

RF Exposure Lab

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CERTIFICATE OF COMPLIANCE SAR EVALUATION

Novatel Wireless
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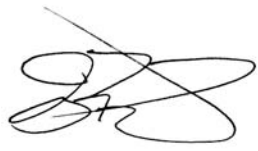
Dates of Test: August 9-10, 2010
Test Report Number: SAR.20100803
Revision P

FCC ID:	NBZNRM-CC208
IC Certificate:	3229A-CC208
Model(s):	CC208
Test Sample:	Engineering Unit Same as Production
Serial No.:	5D
Equipment Type:	Wireless Modem
Classification:	PCS Licensed Transmitter (PCB)
TX Frequency Range:	824.7 – 848.31 MHz, 1851.25 – 1908.75 MHz, 2496 – 2690 MHz
Frequency Tolerance:	± 2.5 ppm
Maximum RF Output:	835 MHz – 24.55 dBm, 1900 MHz – 24.06 dBm , 2600 MHz – 23.31 dBm Conducted
Signal Modulation:	CDMA, QPSK, 16QAM
Antenna Type (Length):	Internal
Application Type:	Certification
FCC Rule Parts:	Part 22, 24, 27
KDB Issued for Test:	KDB 597947
Industry Canada:	RSS-102

This wireless mobile and/or portable device has been shown to be compliant for localized specific absorption rate (SAR) for uncontrolled environment/general exposure limits specified in ANSI/IEEE Std. C95.1-1992 and had been tested in accordance with the measurement procedures specified in IEEE 1528-2003, OET Bulletin 65 Supp. C, RSS-102 and Safety Code 6 (See test report).

I attest to the accuracy of the data. All measurements were performed by myself or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

RF Exposure Lab, LLC certifies that no party to this application are subject to denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 863(a).



Jay M. Moulton
Vice President



Certificate # 2387.01

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1. Introduction

This measurement report shows compliance of the Novatel Wireless Model CC208 FCC ID: NBZNRM-CC208 with FCC Part 2, 1093, ET Docket 93-62 Rules for mobile and portable devices and IC Certificate: 3229A-CC208 with RSS102 & Safety Code 6. The FCC have adopted the guidelines for evaluating the environmental effects of radio frequency radiation in ET Docket 93-62 on August 6, 1996 to protect the public and workers from the potential hazards of RF emissions due to FCC regulated portable devices. [1], [6]

The test procedures, as described in ANSI C95.1 – 1992 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz [2], ANSI C95.3 – 2002 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields [3], FCC OET Bulletin 65 Supp. C – 2001 [4], IEEE Std.1528 – 2003 Recommended Practice [5], and Health Canada Safety Code 6 Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3kHz to 300 GHz were employed.

For express cards, the device is required to be tested on the bottom of the modem. The test must be conducted with the device installed in a laptop. The test is conducted with a 10 mm gap between the modem and the phantom. The test is conducted both in express card configuration and in PCMCIA configuration.

SAR Definition [5]

Specific Absorption Rate is defined as the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dV) of a given density (ρ).

$$SAR = \frac{d}{dt} \left(\frac{dW}{dm} \right) = \frac{d}{dt} \left(\frac{dW}{\rho dV} \right)$$

SAR is expressed in units of watts per kilogram (W/kg). SAR can be related to the electric field at a point by

$$SAR = \frac{\sigma |E|^2}{\rho}$$

where:

- σ = conductivity of the tissue (S/m)
- ρ = mass density of the tissue (kg/m³)
- E = rms electric field strength (V/m)

2. SAR Measurement Setup

Robotic System

The measurements are conducted utilizing the ALSAS-10-U automated dosimetric assessment system. The ALSAS-10-U is designed and manufactured by Aprel Laboratories in Nepean, Ontario, Canada. The system utilizes a Robcomm 3 robot manufactured by ThermoCRS located in Michigan USA.

System Hardware

The system consists of a six axis articulated arm, controller for precise probe positioning (0.05 mm repeatability), a power supply, a teach pendant for teaching area scans, near field probe, an IBM Pentium 4™ 2.66 GHz PC with Windows XP Pro™, and custom software developed to enable communications between the robot controller software and the host operating system.

An amplifier is located on the articulated arm, which is isolated from the custom designed end effector and robot arm. The end effector provides the mechanical touch detection functionality and probe connection interface. The amplifier is functionally validated within the manufacturer's site and calibrated at NCL Calibration Laboratories. A Data Acquisition Card (DAC) is used to collect the signal as detected by the isotropic e-field probe. The DAC manufacturer calibrates the DAC to NIST standards. A formal validation is executed using all mechanical and electronic components to prove conformity of the measurement platform as a whole.

System Description

The ALSAS-10-U has been designed to measure devices within the compliance environment to meet all recognized standards. The system also conforms to standards, which are currently being developed by the scientific and manufacturing community.

The course scan resolution is defined by the operator and reflects the requirements of the standard to which the device is being tested. Precise measurements are made within the predefined course scan area and the values are logged.

The user predefines the sample rate for which the measurements are made so as to ensure that the full duty-cycle of a pulse modulation device is covered during the sample. The following algorithm is an example of the function used by the system for linearization of the output for the probe.

$$V_i = U_i + U_i^2 \bullet \frac{cf}{dcp_i}$$



The April E-Field probe is evaluated to establish the diode compression point.

A complex algorithm is then used to calculate the values within the measured points down to a resolution of 1mm. The data from this process is then used to provide the co-ordinates from which the cube scan is created for the determination of the 1 g and 10 g averages.

Cube scan averaging consists of a number of complex algorithms, which are used to calculate the one, and ten gram averages. The basis for the cube scan process is centered on the location where the maximum measured SAR value was found. When a secondary peak value is found which is within 60% of the initial peak value, the system will report this back to the operator who can then assess the need for further analysis of both the peak values prior to the one and ten-gram cube scan averaging process. The algorithm consists of 3D cubic Spline, and Lagrange extrapolation to the surface, which form the matrix for calculating the measurement output for the one and ten gram average values. The resolution for the physical scan integral is user defined with a final calculated resolution down to 1mm.

In-depth analysis for the differential of the physical scanning resolution for the cube scan analysis has been carried out, to identify the optimum setting for the probe positioning steps, and this has been determined at 8mm increments on the X, & Y planes. The reduction of the physical step increment increased the time taken for analysis but did not provide a better uncertainty or return on measured values.

The final output from the system provides data for the area scan measurements, physical and splined (1mm resolution) cube scan with physical and calculated values (1mm resolution).

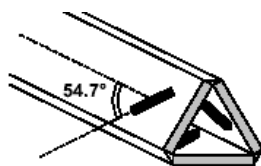
The overall uncertainty for the methodology and algorithms the ALSAS-10-U used during the SAR calculation was evaluated using the data from IEEE 1528 f3 algorithm:

$$f_3(x, y, z) = A \frac{a^2}{\frac{a^2}{4} + x'^2 + y'^2} \left(e^{-\frac{2z}{a}} + \frac{a^2}{2(a + 2z)^2} \right)$$

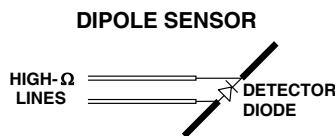
The probe used during the measurement process has been assessed to provide values for diode compression. These values are calculated during the probe calibration exercise and are used in the mathematical calculations for the assessment of SAR.

E-Field Probe

The E-field probe used by RF Exposure Lab, LLC, has been fully calibrated and assessed for isotropic, and boundary effect. The probe utilizes a triangular sensor arrangement as detailed in the diagram below right.



Δ-BEAM



The SAR is assessed with the probe which moves at a default height of 4 mm from the center of the diode, which is mounted to the sensor, to the phantom surface (Z height). The diagram above right shows how the center of the sensor is defined with the location of the diode placed at the center of the dipole. The 4 mm default in the Z axis is the optimum height for assessing SAR where the boundary effect is at its least, with the probe located closest to the phantom surface (boundary).

The manufacturer specified precision of the robot is ± 0.05 mm and the precision of the APREL bottom detection device is ± 0.1 mm. These precisions are calibrated and tested in the manufacturing process of the bottom detection device. A constant distance is maintained because the surface of the phantom is dynamically detected for each point. The surface detection algorithm corrects the position of the robot so that the probe rests on the surface of the phantom. The probe is then moved to the measurement location 2.44 mm above the phantom surface resulting in the probe center location to be at 4.0 mm above the phantom surface. Therefore, the probe sensor will be at 4.0 mm above the phantom surface ± 0.1 mm for each SAR location for frequencies below 3 GHz. The probe is moved to the measurement location 1.44 mm above the phantom surface resulting in the probe center location to be at 2.0 mm above the phantom surface. Therefore, the probe sensor will be at 2.0 mm above the phantom surface ± 0.1 mm for each SAR location for frequencies above 3 GHz.

The probe boundary effect compensation cannot be disabled in the ALSAS-10U testing system. The probe tip will always be at least half a probe tip diameter from the phantom surface. For frequencies up to 3 GHz, the probe diameter is 5 mm. With the sensor offset set at 1.54 mm (default setting), the sensor to phantom gap will be 4.0 mm which is greater than half the probe tip diameter. For frequencies greater than 3 GHz, the probe diameter is 3 mm. With the sensor offset set at 0.56 mm (default setting), the sensor to phantom gap will be 3.0 mm which is greater than half the probe tip diameter.

The separation of the first 2 measurement points in the zoom scan is specified in the test setup software. For frequencies below 3 GHz, the user must specify a zoom scan resolution of less than 6 mm in the z-axis to have the first two measurements within 1 cm of the surface. The z-axis is set to 4 mm as shown on each of the data sheets in Appendix B. For frequencies above 3 GHz, the user must specify a zoom scan resolution of less than 3 mm in the z-axis to have the first two measurements within 5 mm of the surface. The z-axis is set to 2 mm as shown on each of the data sheets in Appendix B.

The zoom scan volume for devices ≤ 3 GHz with a cube scan of 5x5x8 yields a volume of 32x32x28 mm³. For devices >3 GHz and <4.5 GHz, the cube scan of 9x9x9 yields a volume of 32x32x24 mm³. For devices ≥ 4.5 GHz, the cube scan of 7x7x12 yields a volume of 24x24x22 mm³.

3. Robot Specifications

Specifications

Positioner: ThermoCRS, Robot Model: Robocomm 3
Repeatability: 0.05 mm
No. of axis: 6

Data Acquisition Card (DAC) System

Cell Controller

Processor: Pentium 4™
Clock Speed: 2.66 GHz
Operating System: Windows XP Pro™

Data Converter

Features: Signal Amplifier, End Effector, DAC
Software: ALSAS 10-U Software

E-Field Probe

Model: Various See Probe Calibration Sheet
Serial Number: Various See Probe Calibration Sheet
Construction: Triangular Core Touch Detection System
Frequency: 10MHz to 6GHz

Phantom

Phantom: Uniphantom, Right Phantom, Left Phantom



4. Probe and Dipole Calibration

See Appendix D and E.

5. Phantom & Simulating Tissue Specifications

SAM Phantom



The Aprel system utilizes three separate phantoms. Each phantom for SAR assessment testing is a low loss dielectric shell, with shape and dimensions derived from the anthropomorphic data of the 90th percentile adult male head dimensions as tabulated by the US Army. The SAM phantom shell is bisected along the mid sagittal plane into right and left halves. The perimeter sidewalls of each phantom half is extended to allow filling with liquid to a depth of 15 cm that is sufficient to minimize reflections from the upper surface [5]. The Uni-Phantom is used to conduct body measurements and held to face measurements. The depth of the phantom allows for 15 cm of tissue material to be filled within the phantom. See photos in Appendix C.

Head & Body Simulating Mixture Characterization

The head and body mixtures consist of the material based on the table listed below. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the desired tissue. Body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations.

Table 5.1 Typical Composition of Ingredients for Tissue

Ingredients		Simulating Tissue		
		835 MHz Body	1900 MHz Body	2600 MHz Body
Mixing Percentage				
Water		52.40	69.91	69.83
Sugar		45.00	0.00	0.00
Salt		1.40	0.13	0.00
HEC		1.00	0.00	0.00
Bactericide		0.10	0.00	0.00
DGBE		0.00	29.96	30.17
Dielectric Constant	Target	55.20	53.30	52.51
Conductivity (S/m)	Target	0.97	1.52	2.16

Device Holder



In combination with the SAM phantom, the mounting device enables the rotation of the mounted transmitter in spherical coordinates whereby the rotation point is the ear opening. The devices can easily, accurately, and repeatably be positioned according to the FCC specifications. The device holder can be locked at different phantom locations (left head, right head, and uni-phantom).

6. ANSI/IEEE C95.1 – 1992 RF Exposure Limits [2]

Uncontrolled Environment

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

Controlled Environment

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Table 8.1 Human Exposure Limits

	UNCONTROLLED ENVIRONMENT General Population (W/kg) or (mW/g)	CONTROLLED ENVIROMENT Professional Population (W/kg) or (mW/g)
SPATIAL PEAK SAR ¹ Head	1.60	8.00
SPATIAL AVERAGE SAR ² Whole Body	0.08	0.40
SPATIAL PEAK SAR ³ Hands, Feet, Ankles, Wrists	4.00	20.00

¹ The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

² The Spatial Average value of the SAR averaged over the whole body.

³ The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

7. Measurement Uncertainty

Exposure Assessment Measurement Uncertainty

Source of Uncertainty	Tolerance Value	Probability Distribution	Divisor	c_i^1 (1-g)	c_i^1 (10-g)	Standard Uncertainty (1-g) %	Standard Uncertainty (10-g) %	v_i
Measurement System								
Probe Calibration	3.5	normal	1	1	1	3.5	3.5	∞
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	0.7	0.7	1.5	1.5	∞
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	0.7	0.7	4.4	4.4	∞
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6	∞
Linearity	4.7	rectangular	$\sqrt{3}$	1	1	2.7	2.7	∞
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6	∞
Readout Electronics	1.0	normal	1	1	1	1.0	1.0	∞
Response Time	0.8	rectangular	$\sqrt{3}$	1	1	0.5	0.5	∞
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1	1.0	1.0	∞
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1	1.7	1.7	∞
Probe Positioner Mech. Restriction	0.4	rectangular	$\sqrt{3}$	1	1	0.2	0.2	∞
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1	1.7	1.7	∞
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	1	2.1	2.1	∞
Test Sample Positioning	4.0	normal	1	1	1	4.0	4.0	7
Device Holder Uncertainty	2.0	normal	1	1	1	2.0	2.0	2
Drift of Output Power	4.2	rectangular	$\sqrt{3}$	1	1	2.4	2.4	∞
Phantom and Setup								
Phantom Uncertainty (shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	1	2.0	2.0	∞
Liquid Conductivity (target)	5.0	rectangular	$\sqrt{3}$	0.7	0.5	2.0	1.4	∞
Liquid Conductivity (meas.)	0.5	normal	1	0.7	0.5	0.4	0.3	5
Liquid Permittivity (target)	5.0	rectangular	$\sqrt{3}$	0.6	0.5	1.7	1.4	∞
Liquid Permittivity (meas.)	1.0	normal	1	0.6	0.5	0.6	0.5	5
Combined Uncertainty		RSS				9.6	9.4	>500
Combined Uncertainty (coverage factor=2)		Normal (k=2)				19.1	18.8	>500

8. System Validation

Tissue Verification

Table 8.1 Measured Tissue Parameters

		835 MHz Body		1900 MHz Body		2590 MHz Body	
Date(s)		Aug. 9, 2010		Aug. 9, 2010		Aug. 10, 2010	
Liquid Temperature (°C)	20.0	Target	Measured	Target	Measured	Target	Measured
Dielectric Constant: ϵ		55.20	55.01	53.30	52.29	52.52	52.48
Conductivity: σ		0.97	0.98	1.52	1.56	2.15	2.16
		2590 MHz Body					
Date(s)		Feb. 11, 2011					
Liquid Temperature (°C)	20.0	Target	Measured				
Dielectric Constant: ϵ		52.52	52.18				
Conductivity: σ		2.15	2.17				

See Appendix A for data printout.

Test System Verification

Prior to assessment, the system is verified to the $\pm 10\%$ of the specifications at the test frequency by using the system kit. Power is normalized to 1 watt. Body Tissue used for all validation test setups. The probe is valid to ± 100 MHz for 835 and 1900 MHz, and $\pm 5\%$ for 2600 MHz. The dipole is valid over the same frequency range. (Graphic Plots Attached)

Table 8.2 System Dipole Validation Target & Measured

	Test Frequency	Target 1W SAR _{1g} (W/kg) per Certificate	Tissue Used for Calibration	Tissue Used for Verification	Measure SAR _{1g} (W/kg)	Deviation (%)
09-Aug-2010	835 MHz	9.81	Body	Body	9.25	- 5.71
09-Aug-2010	1900 MHz	40.90	Body	Body	39.12	- 4.35
10-Aug-2010	2600 MHz	56.42	Body	Body	54.01	- 4.27
11-Feb-2011	2600 MHz	56.42	Body	Body	55.30	- 1.99

See Appendix A for data plots.

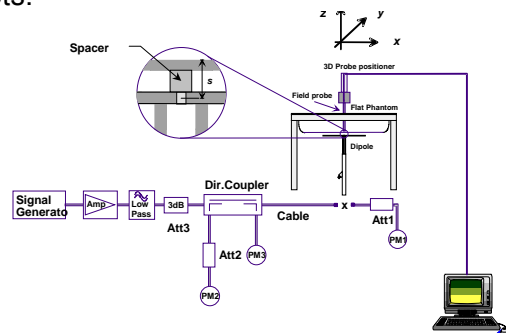


Figure 8.1 Dipole Validation Test Setup

Note: The November Dipole Calibration Certificates with Body Calibrations are provided in order to verify the Body System Verifications that were performed in August. All system verifications were conducted with the dipole calibrated with body tissue. This was discussed with the FCC on November 24 and the resolution was that the Dipoles used were calibrated for Body measurements after the discussions.

9. SAR Test Data Summary

See Measurement Result Data Pages

See Appendix B for SAR Test Data Plots.
See Appendix C for SAR Test Setup Photos.

Procedures Used To Establish Test Signal

The actual transmission is activated through a base station simulator or similar equipment. The DUT did not contain any test software to facilitate any of the required signaling for the tests. See data pages for actual procedure used in measurement.

Device Test Condition

In order to verify that the device was tested at full power, conducted output power measurements were performed before and after each SAR measurement to confirm the output power unless otherwise noted. If a conducted power deviation of more than 5% occurred, the test was repeated.

The testing was conducted on the bottom of the modem. The Express Card testing was conducted with the modem installed in a Dell Latitude XT2. The PC Card testing was conducted with the modem installed in a Toshiba Portege Model R200. The gap was measured to be 10 mm from the phantom for both configurations.

The 1xRTT testing was conducted in RC3 with the device configured using TDSO/SO32 with FCH transmitting at full rate. The power control was set to "All Bits Up." 1xRTT did not require SAR testing due to the measured power being less than 1/4 dB of Rev. 0.

The Rev. 0 testing was conducted with the Reverse Data Channel rate of 153.6 kbps. The Forward Traffic Channel data rate is set to the 2-slot version of 307.2 kbps with the ACK Channel transmitting in all slots. The power control was set to "All Bits Up." Other rates were not tested due to the conducted power measured was less than 1/4 dB higher than 153.6 kbps.

The Rev. A Subtype 2 testing was conducted with the Reverse Data Channel payload size of 4096 bits and Termination Target of 16 slots. The Forward Traffic Channel data rate is set to the 2-slot version of 307.2 kbps with the ACK Channel transmitting in all slots. The power control was set to "All Bits Up." Rev. A did not require SAR testing due to the measured power being less than 1/4 dB of Rev. 0.

10. FCC 3G Measurement Procedures

Power measurements were performed using a base station simulator under average power.

10.1 Procedures Used to Establish RF Signal for SAR

The device was placed into a simulated call using a base station simulator in a screen room. Such test signals offer a consistent means for testing SAR and recommended for evaluating SAR. The SAR measurement software calculates a reference point at the start and end of the test to check for power drifts. If conducted power deviations of more than 5% occurred, the tests were repeated.

10.2 SAR Measurement Conditions for CDMA2000, 1xEV-DO

10.2.1 Output Power Verification 1xRTT

Use CDMA2000 Rev 6 protocol in the call box.

- 1) Test for Reverse/Forward TCH RC1, Reverse/Forward TCH RC2, and RC3 Reverse FCH and demodulation of RC 3, 4 and 5.
 - a. Set up a call using Fundamental Channel Test Mode 1 (RC1, SO 2) with 9600 bps data rate only.
 - b. As per C.S0011 or TIA/EIA-98-F Table 4.4.5.2-1, set the test parameters.
 - c. Send continuously '0' power control bits to the device.
 - d. Measure the output power at device antenna connector as recorded on the power meter with values corrected for cables losses.
 - e. Repeat step b through d for Fundamental Channel Test Mode:
 - i. RC1, SO2
 - ii. RC2, SO9
 - iii. RC1, SO55
 - iv. RC3, SO55
- 2) Test for RC 3 Reverse FCH, RC3 Reverse SCH0 and demodulation of RC 3, 4 and 5.
 - a. Set up a call using Supplemental Channel Test Mode 3 (RC 3, SO 32) with 9600 bps Fundamental Channel and 9600 bps SCH0 data rate.
 - b. As per C.S0011 or TIA/EIA-98-F Table 4.4.5.2-2, set the test parameters.
 - c. Send alternating '0' and '1' power control bit to the device
 - d. Determine the active channel configuration. If the desired channel configuration is not the active channel configuration, increase $\hat{\rho}$ by 1 dB and repeat the verification. Repeat this step until the desired channel configuration becomes active.
 - e. Measure the output power at the device antenna connector.
 - f. Decrease $\hat{\rho}$ by 0.5 dB.
 - g. Determine the active channel configuration. If the active channel configuration is the desired channel configuration, measure the output power at the device antenna connector.
 - h. Repeat step f and g until the output power no longer increases or the desired channel configuration is no longer active. Record the highest output power achieved with the desired channel configuration active.
 - i. Repeat step a through h ten times and average the result.

10.3.1 Output Power Verification 1xRTT

- 1) Use 1xEV-DO Rel 0 protocol in the call box 8960.
 - a. FTAP
 - Select Test Application Protocol to FTAP
 - Set FTAP Rate to 307.2 kbps (2 Slot, QPSK)
 - Generator Info -> Termination Parameters -> Max Forward Packet Duration -> 16 Slots
 - Set \hat{I} or to -60 dBm/1.23 MHz
 - Send continuously '0' power control bits
 - Measure the power at device antenna connector
 - b. RTAP
 - Select Test Application Protocol to RTAP
 - Set RTAP Rate to 9.6 kbps
 - Generator Info -> Termination Parameters -> Max Forward Packet Duration -> 16 Slots
 - Set \hat{I} or to -60 dBm/1.23 MHz
 - Send continuously '0' power control bits
 - Measure the power at device antenna connector
 - Repeat above steps for RTAP Rate = 19.2 kbps, 38.4 kbps, 76.8 kbps and 153.6 kbps respectively
- 2) Use 1xEV-DO Rev A protocol in the call box 8960
 - a. FETAP
 - Select Test Application Protocol to FETAP
 - Set FETAP Rate to 307.2 kbps (2 Slot, QPSK)
 - Generator Info -> Termination Parameters -> Max Forward Packet Duration -> 16 Slots
 - Set \hat{I} or to -60 dBm/1.23 MHz
 - Send continuously '0' power control bits
 - Measure the power at device antenna connector
 - b. RETAP
 - Select Test Application Protocol to RETAP
 - F-Traffic Format -> 4 (1024, 2, 128) Canonical (307.2k, QPSK) • Set R-Data Pkt Size to 128
 - Protocol Subtype Config -> Release A Physical Layer Subtype -> Subtype 2 -> PL Subtype 2 Access Channel MAC Subtype -> Default (Subtype 0)
 - Generator Info -> Termination Parameters -> Max Forward Packet Duration -> 16 Slots ->ACK R-Data After -> Subpacket 0 (All ACK)
 - Set \hat{I} or to -60 dBm/1.23 MHz
 - Send continuously '0' power control bits
 - Measure the power at device antenna connector
 - Repeat above steps for R-Data Pkt Size = 256, 512, 768, 1024, 1536, 2048, 3072, 4096, 6144, 8192, 12288 respectively.

1xRTT Power Measurements

IS-2000	Channel	SO2 [dBm]	SO9 [dBm]	SO55 [dBm]	SO55 [dBm]
	F-RC	RC1	RC2	RC1	RC3
Band	Vocoder Rate	Full	Full	Full	Full
Cellular	1013	24.46	24.42	24.46	24.49
	384	24.50	24.48	24.45	24.50
	777	24.48	24.43	24.40	24.46
PCS	25	23.99	23.92	23.98	23.97
	600	23.96	23.89	23.94	23.97
	1175	23.97	23.96	23.95	23.99

EvDo Rev 0 Power Measurements

1x EvDo Rev. 0 [dBm] - FTAP rate = 2 Slot Version 307.2 kbps						
	RTAP Rate	9.6 kbps	19.2 kbps	38.4 kbps	76.8 kbps	153.6 kbps
Band	Channel					
Cellular	1013	24.43	24.49	24.51	24.52	24.50
	384	24.48	24.50	24.47	24.43	24.51
	777	24.51	24.47	24.52	24.53	24.50
PCS	25	23.92	24.00	23.98	24.01	24.01
	600	23.97	23.92	23.99	24.02	24.03
	1175	24.00	24.01	23.91	23.96	24.02

EvDo Rev A Power Measurements

1x EvDo Rev. A Type 2 [dBm] - FTAP rate = 2 Slot Version 307.2 kbps													
	RETAP Payload	128 bits	256 bits	512 bits	768 bits	1024 bits	1536 bits	2048 bits	3072 bits	4096 bits	6144 bits	8192 bits	12288 bits
Band	Channel												
Cellular	1013	24.42	24.46	24.52	24.49	24.51	24.54	24.47	24.48	24.55	24.53	24.49	24.54
	384	24.47	24.53	24.46	24.42	24.49	24.51	24.43	24.52	24.53	24.52	24.46	24.48
	777	24.39	24.46	24.42	24.48	24.37	24.47	24.43	24.49	24.50	24.41	24.38	24.46
PCS	25	23.95	23.98	24.01	23.97	23.92	24.02	24.02	23.94	24.03	23.99	23.97	24.01
	600	23.91	23.97	23.94	24.02	23.98	23.97	24.05	24.01	24.06	23.97	23.89	24.00
	1175	23.99	23.96	23.90	24.01	23.96	23.89	24.01	23.92	24.02	23.91	23.94	24.01

Power Control was set in "All Bits Up" for all measurements.

10.4.1 WiMax System Description

The device is a 2.5 GHz WiMax transceiver in a Express Card configuration using Beceem chipset which supports 2Tx and 2Rx for this device. Both antennas are used for both transmitting and receiving. Its uplink is capable of both 10 MHz and 5 MHz bandwidths. The uplink sub-frame is triggered by an Allocation Start Time contained in the information of UL-MAP. This information specifies the starting times of the Uplink and Downlink frames. In any UL sub-frame, the duty factor ranging and bandwidth information is used to ensure optimal system operation. In normal device transmission, the device will transmit control signaling at the first 3 uplink symbols and then use the rest of the uplink symbols for data traffic bursts in the uplink sub-frame. Since the first 3 symbols are also used for ranging detection purposes and are shared among other device users, its transmitting power is much smaller than the data burst symbol power. The Mobile WiMax Test Set contained the Beceem test software to generate the correct signal with the first 3 bits low. During the testing modes, the first 3 symbols have no power output and the data traffic bursts are always running at the maximum output power level. In the real usage, the data burst power will be adjusted according to the signal strength of the communication. In this way, by using the test software mode arrangement, we are transmitting at a worst case RF level during the data portion Symbols 4 to 18.

The data burst zone can operate in one of two modes:

PUSC

For the 10 MHz bandwidth, it has 35 sub-channels structured from 1024 subcarriers; 184 are used as spare/safeguard subcarriers, leaving 840 available for transmission. From this, 560 subcarriers for data transmission with 280 subcarriers intended for pilot use. For the 5 MHz bandwidth, it contains 17 sub-channels using 512 subcarriers; 104 subcarriers are spare/safeguard subcarriers, 272 for data transmission, and 136 for pilot.

AMC

For the 10 MHz bandwidth, it has 48 sub-channels structured from 1024 subcarriers; 160 are used as spare/safeguard subcarriers, leaving 864 available for transmission. From this, 768 subcarriers for data transmission with 96 subcarriers intended for pilot use. For the 5 MHz bandwidth, it contains 24 sub-channels using 512 subcarriers; 80 subcarriers as spare/safeguard subcarriers, 384 for data transmission, and 48 for pilot.

The base station simulator (Agilent E6651A Mobile WiMax Test Set) contains Beceem control firmware within the base station simulator to establish the required signaling. The E6651A produces a downlink DL burst every 5 milliseconds which simulates the transmission of a base-station operating under normal mode. This DL burst instructs the mobile station MS to transmit for 15 symbols in the UL data zone. This UL transmission is repeated every 5 milliseconds. The TX power of the mobile station is set to maximum power. The Mobile WiMax Test Set and MS use the same frequency. The Mobile WiMax Test Set power is much lower than the MS Tx power (~80 dB lower) and does not affect the SAR readings.

The MS synchronizes to the signal from the Mobile WiMax Test Set in frequency and time. It then demodulates two maps contained in the Mobile WiMax Test Set DL frame. The first map (DL map) specifies the number of DL symbols (29). The second map (UL map) specifies the number of UL symbols (18). The UL map also tells the MS to transmit a burst which occupies all data symbols and all sub-channels. No control channel transmissions are requested by the

Mobile WiMax Test Set. Measurements are taken in this configuration with the MS transmitting using the 29:18 ratio, but since there is no energy in the control symbols, the effective power is only across 15 symbols.

