probe Name : H-field probe
Probe Type : H-Field Sensor
Probe Model : ALS-H-020
Date Calibrated : 02-Oct-2004

Test Frequency : 849 MHz
Channel number : 799
Probe Mod. Factor : 1.052 dB
Probe Sensitivity : 89.3 mV/(A/m)
Compression Point : 95 mV
Offset : 3 mm
HAC Test (26x26X1): Measurement grid dx=2, dy=2, dz=10
H-Field : 0.252 A/m Peak
dB : -11.986 db(A/m) Peak
Category : M3
contiguous sub-grids shaded red are excluded



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info@aprel.com
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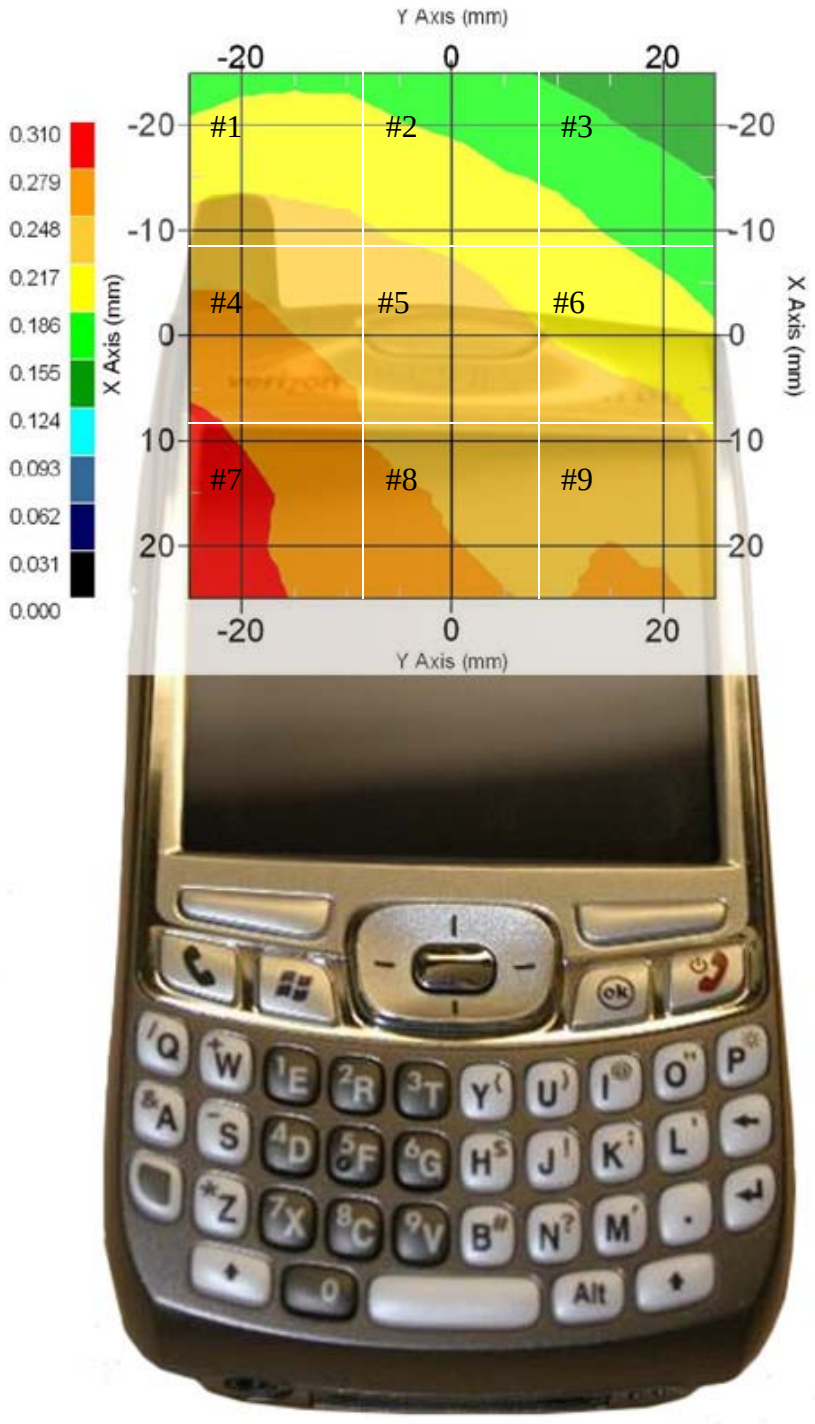

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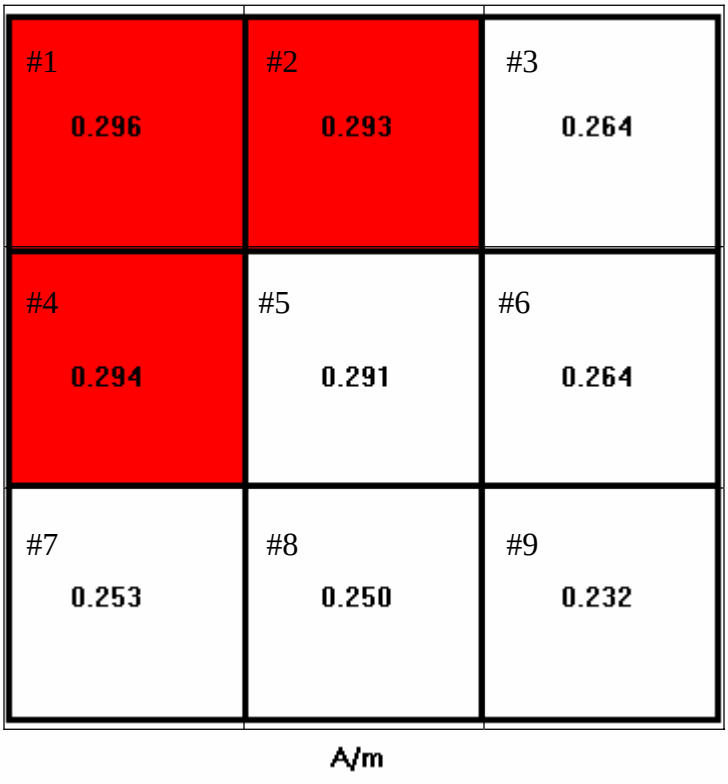
HAC Test Report

Device Type : CDMA
Device Name : Treo 700P
Device S/N : E5225
Probe Serial No. : 101
Probe Name : H-field probe
Probe Type : H-Field Sensor
Probe Model : ALS-H-020
Date Calibrated : 02-Oct-2004

Test Frequency : 1850 MHz
Channel number : 001
Probe Mod. Factor : 1.07 dB
Probe Sensitivity : 424 mV/(A/m)
Compression Point : 95 mV
Offset : 3 mm
HAC Test (26x26X1): Measurement grid dx=2, dy=2, dz=10
H-Field : 0.291 A/m Peak
dB : -10.721 db(A/m) Peak
Category : M3
contiguous sub-grids shaded red are excluded



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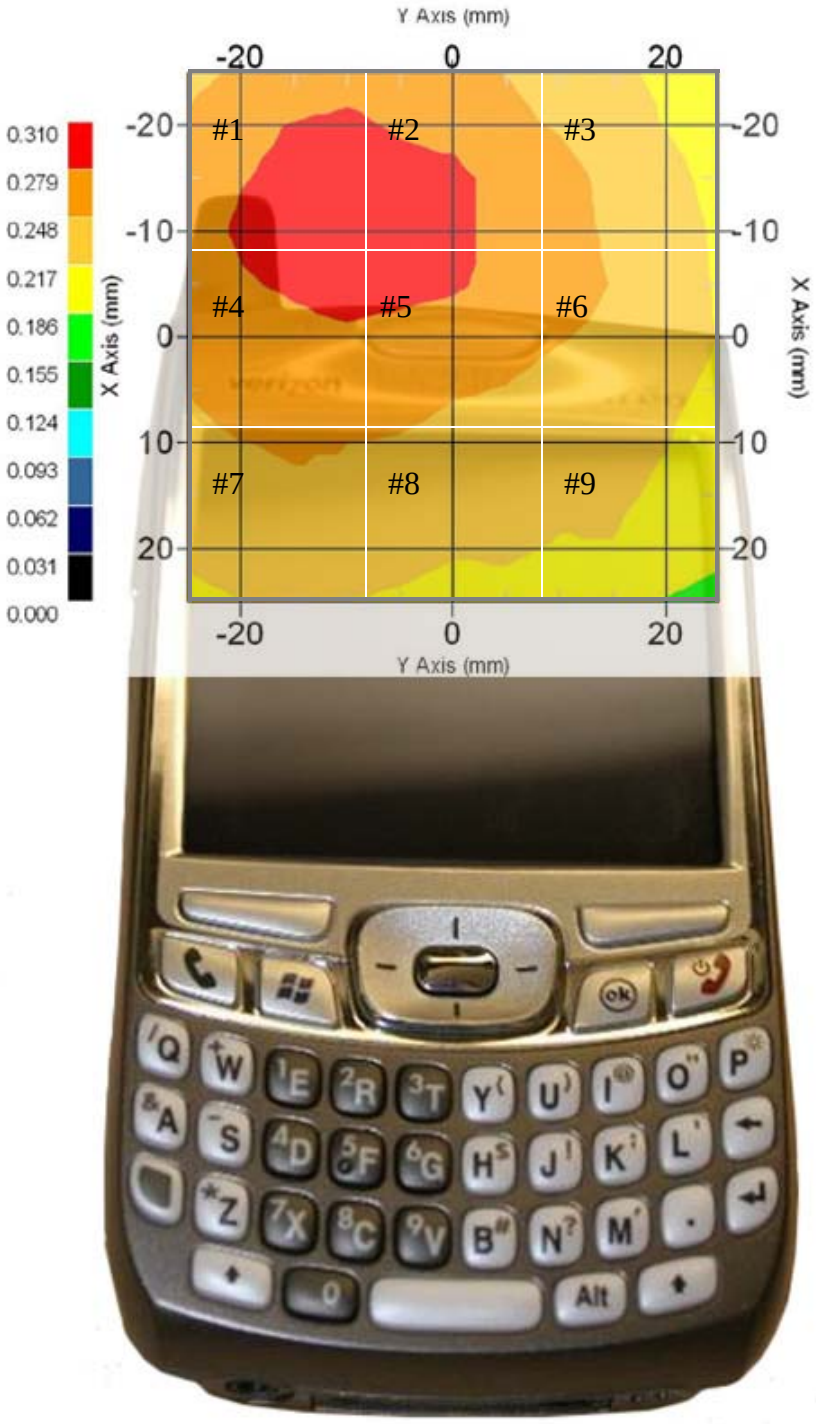

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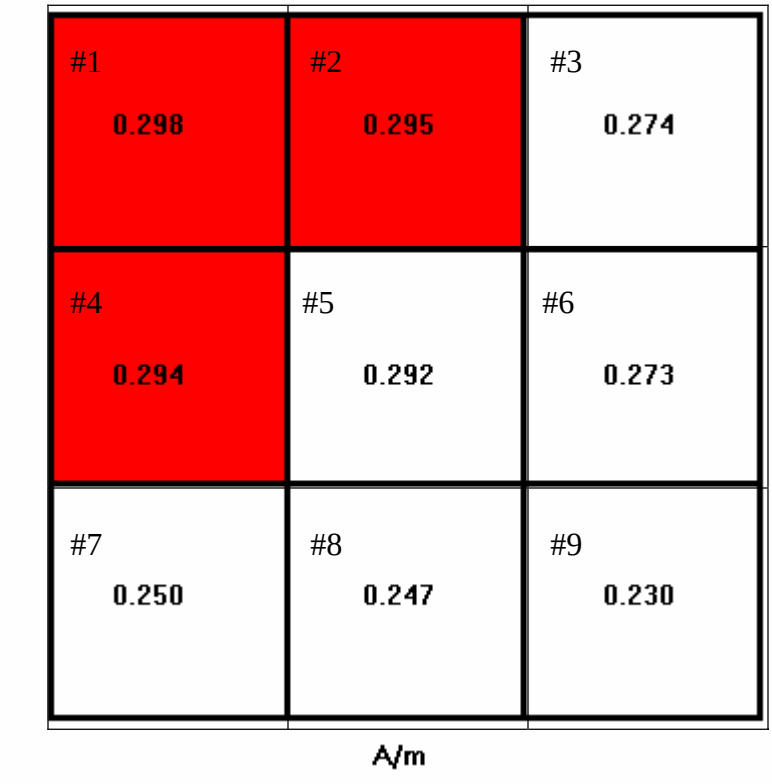
HAC Test Report

Device Type : CDMA
Device Name : Treo 700P
Device S/N : E5225
Probe Serial No. : 101
Probe Name : H-field probe
Probe Type : H-Field Sensor
Probe Model : ALS-H-020
Date Calibrated : 02-Oct-2004

Test Frequency : 1880 MHz
Channel number : 600
Probe Mod. Factor : 1.07 dB
Probe Sensitivity : 438 mV/(A/m)
Compression Point : 95 mV
Offset : 3 mm
HAC Test (26x26X1): Measurement grid dx=2, dy=2, dz=10
H-Field : 0.292 A/m Peak
dB : -10.686 db(A/m) Peak
Category : M3
contiguous sub-grids shaded red are excluded



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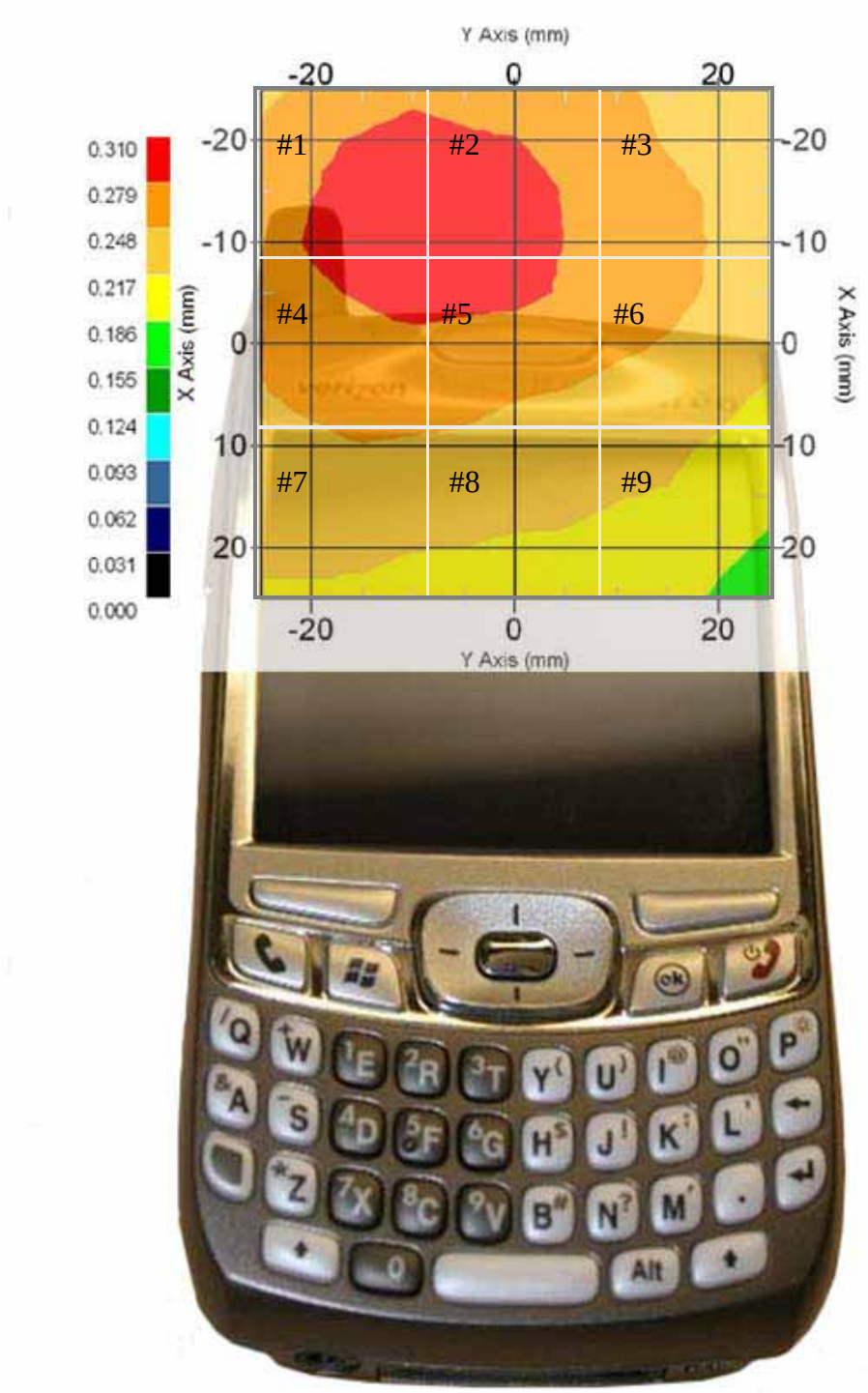

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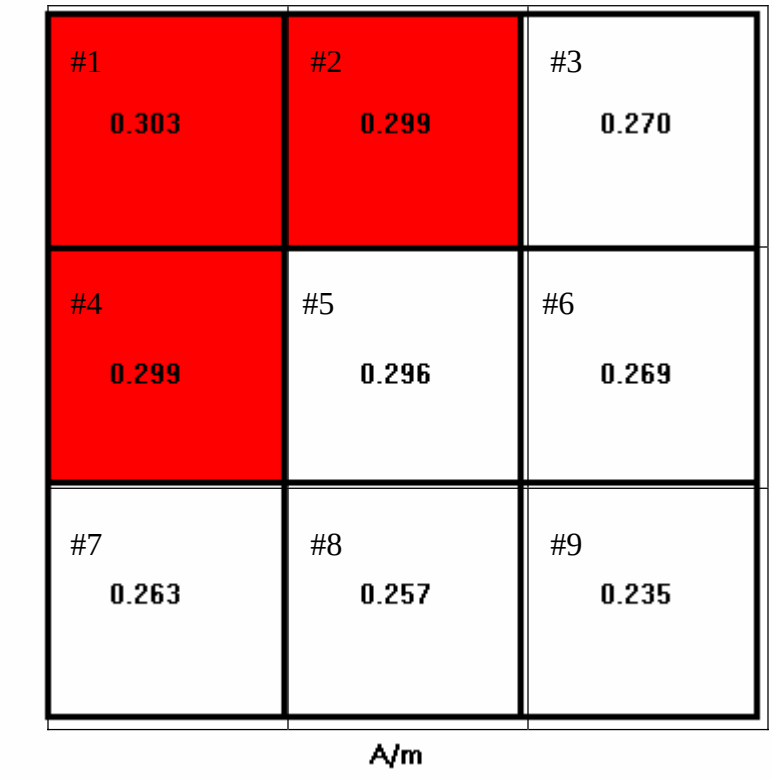
HAC Test Report