As mentioned above the DL:UL frame is specified in the DL and UL maps respectively. There is no ranging present when there is data traffic. The other types of control traffic are HARQ ACK/NACK, CQICH (CINR reporting) and bandwidth BW requests. BW requests are piggy-backed onto the data symbols when traffic is present. Since the BW requests are shared across the Control Symbols (traffic versus non-traffic modes), the control traffic that is relevant to the SAR calculation is CQICH and HARQ ACK/NACK. The maximum power for this control traffic is 30.61 mW (5/35 of 214.30 mW) for 10 MHz and 62.02 mw (5/17 of 210.86 mW) for 5 MHz.

In the test mode, the UL operates in PUSC or AMC with all data sub-channels (All 48 sub-channels for AMC and 35 sub-channels for PUSC) occupied with data. During normal operation, the MS will transmit on all sub-channels when the maximum UL throughput is required. It is possible for the MS to transmit with fewer sub-channels. The sub-channels consist of tones that are distributed over the entire signal BW and a jump every three symbols so that the spectral density and hence SAR for the fractional sub-channel case will be similar to the full sub-channel case that is tested. (Note: In the WiMax standard, a sub-channel consists of tones that are spread across the occupied bandwidth. After every three symbols, the tones that make up the sub-channel switch to a new set of frequencies spread across the band. This “jumping” is called sub-channel rotation and helps to give the sub-channel frequency diversity.)

Equipment Used for network side:

Agilent E6651A Mobile WiMax Test Set

The testing was done using a common 29:18 ratio as this is the maximum achievable ratio for the product. The 29 indicates the number of downlink (from the base station) symbols, and the 18 indicates the number of uplink (transmitted from the MS) symbols. Inside the uplink, 15 symbols are used for data, and three of the symbols are used for sending control information to the network. During the testing, the control symbols contained no information, so did not contribute to the total energy transmitted. To compensate for the maximum energy which may be present in the 3 control symbols, the following scheme is used for the scaling factor:

Maximum output power of 5 MHz is 23.24 dBm = 210.86 mW

The maximum power in 5 MHz control traffic is 62.02 mW (5/17 of 210.86 mW)

Scaled factor for 5 MHz Bandwidth = see table below

Maximum output power of 10 MHz is 23.31 dBm = 214.30 mW

The maximum power in 10 MHz control traffic is 30.61 mW (5/35 of 214.30 mW)

Scaled factor for 10 MHz Bandwidth = see table below

Conversion Factor for 5 MHz Bandwidth = $1/(15/48) = 3.2$

Conversion Factor for 10 MHz Bandwidth = $1/(15/48) = 3.2$

For AMC scaling procedure, AMC 15 traffics symbol was tested at full power . Control power was scaled with respect to control symbols using PUSC.

10.5.1 WiMax Conducted Power Measurements

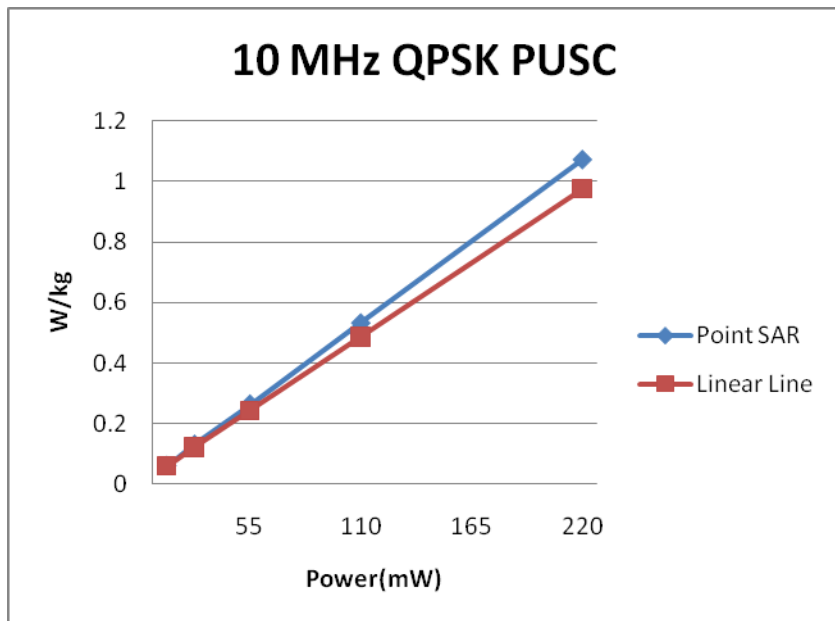
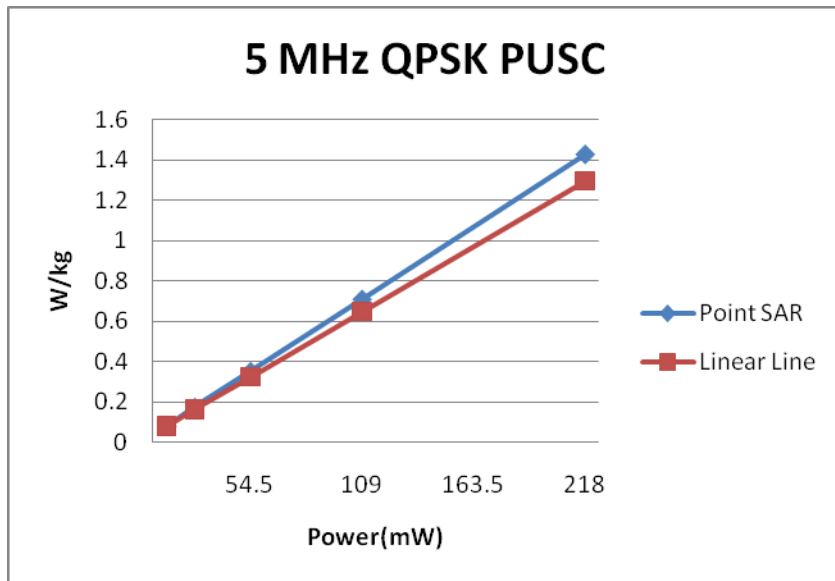
Zone Type	Modulation	Coding Rate	Frequency	Antenna 1 - Main			Antenna 2 - Diversity		
				Peak Power	Average Power	PAPR	Peak Power	Average Power	PAPR
PUSC	QPSK (BW 5 MHz)	1/2	2498.5	32.72	23.24	9.48	32.97	23.50	9.47
			2593.0	31.65	23.18	8.47	32.18	23.37	8.81
			2687.5	31.77	23.20	8.57	32.17	23.41	8.76
		3/4	2498.5	32.73	23.22	9.51	31.96	23.41	8.55
			2593.0	31.67	23.17	8.50	32.19	23.21	8.98
			2687.5	31.78	23.15	8.63	32.19	23.33	8.86
	16QAM (BW 5 MHz)	1/2	2498.5	32.78	23.16	9.62	33.24	23.46	9.78
			2593.0	31.75	23.11	8.64	32.36	23.34	9.02
			2687.5	31.73	23.19	8.54	32.08	23.10	8.98
		3/4	2498.5	32.81	23.07	9.74	32.88	23.31	9.57
			2593.0	31.69	23.15	8.54	32.21	23.12	9.09
			2687.5	31.88	23.06	8.82	32.19	23.19	9.00
	QPSK (BW 10 MHz)	1/2	2501.0	33.02	23.31	9.71	33.23	23.35	9.88
			2593.0	31.90	23.26	8.64	32.45	23.49	8.96
			2685.0	32.00	23.20	8.80	32.46	23.40	9.06
		3/4	2501.0	32.81	23.30	9.51	33.08	23.22	9.86
			2593.0	31.87	23.25	8.62	32.22	23.29	8.93
			2685.0	31.73	23.11	8.62	32.47	23.34	9.13
	16QAM (BW 10 MHz)	1/2	2501.0	33.05	23.25	9.80	33.15	23.19	9.96
			2593.0	31.85	23.19	8.66	32.47	23.25	9.22
			2685.0	32.20	23.16	9.04	32.26	23.31	8.95
		3/4	2501.0	31.89	23.07	8.82	32.41	23.18	9.23
			2593.0	31.97	23.07	8.90	32.47	23.17	9.30
			2685.0	31.99	23.08	8.91	32.64	23.29	9.35
AMC	QPSK (BW 5 MHz)	1/2	2498.5	31.74	23.23	8.51	31.86	23.29	8.57
			2593.0	31.78	23.15	8.63	31.88	23.21	8.67
			2687.5	32.29	23.16	9.13	31.86	23.34	8.52
		3/4	2498.5	31.41	23.22	8.19	31.23	23.20	8.03
			2593.0	31.11	23.03	8.08	31.25	23.15	8.10
			2687.5	31.19	23.15	8.04	31.34	23.24	8.10
	16QAM (BW 5 MHz)	1/2	2498.5	31.97	23.19	8.78	32.06	23.24	8.82
			2593.0	32.38	23.07	9.31	31.57	23.17	8.40
			2687.5	31.49	23.14	8.35	31.72	23.26	8.46
		3/4	2498.5	31.22	23.15	8.07	31.16	23.15	8.01
			2593.0	31.06	23.02	8.04	31.18	23.11	8.07
			2687.5	31.14	23.08	8.06	31.58	23.16	8.42
	QPSK (BW 10 MHz)	1/2	2501.0	31.60	23.28	8.32	32.14	23.29	8.85
			2593.0	31.96	23.09	8.87	31.80	23.30	8.50
			2685.0	32.00	23.09	8.91	32.54	23.27	9.27
		3/4	2501.0	31.48	23.25	8.23	31.48	23.23	8.25
			2593.0	31.32	23.04	8.28	31.43	23.21	8.22
			2685.0	31.22	23.01	8.21	31.62	23.19	8.43
	16QAM (BW 10 MHz)	1/2	2501.0	31.31	23.24	8.07	32.49	23.21	9.28
			2593.0	31.70	23.07	8.63	32.10	23.26	8.84
			2685.0	31.71	23.07	8.64	32.46	23.22	9.24
		3/4	2501.0	31.23	23.08	8.15	31.38	23.20	8.18
			2593.0	31.16	23.00	8.16	31.39	23.18	8.21
			2685.0	31.19	23.05	8.14	31.65	23.15	8.50

Note: An Agilent wideband power meter was used for measuring the conducted power.

The SAR probe used in the measurements is calibrated with a sinusoidal CW signal. Since the DL:UL symbol ratio configuration used in the SAR tests provides a periodic uplink burst, the duty factor can be compensated by selecting the correct conversion factor (cf) for the SAR measurements. The high PAPR of OFDM/OFDMA is expected to introduce additional SAR measurement errors because the SAR probe is not calibrated for this type of random noise-like signals with large amplitude and phase variations within the bursts. The SAR error is also expected to vary with the average power and average PAPR at each measurement point, both temporally and spatially. In order to estimate the measurement error due to PAPR issues, the configuration with the highest SAR in each channel bandwidth and frequency band is measured at various power levels, in 3 dB steps, until the maximum power level is reached with the DUT positioned 10 mm from the phantom surface. As shown by the results and plot below, SAR is linear to power only when the probe sensors are operating within the square-law region. As power continues to increase, the measured SAR error becomes increasingly larger. Since these are single point peak SAR values measured with the probe positioned at the peak SAR location, at 2 mm from the phantom surface, the values are substantially higher than the 1-g SAR required to determine compliance. Based on the linearity plots, SAR is not being underestimated.

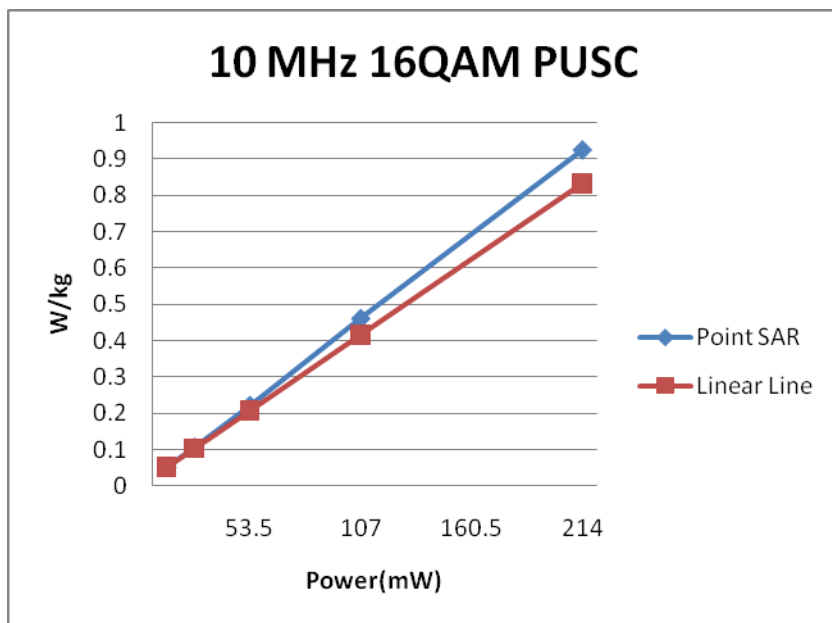
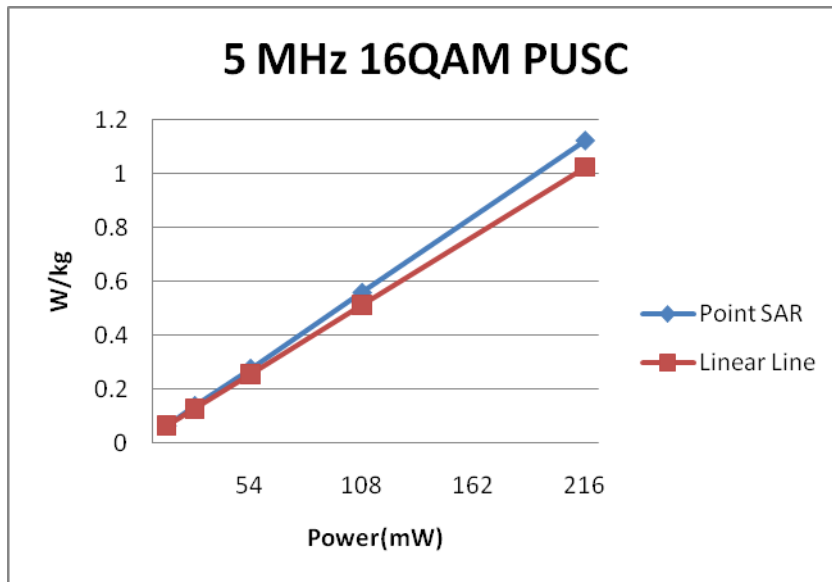
Linearity Response Check PUSC QPSK

Output Power	dBm	11.38	14.38	17.38	20.38	23.38
	mW	13.63	27.25	54.5	109	218
5 MHz Single Point SAR (W/kg)		0.081	0.174	0.351	0.709	1.426
5 MHz Linear Line		0.081	0.162	0.324	0.648	1.296
Percent Deviation		0.000	7.407	8.333	9.414	10.031
Output Power	dBm	11.42	14.42	17.42	20.42	23.42
	mW	13.75	27.5	55	110	220
10 MHz Single Point SAR (W/kg)		0.061	0.131	0.264	0.532	1.072
10 MHz Linear Line		0.061	0.122	0.244	0.488	0.976
Percent Deviation		0.000	7.377	8.197	9.016	9.836



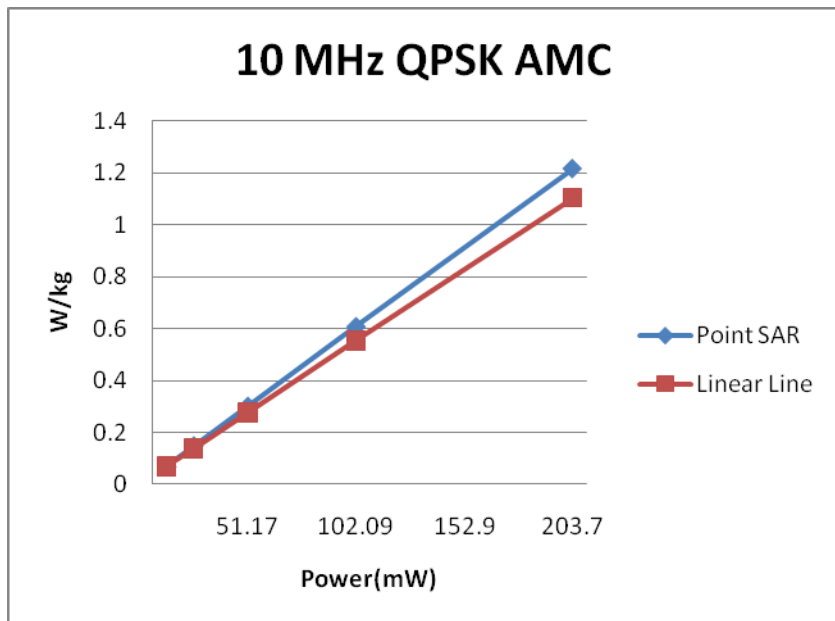
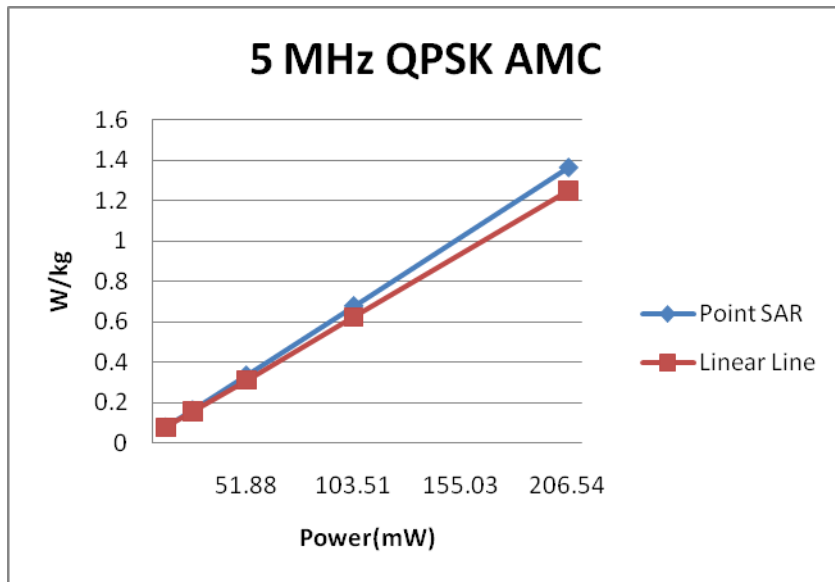
Linearity Response Check PUSC 16QAM

Output Power	dBm	11.34	14.34	17.34	20.34	23.34
	mW	13.5	27	54	108	216
5 MHz Single Point SAR (W/kg)		0.064	0.139	0.277	0.559	1.124
5 MHz Linear Line		0.064	0.128	0.256	0.512	1.024
Percent Deviation		0.000	8.594	8.203	9.180	9.766
Output Power	dBm	11.30	14.30	17.30	20.30	23.30
	mW	13.38	26.75	53.5	107	214
10 MHz Single Point SAR (W/kg)		0.052	0.107	0.222	0.461	0.925
10 MHz Linear Line		0.052	0.104	0.208	0.416	0.832
Percent Deviation		0.000	2.885	6.731	10.817	11.178



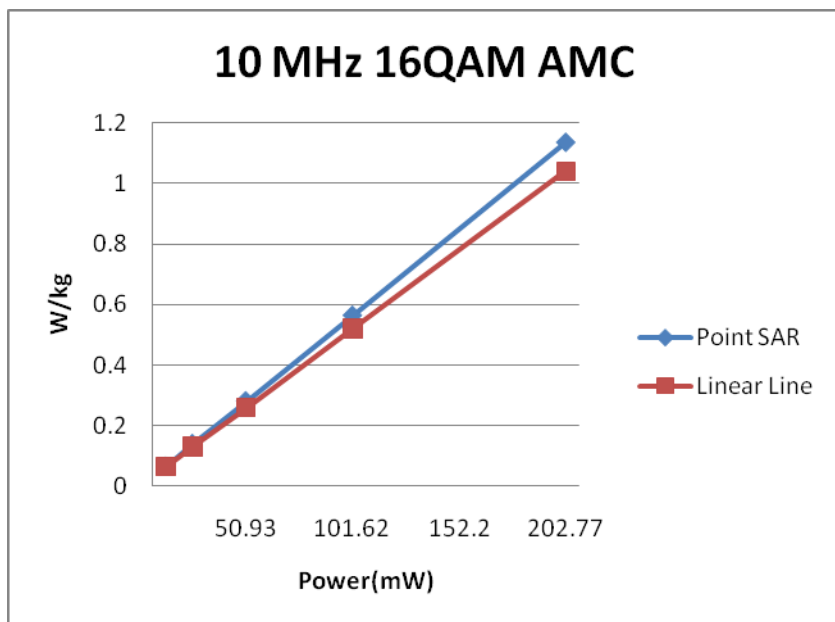
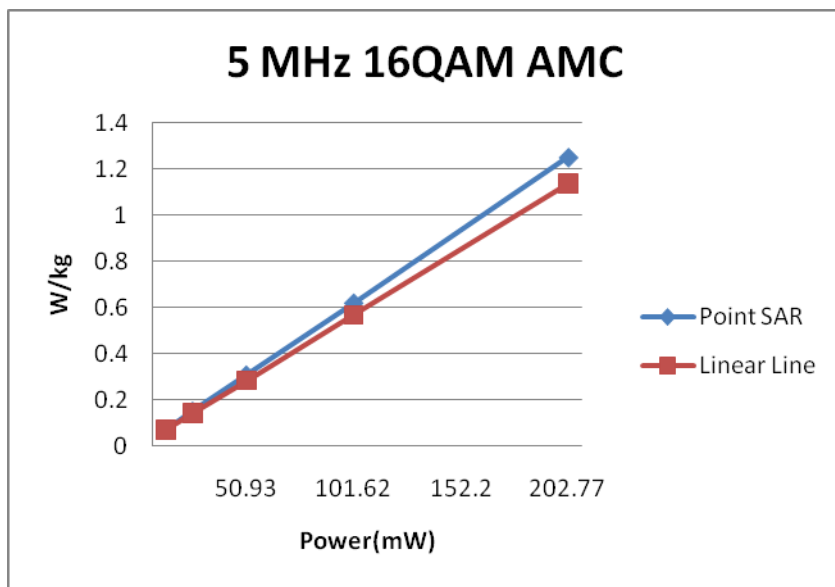
Linearity Response Check AMC QPSK

Output Power	dBm	11.15	14.15	17.15	20.15	23.15
	mW	13.03	26.00	51.88	103.51	206.54
5 MHz Single Point SAR (W/kg)		0.078	0.163	0.335	0.679	1.365
5 MHz Linear Line		0.078	0.156	0.312	0.624	1.248
Percent Deviation		0.00	4.49	7.37	8.81	9.38
Output Power	dBm	11.09	14.09	17.09	20.09	23.09
	mW	12.85	25.64	51.17	102.09	203.70
10 MHz Single Point SAR (W/kg)		0.069	0.149	0.301	0.607	1.215
10 MHz Linear Line		0.069	0.138	0.276	0.552	1.104
Percent Deviation		0.00	7.97	9.06	9.96	10.05



Linearity Response Check AMC 16QAM

Output Power	dBm	11.07	14.07	17.07	20.07	23.07
	mW	12.79	25.53	50.93	101.62	202.77
5 MHz Single Point SAR (W/kg)		0.071	0.152	0.309	0.621	1.252
5 MHz Linear Line		0.071	0.142	0.284	0.568	1.136
Percent Deviation		0.00	7.04	8.80	9.33	10.21
Output Power	dBm	11.07	14.07	17.07	20.07	23.07
	mW	12.79	25.53	50.93	101.62	202.77
10 MHz Single Point SAR (W/kg)		0.065	0.140	0.281	0.564	1.136
10 MHz Linear Line		0.065	0.130	0.260	0.520	1.040
Percent Deviation		0.00	7.69	8.08	8.46	9.23



PUSC (Antenna 1 – Main)								
	High		Middle		Low		Max. Rated Power	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
5 MHz	209	208	208	205	211	207	224	224
Scaling Factor	1.135	1.138	1.140	1.159	1.125	1.146		
10 MHz	209	207	212	208	214	211	224	224
Scaling Factor	1.103	1.113	1.088	1.105	1.075	1.090		

AMC (Antenna 1 – Main)								
	High		Middle		Low		Max. Rated Power	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
5 MHz	207	206	207	203	210	209	224	224
Scaling Factor	1.146	1.151	1.148	1.170	1.127	1.133		
10 MHz	204	203	204	203	213	211	224	224
Scaling Factor	1.131	1.136	1.131	1.136	1.083	1.093		

PUSC (Antenna 2 – Diversity)								
	High		Middle		Low		Max. Rated Power	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
5 MHz	219	204	217	216	224	222	224	224
Scaling Factor	1.083	1.163	1.093	1.098	1.059	1.068		
10 MHz	219	214	223	211	216	208	224	224
Scaling Factor	1.052	1.077	1.033	1.092	1.067	1.108		

AMC (Antenna 2 – Diversity)								
	High		Middle		Low		Max. Rated Power	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
5 MHz	216	212	209	208	213	211	224	224
Scaling Factor	1.098	1.119	1.135	1.140	1.114	1.124		
10 MHz	212	210	214	212	213	209	224	224
Scaling Factor	1.087	1.097	1.077	1.087	1.082	1.102		

5 MHz calculation of Scaling Factor formula used is as follows:

$$[(\text{Rated Power} \times 5/17)^3 + (\text{Rated Power} \times 15)] / [\text{Measured Power} \times 15]$$

10 MHz calculation of Scaling Factor formula used is as follows:

$$[(\text{Rated Power} \times 5/35)^3 + (\text{Rated Power} \times 15)] / [\text{Measured Power} \times 15]$$

Sample of Scaling Factor Calculation:

Using High Channel 5 MHz QPSK on Antenna 2 in PUSC the measured average power was 219 mW. The maximum rated power of the device is 224 mW.

$$[(224 \text{ mW} \times 5/17)^3 + (224 \text{ mW} \times 15)] / [219 \text{ mW} \times 15] = 1.083$$

Using High Channel 10 MHz QPSK on Antenna 2 in PUSC the measured average power was 219 mW. The maximum rated power of the device is 224 mW.

$$[(224 \text{ mW} \times 5/35)^3 + (224 \text{ mW} \times 15)] / [219 \text{ mW} \times 15] = 1.052$$

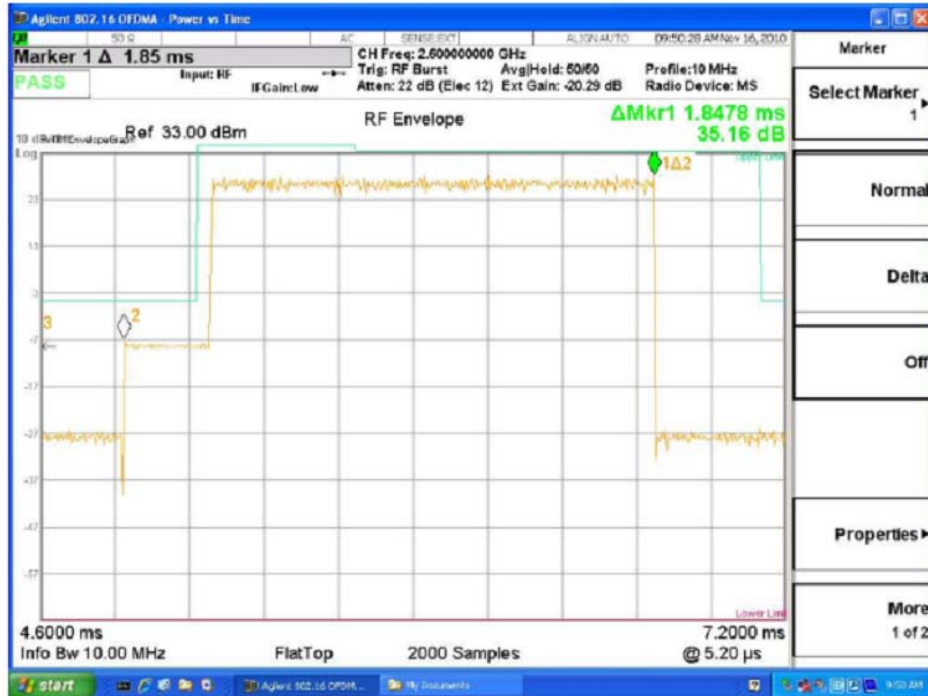
10.6.1 Spectrum Analyzer Plots



Timing Plot for WiMax Signal



WiMax Pulse with 15 Traffic on, 3 controls inactive (DC)



WiMax Timing Plot Burst

See Appendix G for additional Plots

SAR Test Configurations for WiMax								
			QPSK 1/2			QPSK 3/4		
			Low	Mid	High	Low	Mid	High
Antenna 1	PUSC	5 MHz	Tested	Note 1	Note 1	Note 2	Note 2	Note 2
		10 MHz	Tested	Note 1	Note 1	Note 2	Note 2	Note 2
	AMC	5 MHz	Tested	Note 2	Note 2	Note 2	Note 2	Note 2
		10 MHz	Tested	Note 2	Note 2	Note 2	Note 2	Note 2
Antenna 2	PUSC	5 MHz	Tested	Tested	Tested	Note 2	Note 2	Note 2
		10 MHz	Tested	Tested	Tested	Note 2	Note 2	Note 2
	AMC	5 MHz	Tested	Tested	Tested	Note 2	Note 2	Note 2
		10 MHz	Tested	Note 2	Note 2	Note 2	Note 2	Note 2
			16QAM 1/2			16QAM 3/4		
			Low	Mid	High	Low	Mid	High
Antenna 1	PUSC	5 MHz	Tested	Note 1	Note 1	Note 2	Note 2	Note 2
		10 MHz	Tested	Note 1	Note 1	Note 2	Note 2	Note 2
	AMC	5 MHz	Tested	Tested	Tested	Note 2	Note 2	Note 2
		10 MHz	Note 3	Note 3	Note 3	Note 2	Note 2	Note 2
Antenna 2	PUSC	5 MHz	Tested	Tested	Tested	Note 2	Note 2	Note 2
		10 MHz	Tested	Tested	Tested	Note 2	Note 2	Note 2
	AMC	5 MHz	Tested	Tested	Tested	Note 2	Note 2	Note 2
		10 MHz	Tested	Note 3	Note 3	Note 2	Note 2	Note 2

Note 1 - Reduced Per TCB Workshop Notes October 2010 page 34.

Note 2 - Reduced per TCB Workshop Notes April 2010 page 9

Note 3 - Reduced per TCB Workshop Notes April 2010 page 9 and October 2010 page 33

The WiMAX configuration instructions of the Agilent E6651A were provided by Novatel Wireless. These instructions included the selection of zones (AMC/PUSC), modulation types (16 QAM/QPSK), and other required WiMAX signals. A copy of these instructions are included as part of the operational description.


SAR Data Summary – 835 MHz Body

MEASUREMENT RESULTS

Gap	Config.	Frequency		Rev Level	Begin/End Power		Reverse Channel	Forward Channel	SAR (W/kg)
		MHz	Ch.		(dBm)	(dBm)			
10 mm	Express Card	824.70	1013	Rev 0	24.50	24.46	153.6 kbps	2 Slot 307.2 kbps	1.40
		836.52	384	Rev 0	24.51	24.48	153.6 kbps	2 Slot 307.2 kbps	1.50
		848.31	777	Rev 0	24.50	24.49	153.6 kbps	2 Slot 307.2 kbps	1.28
10 mm	Express Card	824.70	1013	Rev A	24.55	24.52	4096 bits	2 Slot 307.2 kbps	1.25
		836.52	384	Rev A	24.53	24.50	4096 bits	2 Slot 307.2 kbps	1.38
		848.31	777	Rev A	24.50	24.47	4096 bits	2 Slot 307.2 kbps	1.13
10 mm	PC Card	836.52	384	Rev 0	24.50	24.45	153.6 kbps	2 Slot 307.2 kbps	1.07

Body
1.6 W/kg (mW/g)
 averaged over 1 gram

- 1. Power Measured Conducted ERP EIRP
- 2. SAR Measurement Phantom Configuration Left Head Uniphantom Right Head
 SAR Configuration Head Body
- 3. Test Signal Call Mode Test Code Base Station Simulator
- 4. Test Configuration With Belt Clip Without Belt Clip N/A
- 5. All Testing conducted using KDB 447498 Section 2.



Jay M. Moulton
 Vice President

The PC card configuration was tested in the highest SAR Express Card configuration. The PC card adapter is a passive device. If the SAR for the PC Card configuration was more than 1 dB lower than the highest SAR value, other configuration were reduced.


SAR Data Summary – 1900 MHz Body

MEASUREMENT RESULTS

Gap	Config.	Frequency		Rev Level	Begin/End Power		Reverse Channel	Forward Channel	SAR (W/kg)
		MHz	Ch.		(dBm)	(dBm)			
10 mm	Express Card	1851.25	25	Rev 0	24.01	23.98	153.6 kbps	2 Slot 307.2 kbps	1.52
		1880.00	600	Rev 0	24.03	23.95	153.6 kbps	2 Slot 307.2 kbps	1.37
		1908.75	1175	Rev 0	24.02	23.99	153.6 kbps	2 Slot 307.2 kbps	1.19
10 mm	Express Card	1851.25	25	Rev A	24.03	24.00	4096 bits	2 Slot 307.2 kbps	1.52
		1880.00	600	Rev A	24.06	24.03	4096 bits	2 Slot 307.2 kbps	1.36
		1908.75	1175	Rev A	24.02	24.00	4096 bits	2 Slot 307.2 kbps	1.19
10 mm	PC Card	1851.25	25	Rev 0	24.02	23.99	153.6 kbps	2 Slot 307.2 kbps	0.84

Body
1.6 W/kg (mW/g)
averaged over 1 gram

- 1. Power Measured Conducted ERP EIRP
- 2. SAR Measurement Phantom Configuration Left Head Uniphantom Right Head
 SAR Configuration Head Body
- 3. Test Signal Call Mode Test Code Base Station Simulator
- 4. Test Configuration With Belt Clip Without Belt Clip N/A
- 5. All Testing conducted using KDB 447498 Section 2.



 Jay M. Moulton
 Vice President


The PC card configuration was tested in the highest SAR Express Card configuration. The PC card adapter is a passive device. If the SAR for the PC Card configuration was more than 1 dB lower than the highest SAR value, other configuration were reduced.

SAR Data Summary – 2600 MHz Body – WiMax 5 MHz PUSC

MEASUREMENT RESULTS										
Gap	Config.	Ant.	Frequency		Modulation	Begin/End Power		SAR (W/kg)	Scaling Factor	Calculated SAR
			MHz	Ch.		(dBm)	(dBm)			
10 mm	Express Card	1	2498.5	Low	QPSK ½	23.20	23.16	0.550	1.125	0.62
		2	2498.5	Low	QPSK ½	23.24	23.21	0.924	1.059	0.98
		2	2593.0	Mid	QPSK ½	23.18	23.15	1.259	1.093	1.38
		2	2687.5	High	QPSK ½	23.20	23.17	0.464	1.083	0.50
10 mm	Express Card	1	2498.5	Low	16QAM ½	23.14	23.11	0.535	1.146	0.61
		2	2498.5	Low	16QAM ½	23.16	23.12	0.851	1.068	0.91
		2	2593.0	Mid	16QAM ½	23.11	23.09	1.051	1.098	1.15
		2	2687.5	High	16QAM ½	23.14	23.13	0.471	1.163	0.55

Body
1.6 W/kg (mW/g)
 averaged over 1 gram

- 1. Power Measured Conducted ERP EIRP
- 2. SAR Measurement Phantom Configuration Left Head Uniphantom Right Head
 SAR Configuration Head Body
- 3. Test Signal Call Mode Test Code Base Station Simulator
- 4. Test Configuration With Belt Clip Without Belt Clip N/A
- 5. All Testing conducted using KDB 447498 Section 2.



Jay M. Moulton
 Vice President


Note: When the highest SAR channel is 3 dB or more below the limit the remaining channels are not required to be tested per KDB 447498 section 1) e). Test reduction was based on TCB workshop slides from April and October of 2010. The WiMAX configuration instructions of the Agilent E6651A were provided by Novatel Wireless. These instructions included the selection of zones (AMC/PUSC), modulation types (16 QAM/QPSK), and other required WiMAX signals. A copy of these instructions are included as part of the operational description.

SAR Data Summary – 2600 MHz Body – WiMax 10 MHz PUSC

MEASUREMENT RESULTS										
Gap	Config.	Ant.	Frequency		Modulation	Begin/End Power		SAR (W/kg)	Scaling Factor	Calculated SAR
			MHz	Ch.		(dBm)	(dBm)			
10 mm	Express Card	1	2501.0	Low	QPSK ½	23.29	23.22	0.609	1.075	0.65
		2	2501.0	Low	QPSK ½	23.31	23.27	0.936	1.067	1.00
		2	2593.0	Mid	QPSK ½	23.26	23.21	0.849	1.033	0.88
		2	2685.0	High	QPSK ½	23.20	23.18	0.455	1.052	0.48
10 mm	Express Card	1	2501.0	Low	16QAM ½	23.24	23.20	0.508	1.090	0.55
		2	2501.0	Low	16QAM ½	23.25	23.22	0.881	1.108	0.98
		2	2593.0	Mid	16QAM ½	23.19	23.16	0.833	1.092	0.91
		2	2685.0	High	16QAM ½	23.16	23.11	0.691	1.077	0.74

Body
1.6 W/kg (mW/g)
 averaged over 1 gram

- 1. Power Measured Conducted ERP EIRP
- 2. SAR Measurement Phantom Configuration Left Head Uniphantom Right Head
 SAR Configuration Head Body
- 3. Test Signal Call Mode Test Code Base Station Simulator
- 4. Test Configuration With Belt Clip Without Belt Clip N/A
- 5. All Testing conducted using KDB 447498 Section 2.



 Jay M. Moulton
 Vice President

Note: When the highest SAR channel is 3 dB or more below the limit the remaining channels are not required to be tested per KDB 447498 section 1) e). Test reduction was based on TCB workshop slides from April and October of 2010. The WiMAX configuration instructions of the Agilent E6651A were provided by Novatel Wireless. These instructions included the selection of zones (AMC/PUSC), modulation types (16 QAM/QPSK), and other required WiMAX signals. A copy of these instructions are included as part of the operational description.


SAR Data Summary – 2600 MHz Body – WiMax 5 & 10 MHz AMC & PC Card Test

MEASUREMENT RESULTS

Gap	Config.	Ant.	Frequency		Modulation	Begin/End Power		SAR (W/kg)	Scaling Factor	Calculated SAR
			MHz	Ch.		(dBm)	(dBm)			
10 mm	Express Card	1	2498.5	Low	AMC 5 MHz QPSK 1/2	23.29	23.21	0.663	1.127	0.75
		1	2501.5	Low	AMC 10 MHz QPSK 1/2	23.29	23.26	0.693	1.083	0.75
		2	2498.5	Low	AMC 5 MHz QPSK 1/2	23.28	23.24	1.043	1.114	1.16
		2	2593.0	Mid	AMC 5 MHz QPSK 1/2	23.17	23.14	1.026	1.135	1.16
		2	2687.5	High	AMC 5 MHz QPSK 1/2	23.34	23.31	0.713	1.098	0.78
		2	2498.5	Low	AMC 5 MHz 16QAM 1/2	23.24	23.22	0.999	1.124	1.12
		2	2593.0	Mid	AMC 5 MHz 16QAM 1/2	23.17	23.14	0.991	1.140	1.13
		2	2687.5	High	AMC 5 MHz 16QAM 1/2	23.26	23.23	0.770	1.119	0.86
		2	2501.0	Low	AMC 10 MHz QPSK 1/2	23.29	23.25	0.969	1.082	1.05
	2	2501.0	Low	AMC 10 MHz 16QAM 1/2	23.21	23.18	0.956	1.102	1.05	
	PC Card PUSC	2	2593.0	Mid	5 MHz QPSK 1/2	23.14	23.10	0.943	1.093	1.03

Body
1.6 W/kg (mW/g)
 averaged over 1 gram

- 1. Power Measured Conducted ERP EIRP
- 2. SAR Measurement Phantom Configuration Left Head Uniphantom Right Head
 SAR Configuration Head Body
- 3. Test Signal Call Mode Test Code Base Station Simulator
- 4. Test Configuration With Belt Clip Without Belt Clip N/A
- 5. All Testing conducted using KDB 447498 Section 2.



Jay M. Moulton
 Vice President

Note: When the highest SAR channel is 3 dB or more below the limit the remaining channels are not required to be tested per KDB 447498 section 1) e). Test reduction was based on TCB workshop slides from April and October of 2010. The PC card configuration was tested in the highest SAR Express Card configuration. The PC card adapter is a passive device. If the SAR for the PC Card configuration was more than 1 dB lower than the highest SAR value, other configuration were reduced. The WiMAX configuration instructions of the Agilent E6651A were provided by Novatel Wireless. These instructions included the selection of zones (AMC/PUSC), modulation types (16 QAM/QPSK), and other required WiMAX signals. A copy of these instructions are included as part of the operational description.

11. Test Equipment List

Table 12.1 Equipment Specifications

Type	Calibration Due Date	Serial Number
ThermoCRS Robot	N/A	RAF0338198
ThermoCRS Controller	N/A	RCF0338224
ThermoCRS Teach Pendant (Joystick)	N/A	STP0334405
IBM Computer, 2.66 MHz P4	N/A	8189D8U KCPR08N
Apriel E-Field Probe ALS-E020	10/21/2010	RFE-217
Apriel E-Field Probe ALS-E030	07/14/2011	E030-001
Apriel Dummy Probe	N/A	023
Apriel Left Phantom	N/A	RFE-267
Apriel Right Phantom	N/A	RFE-268
Apriel UniPhantom	N/A	RFE-273
Apriel Validation Dipole ALS-D-450-S-2	01/12/2011	RFE-362
Apriel Validation Dipole ALS-D-835-S-2	01/14/2011	180-00561
Apriel Validation Dipole ALS-D-900-S-2	01/12/2011	RFE-275
Apriel Validation Dipole ALS-D-1900-S-2	01/15/2011	210-00713
Apriel Validation Dipole ALS-D-2450-S-2	01/12/2011	RFE-278
Apriel Validation Dipole RFE-D-2600-S-2	01/18/2011	RFE-121
Apriel Validation Dipole RFE-D-BB-S-2	01/12/2011	235-00801
Agilent (HP) 437B Power Meter	03/24/2011	3125U08837
Agilent (HP) 8481B Power Sensor	03/24/2011	3318A05384
Advantest R3261A Spectrum Analyzer	03/24/2011	31720068
Agilent (HP) 8350B Signal Generator	04/19/2011	2749A10226
Agilent (HP) 83525A RF Plug-In	04/19/2011	2647A01172
Agilent (HP) 8753C Vector Network Analyzer	03/25/2011	3135A01724
Agilent (HP) 85047A S-Parameter Test Set	03/25/2011	2904A00595
Agilent (HP) E55125C Base Station Sim.	03/25/2012	MY48360364
Agilent (HP) E6651A WiMax Base Station	10/22/2010	MY48150124
Apriel Dielectric Probe Assembly	N/A	0011
Head Equivalent Matter (450 MHz)	N/A	N/A
Head Equivalent Matter (835 MHz)	N/A	N/A
Head Equivalent Matter (1900 MHz)	N/A	N/A
Head Equivalent Matter (2450 MHz)	N/A	N/A
Body Equivalent Matter (450 MHz)	N/A	N/A
Body Equivalent Matter (835 MHz)	N/A	N/A
Body Equivalent Matter (1900 MHz)	N/A	N/A
Body Equivalent Matter (2450 MHz)	N/A	N/A
Body Equivalent Matter (2600 MHz)	N/A	N/A
Body Equivalent Matter (5200 MHz)	N/A	N/A
Body Equivalent Matter (5800 MHz)	N/A	N/A

12. Conclusion

The SAR measurement indicates that the EUT complies with the RF radiation exposure limits of the FCC. These measurements are taken to simulate the RF effects exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The tested device complies with the requirements in respect to all parameters subject to the test. The test results and statements relate only to the item(s) tested.

Please note that the absorption and distribution of electromagnetic energy in the body is a very complex phenomena that depends on the mass, shape, and size of the body; the orientation of the body with respect to the field vectors; and, the electrical properties of both the body and the environment. Other variables that may play a substantial role in possible biological effects are those that characterize the environment (e.g. ambient temperature, air velocity, relative humidity, and body insulation) and those that characterize the individual (e.g. age, gender, activity level, debilitation, or disease). Because innumerable factors may interact to determine the specific biological outcome of an exposure to electromagnetic fields, any protection guide shall consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables.

13. References

- [1] Federal Communications Commission, ET Docket 93-62, Guidelines for Evaluating the Environmental Effects of Radio Frequency Radiation, August 1996

- [2] ANSI/IEEE C95.1 – 1992, American National Standard Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 300kHz to 100GHz, New York: IEEE, 1992.

- [3] ANSI/IEEE C95.3 – 1992, IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields – RF and Microwave, New York: IEEE, 1992.

- [4] Federal Communications Commission, OET Bulletin 65 (Edition 97-01), Supplement C (Edition 01-01), Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields, June 2001.

- [5] IEEE Standard 1528 – 2003, IEEE Recommended Practice for Determining the Peak-Spatial Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communication Devices: Measurement Techniques, October 2003.

- [6] Industry Canada, RSS – 102e, Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands), March 2010.

- [7] Health Canada, Safety Code 6, Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3kHz to 300 GHz, 2009.

Appendix A – System Validation Plots and Data

Test Result for UIM Dielectric Parameter

Mon 09/Aug/2010 08:12:51

Freq Frequency(GHz)

FCC_eH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Epsilon

FCC_sH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Sigma

FCC_eB FCC Limits for Body Epsilon

FCC_sB FCC Limits for Body Sigma

Test_e Epsilon of UIM

Test_s Sigma of UIM

Freq	FCC_eB	FCC_sB	Test_e	Test_s
0.8050	55.32	0.97	55.28	0.95
0.8150	55.28	0.97	55.17	0.95
0.8250	55.24	0.97	55.15	0.96
0.8350	55.20	0.97	55.01	0.98
0.8450	55.17	0.98	54.97	0.99
0.8550	55.14	0.99	54.93	1.00
0.8650	55.11	1.01	54.89	1.01

Test Result for UIM Dielectric Parameter

Mon 09/Aug/2010 07:52:28

Freq Frequency(GHz)

FCC_eH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Epsilon

FCC_sH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Sigma

FCC_eB FCC Limits for Body Epsilon

FCC_sB FCC Limits for Body Sigma

Test_e Epsilon of UIM

Test_s Sigma of UIM

Freq	FCC_eB	FCC_sB	Test_e	Test_s
1.8700	53.30	1.52	52.00	1.60
1.8800	53.30	1.52	52.16	1.59
1.8900	53.30	1.52	52.21	1.58
1.9000	53.30	1.52	52.29	1.56
1.9100	53.30	1.52	52.36	1.54
1.9200	53.30	1.52	52.35	1.52
1.9300	53.30	1.52	52.43	1.50

Test Result for UIM Dielectric Parameter

Tue 10/Aug/2010 07:29:48

Freq Frequency(GHz)

FCC_eH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Epsilon

FCC_sH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Sigma

FCC_eB FCC Limits for Body Epsilon

FCC_sB FCC Limits for Body Sigma

Test_e Epsilon of UIM

Test_s Sigma of UIM

Freq	FCC_eB	FCC_sB	Test_e	Test_s
2.5000	52.64	2.02	52.68	2.01
2.5100	52.62	2.04	52.65	2.03
2.5200	52.61	2.05	52.62	2.05
2.5300	52.60	2.06	52.60	2.07
2.5400	52.59	2.08	52.59	2.09
2.5500	52.57	2.09	52.57	2.10
2.5600	52.56	2.11	52.55	2.11
2.5700	52.55	2.12	52.53	2.13
2.5800	52.53	2.13	52.51	2.14
2.5900	52.52	2.15	52.48	2.16
2.6000	52.51	2.16	52.46	2.17
2.6100	52.50	2.18	52.44	2.19
2.6200	52.48	2.19	52.41	2.21
2.6300	52.47	2.21	52.39	2.22
2.6400	52.46	2.22	52.37	2.24
2.6500	52.45	2.23	52.36	2.25
2.6600	52.43	2.25	52.34	2.27
2.6700	52.42	2.26	52.32	2.29
2.6800	52.41	2.28	52.30	2.30
2.6900	52.39	2.29	52.27	2.32
2.7000	52.38	2.30	52.26	2.34

Test Result for UIM Dielectric Parameter

Fri 11/Feb/2011 06:21:36

Freq Frequency(GHz)

FCC_eH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Epsilon

FCC_sH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Sigma

FCC_eB FCC Limits for Body Epsilon

FCC_sB FCC Limits for Body Sigma

Test_e Epsilon of UIM

Test_s Sigma of UIM

Freq	FCC_eB	FCC_sB	Test_e	Test_s
2.5000	52.64	2.02	52.39	2.01
2.5100	52.62	2.04	52.37	2.03
2.5200	52.61	2.05	52.34	2.04
2.5300	52.60	2.06	52.32	2.06
2.5400	52.59	2.08	52.30	2.08
2.5500	52.57	2.09	52.27	2.10
2.5600	52.56	2.11	52.25	2.12
2.5700	52.55	2.12	52.22	2.14
2.5800	52.53	2.13	52.20	2.15
2.5900	52.52	2.15	52.18	2.17
2.6000	52.51	2.16	52.16	2.18
2.6100	52.50	2.18	52.13	2.20
2.6200	52.48	2.19	52.10	2.22
2.6300	52.47	2.21	52.08	2.23
2.6400	52.46	2.22	52.05	2.25
2.6500	52.45	2.23	52.03	2.27
2.6600	52.43	2.25	52.01	2.29
2.6700	52.42	2.26	51.99	2.30
2.6800	52.41	2.28	51.97	2.32
2.6900	52.39	2.29	51.94	2.33
2.7000	52.38	2.30	51.92	2.35

SAR Test Report

By Operator : Jay
Measurement Date : 09-Aug-2010
Starting Time : 09-Aug-2010 08:14:38 AM
End Time : 09-Aug-2010 08:27:36 AM
Scanning Time : 901 secs

Product Data

Device Name : Validation
Serial No. : 835
Type : Dipole
Model : ALS-D-835-S-2
Frequency : 835.00 MHz
Max. Transmit Pwr : 0.1 W
Drift Time : 0 min(s)
Length : 161 mm
Width : 3.6 mm
Depth : 89.8 mm
Antenna Type : Internal
Orientation : Touch
Power Drift-Start : 1.004 W/kg
Power Drift-Finish: 0.985 W/kg
Power Drift (%) : -1.907

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 835
Frequency : 835.00 MHz
Last Calib. Date : 09-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 49.00 RH%
Epsilon : 55.01 F/m
Sigma : 0.98 S/m
Density : 1000.00 kg/cu. m

Probe Data

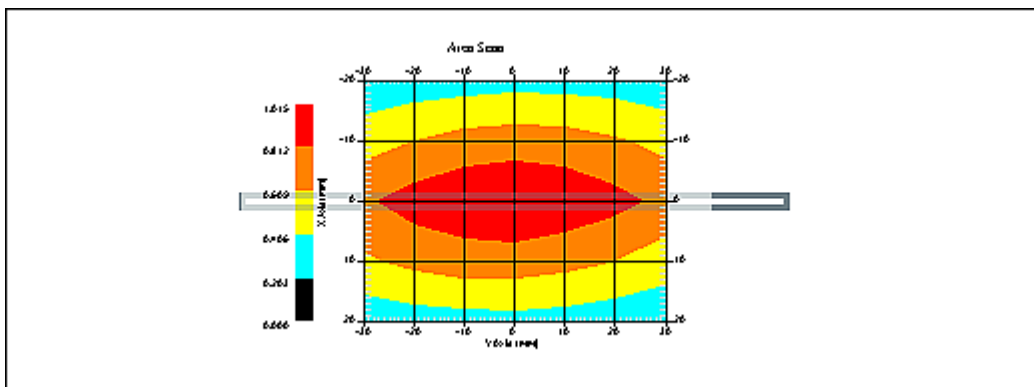
Name : Probe 217 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 835.00 MHz
Conversion Factor: 6.1
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 25.00 °C
Set-up Date : 09-Aug-2010
Set-up Time : 9:21:48 AM
Area Scan : 5x7x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

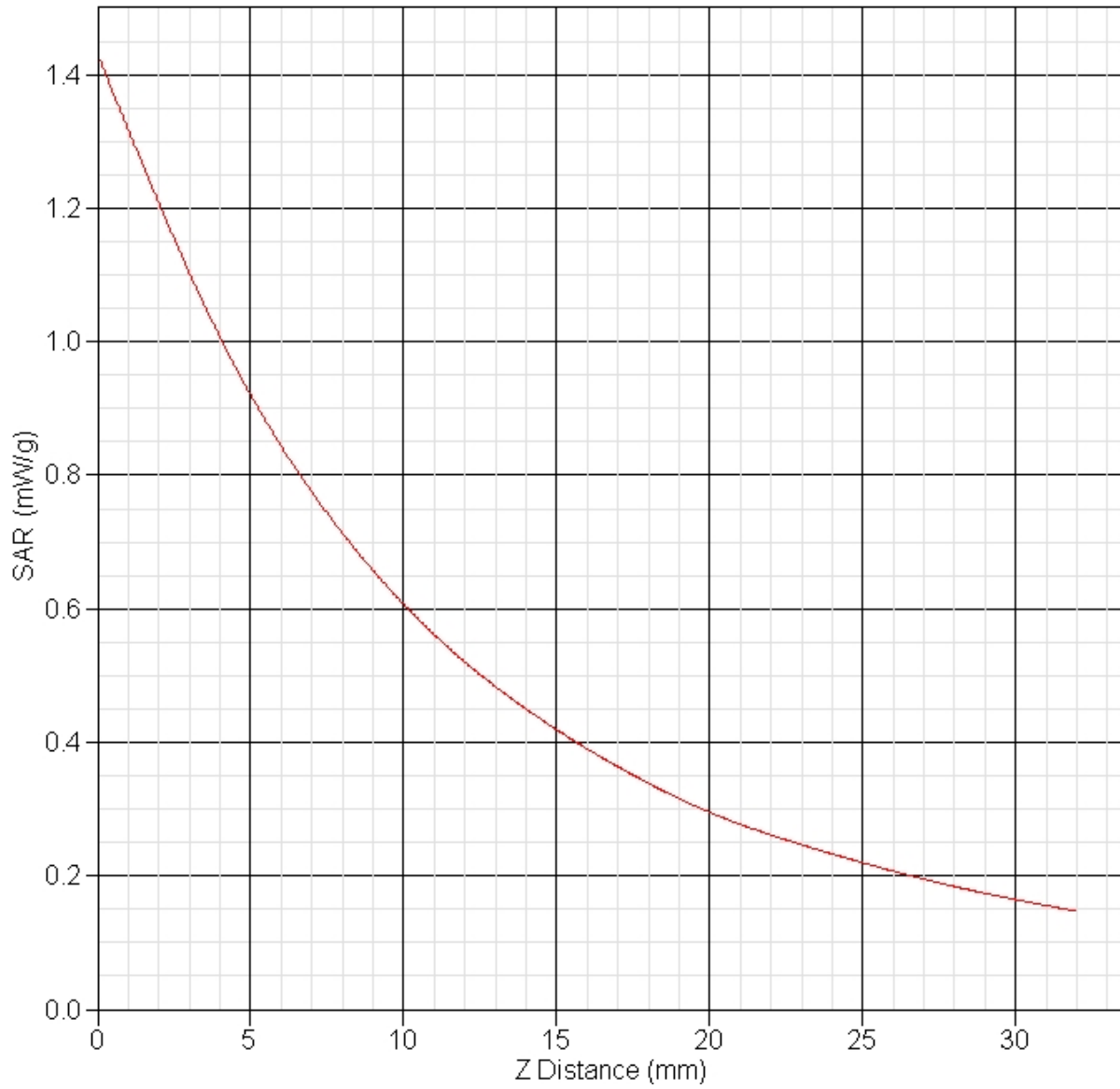
Other Data

DUT Position : Touch
Separation : 15 mm
Channel : Mid



1 gram SAR value : 0.925 W/kg
10 gram SAR value : 0.583 W/kg
Area Scan Peak SAR : 1.014 W/kg
Zoom Scan Peak SAR : 1.431 W/kg

SAR-Z Axis
at Hotspot x:0.25 y:-0.15



SAR Test Report

By Operator : Jay
Measurement Date : 09-Aug-2010
Starting Time : 09-Aug-2010 07:57:44 AM
End Time : 09-Aug-2010 08:10:46 AM
Scanning Time : 782 secs

Product Data

Device Name : Validation
Serial No. : 1900
Type : Dipole
Model : ALS-D-1900-S-2
Frequency : 1900.00 MHz
Max. Transmit Pwr : 0.1 W
Drift Time : 0 min(s)
Length : 68 mm
Width : 3.6 mm
Depth : 39.5 mm
Antenna Type : Internal
Orientation : Touch
Power Drift-Start : 4.453 W/kg
Power Drift-Finish: 4.504 W/kg
Power Drift (%) : 1.134

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 1900
Frequency : 1900.00 MHz
Last Calib. Date : 09-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 49.00 RH%
Epsilon : 52.29 F/m
Sigma : 1.56 S/m
Density : 1000.00 kg/cu. m

Probe Data

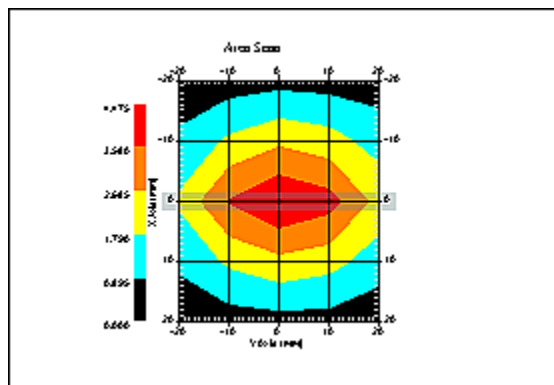
Name : Probe 217 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 1900.00 MHz
Conversion Factor: 4.85
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 09-Aug-2010
Set-up Time : 8:03:12 AM
Area Scan : 5x5x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