Device Type : CDMA
Device Name : Treo 700P
Device S/N : E5225
Probe Serial No. : 101
Probe Name : H-field probe
Probe Type : H-Field Sensor
Probe Model : ALS-H-020
Date Calibrated : 02-Oct-2004

Test Frequency : 1910 MHz
Channel number : 1199
Probe Mod. Factor : 1.07 dB
Probe Sensitivity : 452 mV/(A/m)
Compression Point : 95 mV
Offset : 3 mm
HAC Test (26x26X1): Measurement grid dx=2, dy=2, dz=10
H-Field 0.296 A/m Peak
dB : -10.575 db(A/m) Peak
Category : M3
contiguous sub-grids shaded red are excluded



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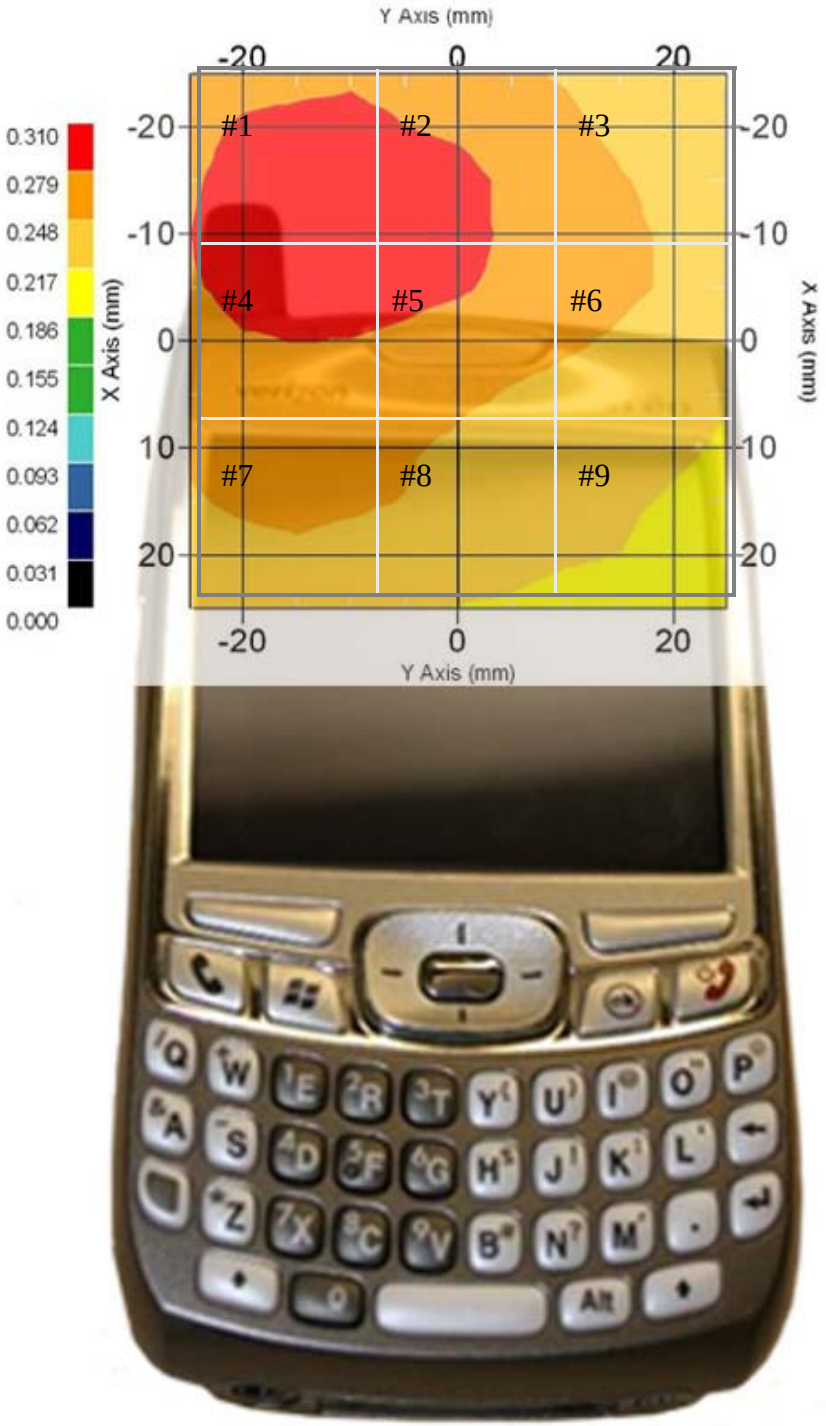

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info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161

Calibration

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info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161

NCL CALIBRATION LABORATORIES

Calibration File No.: CP-422

Client.: APREL

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 H-field RF Probe

Manufacturer: APREL Laboratories
Model No.: H-020
Serial No.: 101

IN AIR Calibration

Calibration Procedure: SSI/DRB-TP-D01-038
Project No: Internal

Calibrated: 2nd October 2004
Released on: 2nd October 2004

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

Released By: _____

***NCL* CALIBRATION LABORATORIES**
51 SPECTRUM WAY
NEPEAN, ONTARIO
CANADA K2R 1E6

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

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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 H-020 101.

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".

Conditions

Probe 101 was a new probe taken from stock prior to 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 makes the calibrated center of the probe

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Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161

Calibration Results Summary

Probe Type: H-Field Probe H-020

Serial Number: 101

Frequencies: see the table "Sensitivity in Air" below

Sensor Offset: 3.0 mm

Sensor Diameter: 4.0 mm

Tip Enclosure: Polycarbonate

Tip Diameter: 8 mm

Total Length: 290 mm

Sensitivity in Air

Frequency	**Channel X**	**Channel Y**	**Channel Z**
824.2MHz	84.2mV/(A/m)^2	84.2mV/(A/m)^2	84.2mV/(A/m)^2
836.5MHz	86.7mV/(A/m)^2	86.7mV/(A/m)^2	86.7mV/(A/m)^2
848.8MHz	89.3mV/(A/m)^2	89.3mV/(A/m)^2	89.3mV/(A/m)^2
1850MHz	424.1mV/(A/m)^2	424.1mV/(A/m)^2	424.1mV/(A/m)^2
1880MHz	438.0mV/(A/m)^2	438.0mV/(A/m)^2	438.0mV/(A/m)^2
1910MHz	452.1mV/(A/m)^2	452.1mV/(A/m)^2	452.1mV/(A/m)^2

Diode Compression Point: 95 mV

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.

51 Spectrum Way
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info@aprel.com
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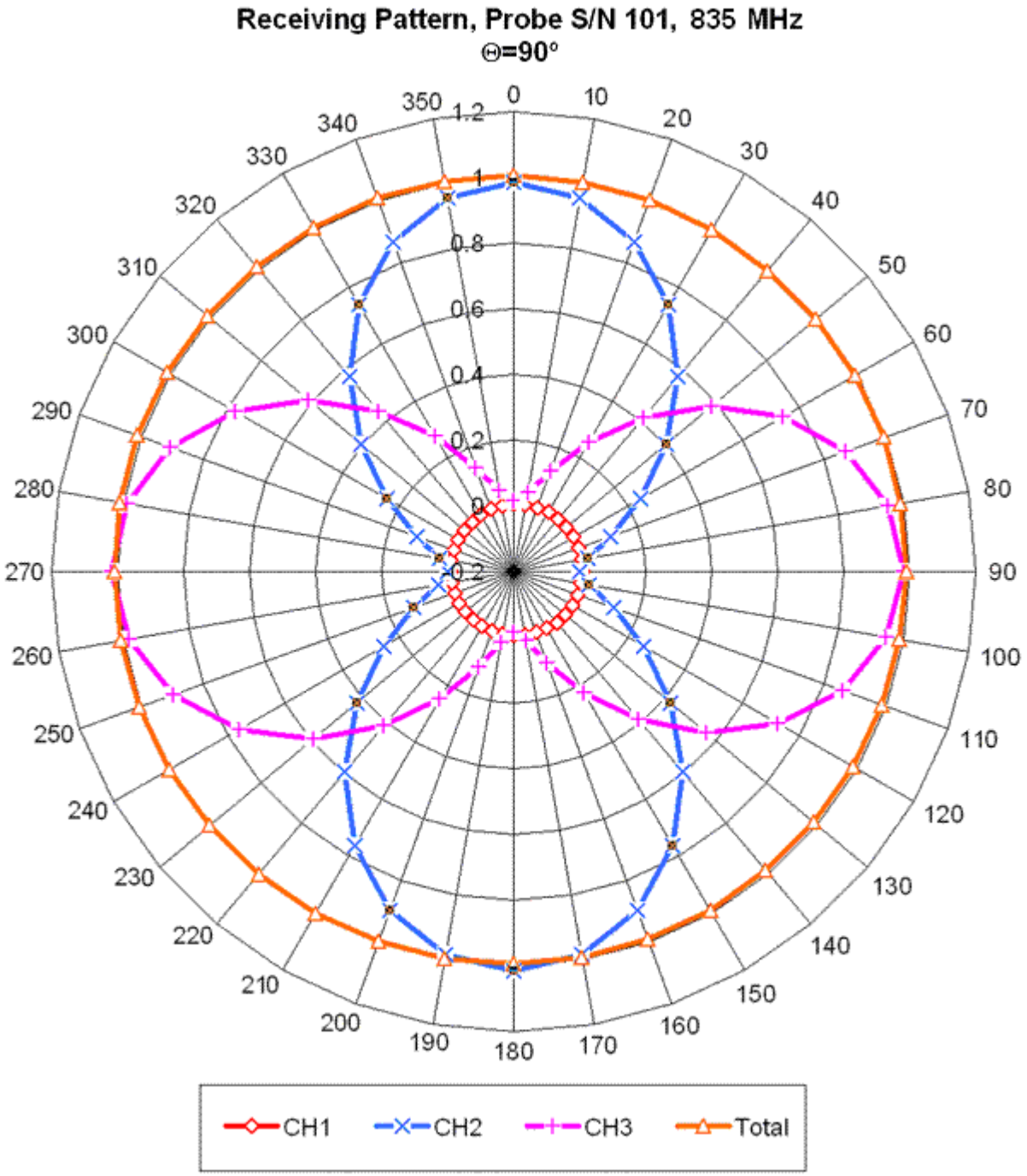
Fax (613) 820-4161

Receiving Pattern at 835 MHz



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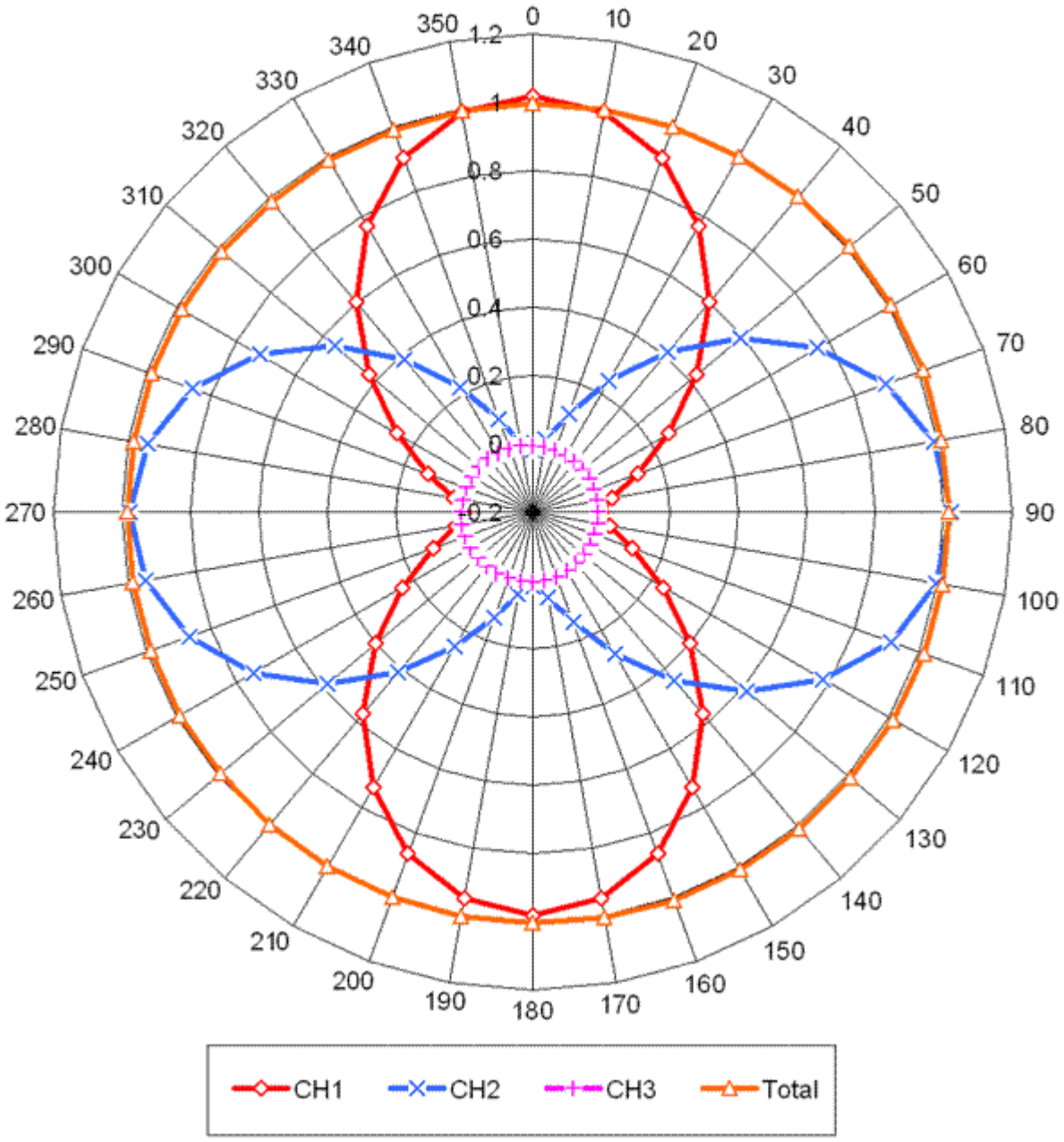
Receiving Pattern, Probe S/N 101, 835 MHz

Θ=0°



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info@aprel.com
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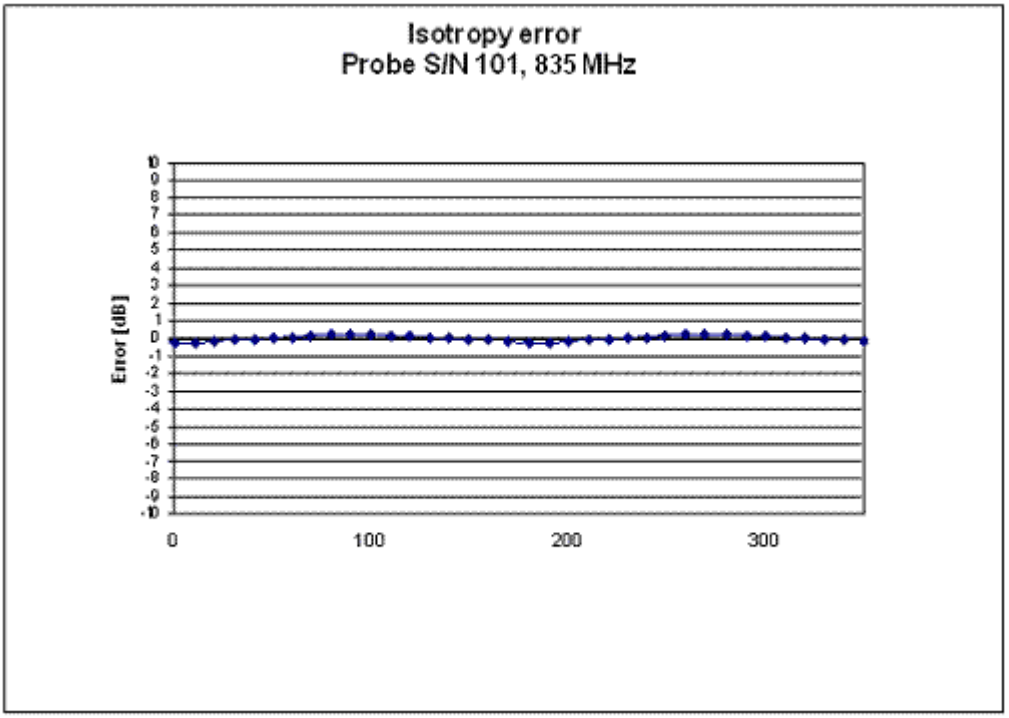
Isotropy Error 835 MHz



Isotropicity: 0.10 dB

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info@aprel.com
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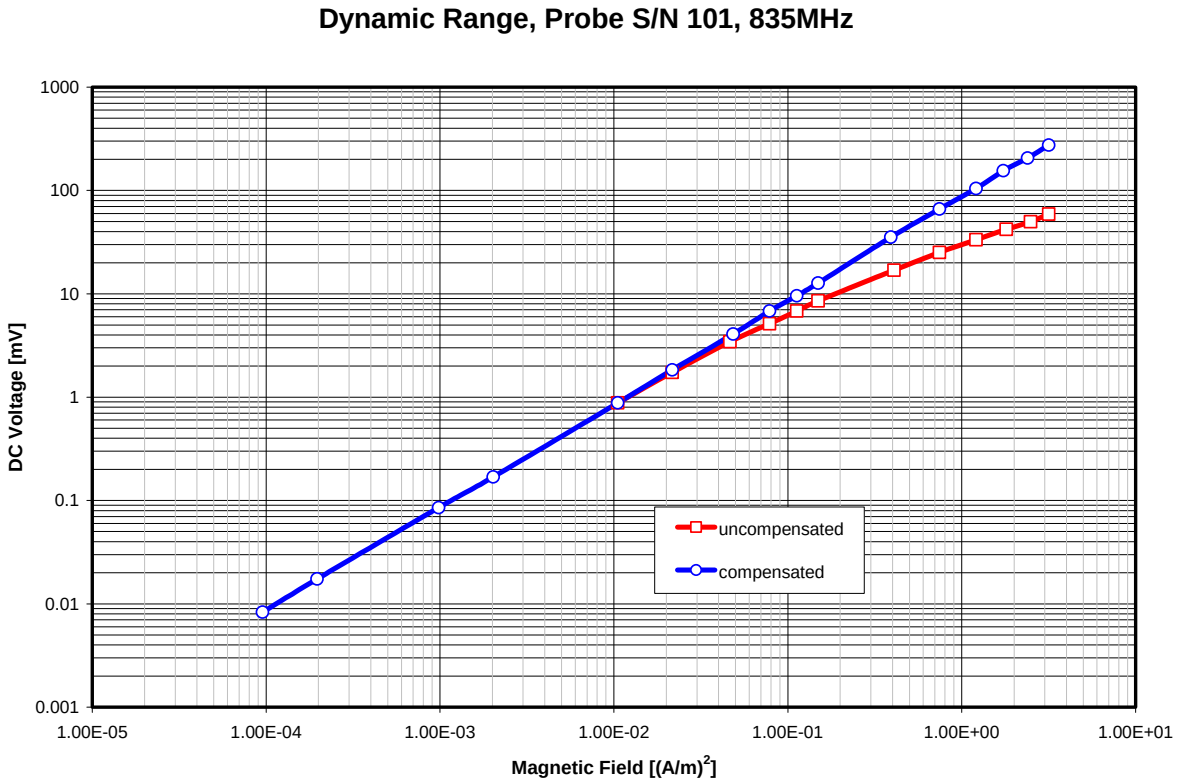
Dynamic Range



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 2005.