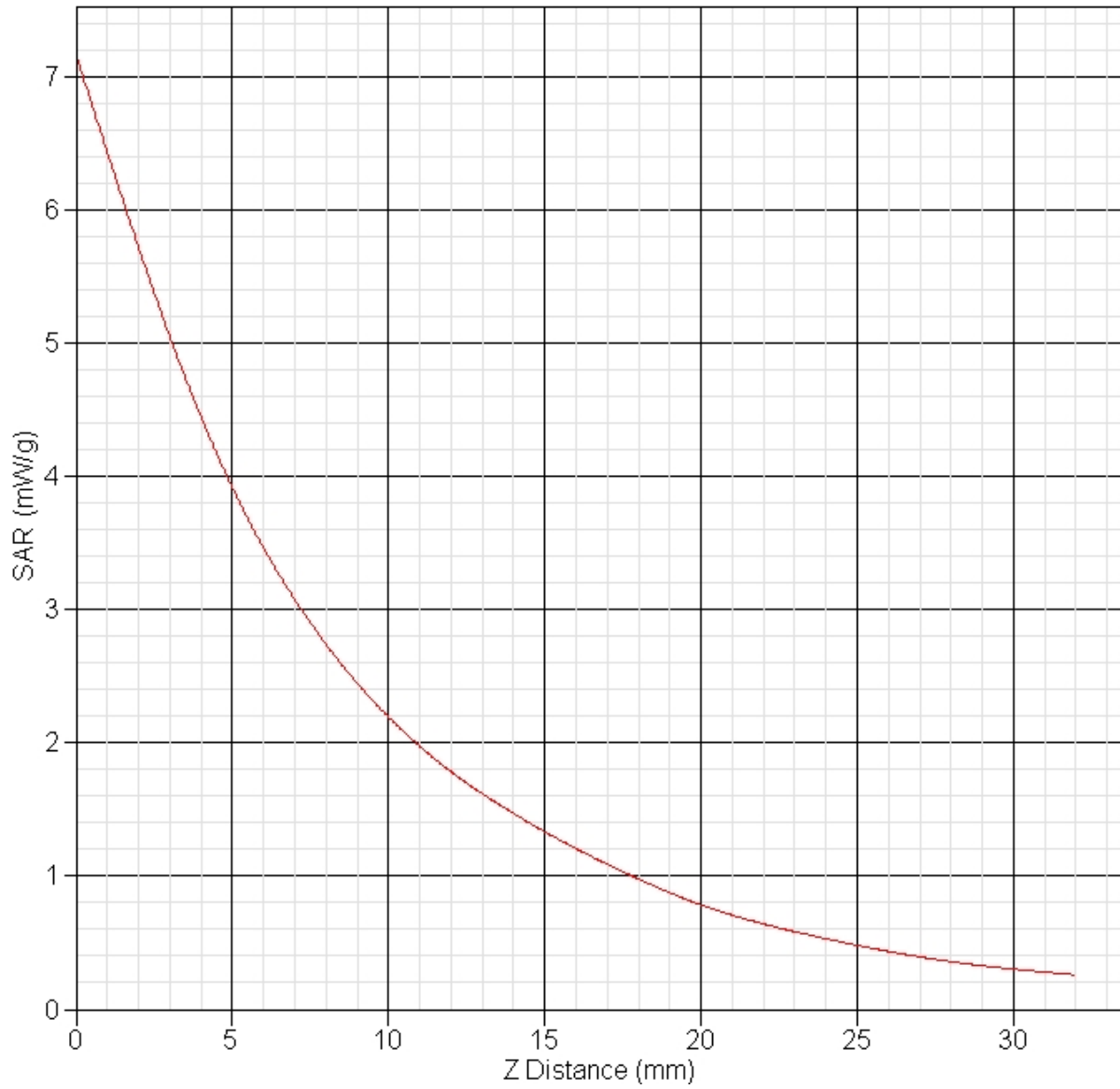
Other Data

DUT Position : Touch
Separation : 10 mm
Channel : Mid



1 gram SAR value : 3.912 W/kg
10 gram SAR value : 1.965 W/kg
Area Scan Peak SAR : 4.391 W/kg
Zoom Scan Peak SAR : 7.126 W/kg

SAR-Z Axis
at Hotspot x:0.25 y:-0.18



SAR Test Report

By Operator : Jay
Measurement Date : 10-Aug-2010
Starting Time : 10-Aug-2010 07:37:55 AM
End Time : 10-Aug-2010 07:52:56 AM
Scanning Time : 778 secs

Product Data

Device Name : Validation
Serial No. : 2600
Type : Dipole
Model : ALS-D-2600-S-2
Frequency : 2600.00 MHz
Max. Transmit Pwr : 0.1 W
Drift Time : 0 min(s)
Length : 51.5 mm
Width : 3.6 mm
Depth : 30.4 mm
Antenna Type : Internal
Orientation : Touch
Power Drift-Start : 5.955 W/kg
Power Drift-Finish: 6.185 W/kg
Power Drift (%) : 3.865

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 2590
Frequency : 2590.00 MHz
Last Calib. Date : 10-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 45.00 RH%
Epsilon : 52.48 F/m
Sigma : 2.16 S/m
Density : 1000.00 kg/cu. m

Probe Data

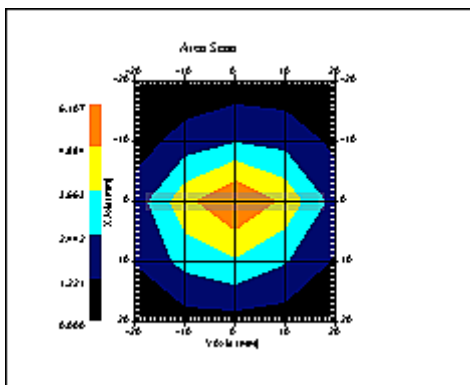
Name : Probe 217 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 2600.00 MHz
Conversion Factor: 3.6
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 10-Aug-2010
Set-up Time : 7:40:13 AM
Area Scan : 5x5x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

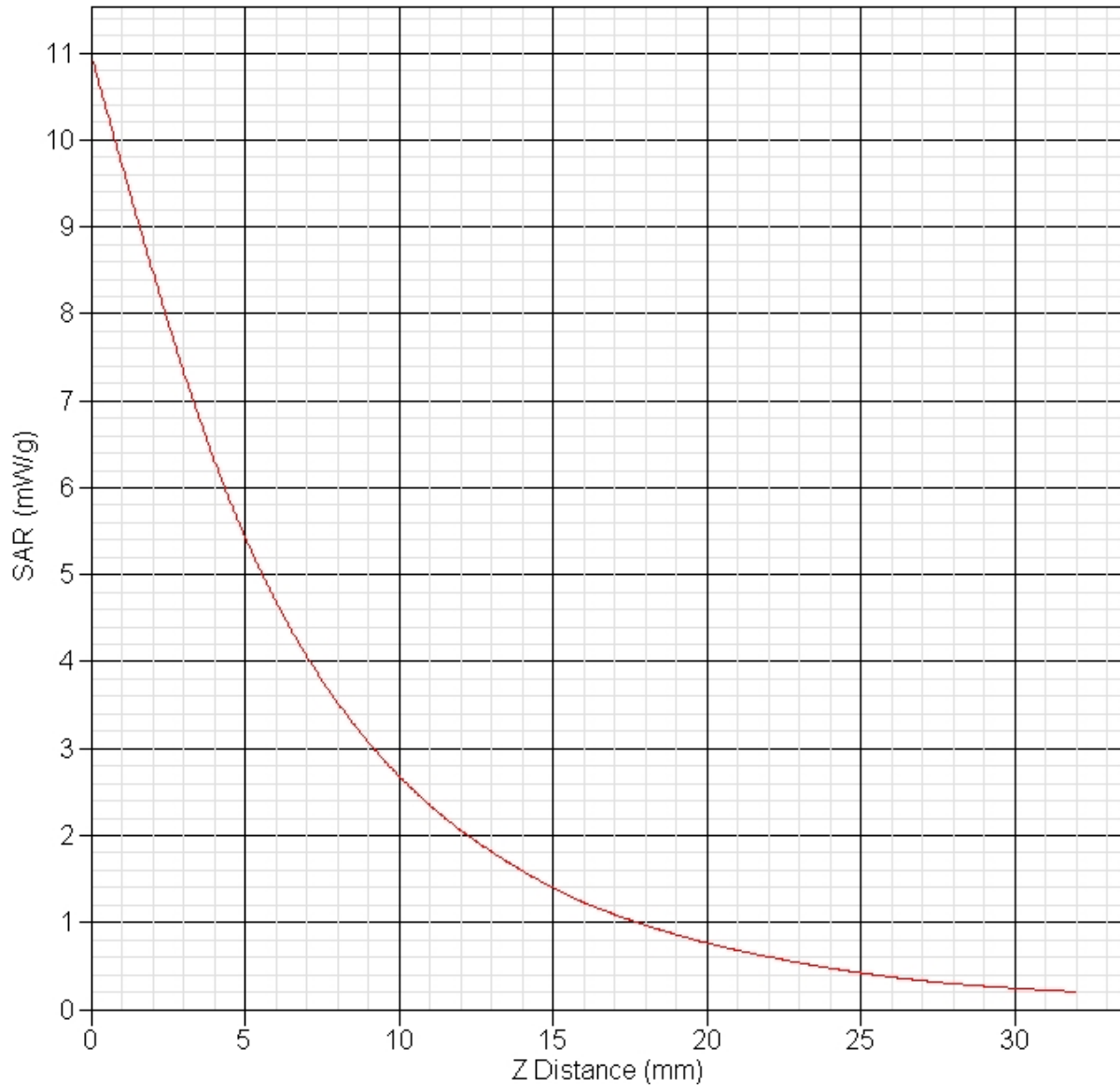
Other Data

DUT Position : Touch
Separation : 10 mm
Channel : Mid



1 gram SAR value : 5.401 W/kg
10 gram SAR value : 2.484 W/kg
Area Scan Peak SAR : 6.107 W/kg
Zoom Scan Peak SAR : 10.990 W/kg

SAR-Z Axis
at Hotspot x:0.30 y:-0.18



SAR Test Report

By Operator : Jay
Measurement Date : 11-Feb-2011
Starting Time : 11-Feb-2011 06:33:22 AM
End Time : 11-Feb-2011 06:46:16 AM
Scanning Time : 774 secs

Product Data

Device Name : Validation
Serial No. : 2600
Type : Dipole
Model : ALS-D-2600-S-2
Frequency : 2600.00 MHz
Max. Transmit Pwr : 0.1 W
Drift Time : 0 min(s)
Length : 48.8 mm
Width : 3.6 mm
Depth : 32.8 mm
Antenna Type : Internal
Orientation : Touch
Power Drift-Start : 6.390 W/kg
Power Drift-Finish: 6.601 W/kg
Power Drift (%) : 3.301

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 2590
Frequency : 2590.00 MHz
Last Calib. Date : 11-Feb-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 45.00 RH%
Epsilon : 52.18 F/m
Sigma : 2.17 S/m
Density : 1000.00 kg/cu. m

Probe Data

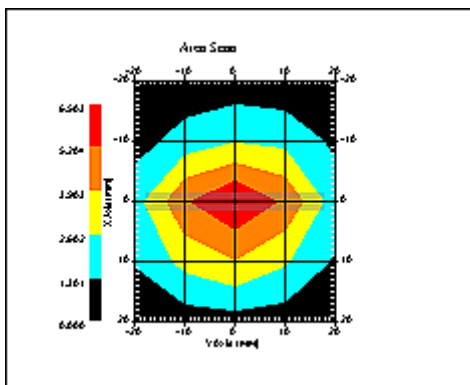
Name : Probe 217 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 2600.00 MHz
Conversion Factor: 3.6
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 16-Aug-2007
Set-up Time : 7:40:13 AM
Area Scan : 5x5x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

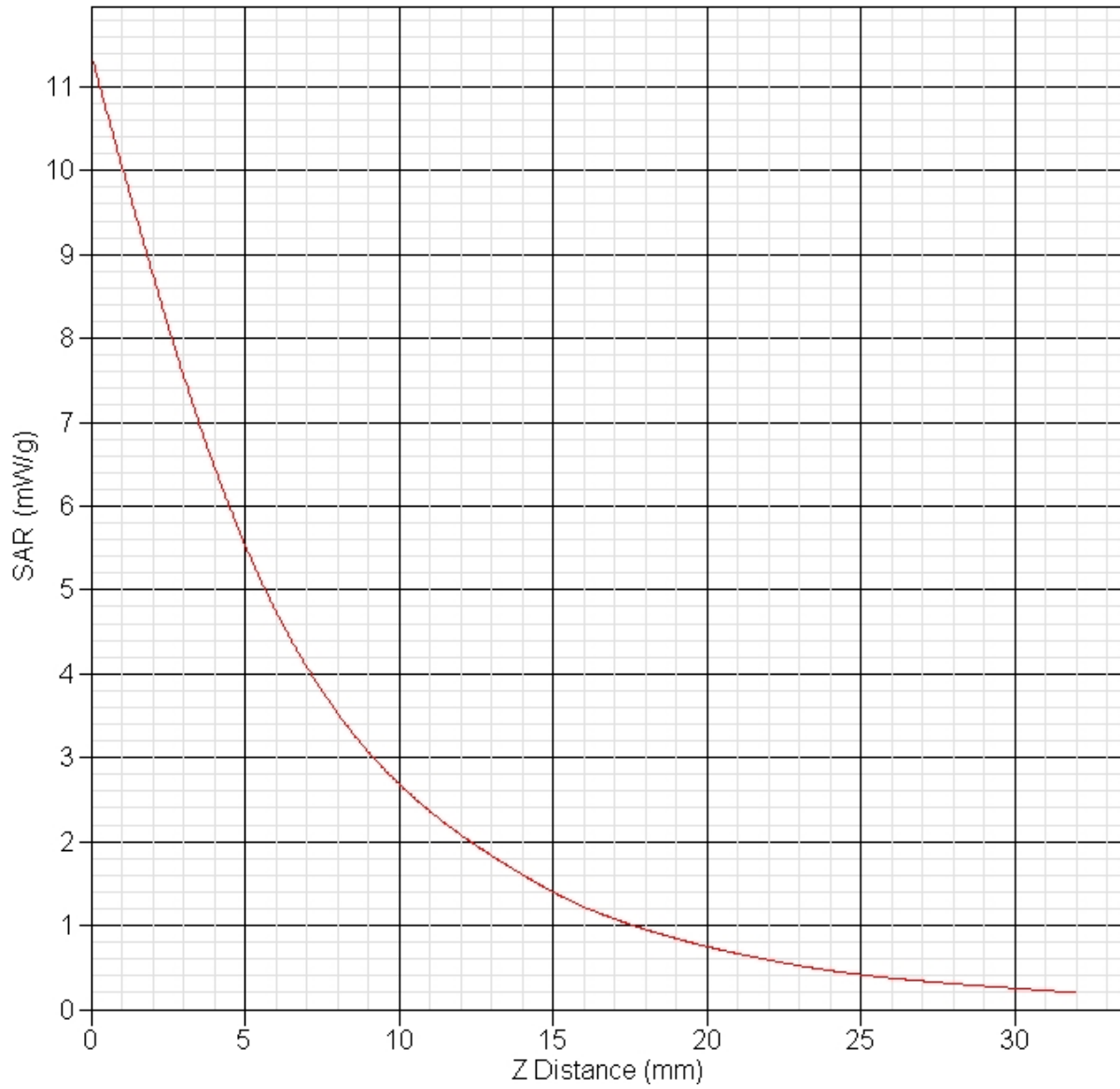
Other Data

DUT Position : Touch
Separation : 10 mm
Channel : Mid



1 gram SAR value : 5.530 W/kg
10 gram SAR value : 2.536 W/kg
Area Scan Peak SAR : 6.503 W/kg
Zoom Scan Peak SAR : 11.390 W/kg

SAR-Z Axis
at Hotspot x:0.24 y:-0.17



Appendix B – SAR Test Data Plots

Note: In all data sheets in Appendix B, the frequency noted in the ‘Product Data’ section is the frequency band which the device was transmitting. This frequency does not refer to the actual frequency and channel of the test. The channel is listed in the ‘Other Data’ section of the data sheet as Low, Mid or High. The actual test frequency is listed in Section 12 in each of the data summary sheets.

SAR Test Report

By Operator : Jay
Measurement Date : 09-Aug-2010
Starting Time : 09-Aug-2010 08:18:12 PM
End Time : 09-Aug-2010 08:33:16 PM
Scanning Time : 904 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : Rev. 0
Model : CC208
Frequency : 835.00 MHz
Max. Transmit Pwr : 0.284 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal
Orientation : Express Card
Power Drift-Start : 1.115 W/kg
Power Drift-Finish: 1.145 W/kg
Power Drift (%) : 2.691

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 835
Frequency : 835.00 MHz
Last Calib. Date : 09-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 40.00 RH%
Epsilon : 55.01 F/m
Sigma : 0.98 S/m
Density : 1000.00 kg/cu. m

Probe Data

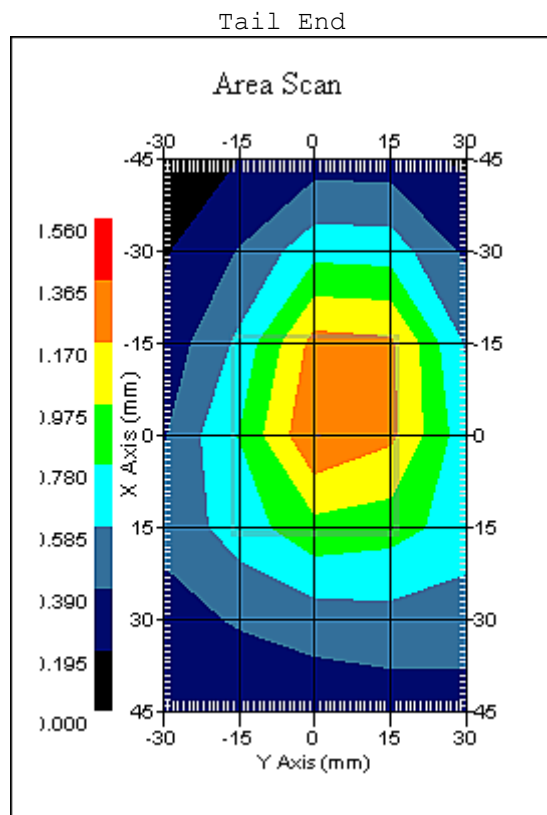
Name : RFEL 217
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 835.00 MHz
Conversion Factor: 6.1
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 09-Aug-2010
Set-up Time : 8:08:32 PM
Area Scan : 7x5x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : Low



1 gram SAR value : 1.397 W/kg
10 gram SAR value : 0.906 W/kg
Area Scan Peak SAR : 1.367 W/kg
Zoom Scan Peak SAR : 2.051 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 09-Aug-2010
Starting Time : 09-Aug-2010 08:33:49 PM
End Time : 09-Aug-2010 08:48:49 PM
Scanning Time : 900 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : Rev. 0
Model : CC208
Frequency : 835.00 MHz
Max. Transmit Pwr : 0.284 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal
Orientation : Express Card
Power Drift-Start : 1.318 W/kg
Power Drift-Finish: 1.342 W/kg
Power Drift (%) : 1.771

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 835
Frequency : 835.00 MHz
Last Calib. Date : 09-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 40.00 RH%
Epsilon : 55.01 F/m
Sigma : 0.98 S/m
Density : 1000.00 kg/cu. m

Probe Data

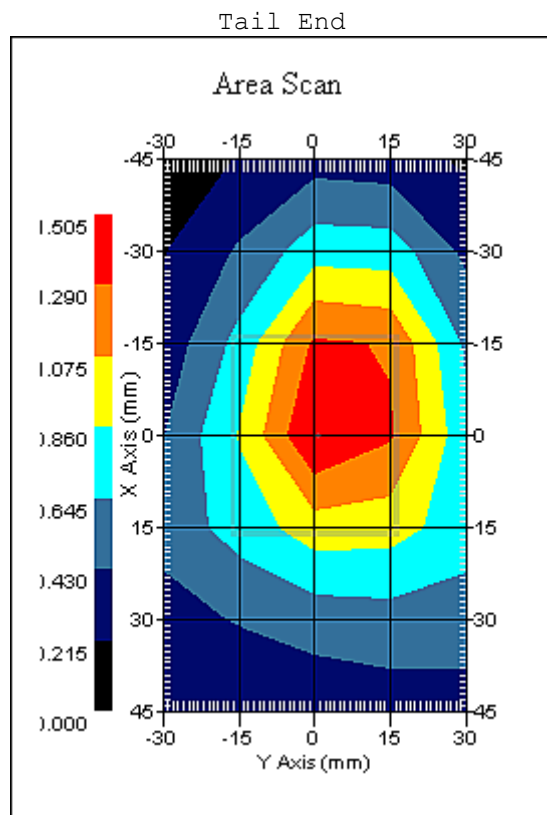
Name : RFEL 217
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 835.00 MHz
Conversion Factor: 6.1
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 09-Aug-2010
Set-up Time : 8:08:32 PM
Area Scan : 7x5x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

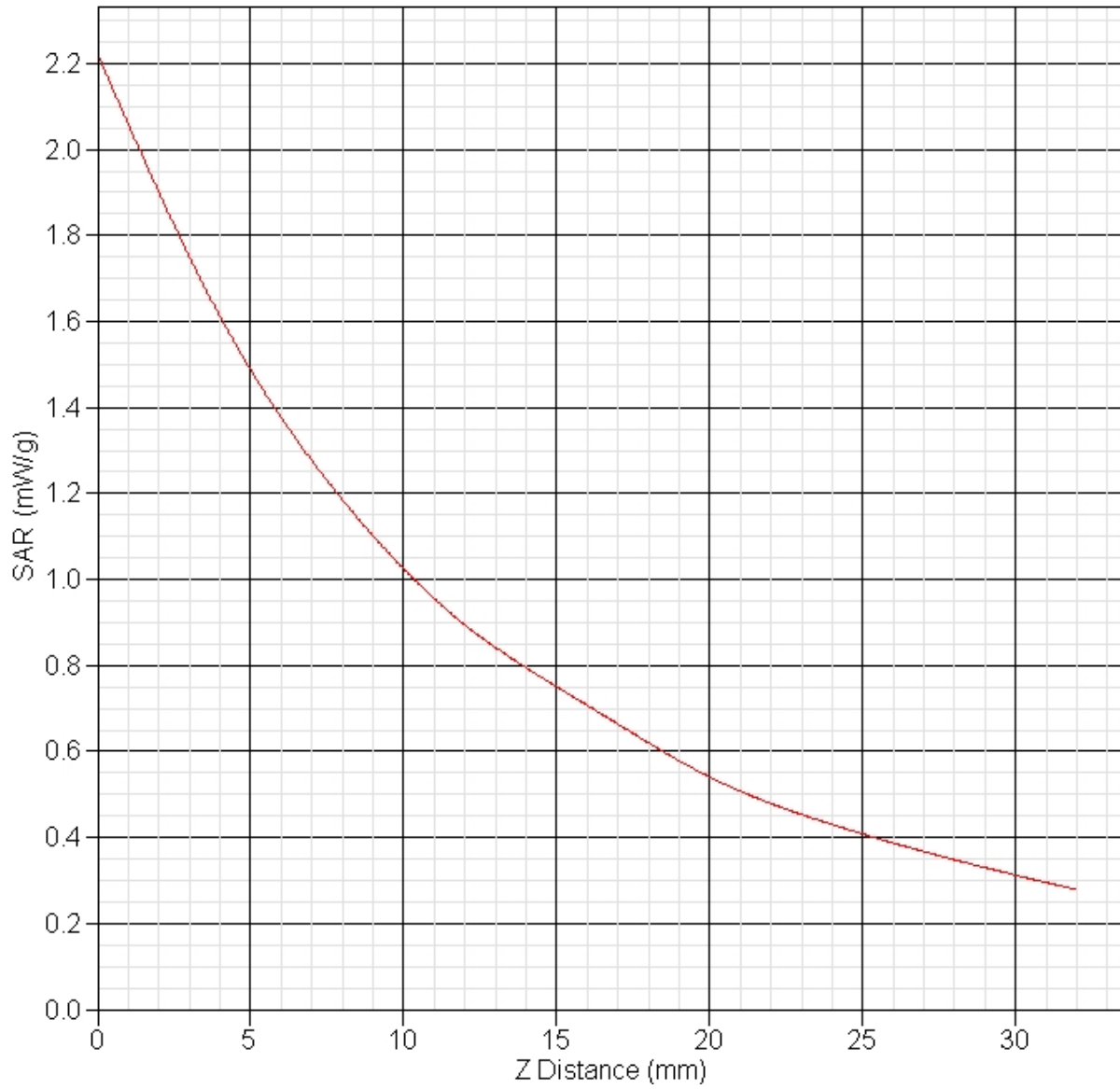
Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : Mid



1 gram SAR value : 1.502 W/kg
10 gram SAR value : 0.972 W/kg
Area Scan Peak SAR : 1.505 W/kg
Zoom Scan Peak SAR : 2.222 W/kg

SAR-Z Axis
at Hotspot x:7.08 y:7.89



SAR Test Report

By Operator : Jay
Measurement Date : 09-Aug-2010
Starting Time : 09-Aug-2010 08:49:23 PM
End Time : 09-Aug-2010 09:04:30 PM
Scanning Time : 907 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : Rev. 0
Model : CC208
Frequency : 835.00 MHz
Max. Transmit Pwr : 0.284 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal
Orientation : Express Card
Power Drift-Start : 1.163 W/kg
Power Drift-Finish: 1.127 W/kg
Power Drift (%) : -3.130

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 835
Frequency : 835.00 MHz
Last Calib. Date : 09-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 40.00 RH%
Epsilon : 55.01 F/m
Sigma : 0.98 S/m
Density : 1000.00 kg/cu. m

Probe Data

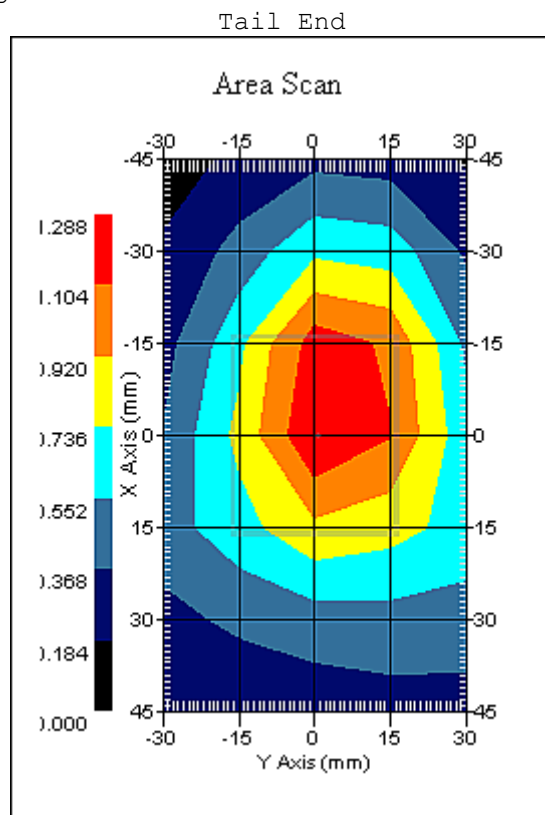
Name : RFEL 217
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 835.00 MHz
Conversion Factor: 6.1
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 09-Aug-2010
Set-up Time : 8:08:32 PM
Area Scan : 7x5x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : High



1 gram SAR value : 1.284 W/kg
10 gram SAR value : 0.845 W/kg
Area Scan Peak SAR : 1.288 W/kg
Zoom Scan Peak SAR : 1.871 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 09-Aug-2010
Starting Time : 09-Aug-2010 09:06:16 PM
End Time : 09-Aug-2010 09:21:20 PM
Scanning Time : 904 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : Rev. A
Model : CC208
Frequency : 835.00 MHz
Max. Transmit Pwr : 0.285 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal
Orientation : Express Card
Power Drift-Start : 1.003 W/kg
Power Drift-Finish: 0.953 W/kg
Power Drift (%) : -4.958

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 835
Frequency : 835.00 MHz
Last Calib. Date : 09-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 40.00 RH%
Epsilon : 55.01 F/m
Sigma : 0.98 S/m
Density : 1000.00 kg/cu. m

Probe Data

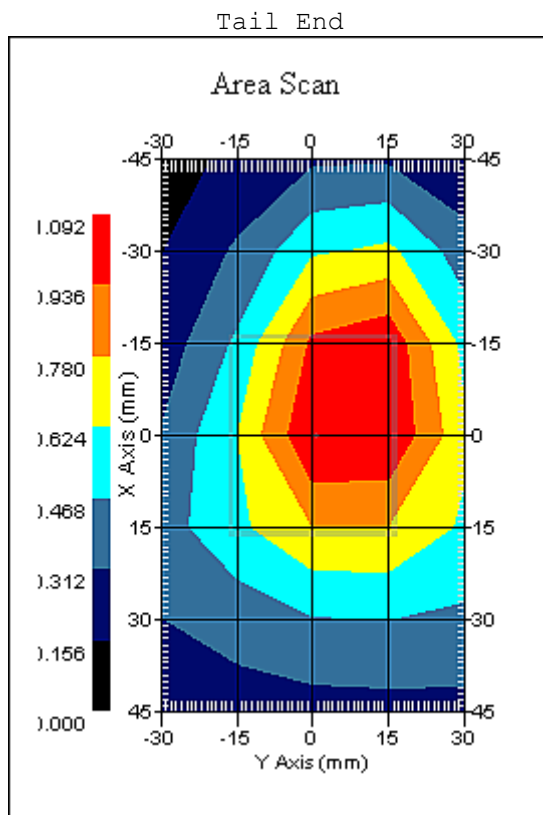
Name : RFEL 217
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 835.00 MHz
Conversion Factor: 6.1
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 09-Aug-2010
Set-up Time : 8:08:32 PM
Area Scan : 7x5x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : Low



PC Tail

1 gram SAR value : 1.249 W/kg
10 gram SAR value : 0.814 W/kg
Area Scan Peak SAR : 1.090 W/kg
Zoom Scan Peak SAR : 1.671 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 09-Aug-2010
Starting Time : 09-Aug-2010 09:22:20 PM
End Time : 09-Aug-2010 09:37:15 PM
Scanning Time : 895 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : Rev. A
Model : CC208
Frequency : 835.00 MHz
Max. Transmit Pwr : 0.285 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal
Orientation : Express Card
Power Drift-Start : 1.033 W/kg
Power Drift-Finish: 1.050 W/kg
Power Drift (%) : 1.578

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 835
Frequency : 835.00 MHz
Last Calib. Date : 09-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 40.00 RH%
Epsilon : 55.01 F/m
Sigma : 0.98 S/m
Density : 1000.00 kg/cu. m

Probe Data

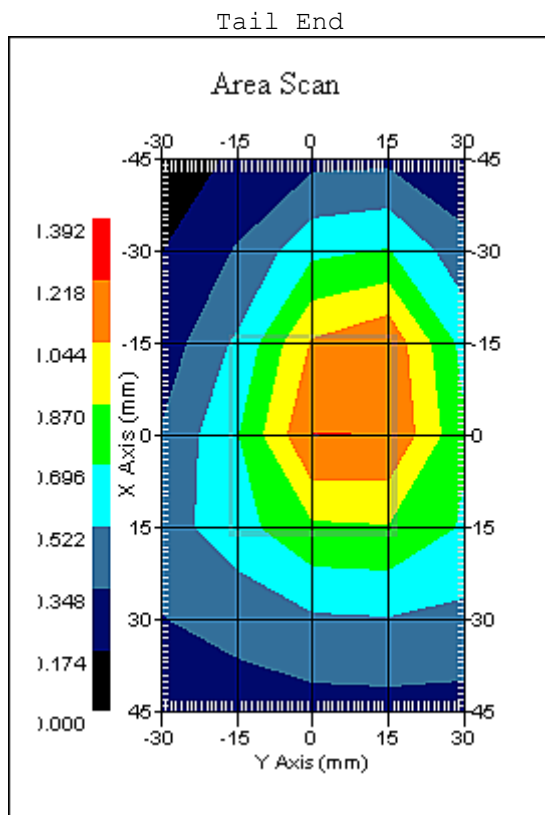
Name : RFEL 217
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 835.00 MHz
Conversion Factor: 6.1
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 1
 Scan Type : Complete
 Tissue Temp. : 20.00 °C
 Ambient Temp. : 23.00 °C
 Set-up Date : 09-Aug-2010
 Set-up Time : 8:08:32 PM
 Area Scan : 7x5x1 : Measurement x=15mm, y=15mm, z=4mm
 Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Express Card
 Separation : 10 mm
 Channel : Mid



1 gram SAR value : 1.378 W/kg
 10 gram SAR value : 0.897 W/kg
 Area Scan Peak SAR : 1.221 W/kg
 Zoom Scan Peak SAR : 1.861 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 09-Aug-2010
Starting Time : 09-Aug-2010 09:37:50 PM
End Time : 09-Aug-2010 09:52:50 PM
Scanning Time : 900 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : Rev. A
Model : CC208
Frequency : 835.00 MHz
Max. Transmit Pwr : 0.285 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal
Orientation : Express Card
Power Drift-Start : 0.951 W/kg
Power Drift-Finish: 0.958 W/kg
Power Drift (%) : 0.743

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 835
Frequency : 835.00 MHz
Last Calib. Date : 09-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 40.00 RH%
Epsilon : 55.01 F/m
Sigma : 0.98 S/m
Density : 1000.00 kg/cu. m

Probe Data

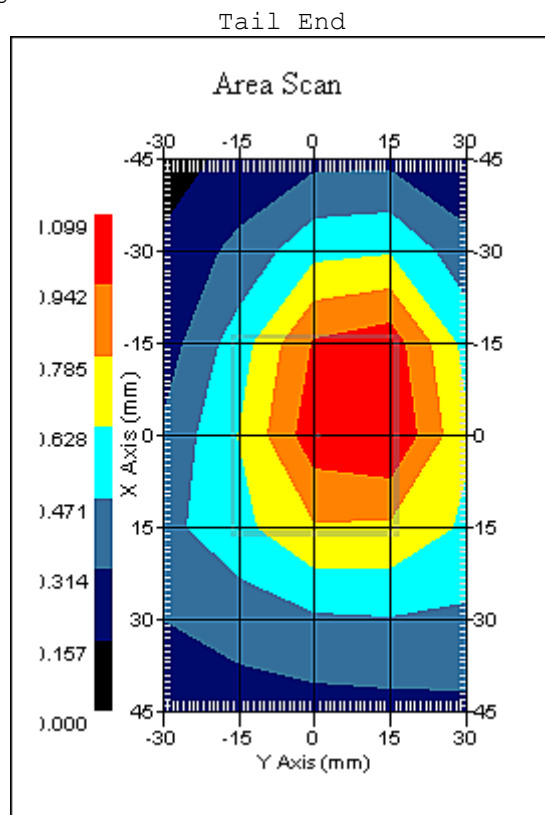
Name : RFEL 217
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 835.00 MHz
Conversion Factor: 6.1
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 09-Aug-2010
Set-up Time : 8:08:32 PM
Area Scan : 7x5x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : High



1 gram SAR value : 1.128 W/kg
10 gram SAR value : 0.756 W/kg
Area Scan Peak SAR : 1.097 W/kg
Zoom Scan Peak SAR : 1.621 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 09-Aug-2010
Starting Time : 09-Aug-2010 09:55:51 PM
End Time : 09-Aug-2010 10:10:44 PM
Scanning Time : 893 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : Rev. 0
Model : CC208
Frequency : 835.00 MHz
Max. Transmit Pwr : 0.284 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal
Orientation : PC Card
Power Drift-Start : 0.647 W/kg
Power Drift-Finish: 0.639 W/kg
Power Drift (%) : -1.214

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 835
Frequency : 835.00 MHz
Last Calib. Date : 09-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 40.00 RH%
Epsilon : 55.01 F/m
Sigma : 0.98 S/m
Density : 1000.00 kg/cu. m

Probe Data

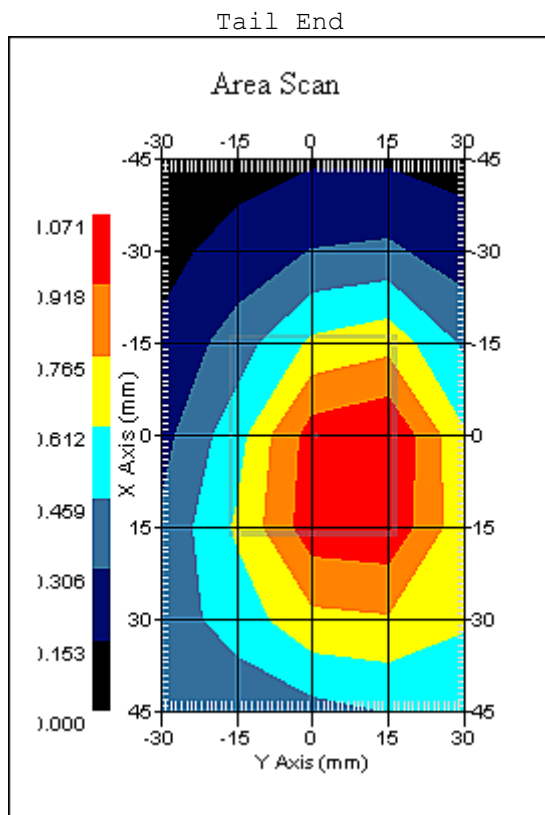
Name : RFEL 217
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 835.00 MHz
Conversion Factor: 6.1
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 09-Aug-2010
Set-up Time : 8:08:32 PM
Area Scan : 7x5x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : PC Card
Separation : 10 mm
Channel : Mid



1 gram SAR value : 1.071 W/kg
10 gram SAR value : 0.727 W/kg
Area Scan Peak SAR : 1.068 W/kg
Zoom Scan Peak SAR : 1.531 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 09-Aug-2010
Starting Time : 09-Aug-2010 06:08:34 PM
End Time : 09-Aug-2010 06:21:34 PM
Scanning Time : 780 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : Rev. 0
Model : CC208
Frequency : 1900.00 MHz
Max. Transmit Pwr : 0.253 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal
Orientation : Express Card
Power Drift-Start : 0.974 W/kg
Power Drift-Finish: 0.979 W/kg
Power Drift (%) : 0.577

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 1900
Frequency : 1900.00 MHz
Last Calib. Date : 09-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 36.00 RH%
Epsilon : 52.29 F/m
Sigma : 1.56 S/m
Density : 1000.00 kg/cu. m

Probe Data

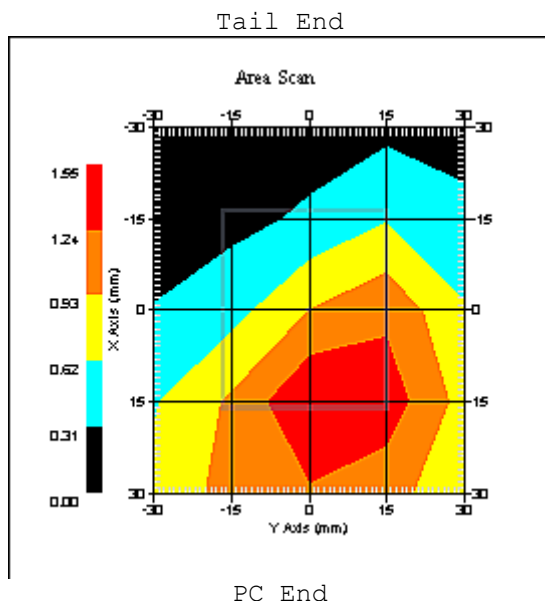
Name : RFEL 217
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 1900.00 MHz
Conversion Factor: 4.85
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 09-Aug-2010
Set-up Time : 5:10:22 PM
Area Scan : 5x5x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

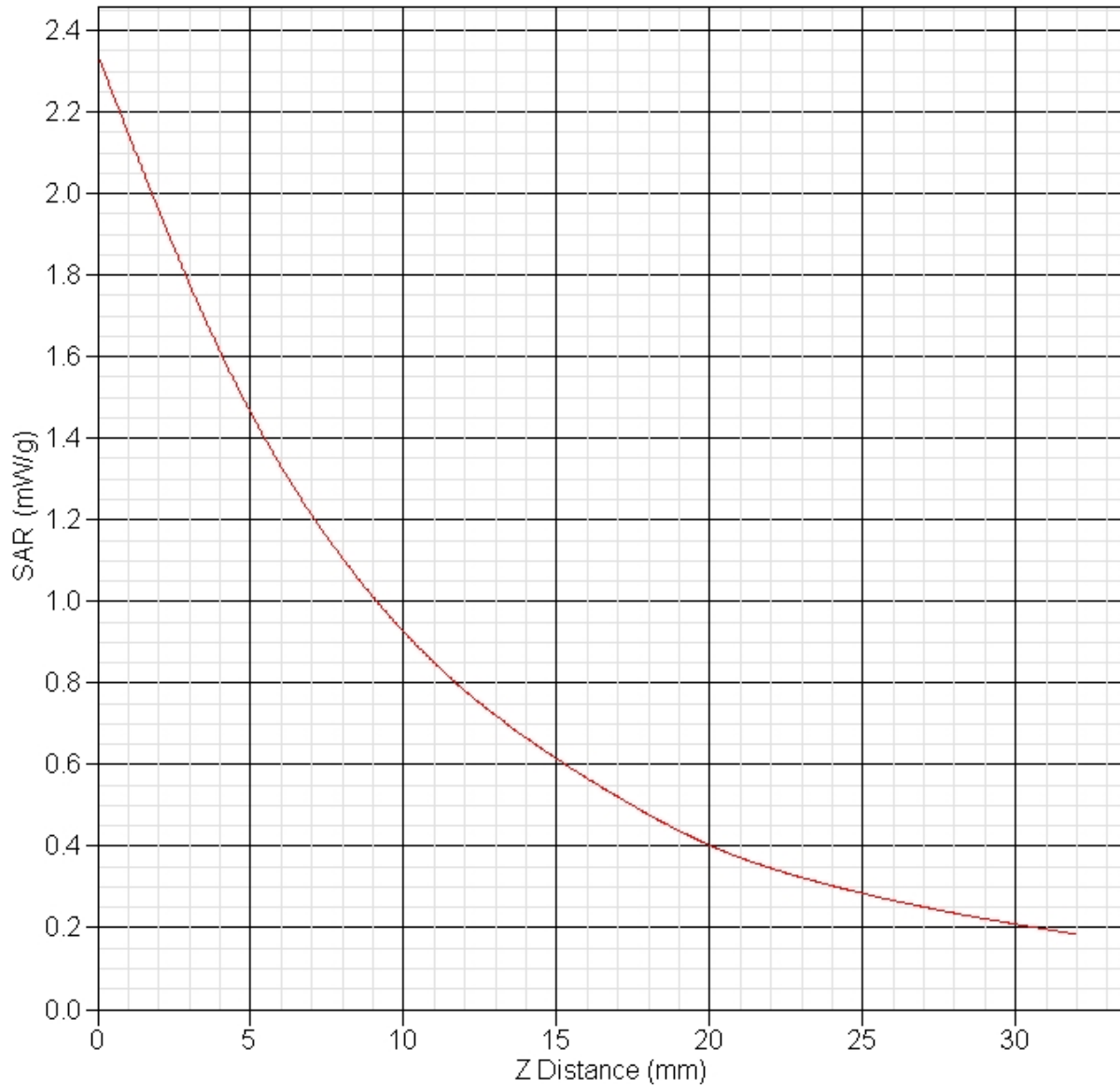
Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : Low



1 gram SAR value : 1.524 W/kg
10 gram SAR value : 0.923 W/kg
Area Scan Peak SAR : 1.549 W/kg
Zoom Scan Peak SAR : 2.342 W/kg

SAR-Z Axis
at Hotspot x:15.07 y:7.86



SAR Test Report

By Operator : Jay
Measurement Date : 09-Aug-2010
Starting Time : 09-Aug-2010 06:23:17 PM
End Time : 09-Aug-2010 06:36:11 PM
Scanning Time : 774 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : Rev. 0
Model : CC208
Frequency : 1900.00 MHz
Max. Transmit Pwr : 0.253 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal
Orientation : Express Card
Power Drift-Start : 0.876 W/kg
Power Drift-Finish: 0.868 W/kg
Power Drift (%) : -0.950

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 1900
Frequency : 1900.00 MHz
Last Calib. Date : 09-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 36.00 RH%
Epsilon : 52.29 F/m
Sigma : 1.56 S/m
Density : 1000.00 kg/cu. m

Probe Data

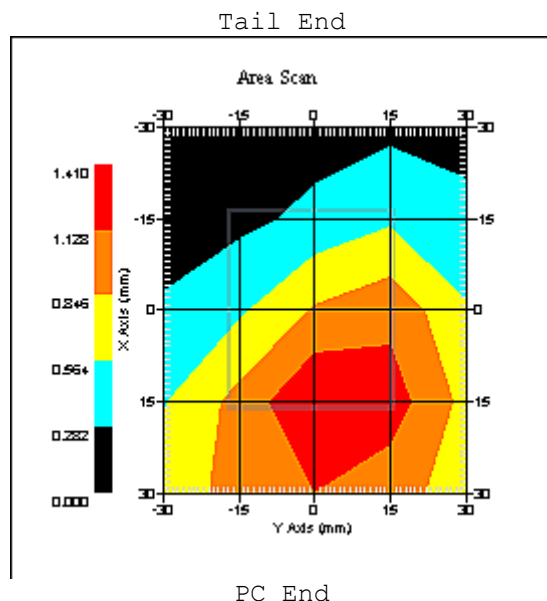
Name : RFEL 217
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 1900.00 MHz
Conversion Factor: 4.85
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 09-Aug-2010
Set-up Time : 6:22:58 PM
Area Scan : 5x5x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : Mid



1 gram SAR value : 1.371 W/kg
10 gram SAR value : 0.829 W/kg
Area Scan Peak SAR : 1.409 W/kg
Zoom Scan Peak SAR : 2.131 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 09-Aug-2010
Starting Time : 09-Aug-2010 06:37:08 PM
End Time : 09-Aug-2010 06:50:05 PM
Scanning Time : 777 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : Rev. 0
Model : CC208
Frequency : 1900.00 MHz
Max. Transmit Pwr : 0.253 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal
Orientation : Express Card
Power Drift-Start : 0.739 W/kg
Power Drift-Finish: 0.753 W/kg
Power Drift (%) : 1.804

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 1900
Frequency : 1900.00 MHz
Last Calib. Date : 09-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 36.00 RH%
Epsilon : 52.29 F/m
Sigma : 1.56 S/m
Density : 1000.00 kg/cu. m

Probe Data

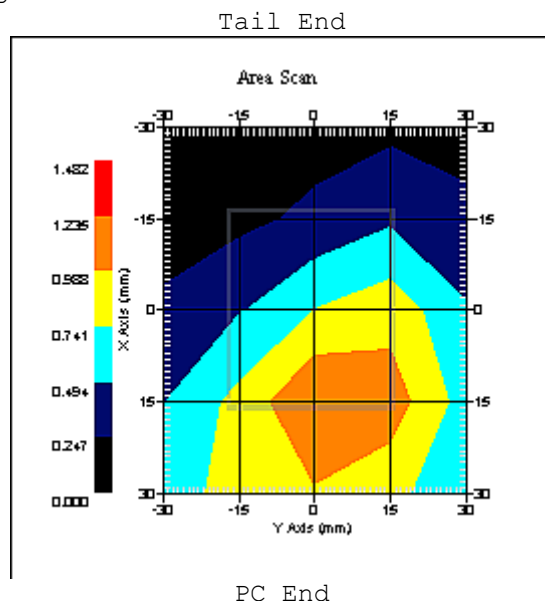
Name : RFEL 217
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 1900.00 MHz
Conversion Factor: 4.85
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 09-Aug-2010
Set-up Time : 6:22:58 PM
Area Scan : 5x5x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : High



1 gram SAR value : 1.185 W/kg
10 gram SAR value : 0.727 W/kg
Area Scan Peak SAR : 1.236 W/kg
Zoom Scan Peak SAR : 1.901 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 09-Aug-2010
Starting Time : 09-Aug-2010 06:53:46 PM
End Time : 09-Aug-2010 07:06:45 PM
Scanning Time : 779 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : Rev. A
Model : CC208
Frequency : 1900.00 MHz
Max. Transmit Pwr : 0.255 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal
Orientation : Express Card
Power Drift-Start : 1.010 W/kg
Power Drift-Finish: 0.960 W/kg
Power Drift (%) : -4.882

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 1900
Frequency : 1900.00 MHz
Last Calib. Date : 09-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 36.00 RH%
Epsilon : 52.29 F/m
Sigma : 1.56 S/m
Density : 1000.00 kg/cu. m

Probe Data

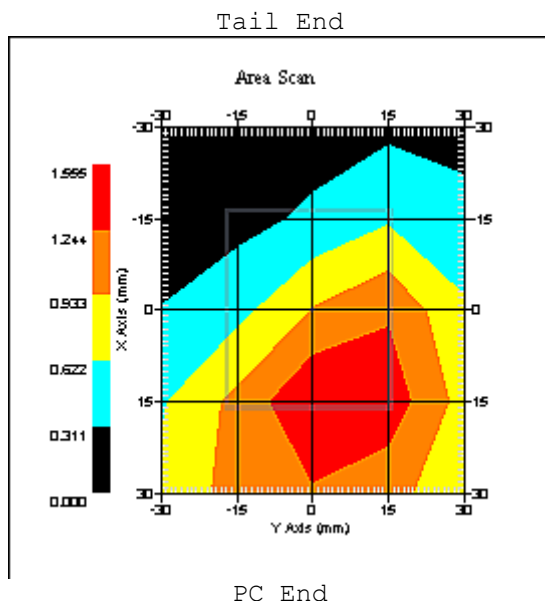
Name : RFEL 217
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 1900.00 MHz
Conversion Factor: 4.85
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 09-Aug-2010
Set-up Time : 6:22:58 PM
Area Scan : 5x5x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : Low



1 gram SAR value : 1.522 W/kg
10 gram SAR value : 0.916 W/kg
Area Scan Peak SAR : 1.554 W/kg
Zoom Scan Peak SAR : 2.402 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 09-Aug-2010
Starting Time : 09-Aug-2010 07:07:31 PM
End Time : 09-Aug-2010 07:20:30 PM
Scanning Time : 779 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : Rev. A
Model : CC208
Frequency : 1900.00 MHz
Max. Transmit Pwr : 0.255 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal
Orientation : Express Card
Power Drift-Start : 0.865 W/kg
Power Drift-Finish: 0.853 W/kg
Power Drift (%) : -1.438

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 1900
Frequency : 1900.00 MHz
Last Calib. Date : 09-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 36.00 RH%
Epsilon : 52.29 F/m
Sigma : 1.56 S/m
Density : 1000.00 kg/cu. m

Probe Data

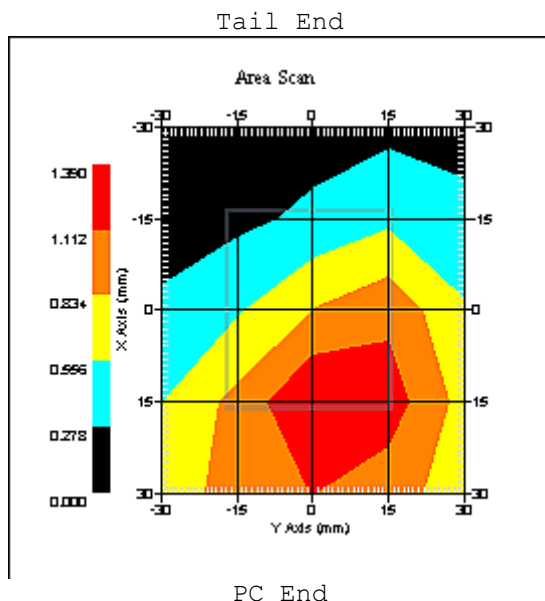
Name : RFEL 217
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 1900.00 MHz
Conversion Factor: 4.85
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 1
 Scan Type : Complete
 Tissue Temp. : 20.00 °C
 Ambient Temp. : 23.00 °C
 Set-up Date : 09-Aug-2010
 Set-up Time : 6:22:58 PM
 Area Scan : 5x5x1 : Measurement x=15mm, y=15mm, z=4mm
 Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Express Card
 Separation : 10 mm
 Channel : Mid



1 gram SAR value : 1.356 W/kg
 10 gram SAR value : 0.826 W/kg
 Area Scan Peak SAR : 1.390 W/kg
 Zoom Scan Peak SAR : 2.121 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 09-Aug-2010
Starting Time : 09-Aug-2010 07:21:01 PM
End Time : 09-Aug-2010 07:33:55 PM
Scanning Time : 774 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : Rev. A
Model : CC208
Frequency : 1900.00 MHz
Max. Transmit Pwr : 0.255 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal
Orientation : Express Card
Power Drift-Start : 0.766 W/kg
Power Drift-Finish: 0.746 W/kg
Power Drift (%) : -2.581

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 1900
Frequency : 1900.00 MHz
Last Calib. Date : 09-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 36.00 RH%
Epsilon : 52.29 F/m
Sigma : 1.56 S/m
Density : 1000.00 kg/cu. m

Probe Data

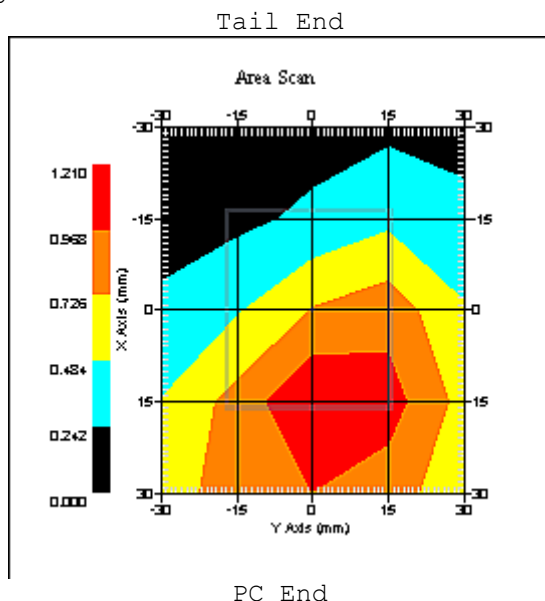
Name : RFEL 217
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 1900.00 MHz
Conversion Factor: 4.85
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 09-Aug-2010
Set-up Time : 6:22:58 PM
Area Scan : 5x5x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : High



1 gram SAR value : 1.189 W/kg
10 gram SAR value : 0.711 W/kg
Area Scan Peak SAR : 1.209 W/kg
Zoom Scan Peak SAR : 1.981 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 09-Aug-2010
Starting Time : 09-Aug-2010 07:52:36 PM
End Time : 09-Aug-2010 08:07:40 PM
Scanning Time : 904 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : Rev. 0
Model : CC208
Frequency : 1900.00 MHz
Max. Transmit Pwr : 0.253 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal
Orientation : PC Card
Power Drift-Start : 0.534 W/kg
Power Drift-Finish: 0.540 W/kg
Power Drift (%) : 1.162

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 1900
Frequency : 1900.00 MHz
Last Calib. Date : 09-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 36.00 RH%
Epsilon : 52.29 F/m
Sigma : 1.56 S/m
Density : 1000.00 kg/cu. m

Probe Data

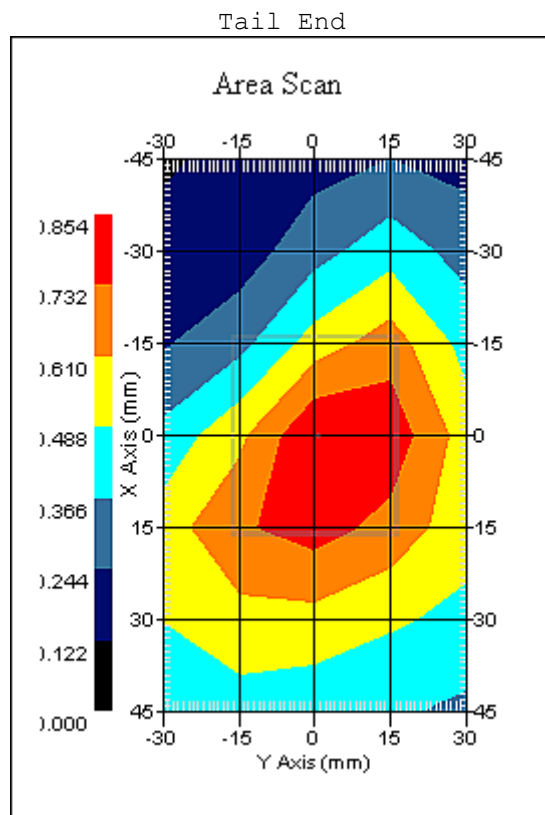
Name : RFEL 217
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 1900.00 MHz
Conversion Factor: 4.85
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 09-Aug-2010
Set-up Time : 6:22:58 PM
Area Scan : 7x5x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : PC Card
Separation : 10 mm
Channel : Low



1 gram SAR value : 0.840 W/kg
10 gram SAR value : 0.532 W/kg
Area Scan Peak SAR : 0.853 W/kg
Zoom Scan Peak SAR : 1.301 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 10-Aug-2010
Starting Time : 10-Aug-2010 02:48:48 PM
End Time : 10-Aug-2010 03:07:16 PM
Scanning Time : 1108 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : 5 MHz QPSK $\frac{1}{2}$ PUSC
Model : CC208
Frequency : 2600.00 MHz
Max. Transmit Pwr : 0.211 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal - Antenna 1
Orientation : Express Card
Power Drift-Start : 0.407 W/kg
Power Drift-Finish: 0.391 W/kg
Power Drift (%) : -3.872

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 2500
Frequency : 2500.00 MHz
Last Calib. Date : 10-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 45.00 RH%
Epsilon : 52.68 F/m
Sigma : 2.01 S/m
Density : 1000.00 kg/cu. m

Probe Data

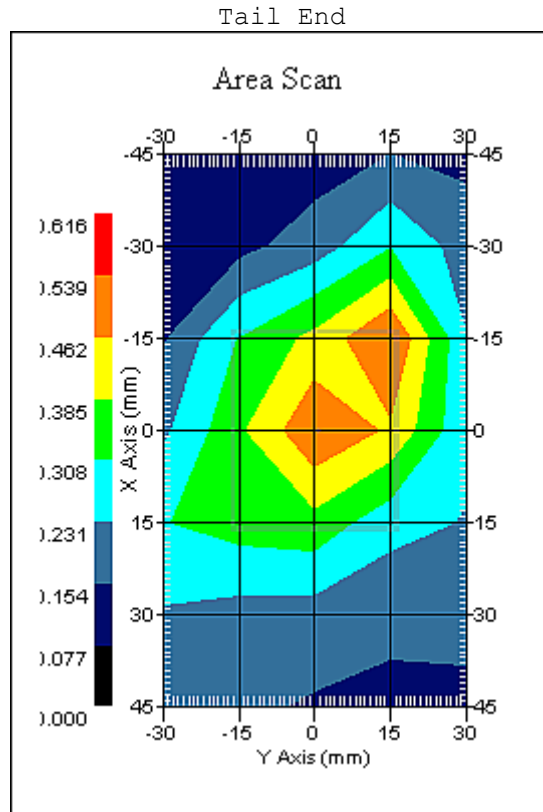
Name : Probe 217 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 2600.00 MHz
Conversion Factor: 3.6
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 3.2
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 10-Aug-2010
Set-up Time : 5:10:22 PM
Area Scan : 7x5x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : Low