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Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161

NCL CALIBRATION LABORATORIES

Calibration File No.: CP-422

Client.: APREL

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 H-field RF Probe

Manufacturer: APREL Laboratories
Model No.: H-020
Serial No.: 101

IN AIR Calibration

Calibration Procedure: SSI/DRB-TP-D01-038
Project No: Internal

Calibrated: 2nd October 2004
Released on: 2nd October 2004

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

Released By: _____

***NCL* CALIBRATION LABORATORIES**
51 SPECTRUM WAY
NEPEAN, ONTARIO
CANADA K2R 1E6

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

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 H-020 101.

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".

Conditions

Probe 101 was a new probe taken from stock prior to 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 makes the calibrated center of the probe

51 Spectrum Way
Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161

Calibration Results Summary

Probe Type: H-Field Probe H-020

Serial Number: 101

Frequencies: see the table "Sensitivity in Air" below

Sensor Offset: 3.0 mm

Sensor Diameter: 4.0 mm

Tip Enclosure: Polycarbonate

Tip Diameter: 8 mm

Total Length: 290 mm

Sensitivity in Air

Frequency	**Channel X**	**Channel Y**	**Channel Z**
824.2MHz	84.2mV/(A/m)^2	84.2mV/(A/m)^2	84.2mV/(A/m)^2
836.5MHz	86.7mV/(A/m)^2	86.7mV/(A/m)^2	86.7mV/(A/m)^2
848.8MHz	89.3mV/(A/m)^2	89.3mV/(A/m)^2	89.3mV/(A/m)^2
1850MHz	424.1mV/(A/m)^2	424.1mV/(A/m)^2	424.1mV/(A/m)^2
1880MHz	438.0mV/(A/m)^2	438.0mV/(A/m)^2	438.0mV/(A/m)^2
1910MHz	452.1mV/(A/m)^2	452.1mV/(A/m)^2	452.1mV/(A/m)^2

Diode Compression Point: 95 mV

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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Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
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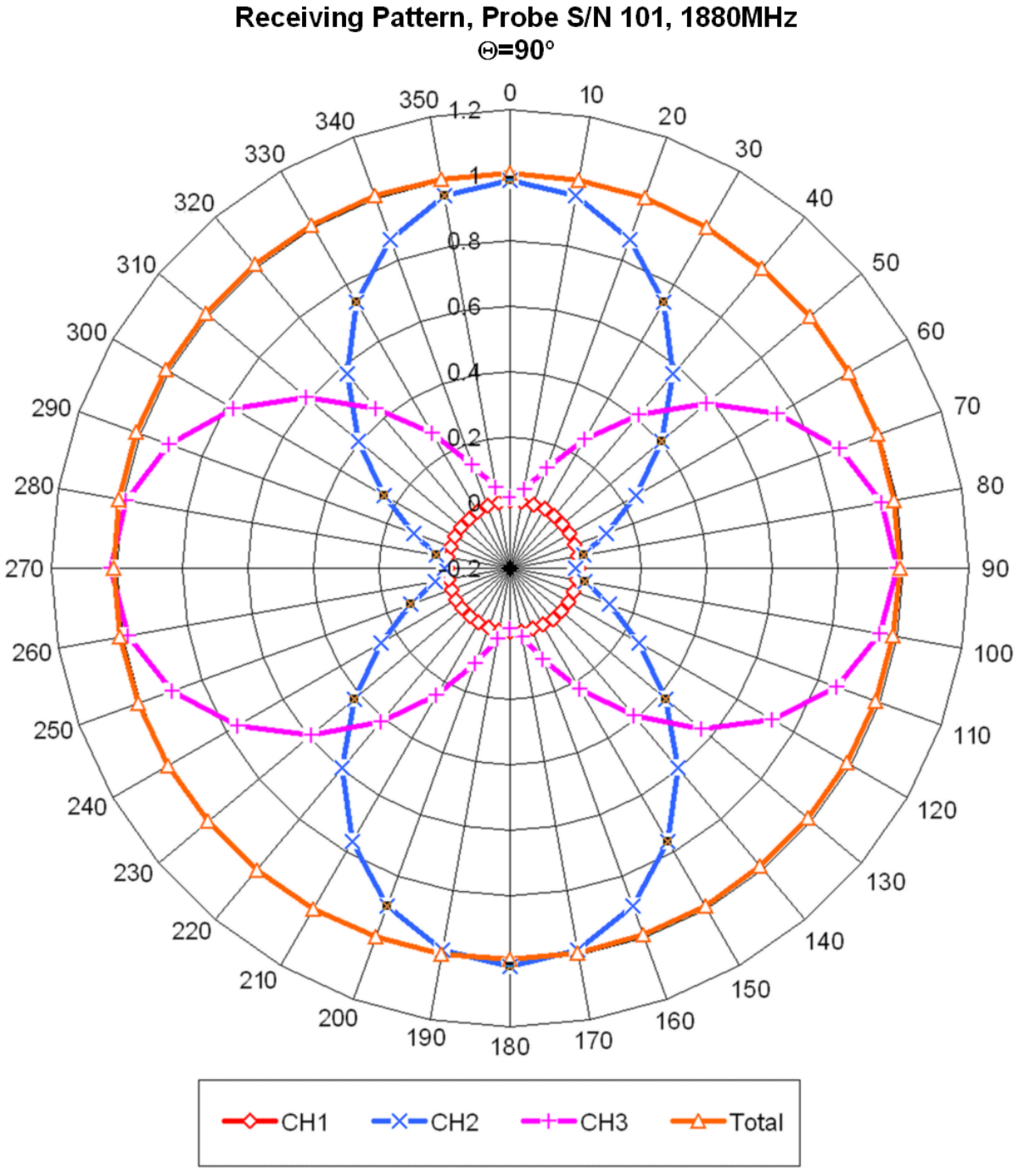
Receiving Pattern at 1880 MHz



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Ottawa ON Canada K2R 1E6
www.aprel.com
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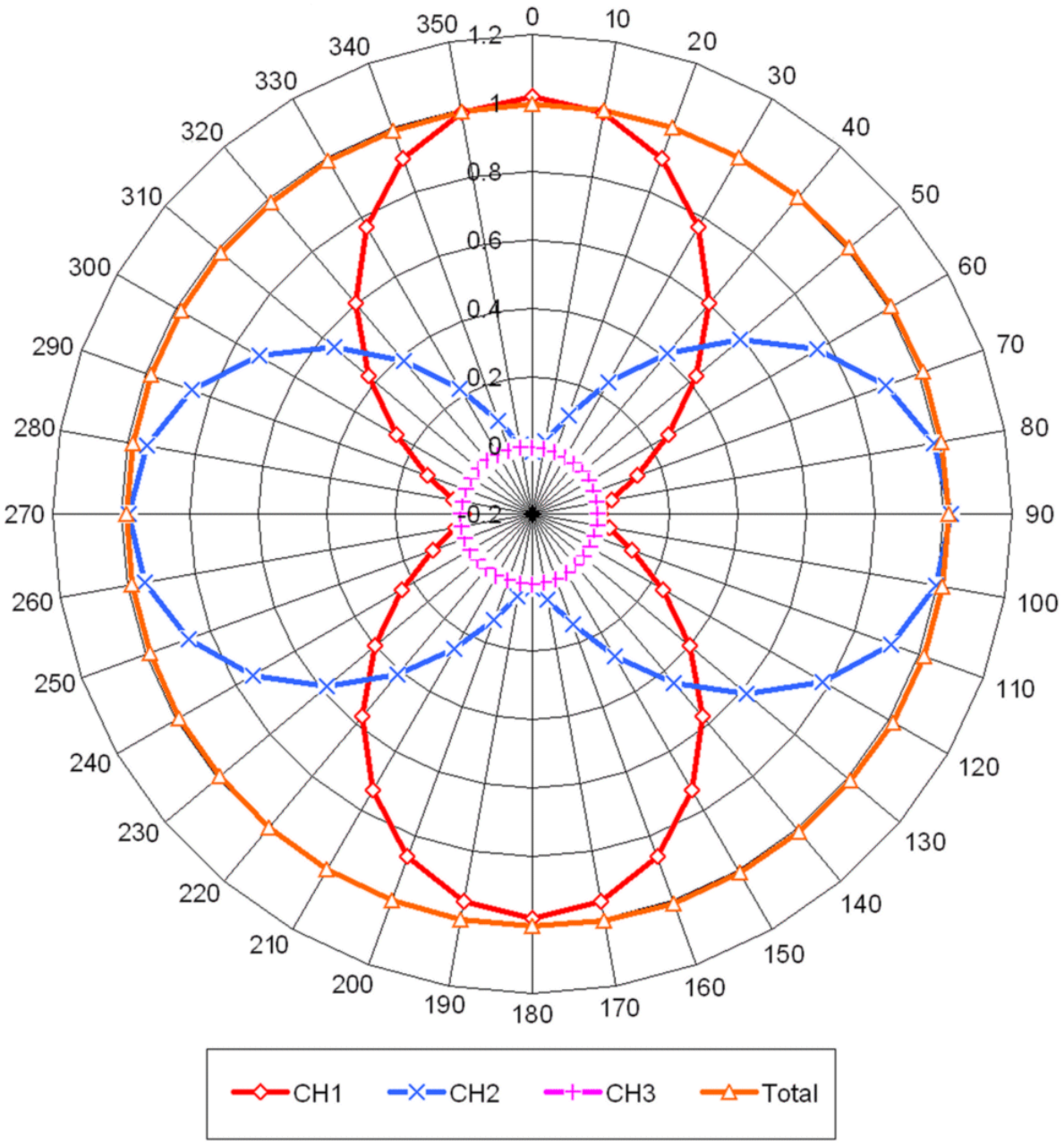
Fax (613) 820-4161

Receiving Pattern, Probe S/N 101, 1880MHz
Θ=0°



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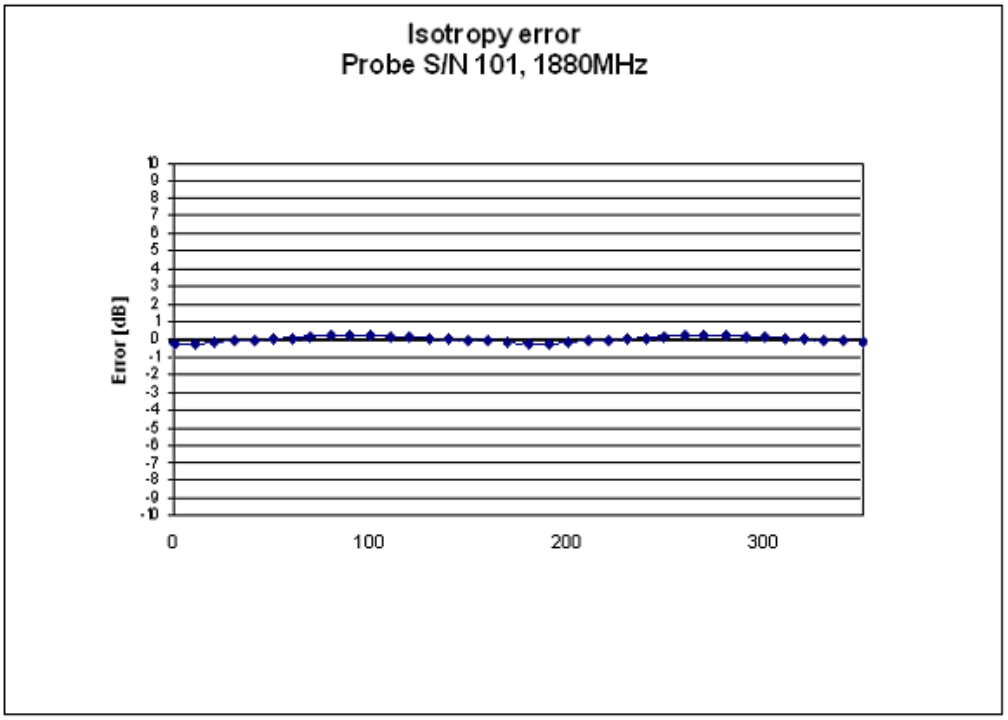
Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161

Isotropy Error 1880 MHz



Isotropicity: 0.10 dB

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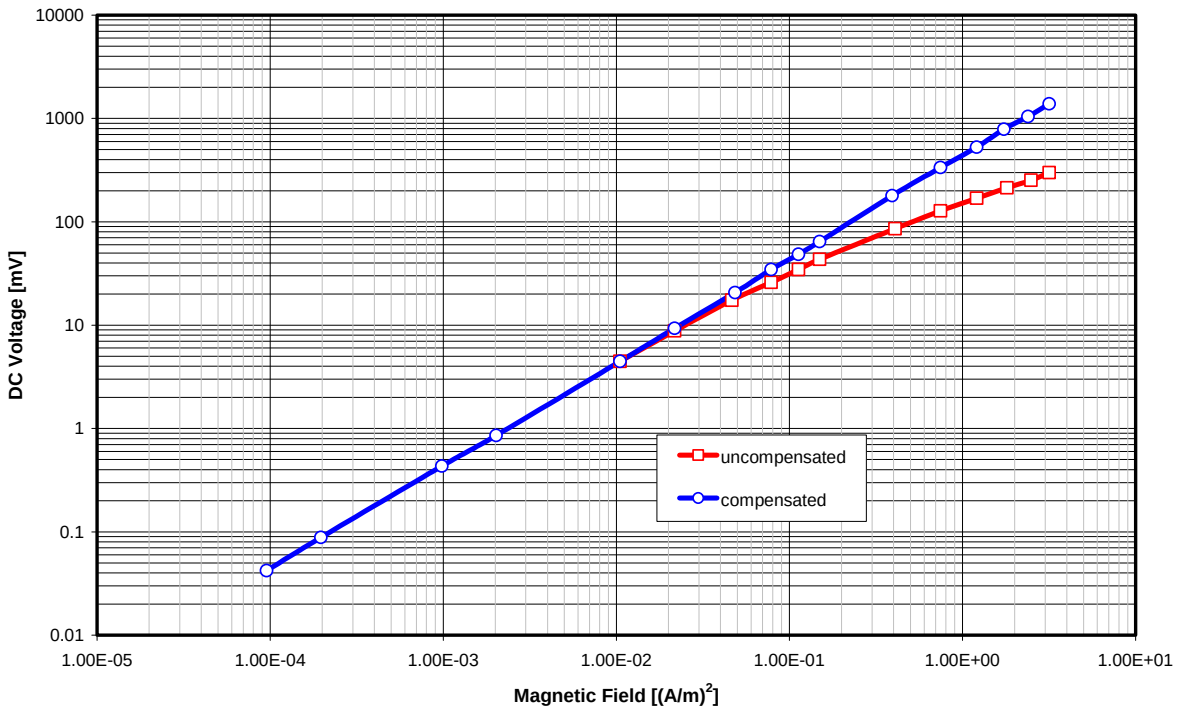
Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161

Dynamic Range



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 2005.

51 Spectrum Way
Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161

NCL CALIBRATION LABORATORIES

Calibration File No.: CP-422

Client.: APREL

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
Model No.: E-020
Serial No.: 269

IN AIR Calibration

Calibration Procedure: SSI/DRB-TP-D01-038
Project No: Internal

Calibrated: 21nd May 2005
Released on: 21nd May 2005

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

Released By: _____

***NCL* CALIBRATION LABORATORIES**
51 SPECTRUM WAY
NEPEAN, ONTARIO
CANADA K2R 1E6

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

Introduction

This Calibration Report reproduces the results of the calibration performed in line with the SSI/DRB-TP-D01-038 E-Field Probe Calibration Procedure. The results contained within this report are for APREL E-Field Probe E-020 269.

References

SSI/DRB-TP-D01-038 E-Field Probe Calibration Procedure
IEEE Std 1309-2005 "Standard for Calibration of Electromagnetic Field Sensors and Probes, Excluding Antennas, from 9 kHz to 40GHz".

Conditions

Probe 269 was a new probe taken from stock prior to calibration.

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

Sensor offset

Each probe is comprised of 3 electric field sensors and positioned at 90 degree to each other in XYZ arrangement. Their electric center makes the calibrated center of the probe. The center is aligned with the main axis of the probe. For constructional reasons it is located a small distance, specified as the vertical offset, above the tip of the probe. The actual offset is specified in the probe's calibration certificate to allow for proper referencing to the probe's calibrated center when the probe's vertical position relative to the tested object is set by touching it with the probe's tip.