1 gram SAR value : 0.550 W/kg
10 gram SAR value : 0.333 W/kg
Area Scan Peak SAR : 0.532 W/kg
Zoom Scan Peak SAR : 0.944 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 10-Aug-2010
Starting Time : 10-Aug-2010 03:29:44 PM
End Time : 10-Aug-2010 03:47:30 PM
Scanning Time : 1066 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : 5 MHz QPSK $\frac{1}{2}$ PUSC
Model : CC208
Frequency : 2600.00 MHz
Max. Transmit Pwr : 0.211 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal - Antenna 2
Orientation : Express Card
Power Drift-Start : 0.681 W/kg
Power Drift-Finish: 0.698 W/kg
Power Drift (%) : 2.473

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 2500
Frequency : 2500.00 MHz
Last Calib. Date : 10-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 45.00 RH%
Epsilon : 52.68 F/m
Sigma : 2.01 S/m
Density : 1000.00 kg/cu. m

Probe Data

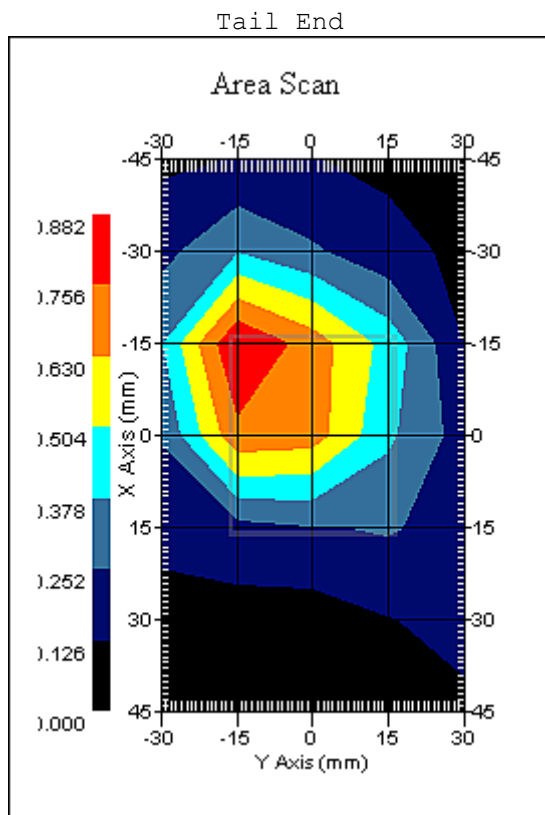
Name : Probe 217 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 2600.00 MHz
Conversion Factor: 3.6
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 3.2
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 10-Aug-2010
Set-up Time : 5:10:22 PM
Area Scan : 7x5x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : Low



1 gram SAR value : 0.924 W/kg
10 gram SAR value : 0.474 W/kg
Area Scan Peak SAR : 0.864 W/kg
Zoom Scan Peak SAR : 1.780 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 10-Aug-2010
Starting Time : 10-Aug-2010 04:33:08 PM
End Time : 10-Aug-2010 04:51:28 PM
Scanning Time : 1100 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : 5 MHz QPSK $\frac{1}{2}$ PUSC
Model : CC208
Frequency : 2600.00 MHz
Max. Transmit Pwr : 0.211 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal - Antenna 2
Orientation : Express Card
Power Drift-Start : 0.880 W/kg
Power Drift-Finish: 0.868 W/kg
Power Drift (%) : -1.451

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 2590
Frequency : 2590.00 MHz
Last Calib. Date : 10-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 45.00 RH%
Epsilon : 52.48 F/m
Sigma : 2.16 S/m
Density : 1000.00 kg/cu. m

Probe Data

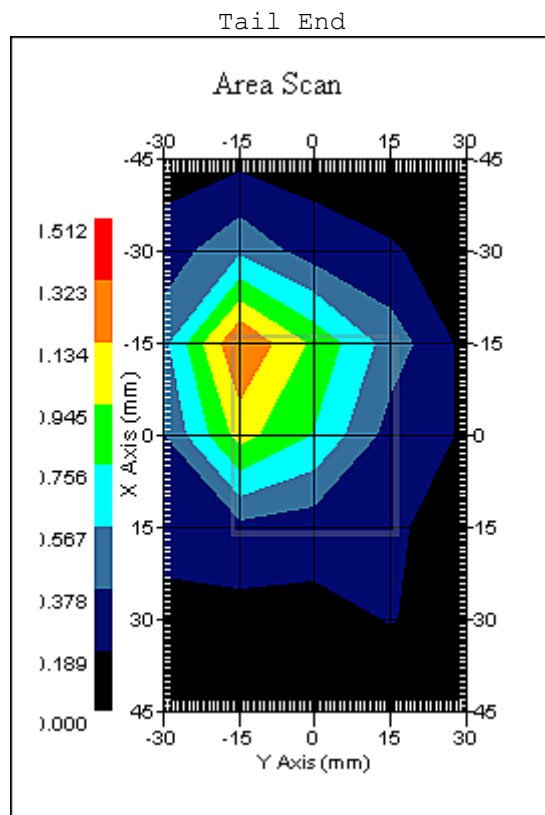
Name : Probe 217 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 2600.00 MHz
Conversion Factor: 3.6
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 3.2
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 10-Aug-2010
Set-up Time : 5:10:22 PM
Area Scan : 7x5x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

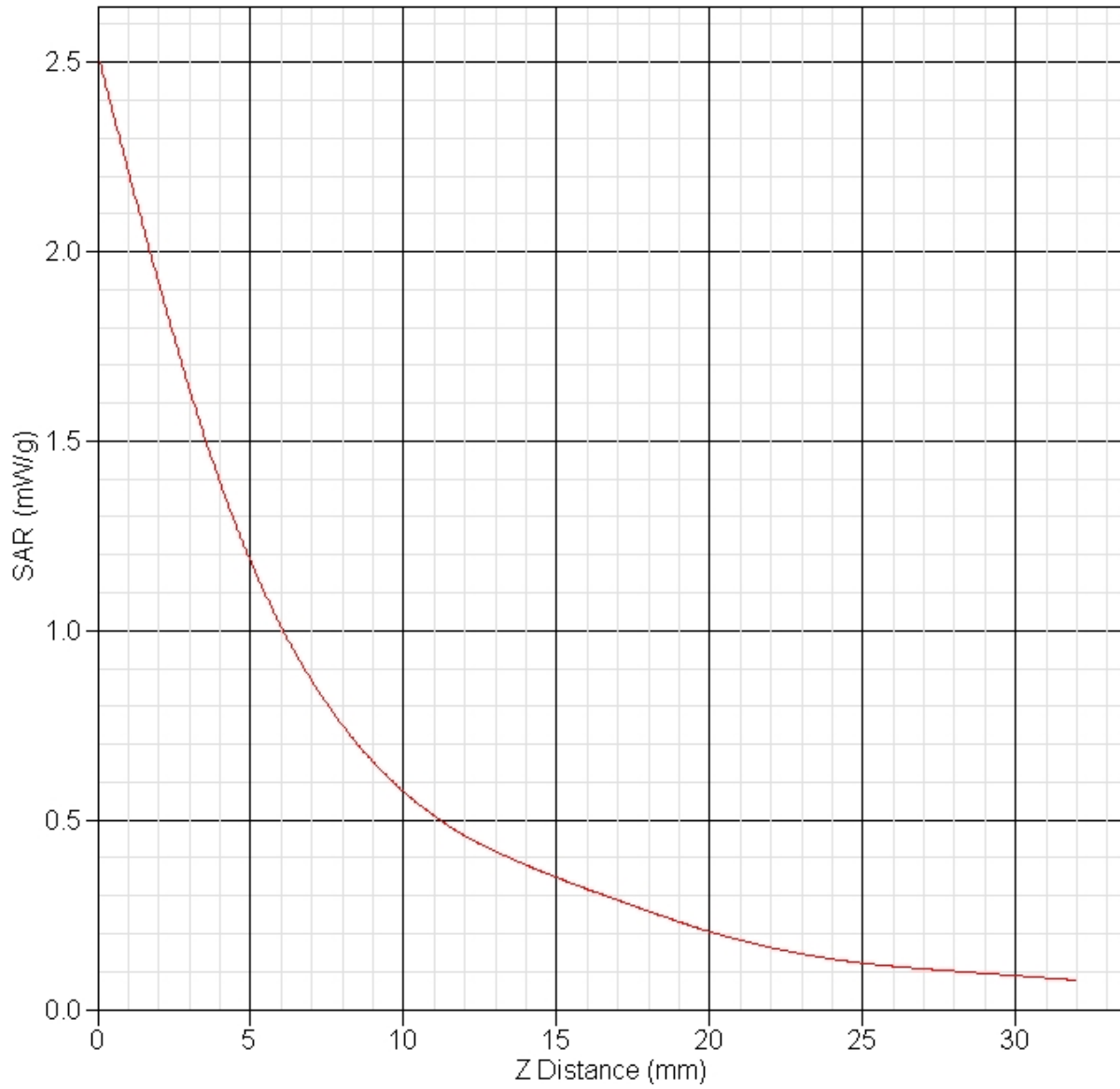
Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : Mid



1 gram SAR value : 1.259 W/kg
10 gram SAR value : 0.611 W/kg
Area Scan Peak SAR : 1.325 W/kg
Zoom Scan Peak SAR : 2.522 W/kg

SAR-Z Axis
at Hotspot x:8.12 y:-15.10



SAR Test Report

By Operator : Jay
Measurement Date : 10-Aug-2010
Starting Time : 10-Aug-2010 06:00:05 PM
End Time : 10-Aug-2010 06:17:39 PM
Scanning Time : 1054 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : 5 MHz QPSK $\frac{1}{2}$ PUSC
Model : CC208
Frequency : 2600.00 MHz
Max. Transmit Pwr : 0.211 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal - Antenna 2
Orientation : Express Card
Power Drift-Start : 0.264 W/kg
Power Drift-Finish: 0.258 W/kg
Power Drift (%) : -2.028

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 2690
Frequency : 2690.00 MHz
Last Calib. Date : 10-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 45.00 RH%
Epsilon : 52.27 F/m
Sigma : 2.32 S/m
Density : 1000.00 kg/cu. m

Probe Data

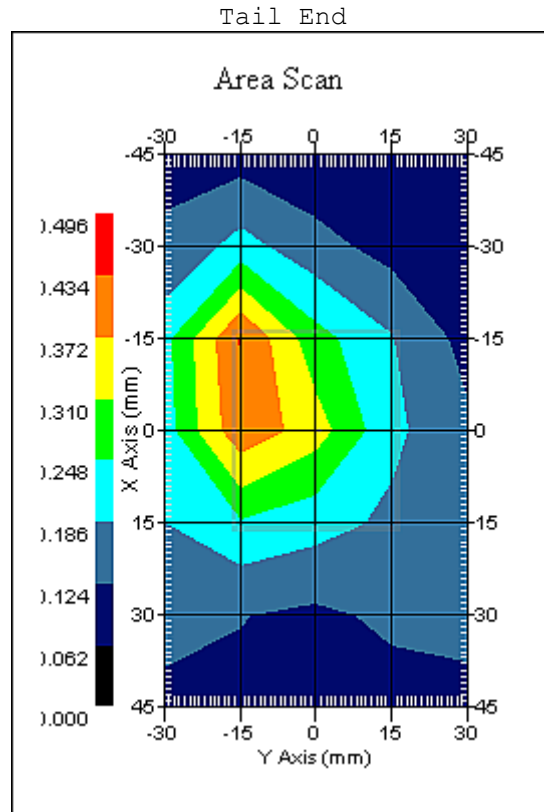
Name : Probe 217 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 2600.00 MHz
Conversion Factor: 3.6
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 3.2
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 10-Aug-2010
Set-up Time : 5:11:30 PM
Area Scan : 7x5x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : High



1 gram SAR value : 0.464 W/kg
10 gram SAR value : 0.266 W/kg
Area Scan Peak SAR : 0.445 W/kg
Zoom Scan Peak SAR : 0.858 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 10-Aug-2010
Starting Time : 10-Aug-2010 03:08:52 PM
End Time : 10-Aug-2010 03:27:28 PM
Scanning Time : 1116 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : 5 MHz 16QAM $\frac{1}{2}$ PUSC
Model : CC208
Frequency : 2600.00 MHz
Max. Transmit Pwr : 0.208 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal - Antenna 1
Orientation : Express Card
Power Drift-Start : 0.387 W/kg
Power Drift-Finish: 0.377 W/kg
Power Drift (%) : -2.404

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 2500
Frequency : 2500.00 MHz
Last Calib. Date : 10-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 45.00 RH%
Epsilon : 52.68 F/m
Sigma : 2.01 S/m
Density : 1000.00 kg/cu. m

Probe Data

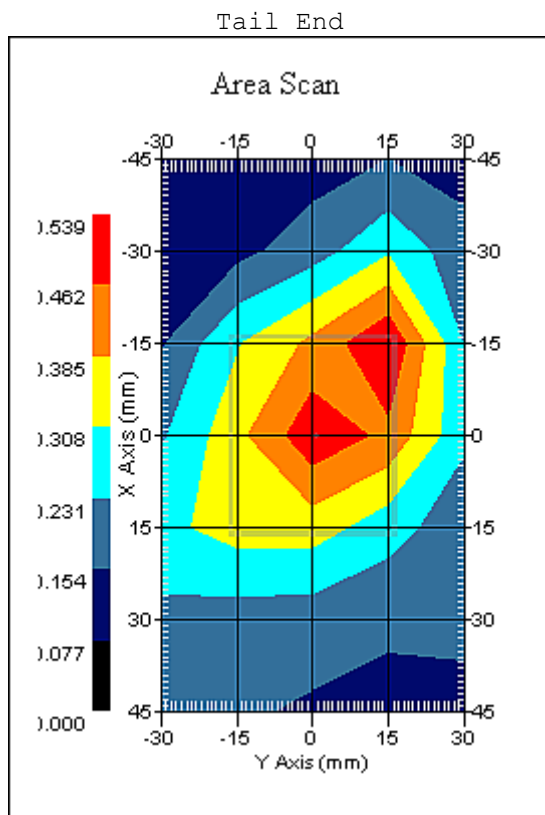
Name : Probe 217 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 2600.00 MHz
Conversion Factor: 3.6
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 3.2
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 10-Aug-2010
Set-up Time : 5:10:22 PM
Area Scan : 7x5x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : Low



1 gram SAR value : 0.535 W/kg
10 gram SAR value : 0.321 W/kg
Area Scan Peak SAR : 0.527 W/kg
Zoom Scan Peak SAR : 0.944 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 10-Aug-2010
Starting Time : 10-Aug-2010 03:48:54 PM
End Time : 10-Aug-2010 04:06:30 PM
Scanning Time : 1056 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : 5 MHz 16QAM $\frac{1}{2}$ PUSC
Model : CC208
Frequency : 2600.00 MHz
Max. Transmit Pwr : 0.208 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal - Antenna 2
Orientation : Express Card
Power Drift-Start : 0.681 W/kg
Power Drift-Finish: 0.674 W/kg
Power Drift (%) : -1.027

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 2500
Frequency : 2500.00 MHz
Last Calib. Date : 10-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 45.00 RH%
Epsilon : 52.68 F/m
Sigma : 2.01 S/m
Density : 1000.00 kg/cu. m

Probe Data

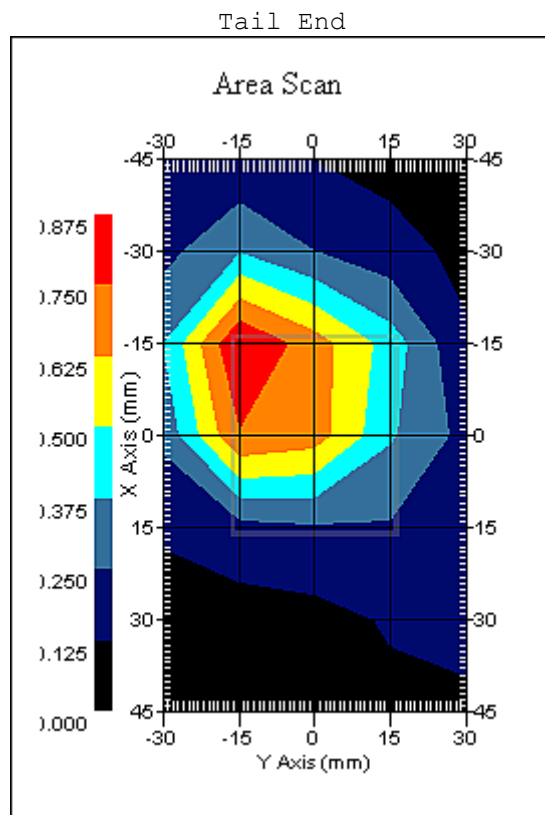
Name : Probe 217 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 2600.00 MHz
Conversion Factor: 3.6
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 3.2
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 10-Aug-2010
Set-up Time : 5:10:22 PM
Area Scan : 7x5x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : Low



1 gram SAR value : 0.851 W/kg
10 gram SAR value : 0.447 W/kg
Area Scan Peak SAR : 0.856 W/kg
Zoom Scan Peak SAR : 1.613 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 10-Aug-2010
Starting Time : 10-Aug-2010 05:11:36 PM
End Time : 10-Aug-2010 05:29:49 PM
Scanning Time : 1093 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : 5 MHz 16QAM $\frac{1}{2}$ PUSC
Model : CC208
Frequency : 2600.00 MHz
Max. Transmit Pwr : 0.208 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal - Antenna 2
Orientation : Express Card
Power Drift-Start : 0.697 W/kg
Power Drift-Finish: 0.684 W/kg
Power Drift (%) : -1.835

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 2590
Frequency : 2590.00 MHz
Last Calib. Date : 10-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 45.00 RH%
Epsilon : 52.48 F/m
Sigma : 2.16 S/m
Density : 1000.00 kg/cu. m

Probe Data

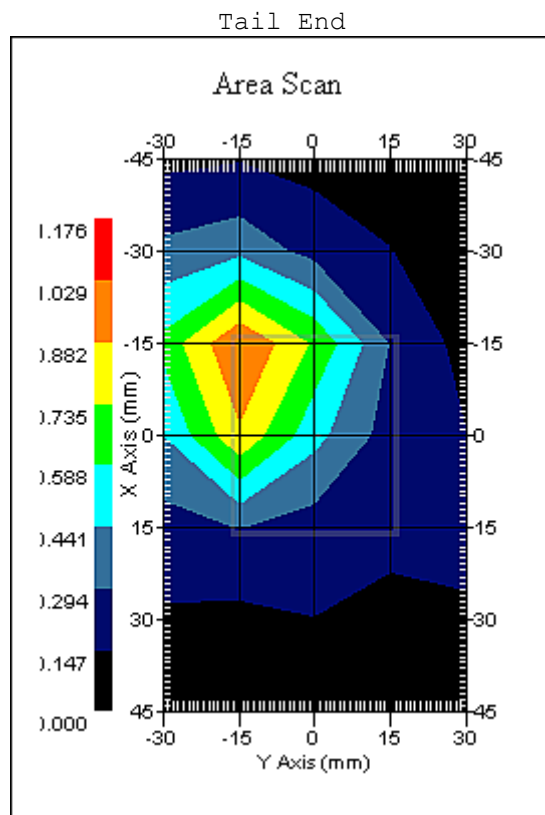
Name : Probe 217 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 2600.00 MHz
Conversion Factor: 3.6
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 3.2
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 10-Aug-2010
Set-up Time : 5:11:30 PM
Area Scan : 7x5x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : Mid



1 gram SAR value : 1.051 W/kg
10 gram SAR value : 0.523 W/kg
Area Scan Peak SAR : 1.031 W/kg
Zoom Scan Peak SAR : 2.091 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 10-Aug-2010
Starting Time : 10-Aug-2010 05:38:29 PM
End Time : 10-Aug-2010 05:55:50 PM
Scanning Time : 1041 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : 5 MHz 16QAM $\frac{1}{2}$ PUSC
Model : CC208
Frequency : 2600.00 MHz
Max. Transmit Pwr : 0.208 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal - Antenna 2
Orientation : Express Card
Power Drift-Start : 0.333 W/kg
Power Drift-Finish: 0.334 W/kg
Power Drift (%) : 0.206

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 2690
Frequency : 2690.00 MHz
Last Calib. Date : 10-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 45.00 RH%
Epsilon : 52.27 F/m
Sigma : 2.32 S/m
Density : 1000.00 kg/cu. m

Probe Data

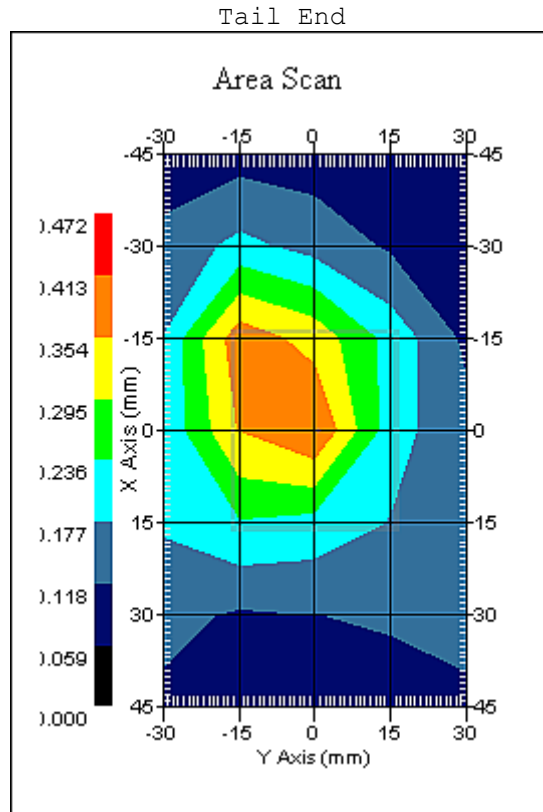
Name : Probe 217 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 2600.00 MHz
Conversion Factor: 3.6
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 3.2
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 10-Aug-2010
Set-up Time : 5:11:30 PM
Area Scan : 7x5x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : High



1 gram SAR value : 0.471 W/kg
10 gram SAR value : 0.266 W/kg
Area Scan Peak SAR : 0.423 W/kg
Zoom Scan Peak SAR : 0.878 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 10-Aug-2010
Starting Time : 10-Aug-2010 11:23:22 AM
End Time : 10-Aug-2010 11:41:51 AM
Scanning Time : 1109 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : 10 MHz QPSK $\frac{1}{2}$ PUSC
Model : CC208
Frequency : 2600.00 MHz
Max. Transmit Pwr : 0.214 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal - Antenna 1
Orientation : Express Card
Power Drift-Start : 0.381 W/kg
Power Drift-Finish: 0.381 W/kg
Power Drift (%) : -0.374

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 2500
Frequency : 2500.00 MHz
Last Calib. Date : 10-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 45.00 RH%
Epsilon : 52.68 F/m
Sigma : 2.01 S/m
Density : 1000.00 kg/cu. m

Probe Data

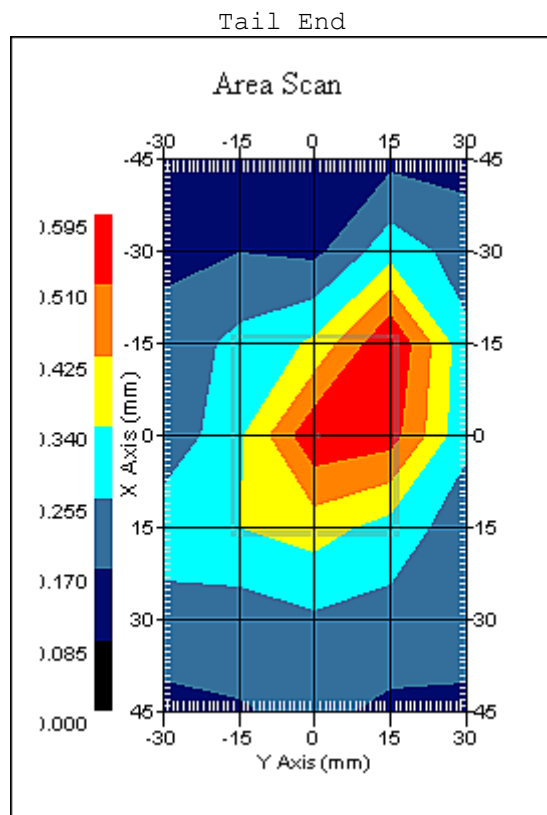
Name : Probe 217 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 2600.00 MHz
Conversion Factor: 3.6
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 3.2
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 10-Aug-2010
Set-up Time : 5:10:22 PM
Area Scan : 7x5x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : Low



1 gram SAR value : 0.609 W/kg
10 gram SAR value : 0.354 W/kg
Area Scan Peak SAR : 0.584 W/kg
Zoom Scan Peak SAR : 1.111 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 10-Aug-2010
Starting Time : 10-Aug-2010 11:45:36 AM
End Time : 10-Aug-2010 12:03:26 PM
Scanning Time : 1070 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : 10 MHz QPSK $\frac{1}{2}$ PUSC
Model : CC208
Frequency : 2600.00 MHz
Max. Transmit Pwr : 0.214 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal - Antenna 2
Orientation : Express Card
Power Drift-Start : 0.781 W/kg
Power Drift-Finish: 0.782 W/kg
Power Drift (%) : 0.178

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 2500
Frequency : 2500.00 MHz
Last Calib. Date : 10-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 45.00 RH%
Epsilon : 52.68 F/m
Sigma : 2.01 S/m
Density : 1000.00 kg/cu. m

Probe Data

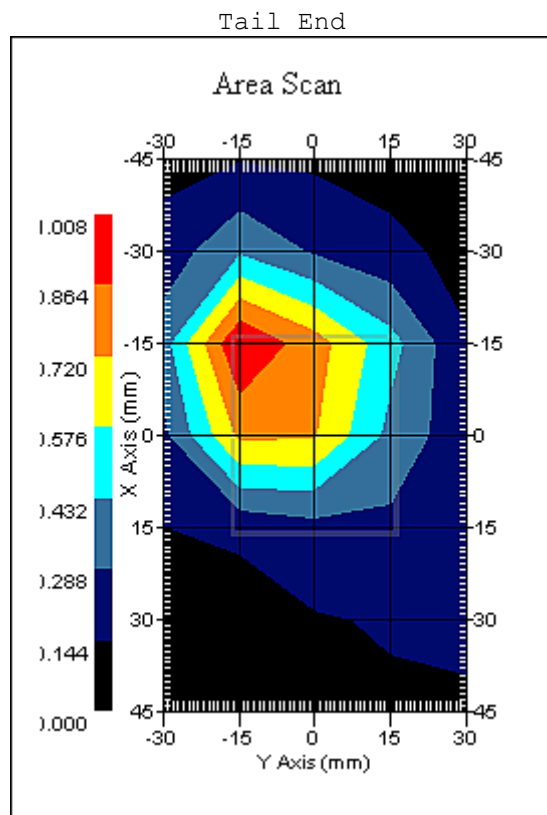
Name : Probe 217 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 2600.00 MHz
Conversion Factor: 3.6
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 3.2
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 10-Aug-2010
Set-up Time : 5:10:22 PM
Area Scan : 7x5x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

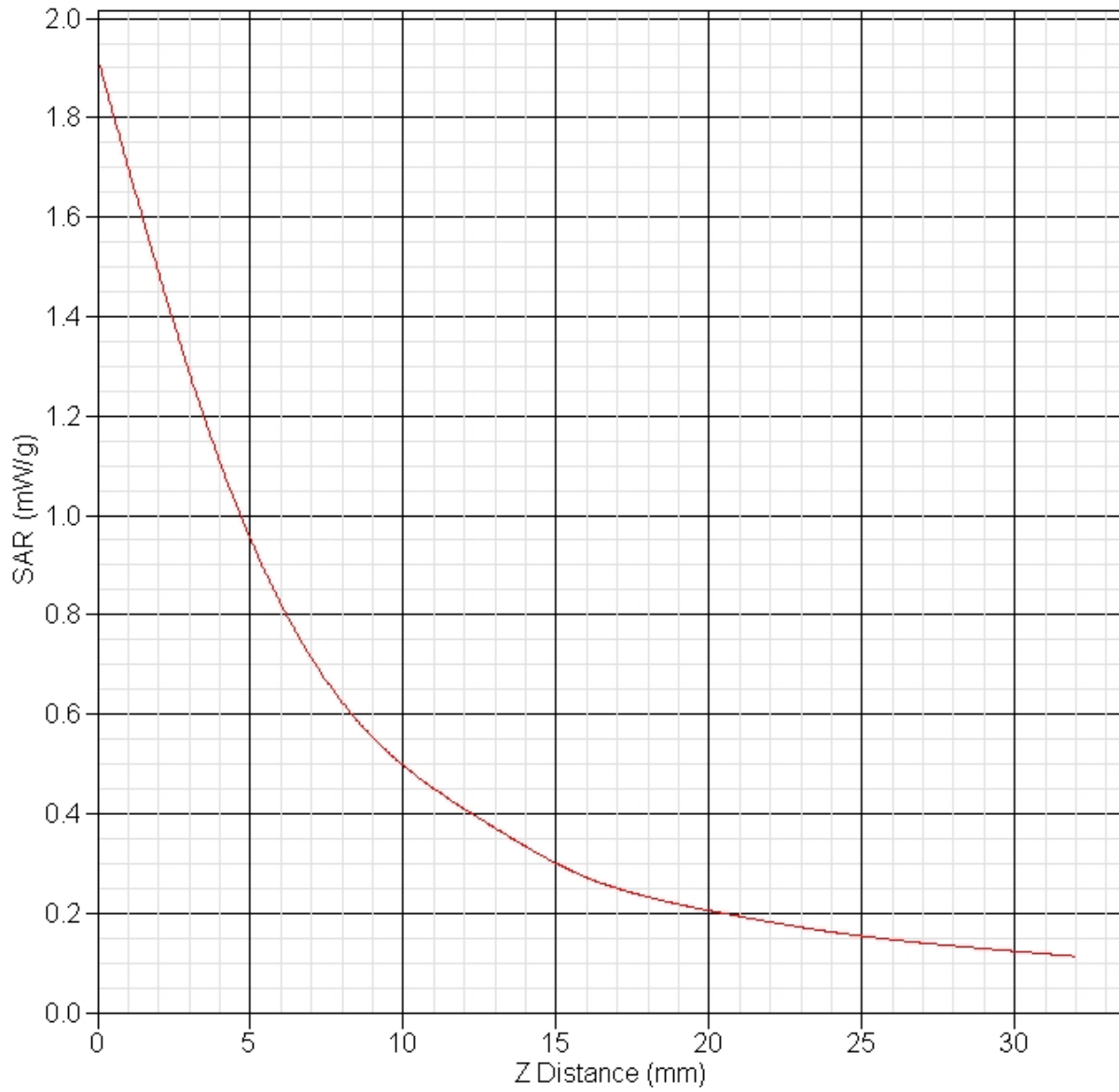
Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : Low