51 Spectrum Way
Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161

Calibration Results Summary

Probe Type:	E-Field Probe E-020
Serial Number:	269
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

Channel X:	1.2 $\mu V/(V/m)^2$
Channel Y:	1.2 $\mu V/(V/m)^2$
Channel Z:	1.2 $\mu V/(V/m)^2$

Diode Compression Point:	95 mV

51 Spectrum Way
Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
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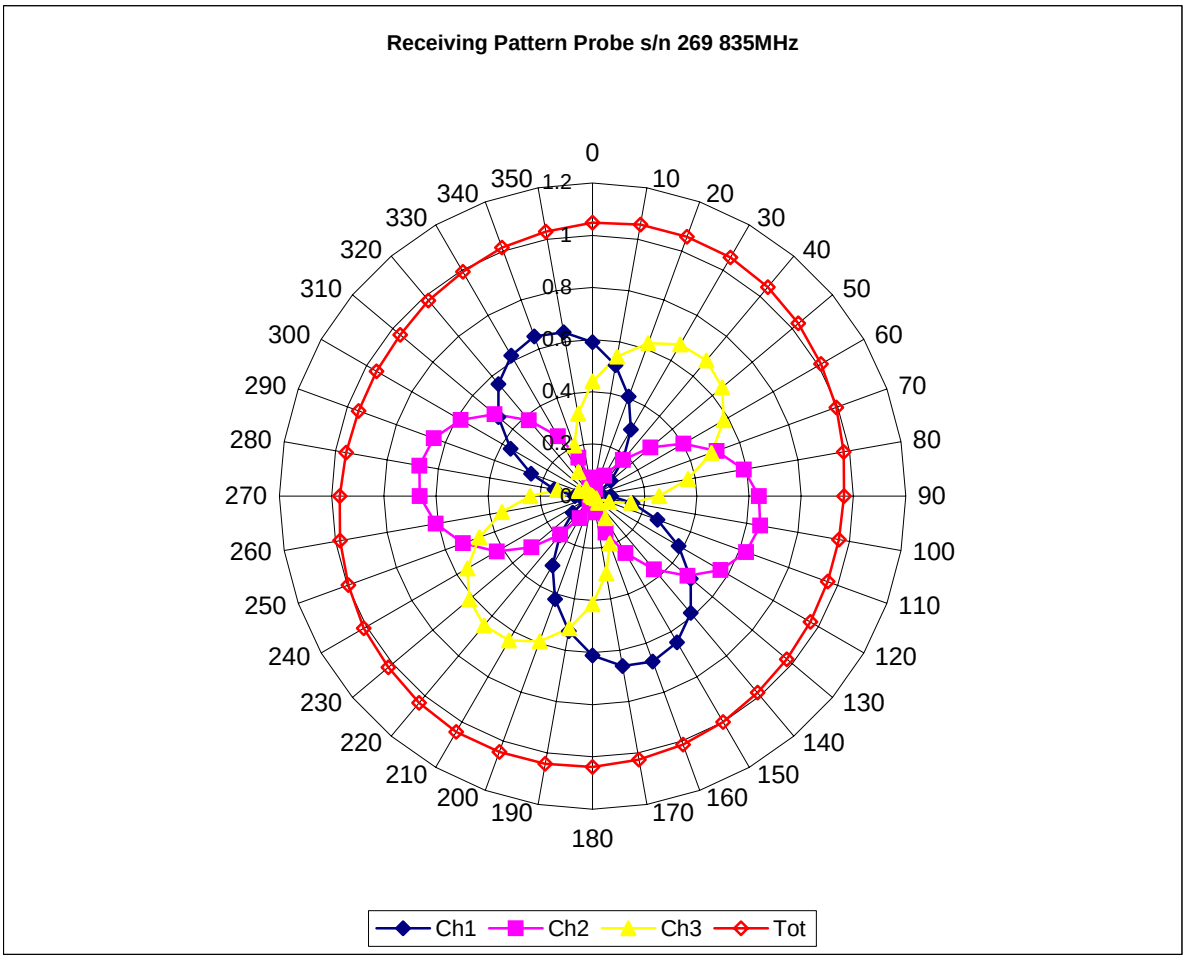
Spatial Resolution:

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.

Receiving Pattern at 835MHz



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info@aprel.com
Phone (613) 820-2730
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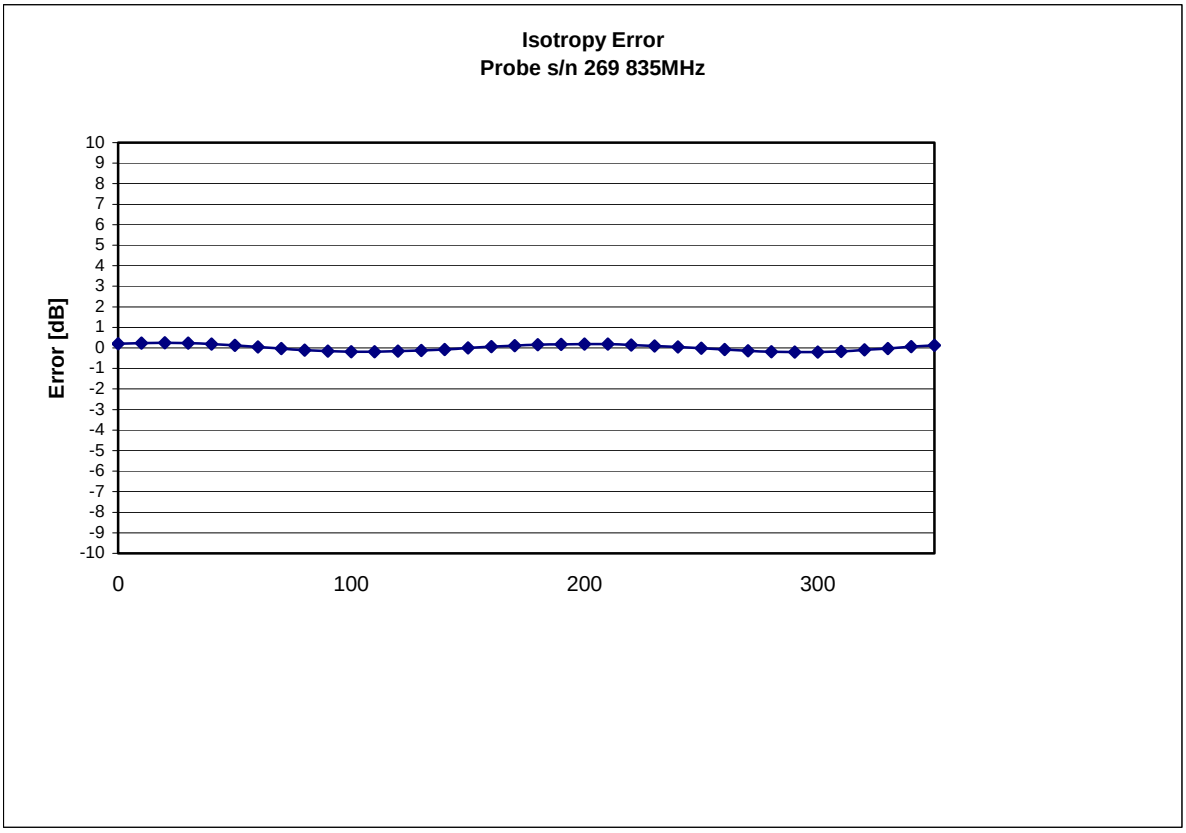
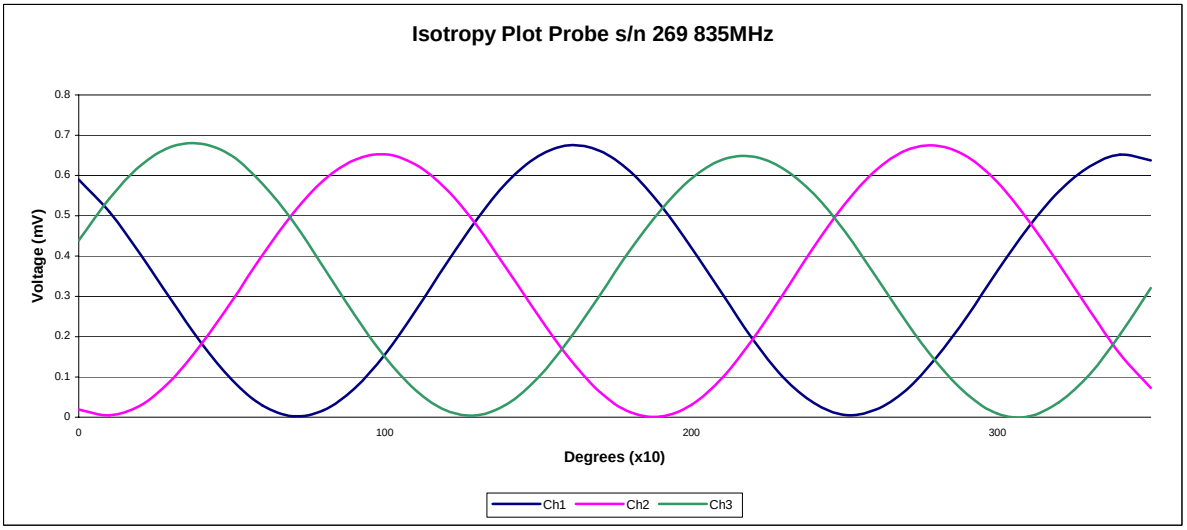
Isotropy Error 835 MHz





Isotropicity: 0.10 dB

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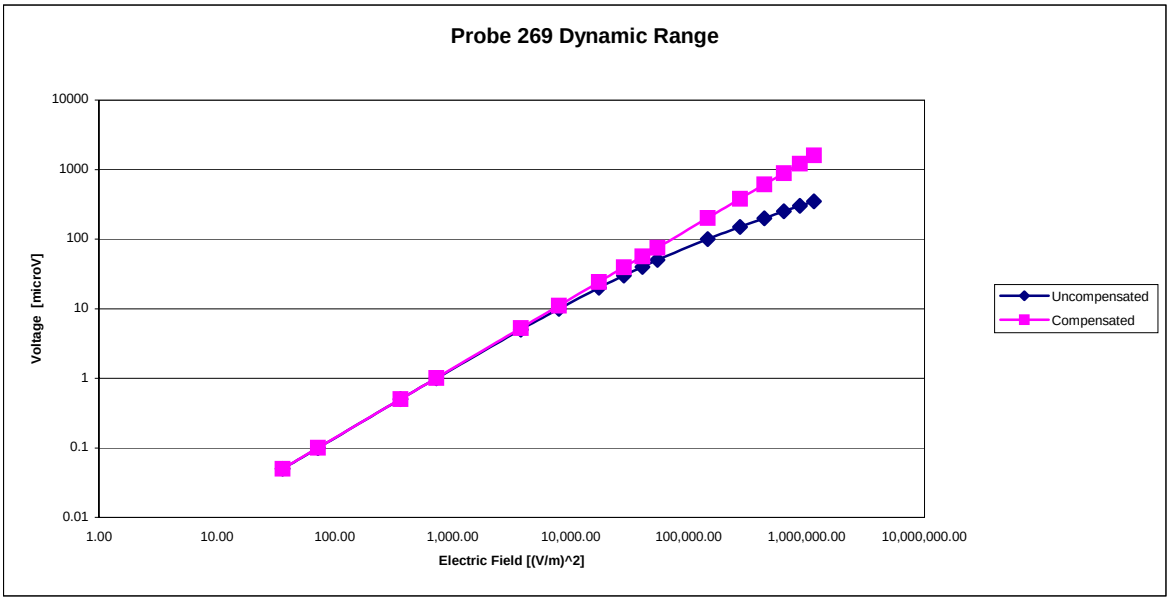
info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161

Dynamic Range



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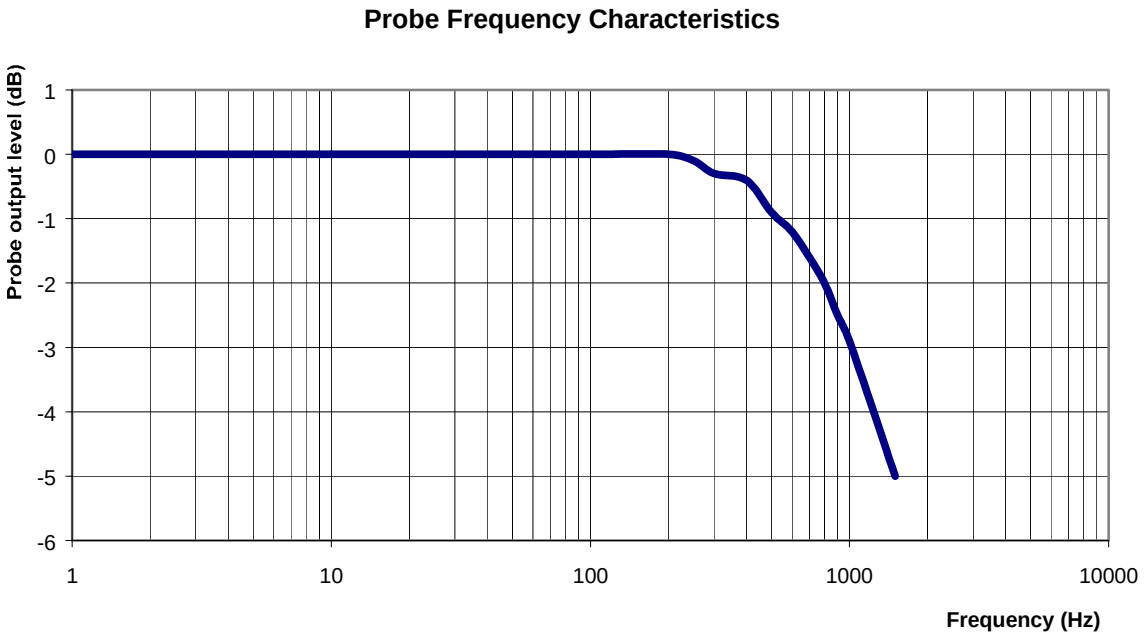
Video Bandwidth



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

51 Spectrum Way
Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161

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 2005.

51 Spectrum Way
Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
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NCL CALIBRATION LABORATORIES

Calibration File No.: CP-422

Client.: APREL

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 E field RF Probe

Manufacturer: APREL Laboratories
Model No.: E-020
Serial No.: 269

IN AIR Calibration

Calibration Procedure: SSI/DRB-TP-D01-038
Project No: Internal

Calibrated: 21nd May 2005
Released on: 21nd May 2005

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

Released By: _____

***NCL* CALIBRATION LABORATORIES**
51 SPECTRUM WAY
NEPEAN, ONTARIO
CANADA K2R 1E6

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

Introduction

This Calibration Report reproduces the results of the calibration performed in line with the SSI/DRB-TP-D01-038 E-Field Probe Calibration Procedure. The results contained within this report are for APREL E-Field Probe E-020 269.

References

SSI/DRB-TP-D01-038 E-Field Probe Calibration Procedure
IEEE Std 1309-2005 "Standard for Calibration of Electromagnetic Field Sensors and Probes, Excluding Antennas, from 9 kHz to 40GHz".

Conditions

Probe 269 was a new probe taken from stock prior to calibration.

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

Sensor offset

Each probe is comprised of 3 electric field sensors and positioned at 90 degree to each other in XYZ arrangement. Their electric center makes the calibrated center of the probe. The center is aligned with the main axis of the probe. For constructional reasons it is located a small distance, specified as the vertical offset, above the tip of the probe. The actual offset is specified in the probe's calibration certificate to allow for proper referencing to the probe's calibrated center when the probe's vertical position relative to the tested object is set by touching it with the probe's tip.

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Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
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Calibration Results Summary

Probe Type:	E-Field Probe E-020
Serial Number:	269
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

Channel X:	1.2 $\mu V/(V/m)^2$
Channel Y:	1.2 $\mu V/(V/m)^2$
Channel Z:	1.2 $\mu V/(V/m)^2$

Diode Compression Point:	95 mV

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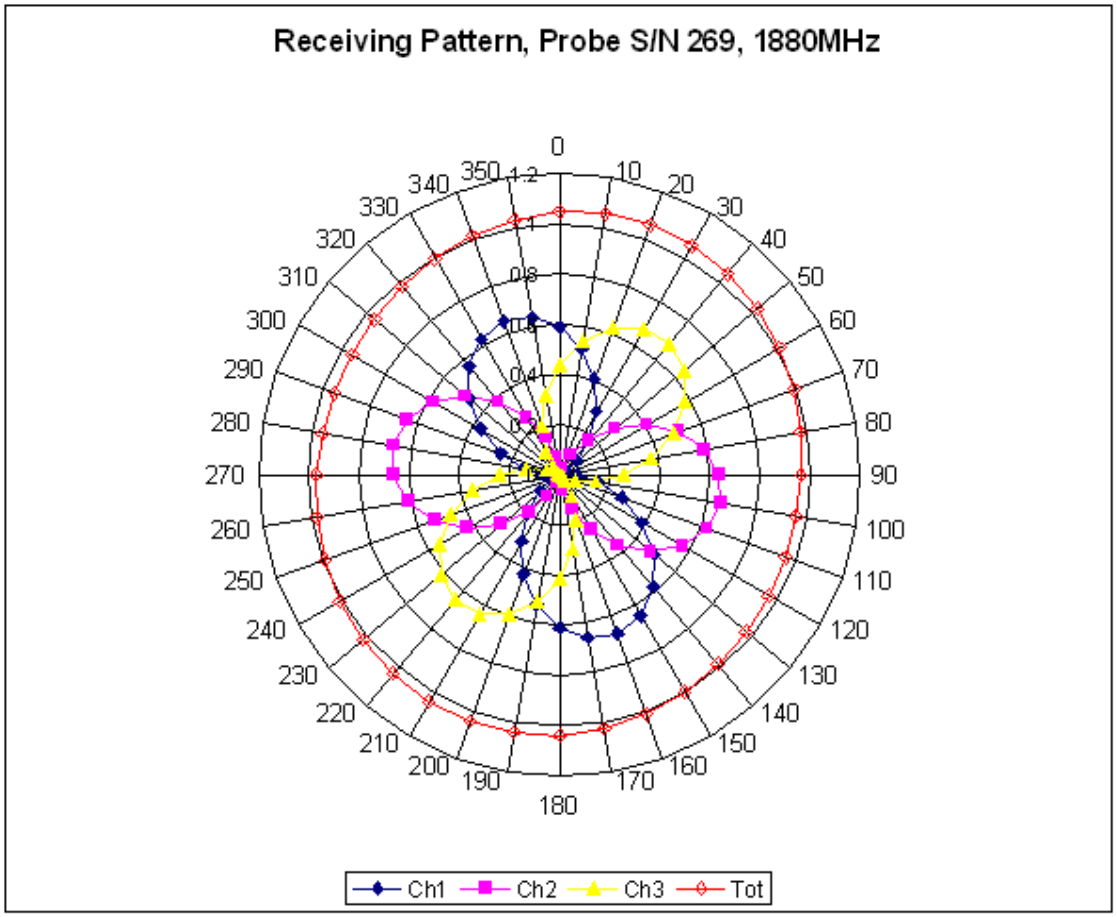
Spatial Resolution:

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.

Receiving Pattern at 1880 MHz



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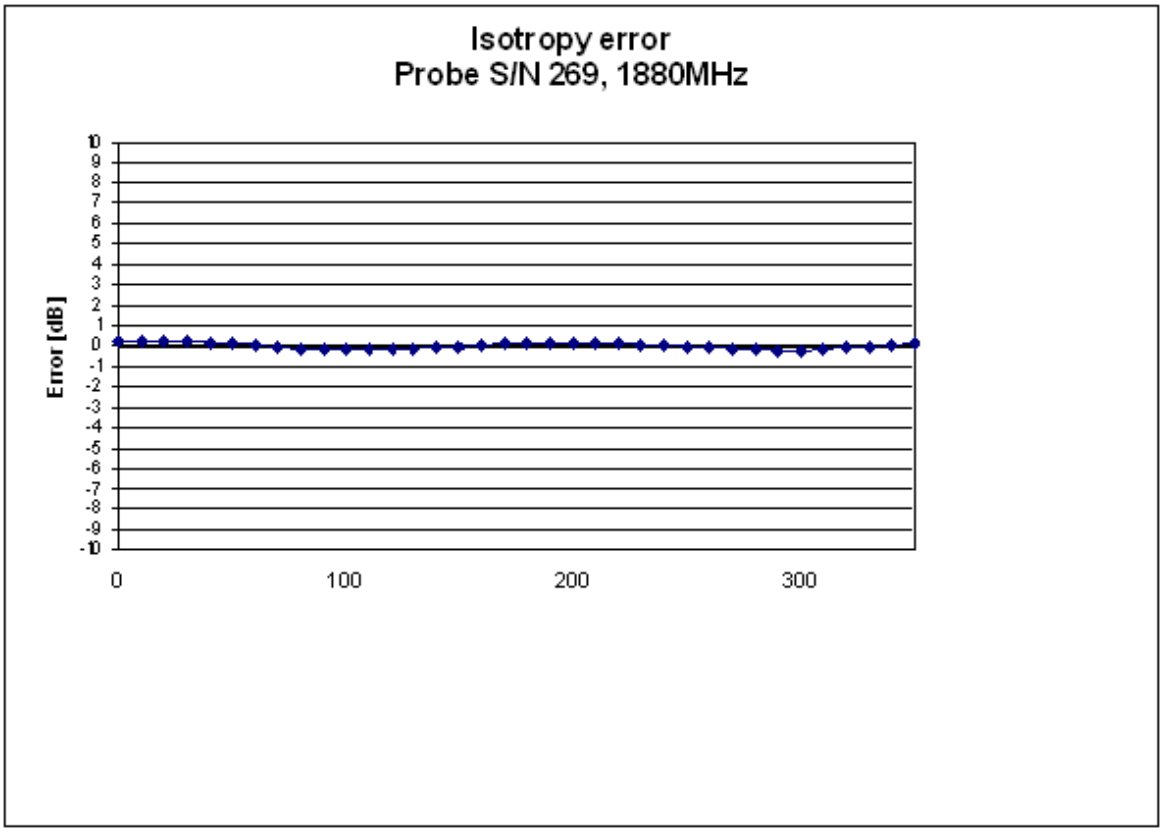
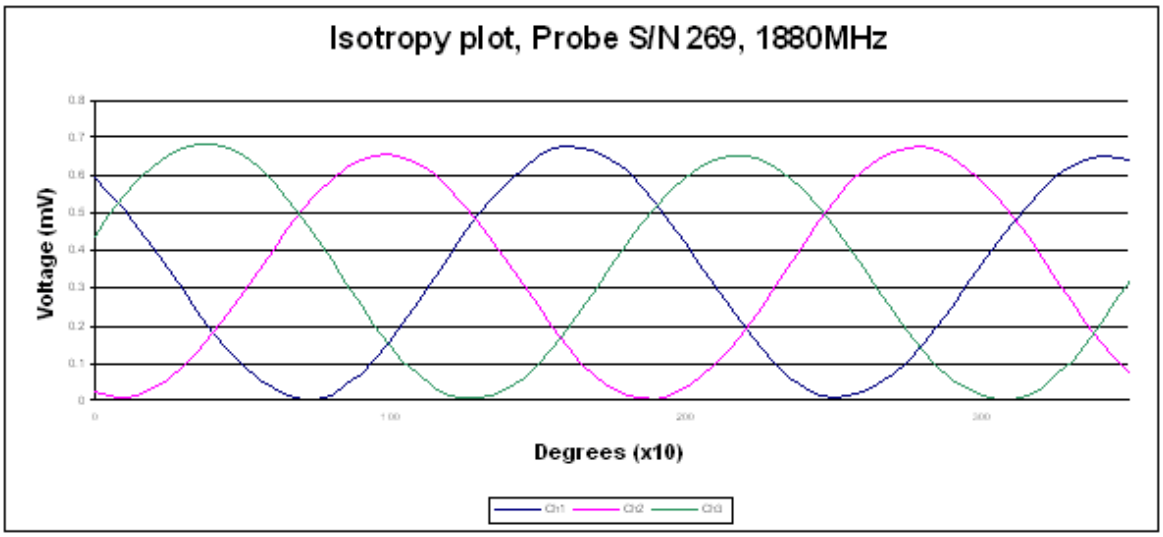
Isotropy Error 1880 MHz





Isotropicity: 0.10 dB

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info@aprel.com
Phone (613) 820-2730
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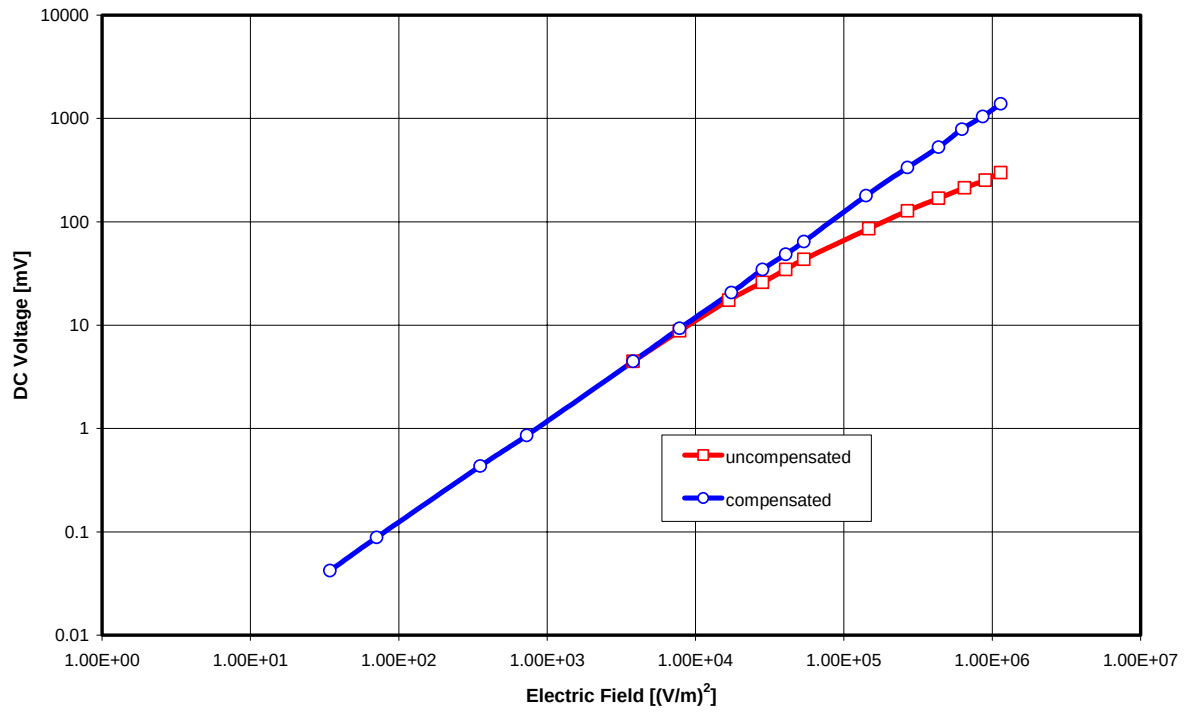
Dynamic Range



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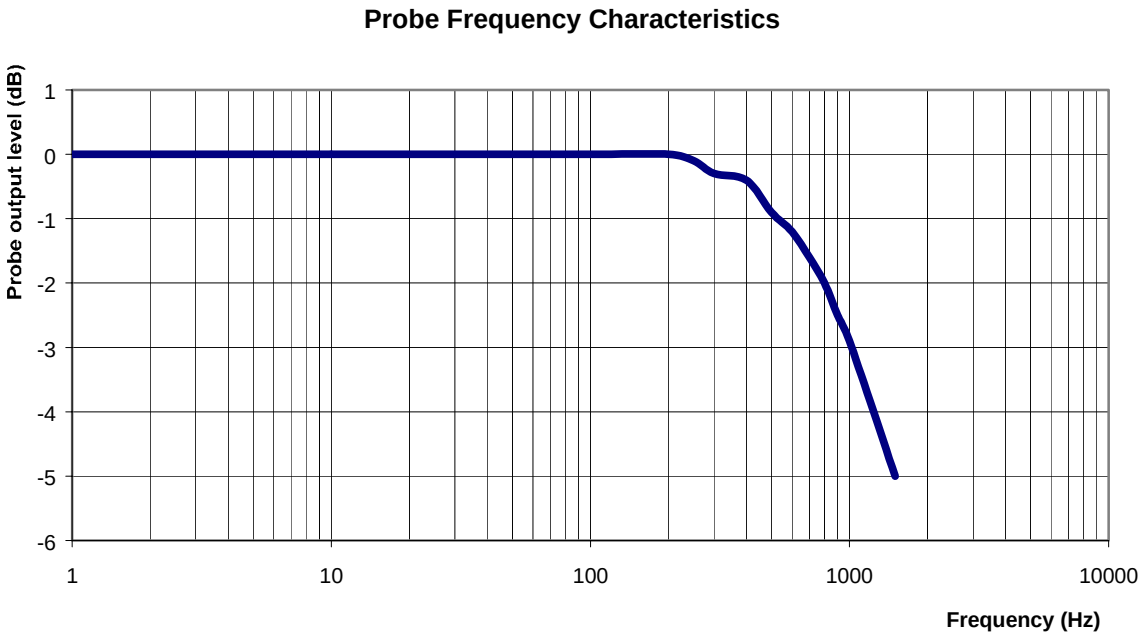
Video Bandwidth



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

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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 2005.

51 Spectrum Way
Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161

Uncertainty Budget

51 Spectrum Way
Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161

WD Near-Field Emissions Measurement Uncertainty Calculated

Contribution	Data (%)	Data Type	Probability Distribution	Divisor	Std. Uncertainty (%)	Std. Uncertainty (dB)
RF Reflections	3.0	Tolerance	rectangular	√3	1.7	
Probe Calibration	3.5	Standard Deviation	normal	1	3.5	
Field Probe Axial isotropy	3.7	Tolerance	rectangular	√3	1.5	
Field Probe Hemispherical Isotropy	10.9	Tolerance	rectangular	√3	4.4	
Probe Linearity	4.7	Tolerance	rectangular	√3	2.7	
Detection Limit	1.0	Tolerance	rectangular	√3	0.6	
Readout Electronics	1.0	Standard Deviation	normal	1	1.0	
Response Time	0.8	Tolerance	rectangular	√3	0.5	
Integration Time	1.7	Tolerance	rectangular	√3	1.0	
Probe Positioning Accuracy	0.4	Accuracy	rectangular	√3	0.2	
Device Holder Uncertainty	2.0	Standard Deviation	normal	1	2.0	
System Repeatability	3.0	Tolerance	rectangular	√3	1.7	
EUT Repeatability	2.0	Standard Deviation	normal	1	0.0	
Combined Standard Uncertainty u_c			normal		**7.6%**	**0.32**
Expanded Uncertainty (coverage factor = 2) U			Normal (K=2)		**15.2%**	**0.61**

51 Spectrum Way
Ottawa ON Canada K2R 1E6
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Fax (613) 820-4161

Measurement uncertainty reflects the quality and accuracy of a measured result as compared to the true value. Such statements are generally required when stating results of measurements so that it is clear to the user of these measurement results that the results may differ when reproduced by different laboratories. Measurement results vary due to the measurement uncertainty of the instrumentation, and measurement technique, even when using a standard for test setups and compliance measurements.

Most uncertainties are calculated using the tolerances of the instrumentation used in the measurement, the measurement setup variability, and the technique used in performing the test. While not generally included, the variability of the equipment under test also figures into the overall measurement uncertainty.

Another component of the overall uncertainty is based on the variability of repeated measurements (so-called Type A uncertainty). This may mean that the Hearing Aid immunity tests may have to be repeated by taking down the test setup and resetting it up so that there is a statistically significant number of repeat measurements to identify this very important aspect of measurement uncertainty.

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Equipment List

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Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161

Equipment Description	Asset / Serial Number	Calibration Due Date
ALSAS-10U	301571	Prior to Test
Anritsu MT8801C	301598	June 2006
Daq-Paq	301573	6 Jan 2006
Pentium 4 Workstation	301574	Not Required
Signal Generator	301468	September 2005
Gigatronics Power Meter	301393	October 2005
Gigatronics Broad Band Power Sensor	301394	October 2005
HP-Directional Coupler	100251	October 2005
APREL Laboratories 800-4200MHz 12W Amplifier	301577	Prior to Test
APREL Laboratories 835MHz Validation Dipole	180-00554	November 2006
APREL Laboratories 1900MHz Validation Dipole	210-00705	June 2006
APREL Laboratories E-020 E-Field Probe	212	October 2006
APREL Laboratories H-020 E-Field Probe	101	April 2006

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Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161

Zero Span & Wideband

Spectrum Analyzer plots

Mobile Service Tester Willtek 4300 was used to register the WD, make a call and then to control the WD, i.e. the WD was not used in the test mode.

In order to establish the call it was set to the appropriate SIN (System ID) and NID (Network ID) numbers. The instrument was equipped with the appropriate antenna to communicate with the WD over the air.

The instrument was used to set both, the uplink channels and output power level of the WD.

Three channels in each band, CDMA and PCS (low, middle and high) were tested. The channels were monitored with a Spectrum Analyzer to verify the correct type of modulation and channel frequencies were tested.

Explanatory Note: From the 0 span power plot, we can see the reference line is 33.4dBm, and the grid step is 1dB. So the power reading is approximately 28dBm. The DUT output signal is then injected into the reference dipole through proper attenuation to arrive 20dBm input power. As an example, if the WD output power is measured to be 27.7 dBm and the cable loss is found to be 0.7 dB, then an 7dB attenuator was used in series with the cable for the measurement. The cable was calibrated using a VNA and the cable loss was then found for different frequencies.

Plots follow.

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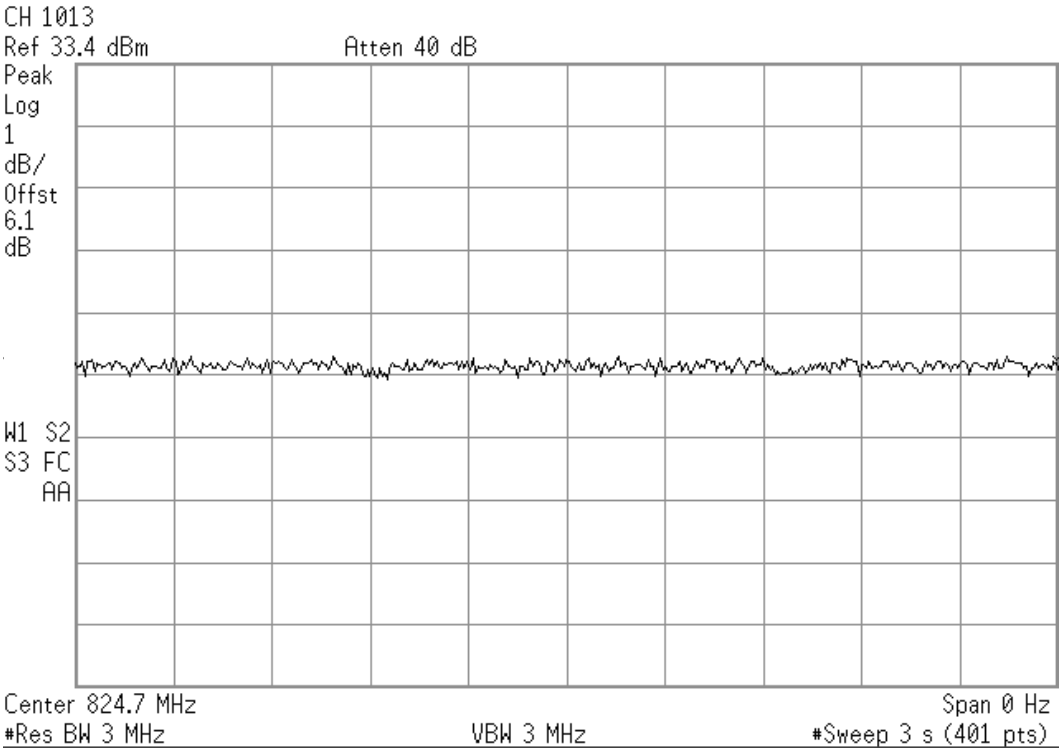
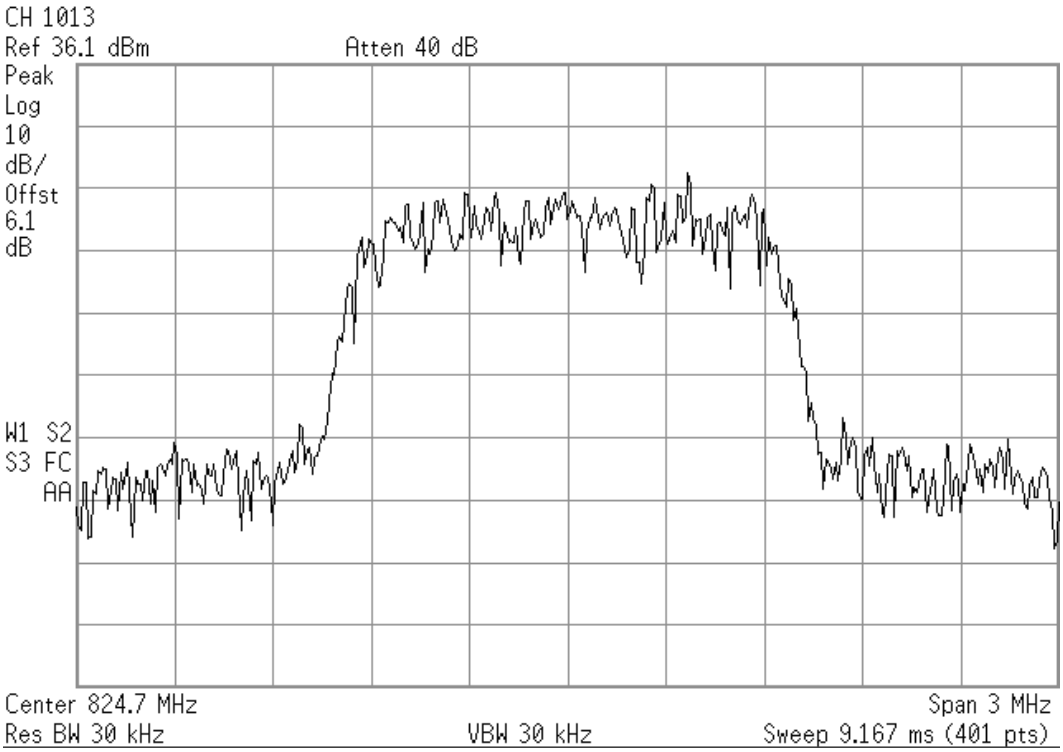