1 gram SAR value : 0.936 W/kg
10 gram SAR value : 0.471 W/kg
Area Scan Peak SAR : 0.988 W/kg
Zoom Scan Peak SAR : 1.888 W/kg

SAR-Z Axis
at Hotspot x:8.08 y:-7.13



SAR Test Report

By Operator : Jay
Measurement Date : 10-Aug-2010
Starting Time : 10-Aug-2010 12:07:29 PM
End Time : 10-Aug-2010 12:25:33 PM
Scanning Time : 1084 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : 10 MHz QPSK $\frac{1}{2}$ PUSC
Model : CC208
Frequency : 2600.00 MHz
Max. Transmit Pwr : 0.214 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal - Antenna 2
Orientation : Express Card
Power Drift-Start : 0.568 W/kg
Power Drift-Finish: 0.570 W/kg
Power Drift (%) : 0.306

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 2590
Frequency : 2590.00 MHz
Last Calib. Date : 10-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 45.00 RH%
Epsilon : 52.48 F/m
Sigma : 2.16 S/m
Density : 1000.00 kg/cu. m

Probe Data

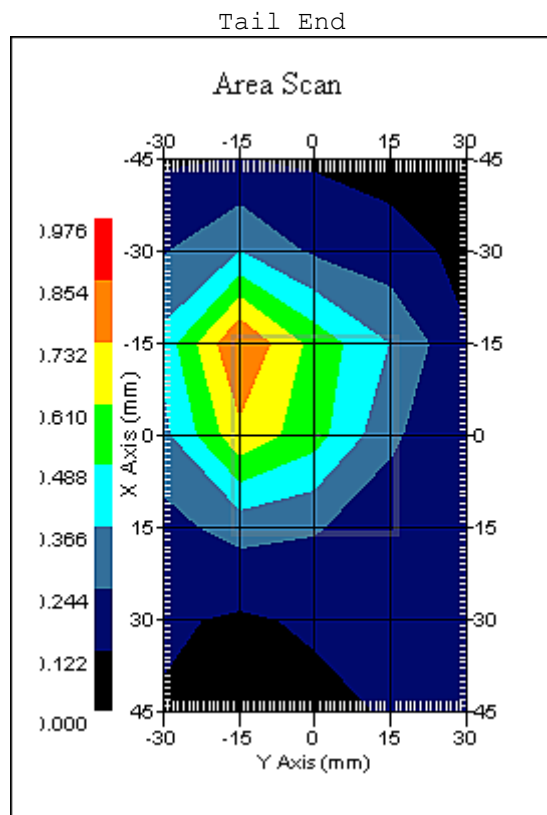
Name : Probe 217 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 2600.00 MHz
Conversion Factor: 3.6
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 3.2
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 10-Aug-2010
Set-up Time : 5:10:22 PM
Area Scan : 7x5x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : Mid



1 gram SAR value : 0.849 W/kg
10 gram SAR value : 0.437 W/kg
Area Scan Peak SAR : 0.857 W/kg
Zoom Scan Peak SAR : 1.631 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 10-Aug-2010
Starting Time : 10-Aug-2010 12:33:38 PM
End Time : 10-Aug-2010 12:51:07 PM
Scanning Time : 1049 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : 10 MHz QPSK $\frac{1}{2}$ PUSC
Model : CC208
Frequency : 2600.00 MHz
Max. Transmit Pwr : 0.214 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal - Antenna 2
Orientation : Express Card
Power Drift-Start : 0.268 W/kg
Power Drift-Finish: 0.267 W/kg
Power Drift (%) : -0.489

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 2690
Frequency : 2590.00 MHz
Last Calib. Date : 10-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 45.00 RH%
Epsilon : 52.27 F/m
Sigma : 2.32 S/m
Density : 1000.00 kg/cu. m

Probe Data

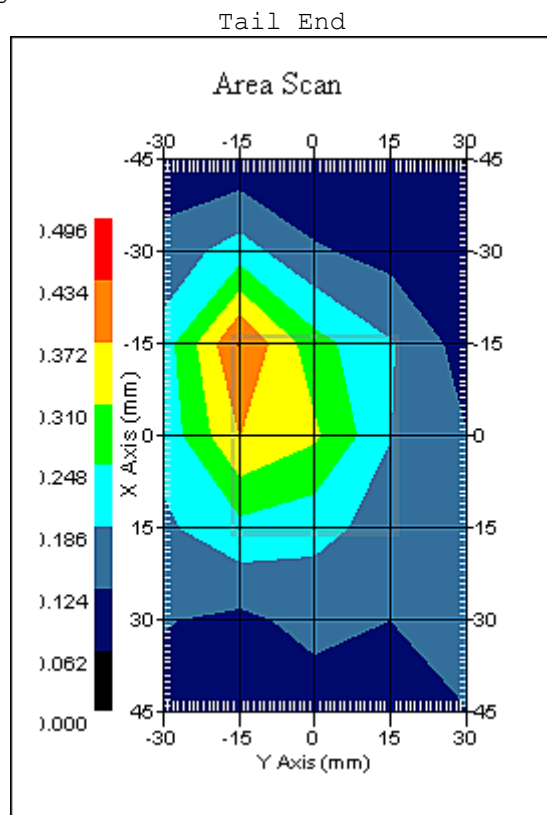
Name : Probe 217 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 2600.00 MHz
Conversion Factor: 3.6
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 3.2
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 10-Aug-2010
Set-up Time : 5:10:22 PM
Area Scan : 7x5x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : High



1 gram SAR value : 0.455 W/kg
10 gram SAR value : 0.258 W/kg
Area Scan Peak SAR : 0.445 W/kg
Zoom Scan Peak SAR : 0.847 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 10-Aug-2010
Starting Time : 10-Aug-2010 02:29:09 PM
End Time : 10-Aug-2010 02:47:10 PM
Scanning Time : 1081 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : 10 MHz 16QAM $\frac{1}{2}$ PUSC
Model : CC208
Frequency : 2600.00 MHz
Max. Transmit Pwr : 0.211 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal - Antenna 1
Orientation : Express Card
Power Drift-Start : 0.435 W/kg
Power Drift-Finish: 0.434 W/kg
Power Drift (%) : -0.254

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 2500
Frequency : 2500.00 MHz
Last Calib. Date : 10-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 45.00 RH%
Epsilon : 52.68 F/m
Sigma : 2.01 S/m
Density : 1000.00 kg/cu. m

Probe Data

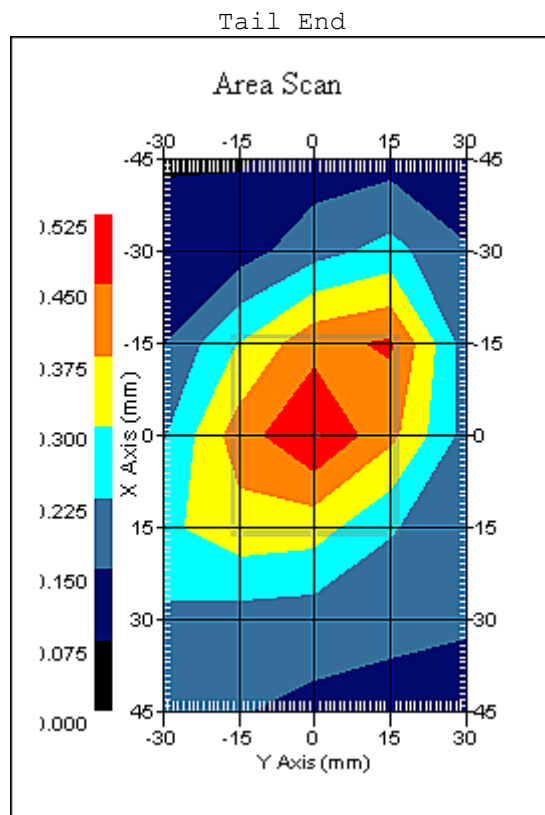
Name : Probe 217 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 2600.00 MHz
Conversion Factor: 3.6
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 3.2
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 10-Aug-2010
Set-up Time : 5:10:22 PM
Area Scan : 7x5x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : Low



1 gram SAR value : 0.508 W/kg
10 gram SAR value : 0.315 W/kg
Area Scan Peak SAR : 0.513 W/kg
Zoom Scan Peak SAR : 0.836 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 10-Aug-2010
Starting Time : 10-Aug-2010 12:54:06 PM
End Time : 10-Aug-2010 01:11:55 PM
Scanning Time : 1069 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : 10 MHz 16QAM $\frac{1}{2}$ PUSC
Model : CC208
Frequency : 2600.00 MHz
Max. Transmit Pwr : 0.211 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal - Antenna 2
Orientation : Express Card
Power Drift-Start : 0.833 W/kg
Power Drift-Finish: 0.814 W/kg
Power Drift (%) : -2.343

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 2500
Frequency : 2500.00 MHz
Last Calib. Date : 10-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 45.00 RH%
Epsilon : 52.68 F/m
Sigma : 2.01 S/m
Density : 1000.00 kg/cu. m

Probe Data

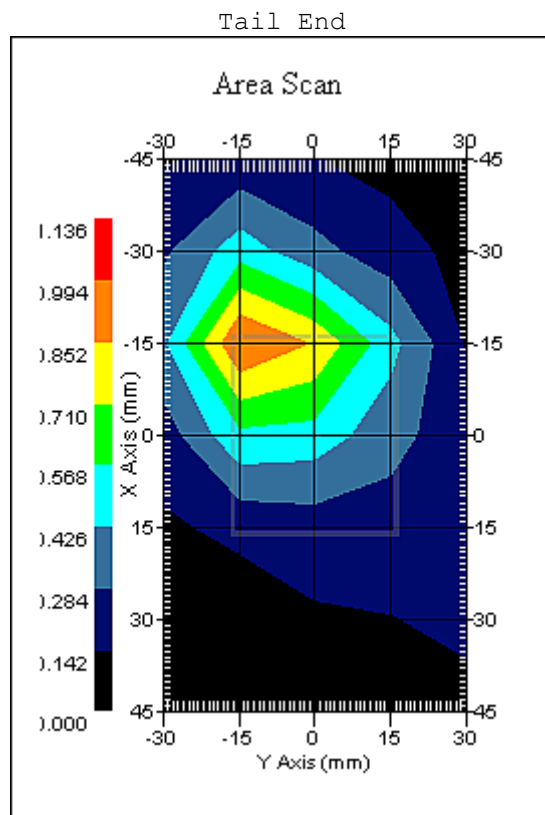
Name : Probe 217 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 2600.00 MHz
Conversion Factor: 3.6
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 3.2
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 10-Aug-2010
Set-up Time : 5:10:22 PM
Area Scan : 7x5x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : Low



1 gram SAR value : 0.881 W/kg
10 gram SAR value : 0.473 W/kg
Area Scan Peak SAR : 0.976 W/kg
Zoom Scan Peak SAR : 1.662 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 10-Aug-2010
Starting Time : 10-Aug-2010 01:21:03 PM
End Time : 10-Aug-2010 01:39:05 PM
Scanning Time : 1082 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : 10 MHz 16QAM $\frac{1}{2}$ PUSC
Model : CC208
Frequency : 2600.00 MHz
Max. Transmit Pwr : 0.211 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal - Antenna 2
Orientation : Express Card
Power Drift-Start : 0.788 W/kg
Power Drift-Finish: 0.762 W/kg
Power Drift (%) : -3.332

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 2590
Frequency : 2590.00 MHz
Last Calib. Date : 10-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 45.00 RH%
Epsilon : 52.48 F/m
Sigma : 2.16 S/m
Density : 1000.00 kg/cu. m

Probe Data

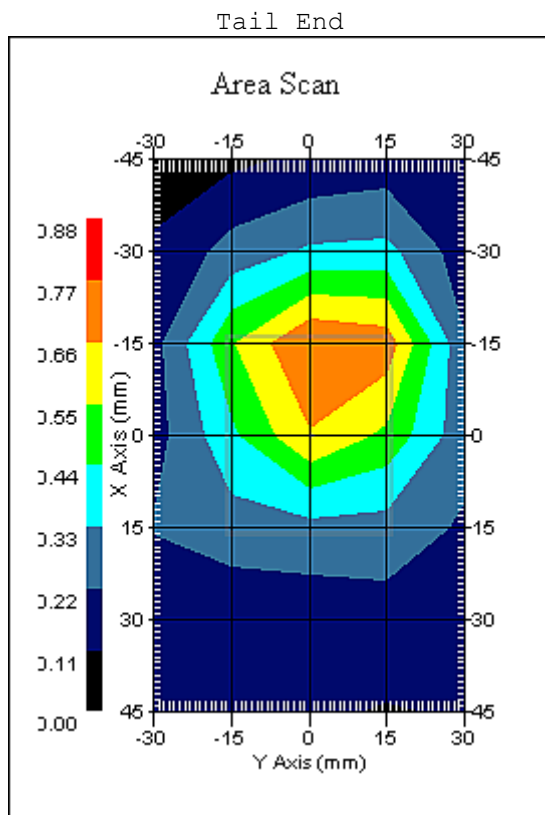
Name : Probe 217 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 2600.00 MHz
Conversion Factor: 3.6
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 3.2
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 10-Aug-2010
Set-up Time : 5:10:22 PM
Area Scan : 7x5x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : Mid



1 gram SAR value : 0.833 W/kg
10 gram SAR value : 0.435 W/kg
Area Scan Peak SAR : 0.773 W/kg
Zoom Scan Peak SAR : 1.491 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 10-Aug-2010
Starting Time : 10-Aug-2010 02:07:23 PM
End Time : 10-Aug-2010 02:25:37 PM
Scanning Time : 1094 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : 10 MHz 16QAM $\frac{1}{2}$ PUSC
Model : CC208
Frequency : 2600.00 MHz
Max. Transmit Pwr : 0.211 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal - Antenna 2
Orientation : Express Card
Power Drift-Start : 0.453 W/kg
Power Drift-Finish: 0.450 W/kg
Power Drift (%) : -0.793

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 2690
Frequency : 2690.00 MHz
Last Calib. Date : 10-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 45.00 RH%
Epsilon : 52.27 F/m
Sigma : 2.32 S/m
Density : 1000.00 kg/cu. m

Probe Data

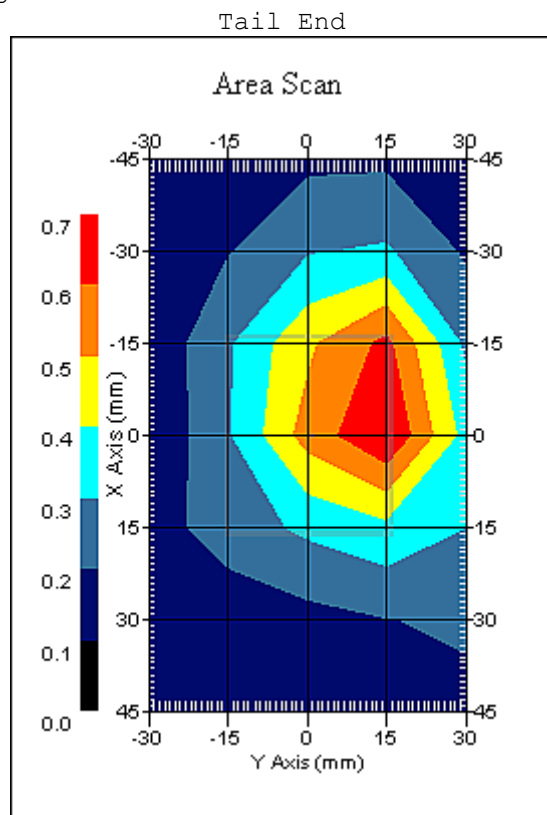
Name : Probe 217 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 2600.00 MHz
Conversion Factor: 3.6
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 3.2
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 10-Aug-2010
Set-up Time : 5:10:22 PM
Area Scan : 7x5x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : High



1 gram SAR value : 0.691 W/kg
10 gram SAR value : 0.386 W/kg
Area Scan Peak SAR : 0.711 W/kg
Zoom Scan Peak SAR : 1.257 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 11-Feb-2011
Starting Time : 11-Feb-2011 08:53:58 AM
End Time : 11-Feb-2011 09:14:34 AM
Scanning Time : 1236 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : 5 MHz QPSK $\frac{1}{2}$ AMC
Model : CC208
Frequency : 2600.00 MHz
Max. Transmit Pwr : 0.25 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal - Antenna 1
Orientation : Express Card
Power Drift-Start : 0.601 W/kg
Power Drift-Finish: 0.586 W/kg
Power Drift (%) : -2.552

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 2590
Frequency : 2590.00 MHz
Last Calib. Date : 11-Feb-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 45.00 RH%
Epsilon : 52.18 F/m
Sigma : 2.17 S/m
Density : 1000.00 kg/cu. m

Probe Data

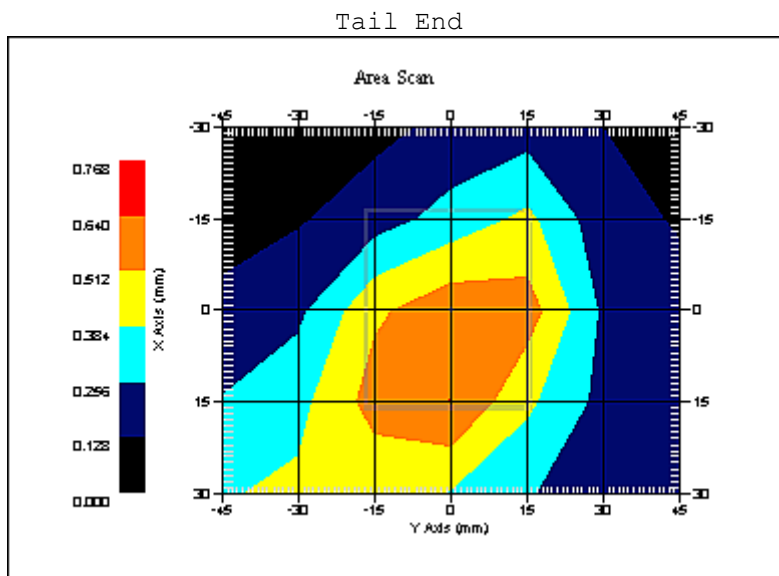
Name : Probe 215 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 215
Last Calib. Date : 22-Sep-2010
Frequency : 2600.00 MHz
Conversion Factor: 4.7
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 3.2
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 11-Feb-2011
Set-up Time : 8:18:29 AM
Area Scan : 5x7x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : Low



1 gram SAR value : 0.663 W/kg
10 gram SAR value : 0.386 W/kg
Area Scan Peak SAR : 0.642 W/kg
Zoom Scan Peak SAR : 1.231 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 11-Feb-2011
Starting Time : 11-Feb-2011 09:16:03 AM
End Time : 11-Feb-2011 09:36:30 AM
Scanning Time : 1227 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : 10 MHz QPSK $\frac{1}{2}$ AMC
Model : CC208
Frequency : 2600.00 MHz
Max. Transmit Pwr : 0.25 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal - Antenna 1
Orientation : Express Card
Power Drift-Start : 0.595 W/kg
Power Drift-Finish: 0.586 W/kg
Power Drift (%) : -1.507

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 2590
Frequency : 2590.00 MHz
Last Calib. Date : 11-Feb-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 45.00 RH%
Epsilon : 52.18 F/m
Sigma : 2.17 S/m
Density : 1000.00 kg/cu. m

Probe Data

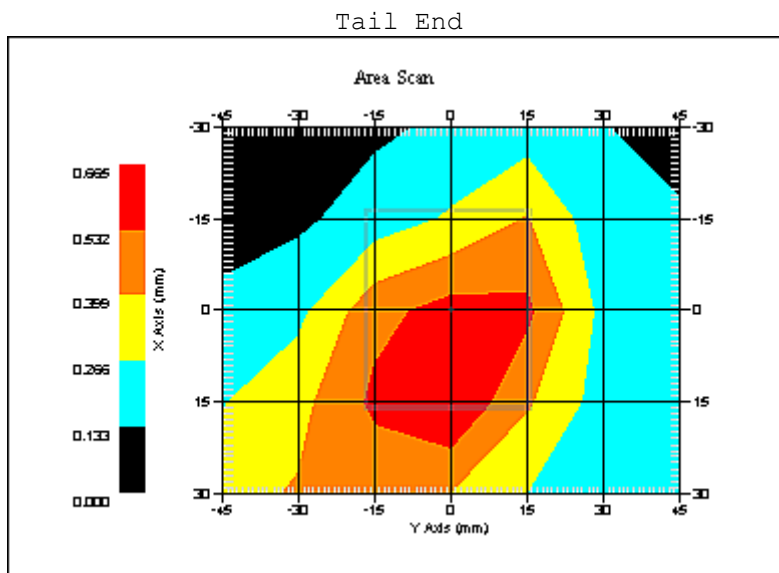
Name : Probe 215 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 215
Last Calib. Date : 22-Sep-2010
Frequency : 2600.00 MHz
Conversion Factor: 4.7
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 3.2
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 11-Feb-2011
Set-up Time : 8:18:29 AM
Area Scan : 5x7x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : Low



1 gram SAR value : 0.693 W/kg
10 gram SAR value : 0.396 W/kg
Area Scan Peak SAR : 0.664 W/kg
Zoom Scan Peak SAR : 1.311 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 11-Feb-2011
Starting Time : 11-Feb-2011 07:51:01 AM
End Time : 11-Feb-2011 08:11:05 AM
Scanning Time : 1204 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : 5 MHz QPSK $\frac{1}{2}$ AMC
Model : CC208
Frequency : 2600.00 MHz
Max. Transmit Pwr : 0.25 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal - Antenna 2
Orientation : Express Card
Power Drift-Start : 1.092 W/kg
Power Drift-Finish: 1.107 W/kg
Power Drift (%) : 1.372

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 2590
Frequency : 2590.00 MHz
Last Calib. Date : 11-Feb-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 45.00 RH%
Epsilon : 52.18 F/m
Sigma : 2.17 S/m
Density : 1000.00 kg/cu. m

Probe Data

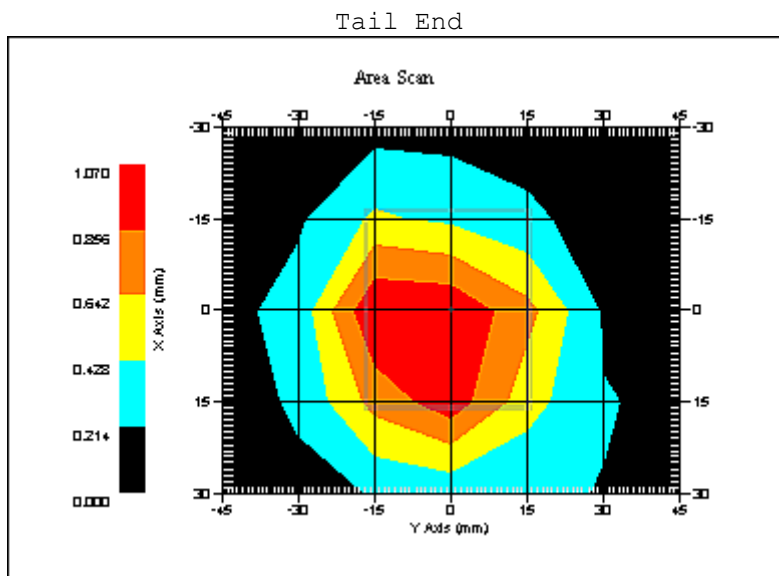
Name : Probe 215 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 215
Last Calib. Date : 22-Sep-2010
Frequency : 2600.00 MHz
Conversion Factor: 4.7
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 3.2
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 11-Feb-2011
Set-up Time : 7:26:16 AM
Area Scan : 5x7x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : Low



1 gram SAR value : 1.043 W/kg
10 gram SAR value : 0.466 W/kg
Area Scan Peak SAR : 1.068 W/kg
Zoom Scan Peak SAR : 2.032 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 10-Aug-2010
Starting Time : 10-Aug-2010 07:06:33 PM
End Time : 10-Aug-2010 07:25:30 PM
Scanning Time : 1137 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : 5 MHz QPSK $\frac{1}{2}$ AMC
Model : CC208
Frequency : 2600.00 MHz
Max. Transmit Pwr : 0.210 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal - Antenna 2
Orientation : Express Card
Power Drift-Start : 0.622 W/kg
Power Drift-Finish: 0.647 W/kg
Power Drift (%) : 3.876

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 2590
Frequency : 2590.00 MHz
Last Calib. Date : 10-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 45.00 RH%
Epsilon : 52.48 F/m
Sigma : 2.16 S/m
Density : 1000.00 kg/cu. m

Probe Data

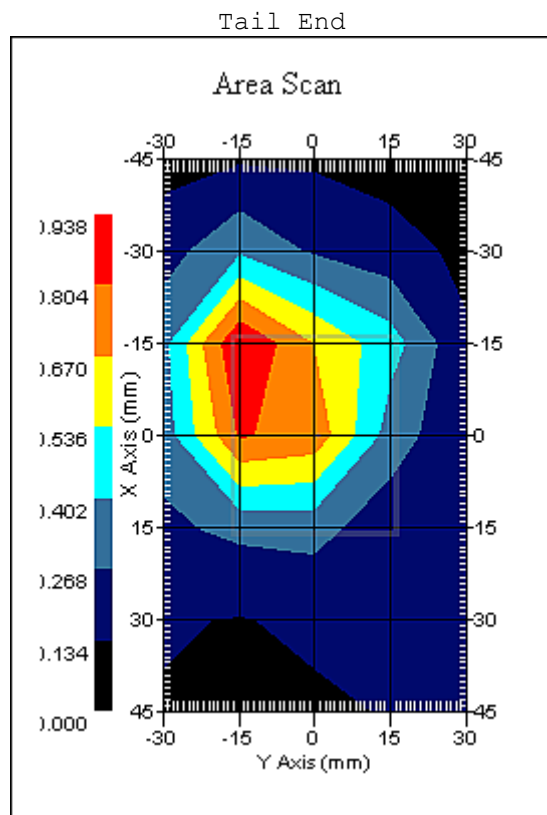
Name : Probe 217 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 2600.00 MHz
Conversion Factor: 3.6
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 3.2
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 10-Aug-2010
Set-up Time : 5:11:30 PM
Area Scan : 7x5x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

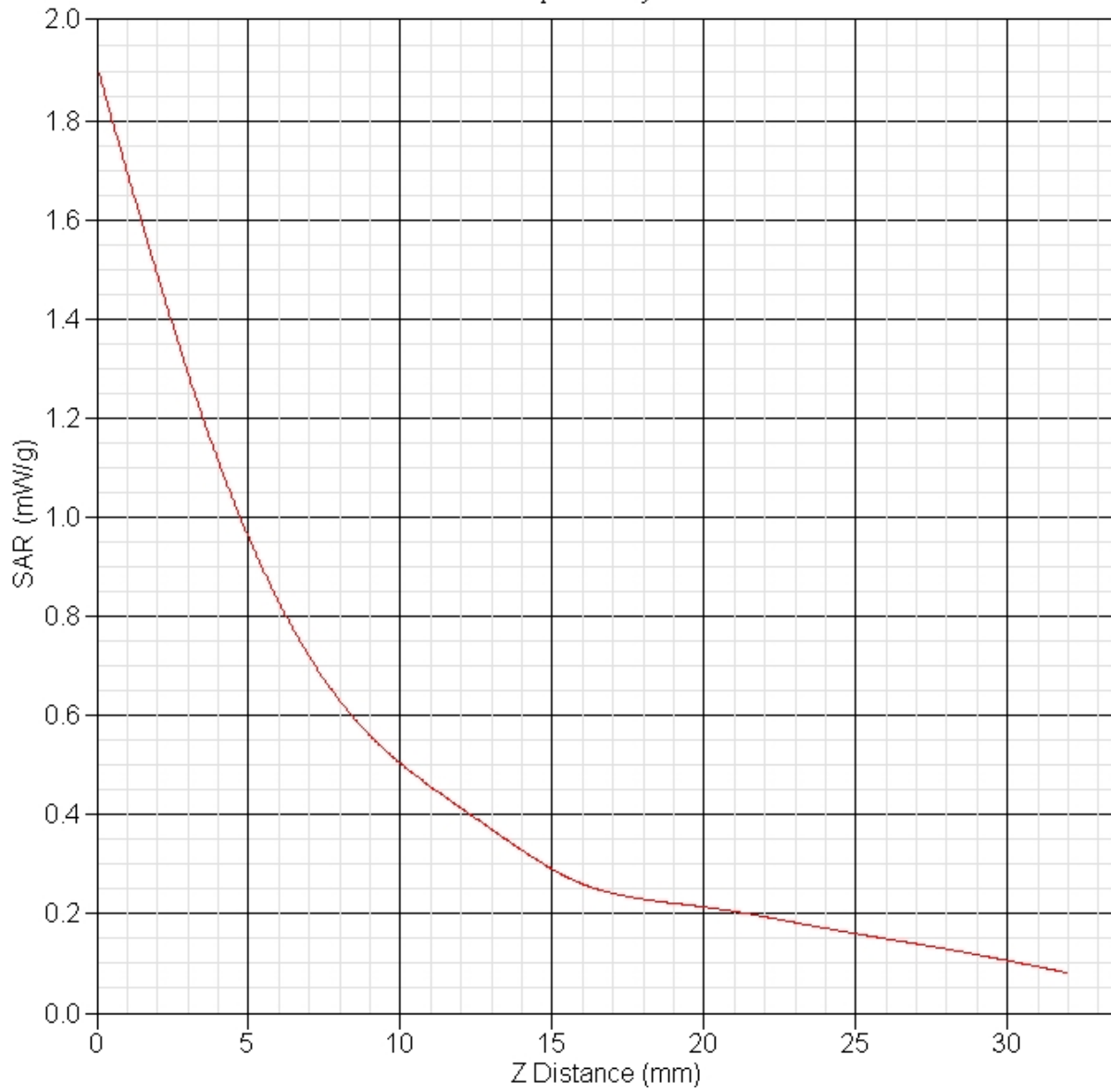
Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : Mid