CDMA band, low channel, zero-span



CDMA band, low channel, wideband

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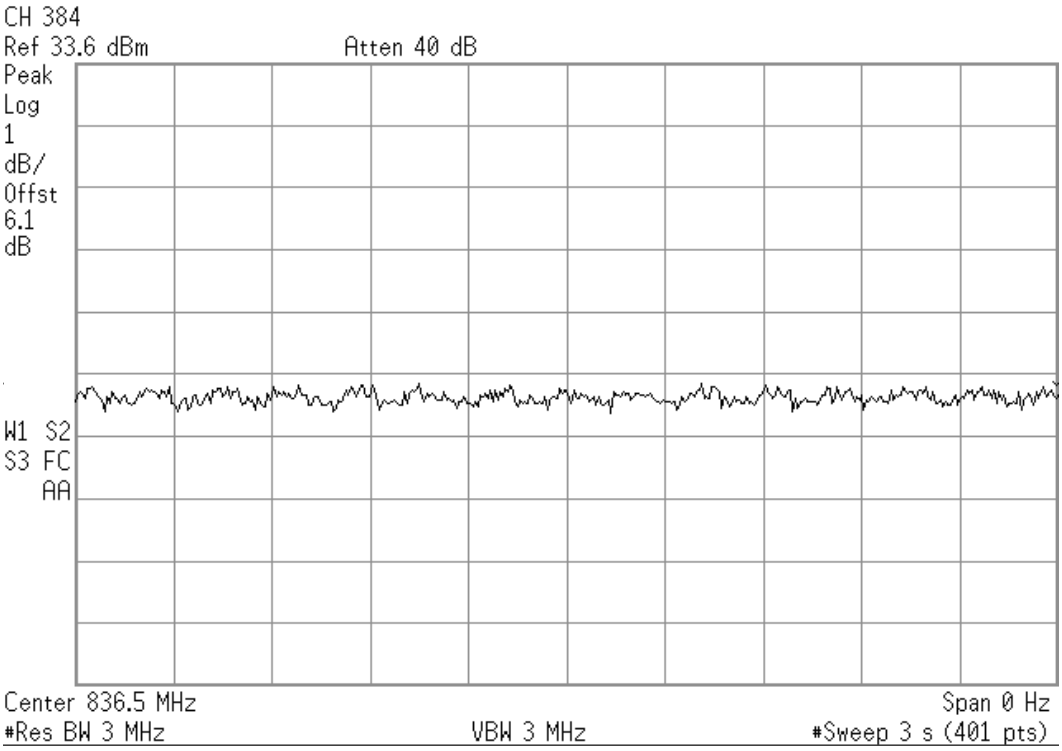
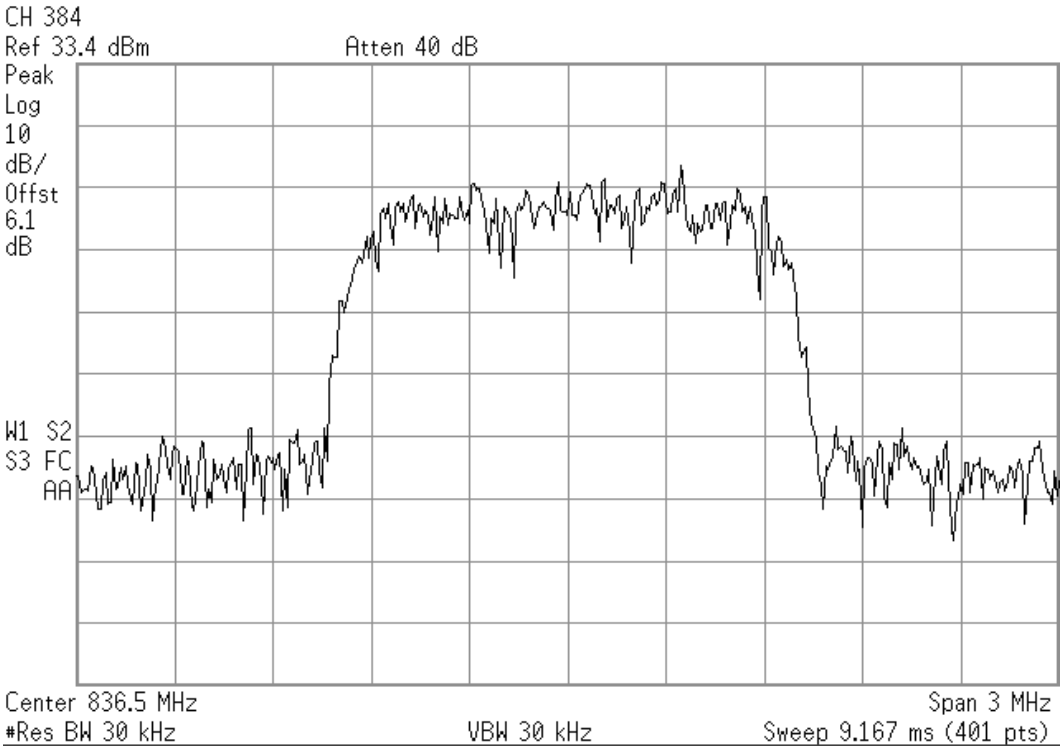


CDMA band, middle channel, zero-span



CDMA band, middle channel, wideband

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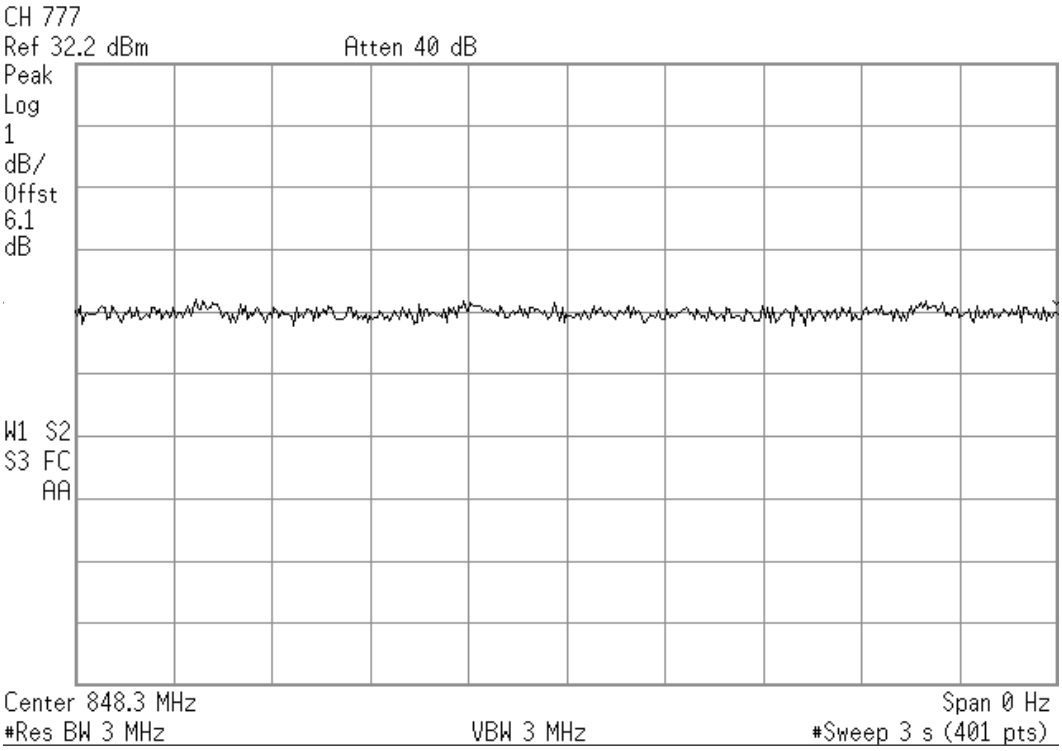
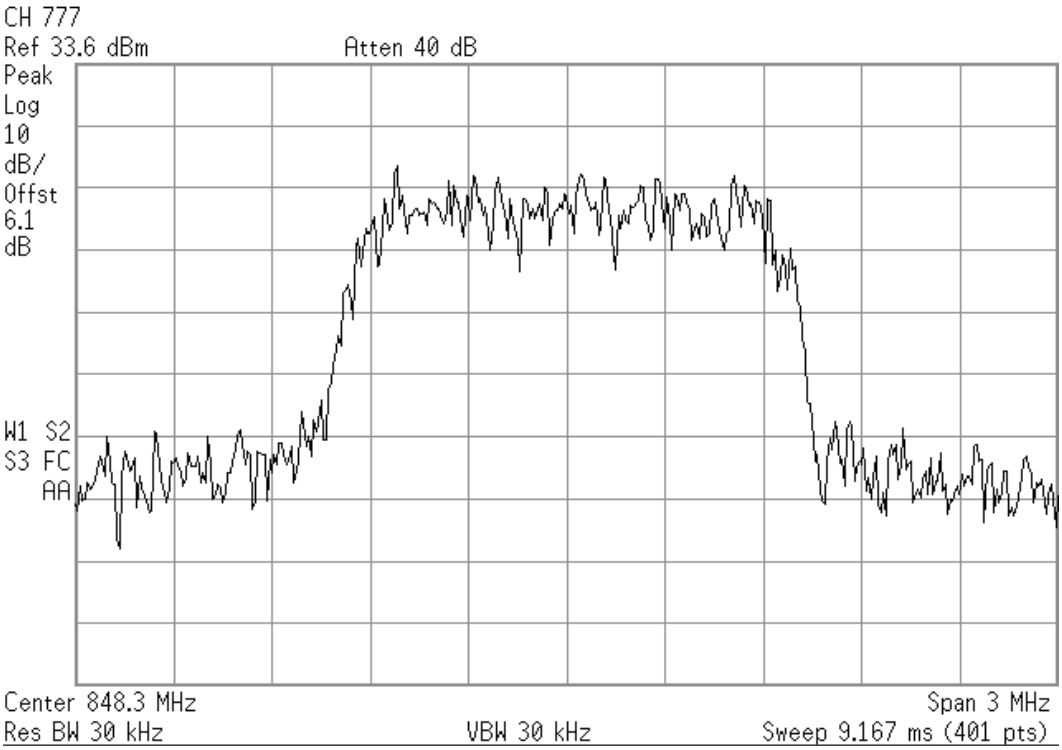


CDMA band, high channel, zero-span



CDMA band, high channel, wideband

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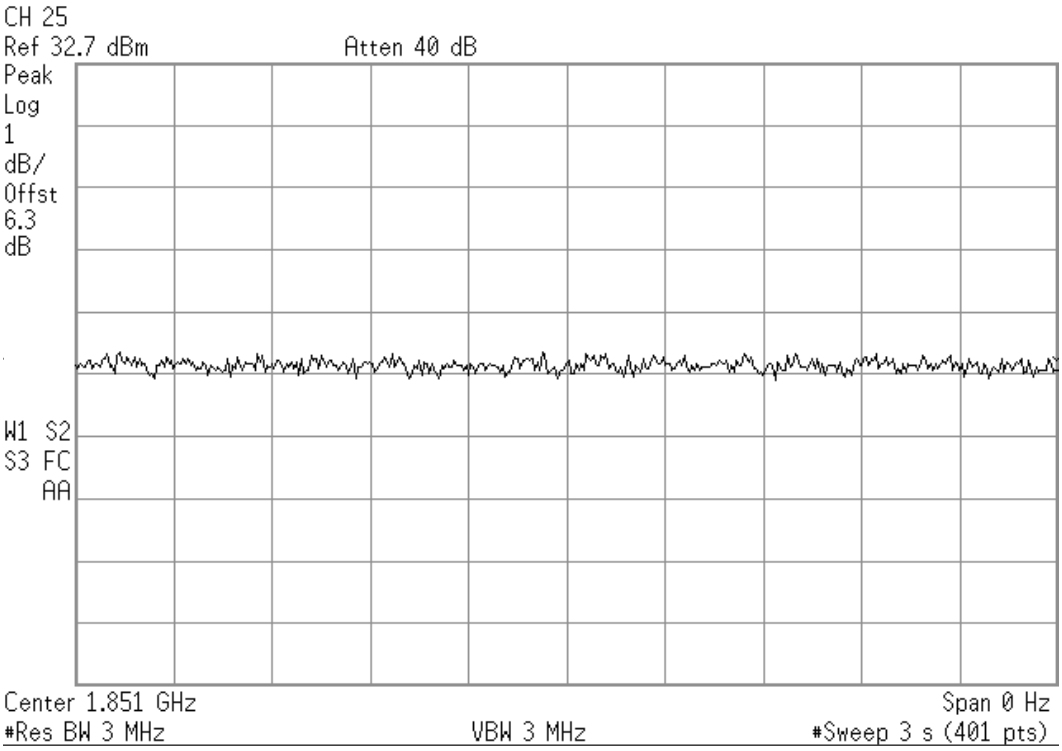
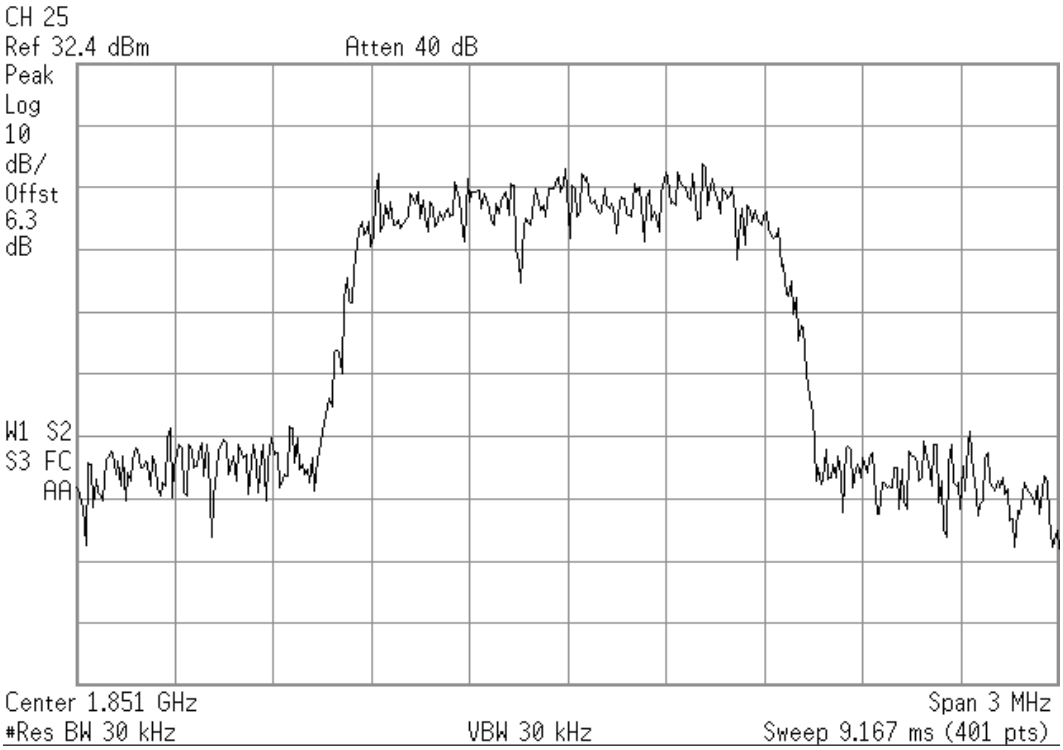


PCS band, low channel, zero-span



PCS band, low channel, wideband

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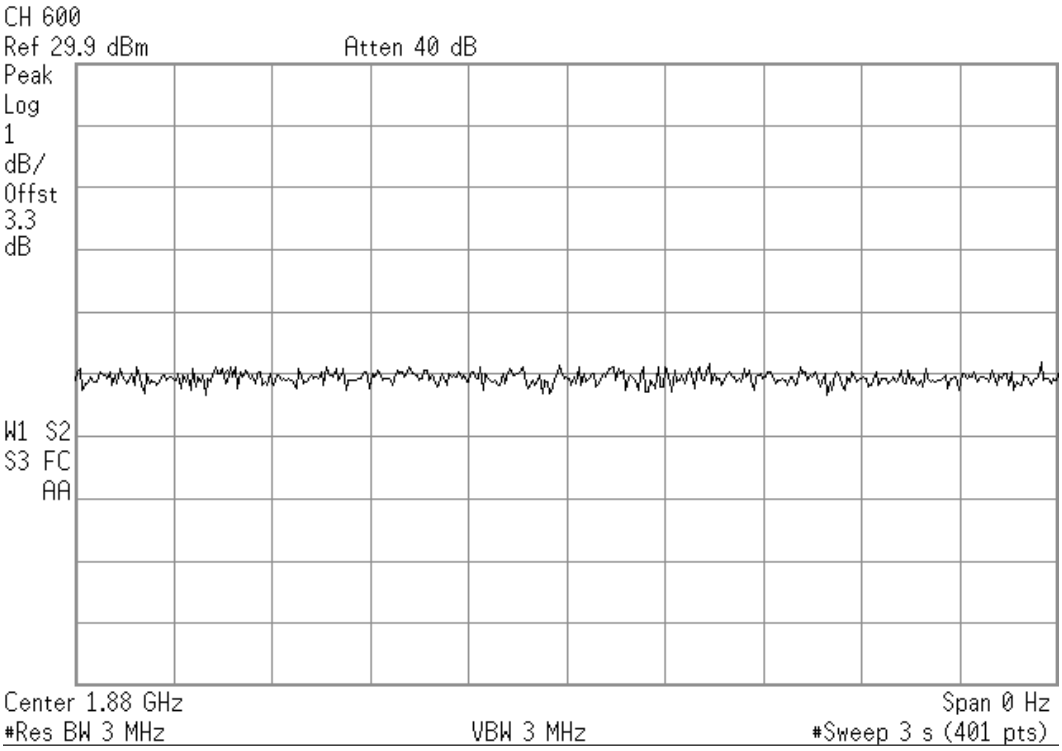
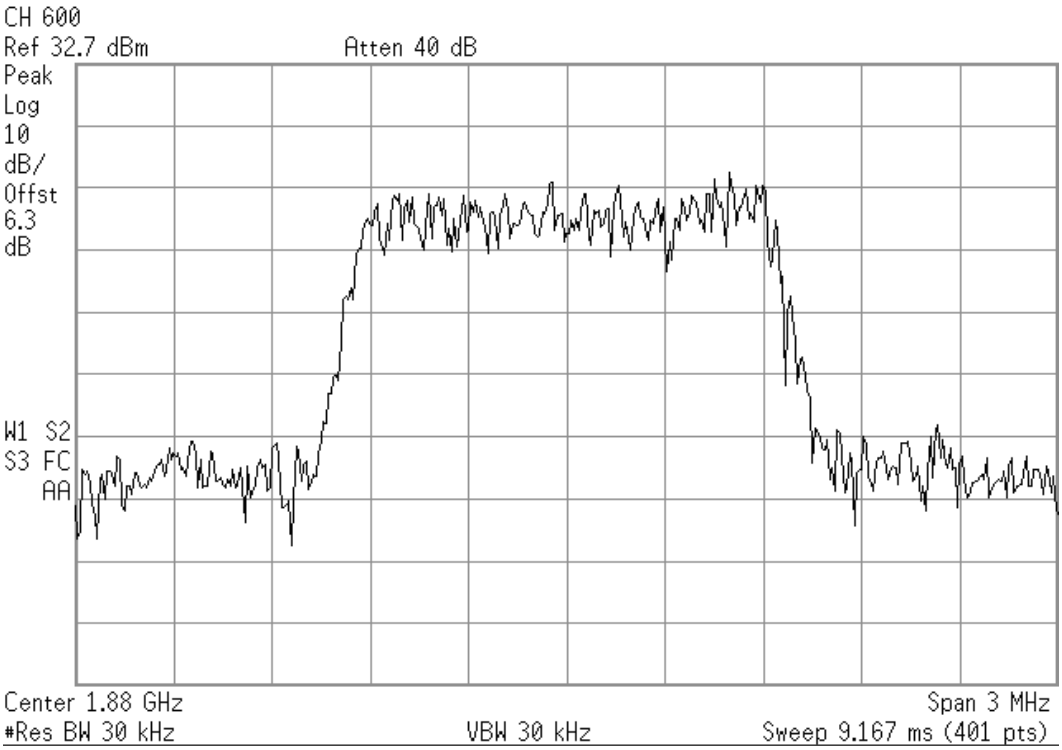


PCS band, middle channel, zero-span



PCS band, middle channel, wideband

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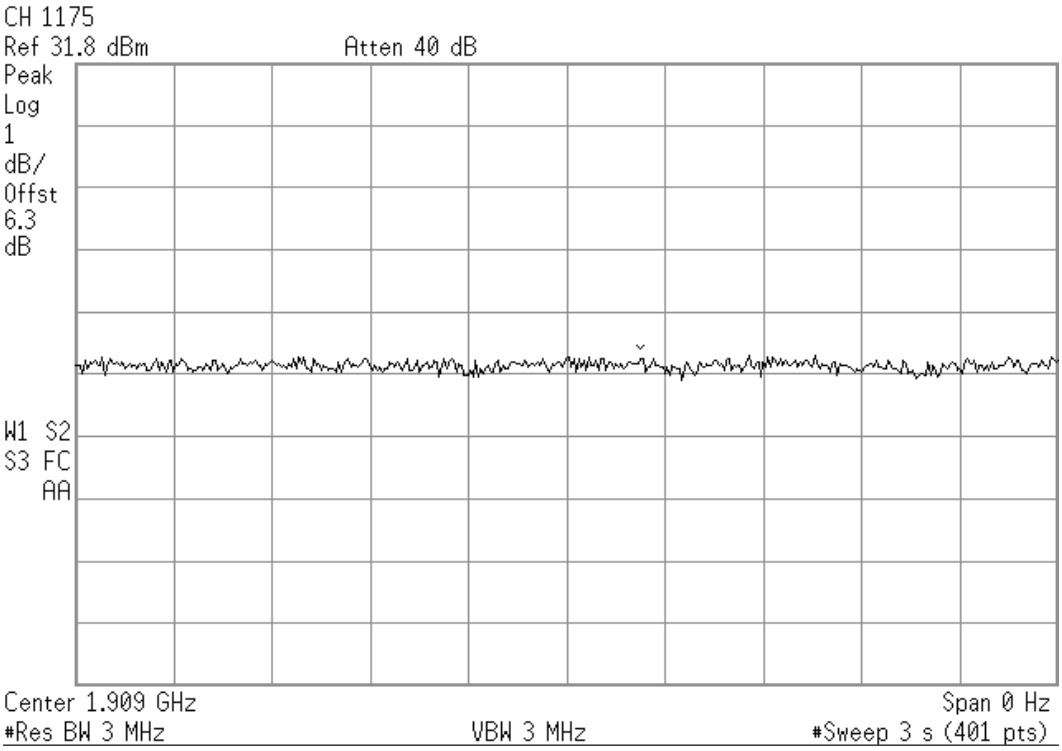
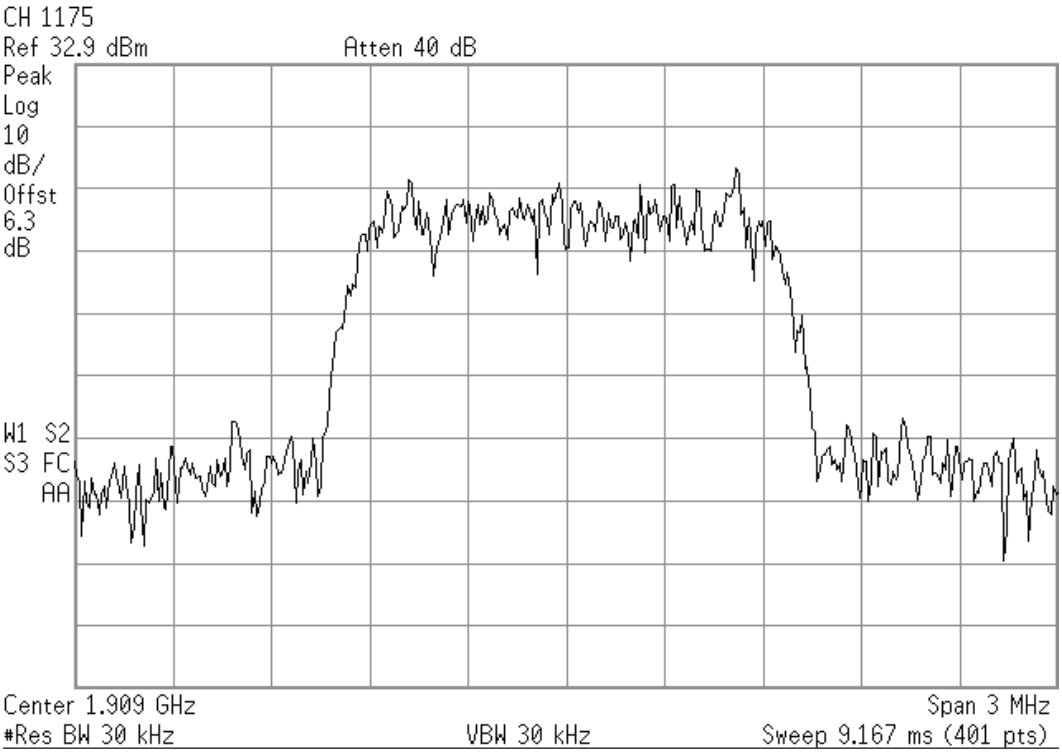


PCS band, high channel, zero-span



PCS band, high channel, wideband

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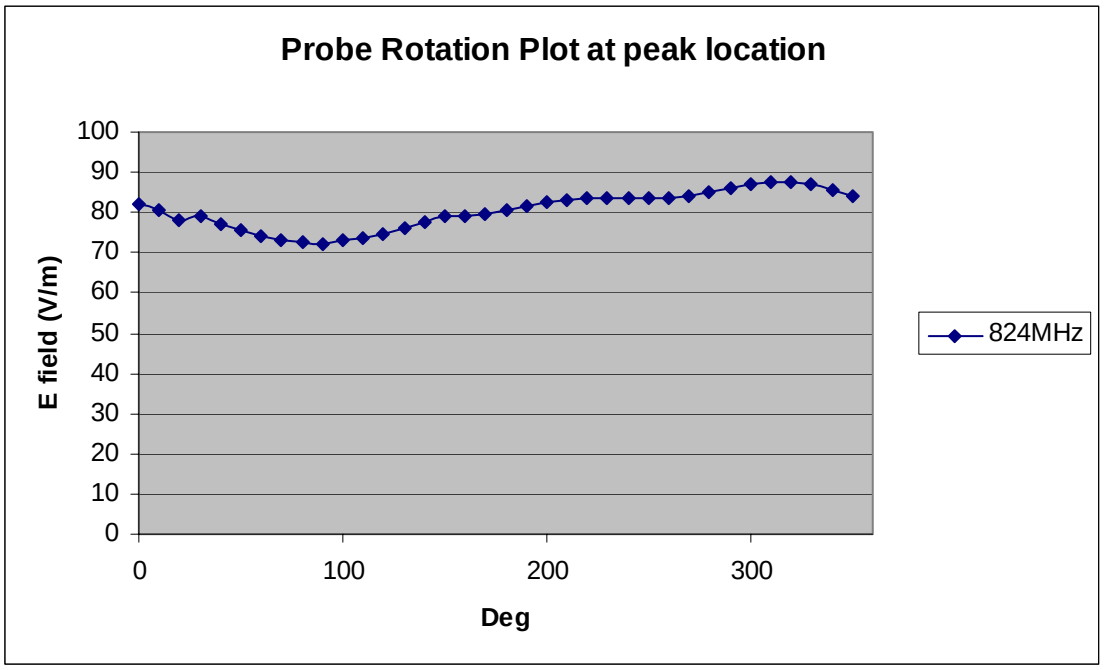
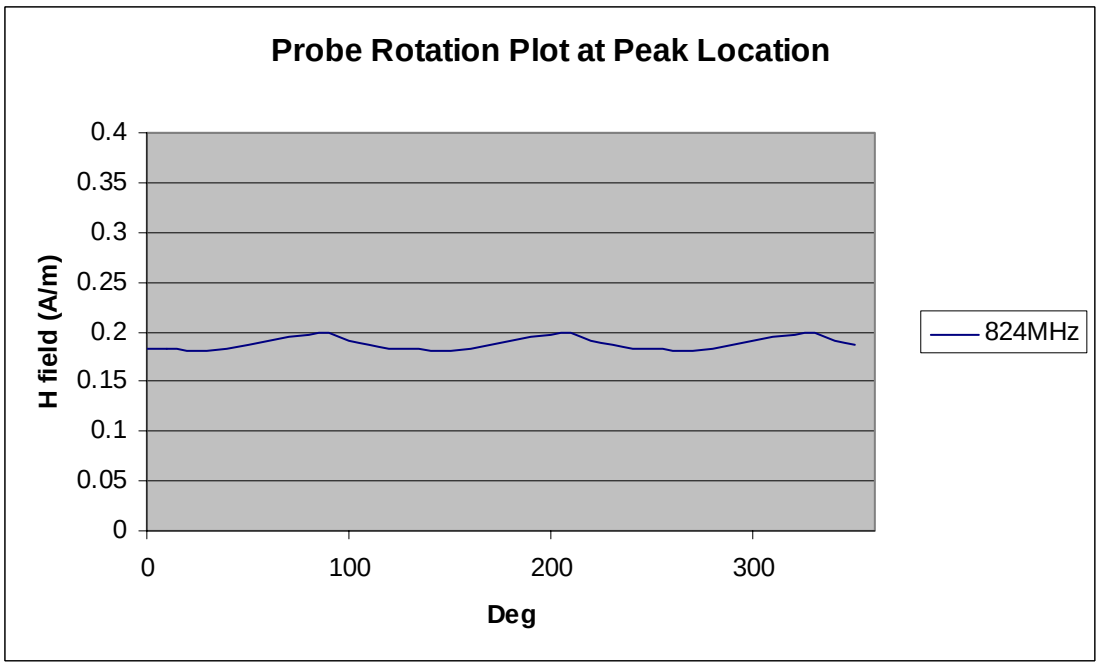
Probe Rotation Plots at Peak Measurement Location after exclusion

1. Frequency 824 MHz, Channel CDMA991

E-field



H-field



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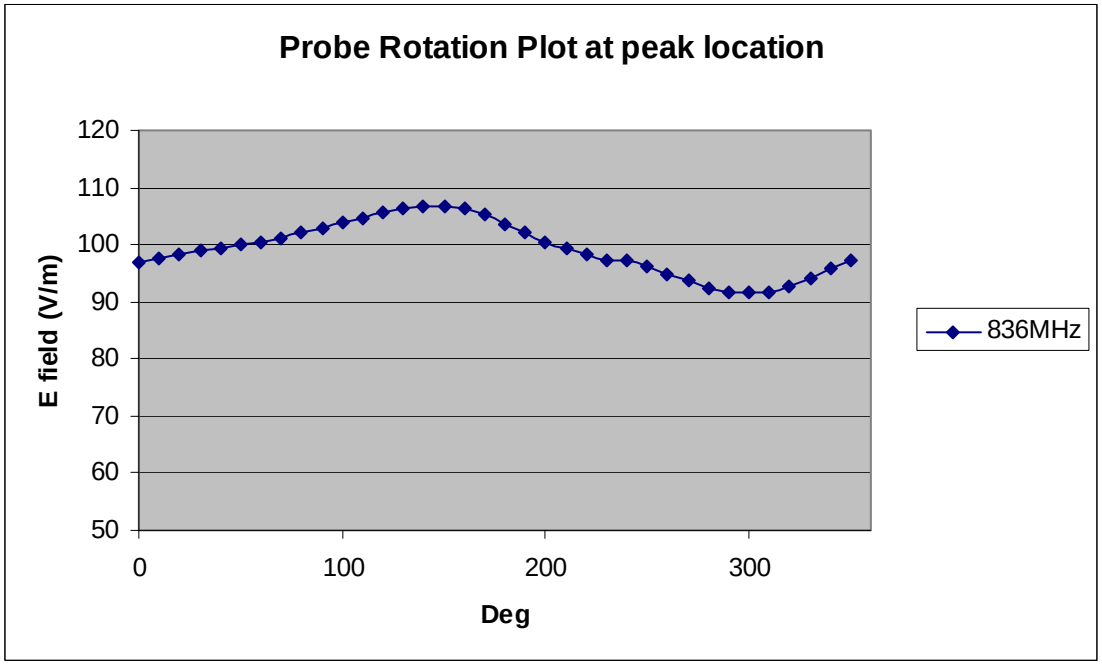
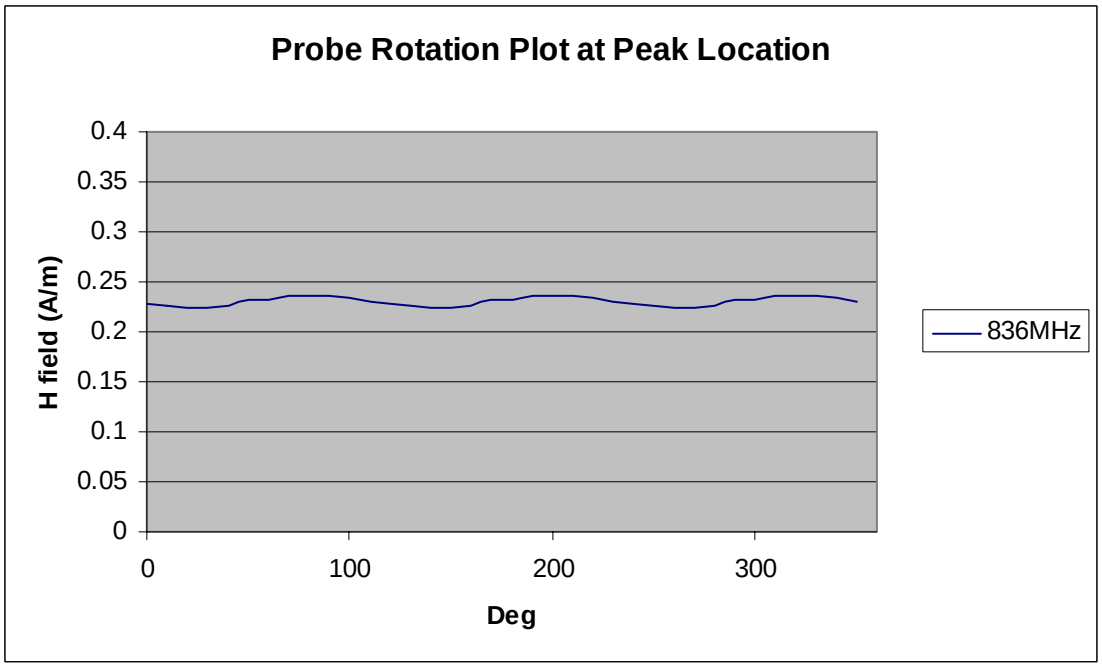
2. Frequency 836.5 MHz, Channel CDMA384

E-field



H-field



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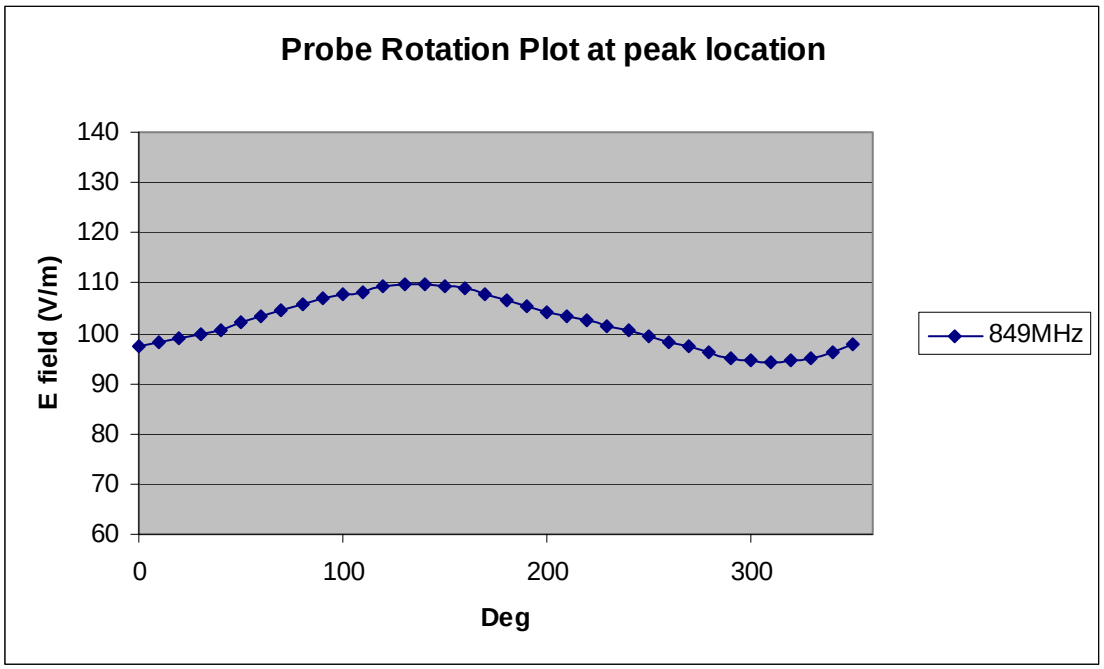
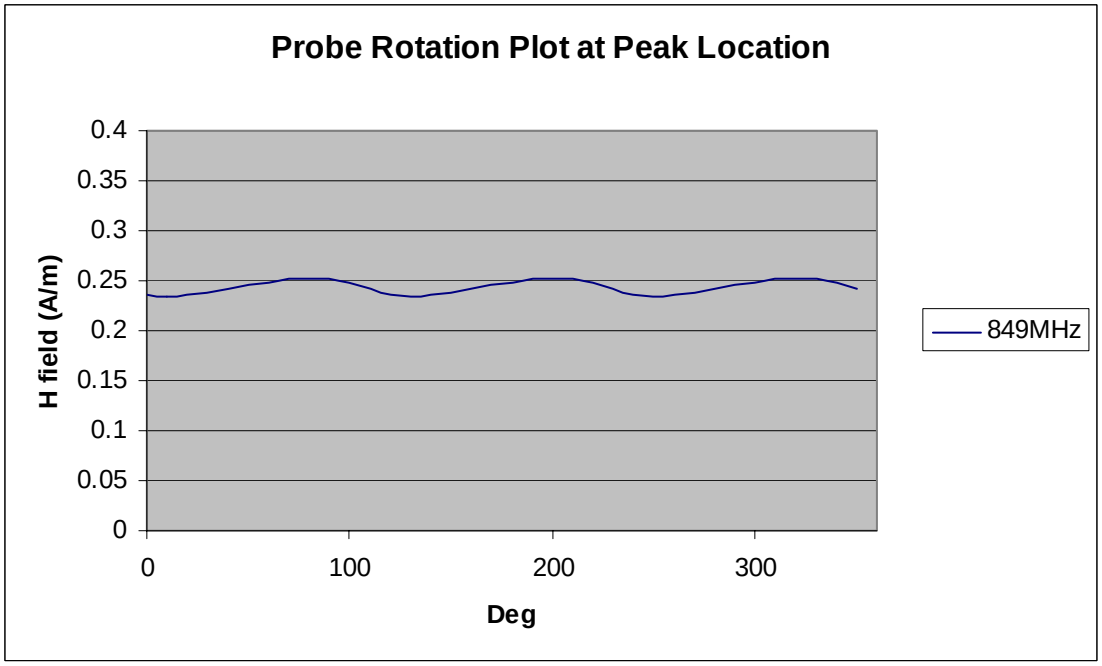
3. Frequency 849 MHz, Channel CDMA799

E-field



H-field



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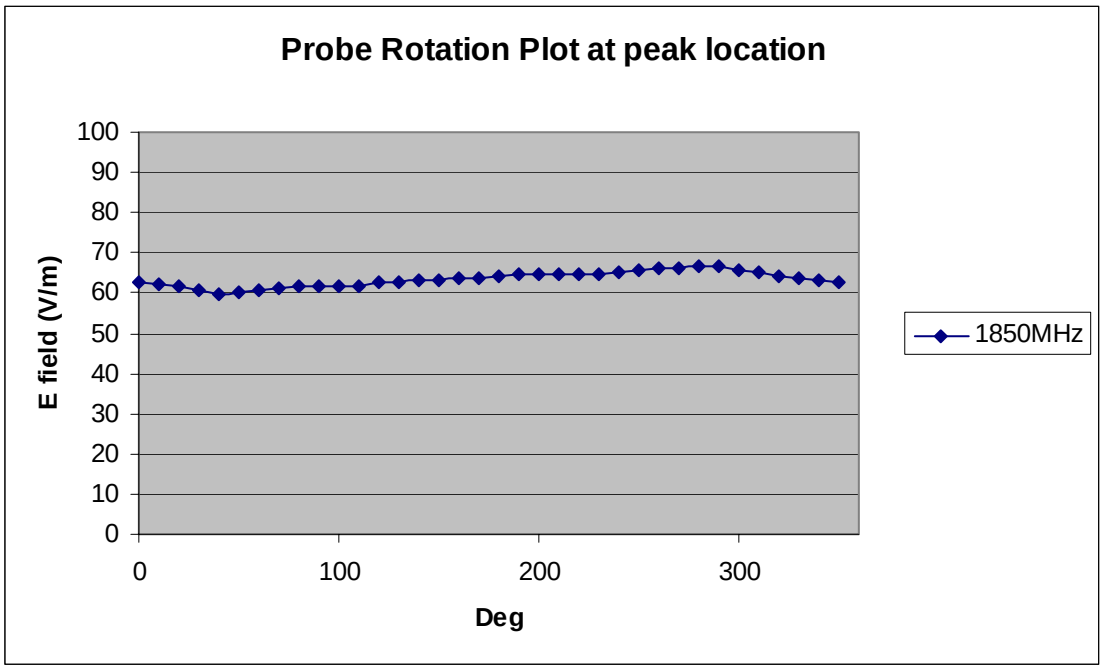
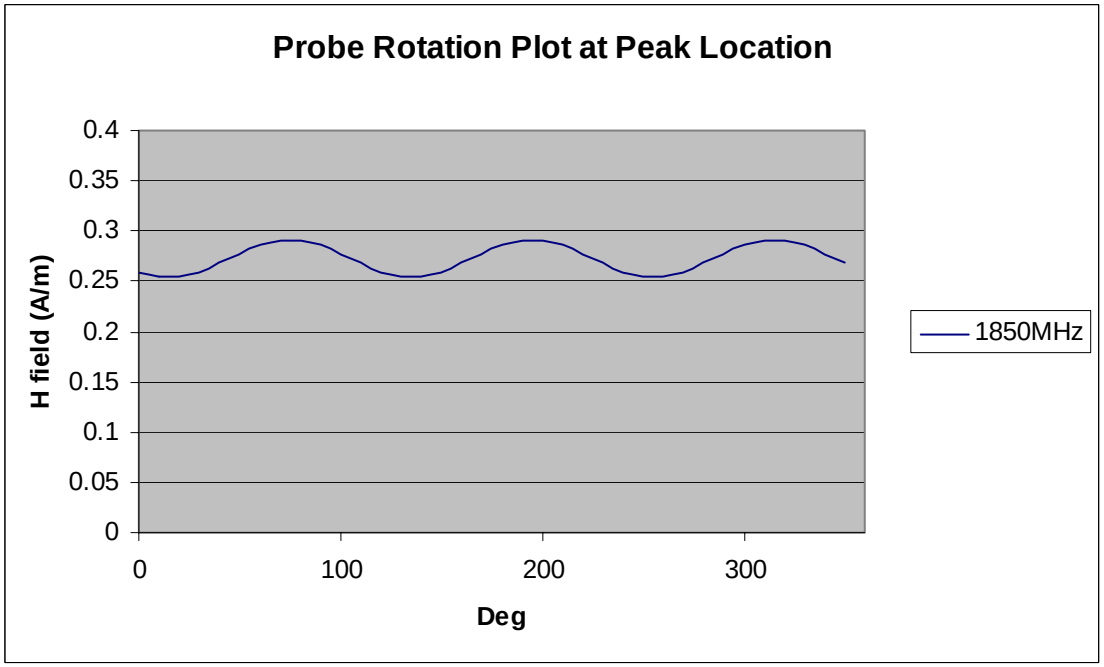
4. Frequency 1850 MHz, Channel PCS001

E-field



H-field



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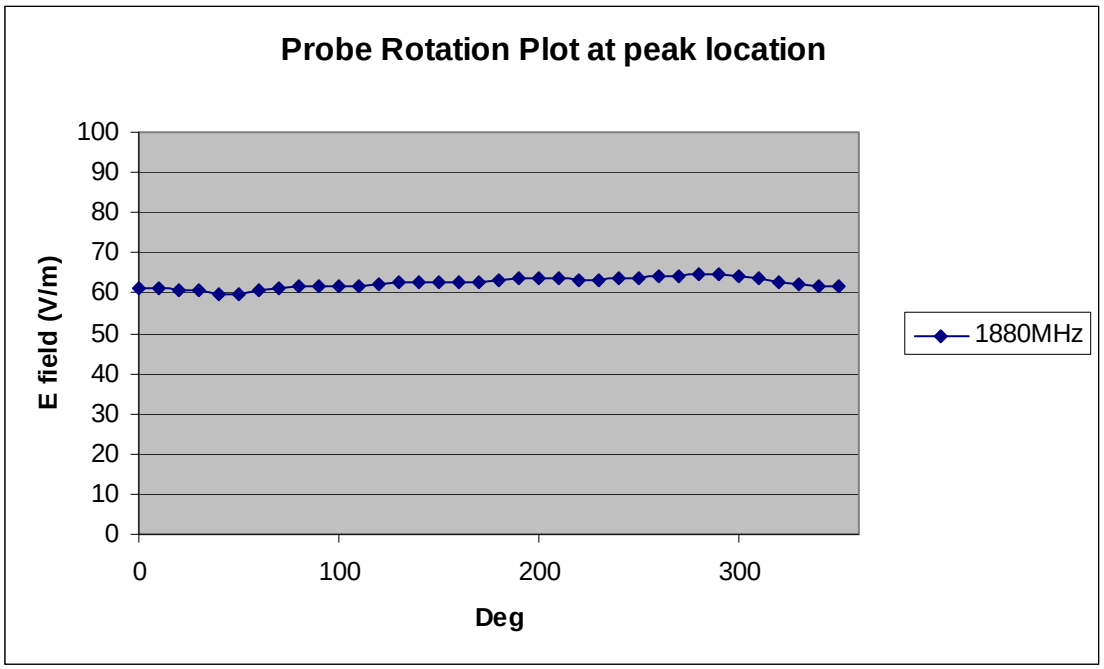
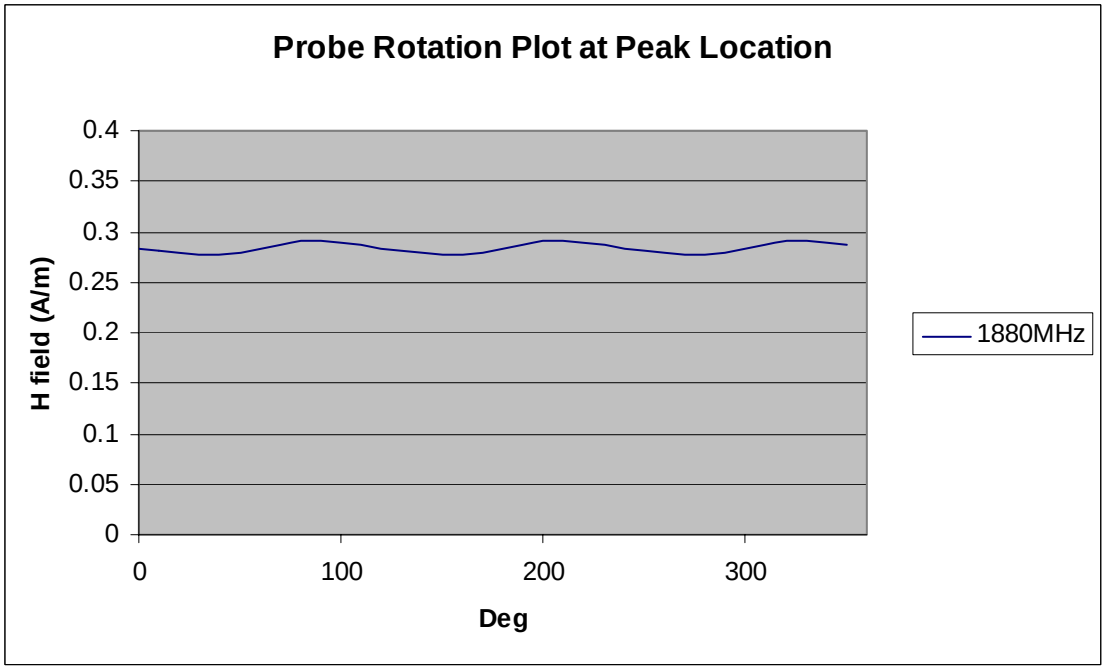
5. Frequency 1880 MHz, Channel PCS600

E-field



H-field



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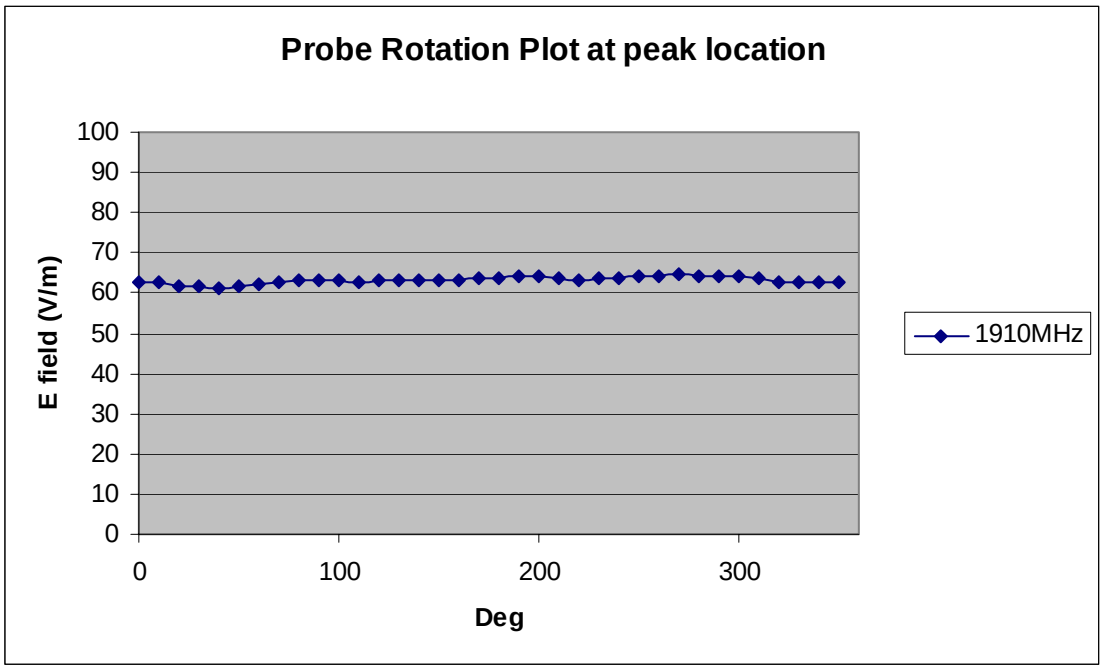
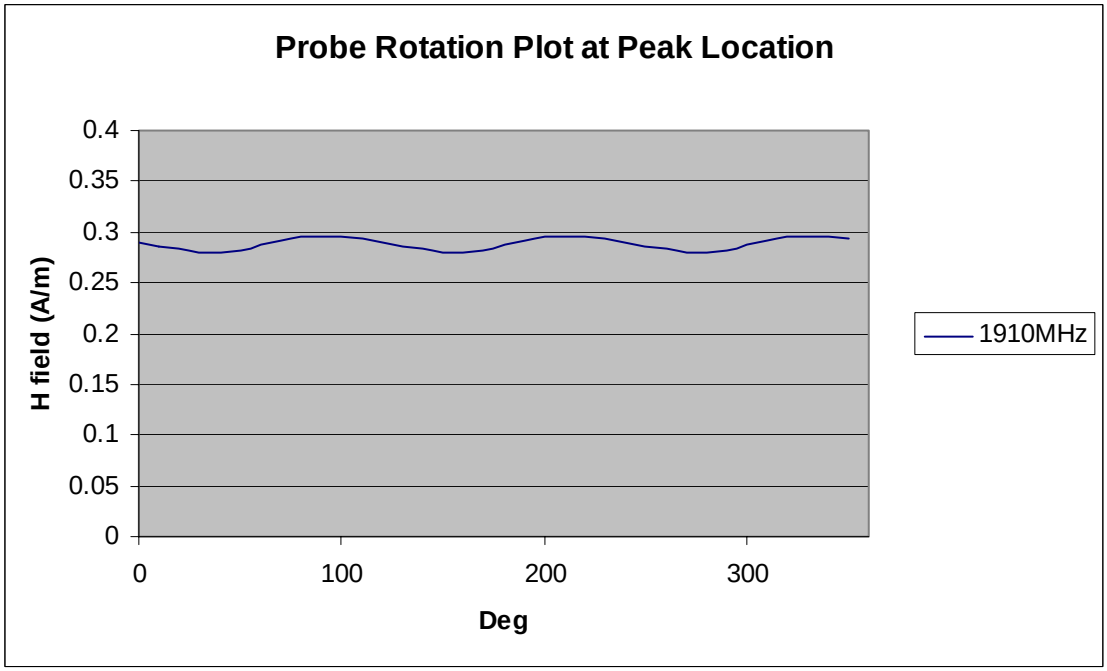
6. Frequency 1910 MHz, Channel PCS1199

E-field



H-field



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