1 gram SAR value : 1.026 W/kg
10 gram SAR value : 0.518 W/kg
Area Scan Peak SAR : 0.937 W/kg
Zoom Scan Peak SAR : 1.911 W/kg

SAR-Z Axis
at Hotspot x:8.12 y:-7.17



SAR Test Report

By Operator : Jay
Measurement Date : 11-Feb-2011
Starting Time : 11-Feb-2011 10:51:07 AM
End Time : 11-Feb-2011 11:10:47 AM
Scanning Time : 1180 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : 5 MHz QPSK $\frac{1}{2}$ AMC
Model : CC208
Frequency : 2600.00 MHz
Max. Transmit Pwr : 0.25 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal - Antenna 2
Orientation : Express Card
Power Drift-Start : 0.557 W/kg
Power Drift-Finish: 0.578 W/kg
Power Drift (%) : 3.777

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 2590
Frequency : 2590.00 MHz
Last Calib. Date : 11-Feb-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 45.00 RH%
Epsilon : 52.18 F/m
Sigma : 2.17 S/m
Density : 1000.00 kg/cu. m

Probe Data

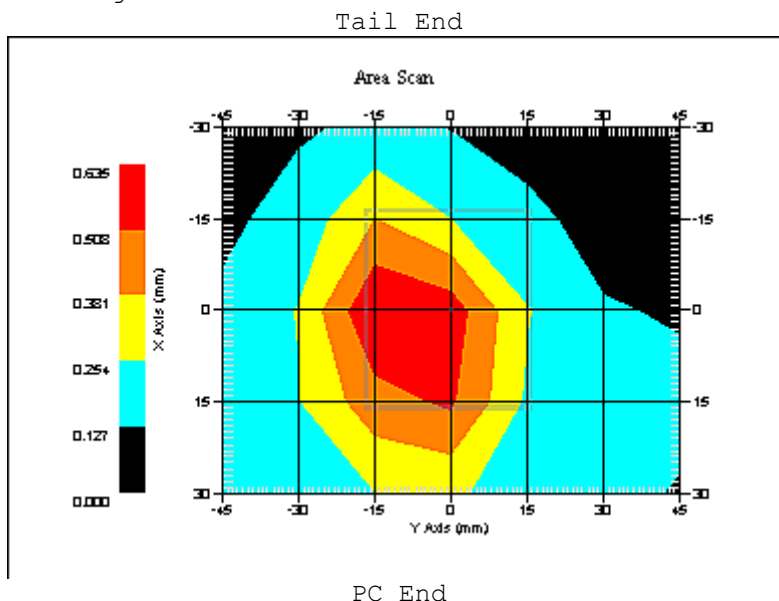
Name : Probe 215 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 215
Last Calib. Date : 22-Sep-2010
Frequency : 2600.00 MHz
Conversion Factor: 4.7
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 3.2
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 11-Feb-2011
Set-up Time : 8:18:29 AM
Area Scan : 5x7x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : High



1 gram SAR value : 0.713 W/kg
10 gram SAR value : 0.354 W/kg
Area Scan Peak SAR : 0.633 W/kg
Zoom Scan Peak SAR : 1.421 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 11-Feb-2011
Starting Time : 11-Feb-2011 08:18:38 AM
End Time : 11-Feb-2011 08:39:28 AM
Scanning Time : 1250 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : 5 MHz 16QAM $\frac{1}{2}$ AMC
Model : CC208
Frequency : 2600.00 MHz
Max. Transmit Pwr : 0.25 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal - Antenna 2
Orientation : Express Card
Power Drift-Start : 1.077 W/kg
Power Drift-Finish: 1.117 W/kg
Power Drift (%) : 3.642

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 2590
Frequency : 2590.00 MHz
Last Calib. Date : 11-Feb-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 45.00 RH%
Epsilon : 52.18 F/m
Sigma : 2.17 S/m
Density : 1000.00 kg/cu. m

Probe Data

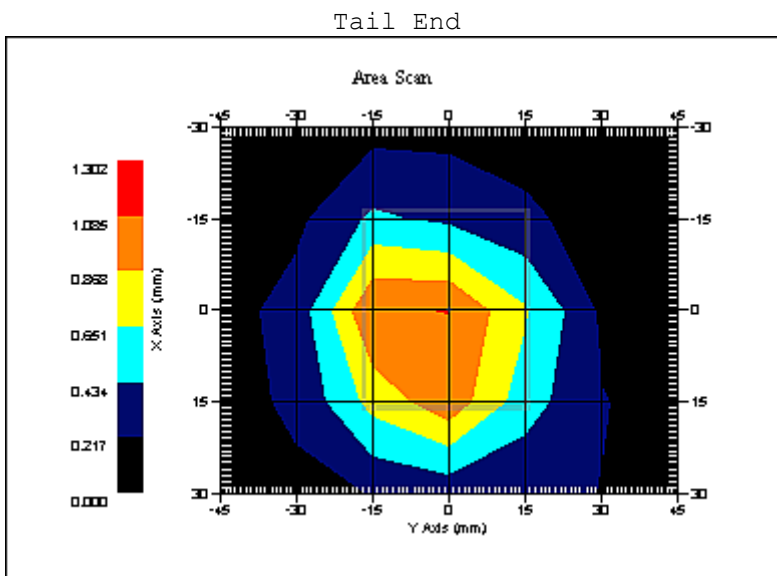
Name : Probe 215 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 215
Last Calib. Date : 22-Sep-2010
Frequency : 2600.00 MHz
Conversion Factor: 4.7
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 3.2
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 11-Feb-2011
Set-up Time : 8:18:29 AM
Area Scan : 5x7x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : Low



1 gram SAR value : 0.999 W/kg
10 gram SAR value : 0.474 W/kg
Area Scan Peak SAR : 1.087 W/kg
Zoom Scan Peak SAR : 1.982 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 11-Feb-2011
Starting Time : 11-Feb-2011 10:08:24 AM
End Time : 11-Feb-2011 10:29:00 AM
Scanning Time : 1236 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Type : 5 MHz 16QAM $\frac{1}{2}$ AMC
Model : CC208
Frequency : 2600.00 MHz
Max. Transmit Pwr : 0.25 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal - Antenna 2
Orientation : Express Card
Power Drift-Start : 1.088 W/kg
Power Drift-Finish: 1.127 W/kg
Power Drift (%) : 3.573

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 2590
Frequency : 2590.00 MHz
Last Calib. Date : 11-Feb-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 45.00 RH%
Epsilon : 52.18 F/m
Sigma : 2.17 S/m
Density : 1000.00 kg/cu. m

Probe Data

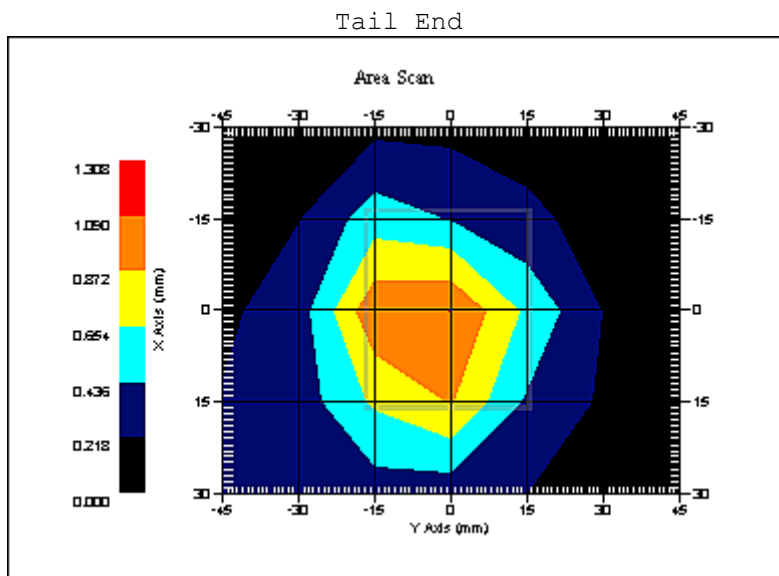
Name : Probe 215 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 215
Last Calib. Date : 22-Sep-2010
Frequency : 2600.00 MHz
Conversion Factor: 4.7
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 3.2
 Scan Type : Complete
 Tissue Temp. : 20.00 °C
 Ambient Temp. : 23.00 °C
 Set-up Date : 11-Feb-2011
 Set-up Time : 8:18:29 AM
 Area Scan : 5x7x1 : Measurement x=15mm, y=15mm, z=4mm
 Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Express Card
 Separation : 10 mm
 Channel : Mid



1 gram SAR value : 0.991 W/kg
 10 gram SAR value : 0.483 W/kg
 Area Scan Peak SAR : 1.091 W/kg
 Zoom Scan Peak SAR : 1.902 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 11-Feb-2011
Starting Time : 11-Feb-2011 11:20:55 AM
End Time : 11-Feb-2011 11:40:22 AM
Scanning Time : 1167 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Type : 5 MHz 16QAM $\frac{1}{2}$ AMC
Model : CC208
Frequency : 2600.00 MHz
Max. Transmit Pwr : 0.25 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal - Antenna 2
Orientation : Express Card
Power Drift-Start : 0.570 W/kg
Power Drift-Finish: 0.591 W/kg
Power Drift (%) : 3.818

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 2590
Frequency : 2590.00 MHz
Last Calib. Date : 11-Feb-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 45.00 RH%
Epsilon : 52.18 F/m
Sigma : 2.17 S/m
Density : 1000.00 kg/cu. m

Probe Data

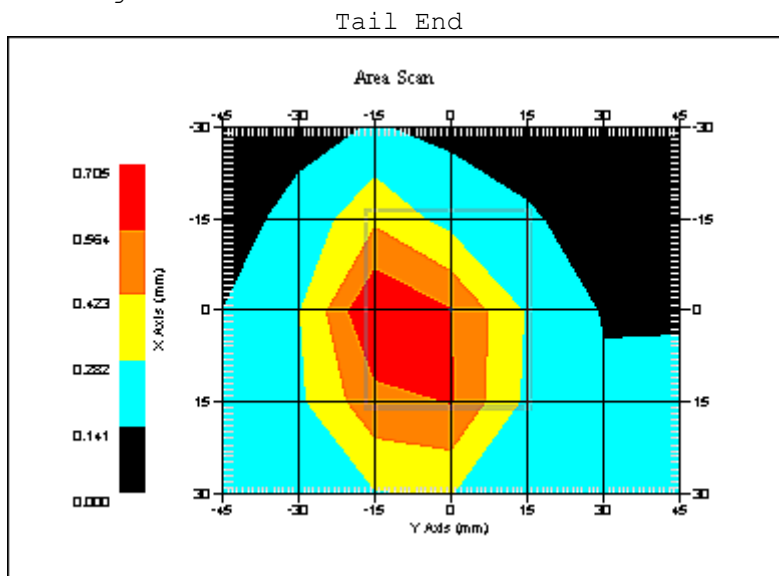
Name : Probe 215 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 215
Last Calib. Date : 22-Sep-2010
Frequency : 2600.00 MHz
Conversion Factor: 4.7
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 3.2
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 11-Feb-2011
Set-up Time : 8:18:29 AM
Area Scan : 5x7x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : High



1 gram SAR value : 0.770 W/kg
10 gram SAR value : 0.379 W/kg
Area Scan Peak SAR : 0.703 W/kg
Zoom Scan Peak SAR : 1.561 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 10-Aug-2010
Starting Time : 10-Aug-2010 07:34:04 PM
End Time : 10-Aug-2010 07:52:21 PM
Scanning Time : 1097 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : 10 MHz QPSK $\frac{1}{2}$ AMC
Model : CC208
Frequency : 2600.00 MHz
Max. Transmit Pwr : 0.213 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal - Antenna 2
Orientation : Express Card
Power Drift-Start : 0.980 W/kg
Power Drift-Finish: 0.974 W/kg
Power Drift (%) : -0.643

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 2500
Frequency : 2500.00 MHz
Last Calib. Date : 10-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 45.00 RH%
Epsilon : 52.68 F/m
Sigma : 2.01 S/m
Density : 1000.00 kg/cu. m

Probe Data

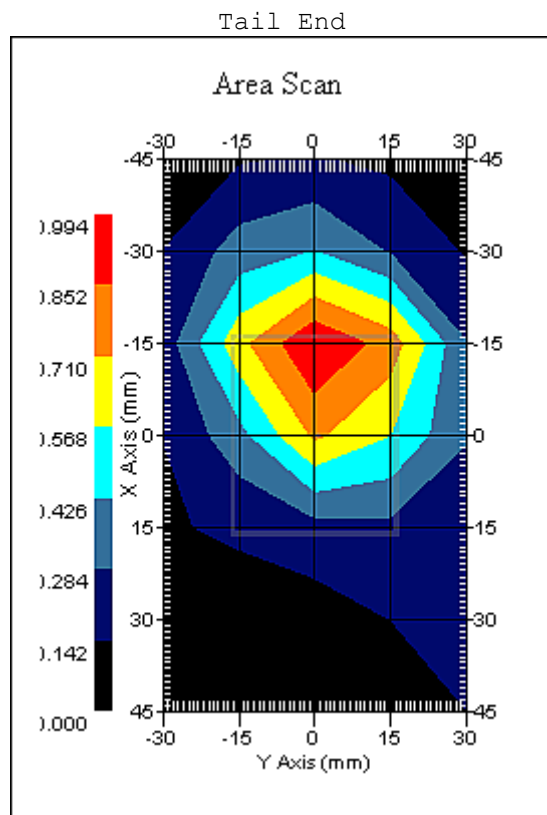
Name : Probe 217 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 2600.00 MHz
Conversion Factor: 3.6
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 3.2
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 10-Aug-2010
Set-up Time : 5:11:30 PM
Area Scan : 7x5x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : Low



1 gram SAR value : 0.969 W/kg
10 gram SAR value : 0.505 W/kg
Area Scan Peak SAR : 0.975 W/kg
Zoom Scan Peak SAR : 1.879 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 11-Feb-2011
Starting Time : 11-Feb-2011 09:46:15 AM
End Time : 11-Feb-2011 10:06:35 AM
Scanning Time : 1220 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : 10 MHz 16QAM $\frac{1}{2}$ AMC
Model : CC208
Frequency : 2600.00 MHz
Max. Transmit Pwr : 0.25 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal - Antenna 2
Orientation : Express Card
Power Drift-Start : 1.094 W/kg
Power Drift-Finish: 1.117 W/kg
Power Drift (%) : 2.104

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 2590
Frequency : 2590.00 MHz
Last Calib. Date : 11-Feb-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 45.00 RH%
Epsilon : 52.18 F/m
Sigma : 2.17 S/m
Density : 1000.00 kg/cu. m

Probe Data

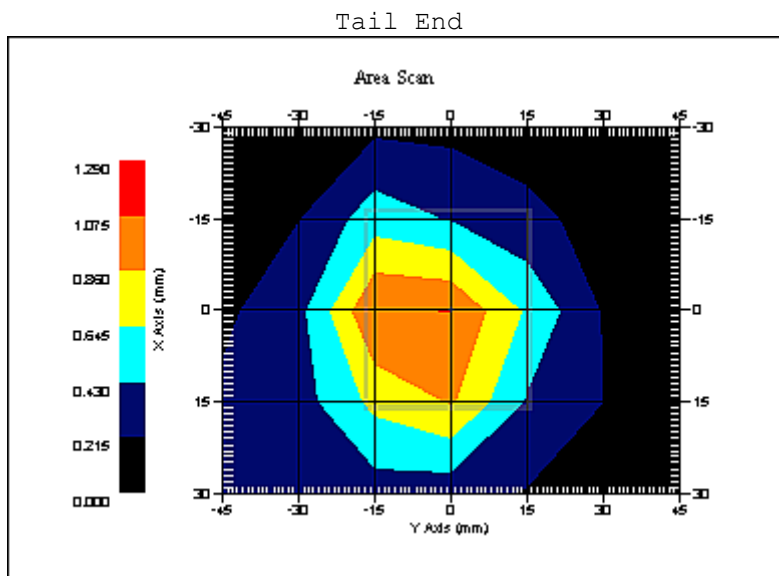
Name : Probe 215 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 215
Last Calib. Date : 22-Sep-2010
Frequency : 2600.00 MHz
Conversion Factor: 4.7
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 3.2
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 11-Feb-2011
Set-up Time : 8:18:29 AM
Area Scan : 5x7x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Express Card
Separation : 10 mm
Channel : Mid



1 gram SAR value : 0.956 W/kg
10 gram SAR value : 0.476 W/kg
Area Scan Peak SAR : 1.076 W/kg
Zoom Scan Peak SAR : 2.012 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 10-Aug-2010
Starting Time : 10-Aug-2010 08:12:12 PM
End Time : 10-Aug-2010 08:30:11 PM
Scanning Time : 1079 secs

Product Data

Device Name : Novatel Wireless
Serial No. : 5D
Mode : 5 MHz QPSK $\frac{1}{2}$ PUSC
Model : CC208
Frequency : 2600.00 MHz
Max. Transmit Pwr : 0.211 W
Drift Time : 0 min(s)
Length : 40 mm
Width : 34 mm
Depth : 18 mm
Antenna Type : Internal - Antenna 2
Orientation : PC Card
Power Drift-Start : 0.779 W/kg
Power Drift-Finish: 0.800 W/kg
Power Drift (%) : 2.809

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data

Type : BODY
Serial No. : 2590
Frequency : 2590.00 MHz
Last Calib. Date : 10-Aug-2010
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 45.00 RH%
Epsilon : 52.48 F/m
Sigma : 2.16 S/m
Density : 1000.00 kg/cu. m

Probe Data

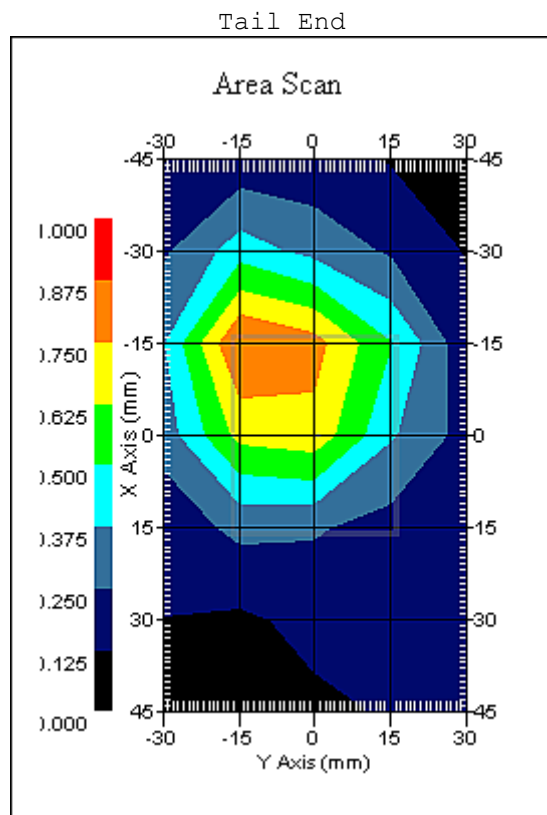
Name : Probe 217 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 217
Last Calib. Date : 21-Oct-2009
Frequency : 2600.00 MHz
Conversion Factor: 3.6
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 3.2
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 10-Aug-2010
Set-up Time : 5:11:30 PM
Area Scan : 7x5x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : PC Card
Separation : 10 mm
Channel : Mid



1 gram SAR value : 0.943 W/kg
10 gram SAR value : 0.495 W/kg
Area Scan Peak SAR : 0.877 W/kg
Zoom Scan Peak SAR : 1.721 W/kg

Appendix D – Probe Calibration Data Sheets

NCL CALIBRATION LABORATORIES

Calibration File No.: CP-1079

Client.: RFEL

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

BODY Calibration

Manufacturer: APREL Laboratories

Model No.: E-020

Serial No.: 217

Calibration Procedure: SSI/DRB-TP-D01-032-E020-V2

Project No: RFEL-E020-CAL-5477

Calibrated: 21st October 2009

Released on: 28th October 2009

This Calibration Certificate is Incomplete Unless Accompanied with the Calibration Results Summary
This calibration has been conducted in line with the SCC ISO-IEC 17025 Scope of Accreditation
Accredited Laboratory Number 48

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-D01-032-E020-V2 E-Field Probe Calibration Procedure. The results contained within this report are for APREL E-Field Probe E-020 217.

References

SSI/DRB-TP-D01-032-E020-V2 E-Field Probe Calibration Procedure

IEEE 1528 "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques"

SSI-TP-011 Tissue Calibration Procedure

IEC 62209 "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 1 & 2: Procedure to determine the Specific Absorption Rate (SAR) for hand-held devices used in close proximity of the ear (frequency range of 300 MHz to 3 GHz)"

IEEE 1309 Draft Standard for Calibration of Electromagnetic Field Sensors and Probes, Excluding Antennas, from 9kHz to 40GHz

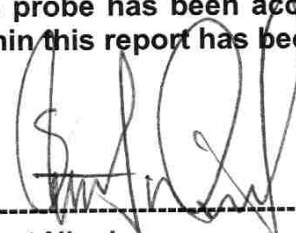
Conditions

Probe 217 was a re-calibration.

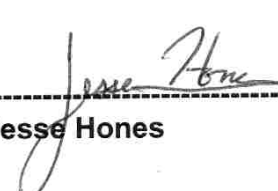
Ambient Temperature of the Laboratory: 22 °C +/- 0.5°C

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

Calibration Results Summary

Probe Type:	E-Field Probe E-020
Serial Number:	217
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

*Resistive to recommended tissue recipes per IEEE-1528

Sensitivity in Air

Channel X:	1.2 $\mu\text{V}/(\text{V}/\text{m})^2$
Channel Y:	1.2 $\mu\text{V}/(\text{V}/\text{m})^2$
Channel Z:	1.2 $\mu\text{V}/(\text{V}/\text{m})^2$
Diode Compression Point:	95 mV

Sensitivity in Body Tissue Measured

Frequency: 835 MHz

Epsilon: 54.9 (+/-5%) **Sigma:** 1.04 S/m (+/-5%)

ConvF

Channel X: 6.1

Channel Y: 6.1

Channel Z: 6.1

Tissue sensitivity values were calculated using the load impedance of the APREL Laboratories Daq-Paq.

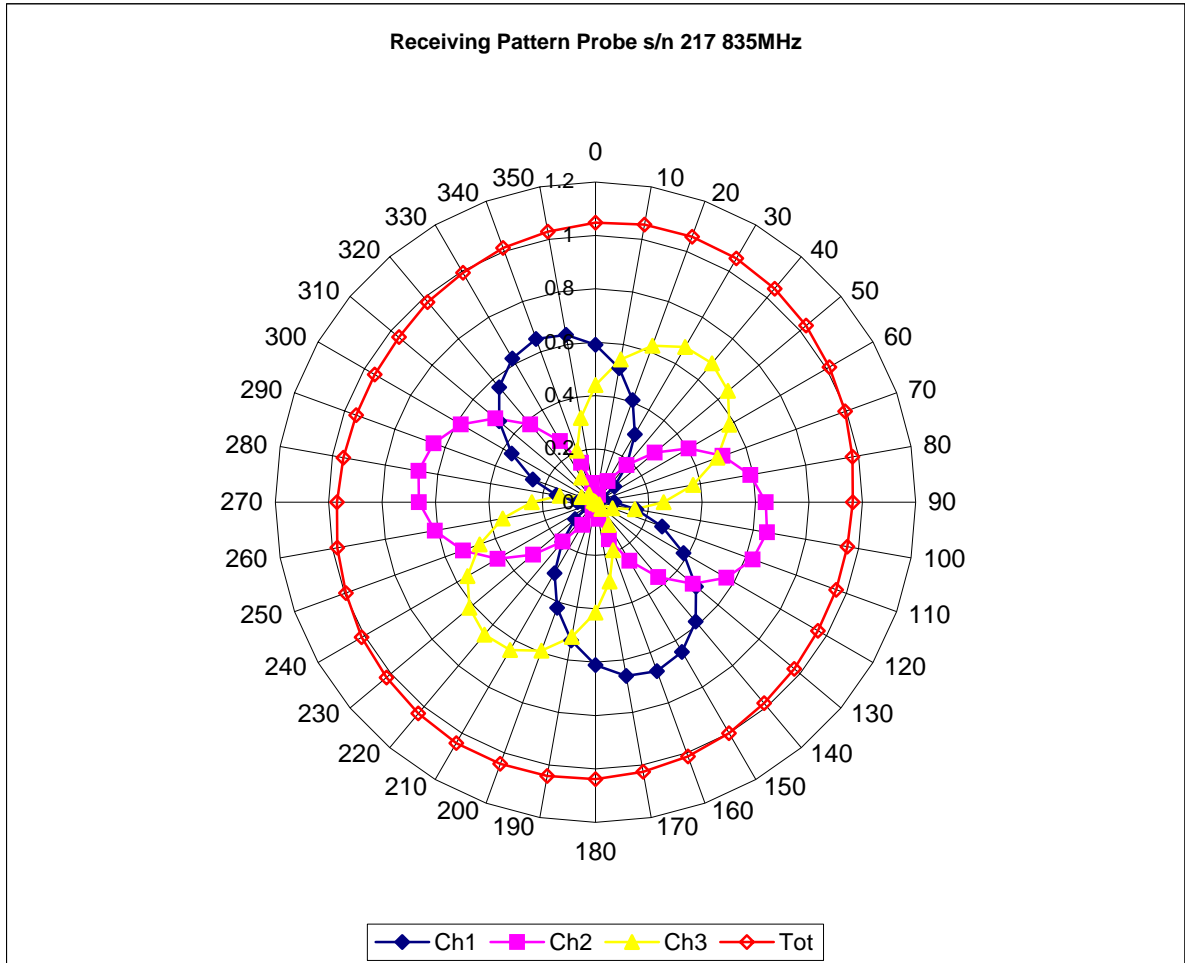
Boundary Effect:

Uncertainty resulting from the boundary effect is less than 2% for the distance between the tip of the probe and the tissue boundary, when less than 2.44mm.

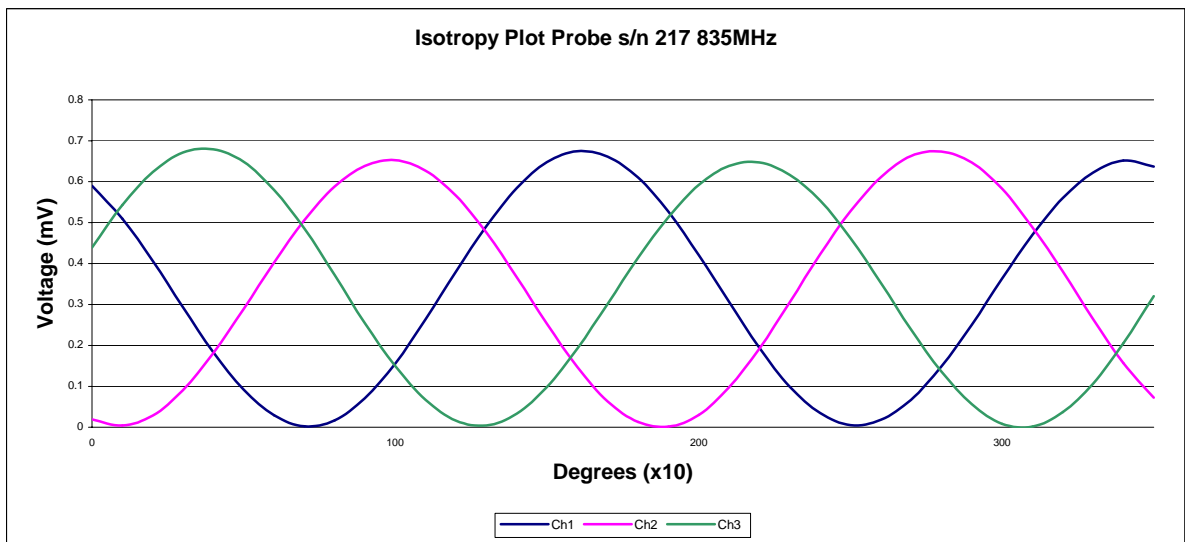
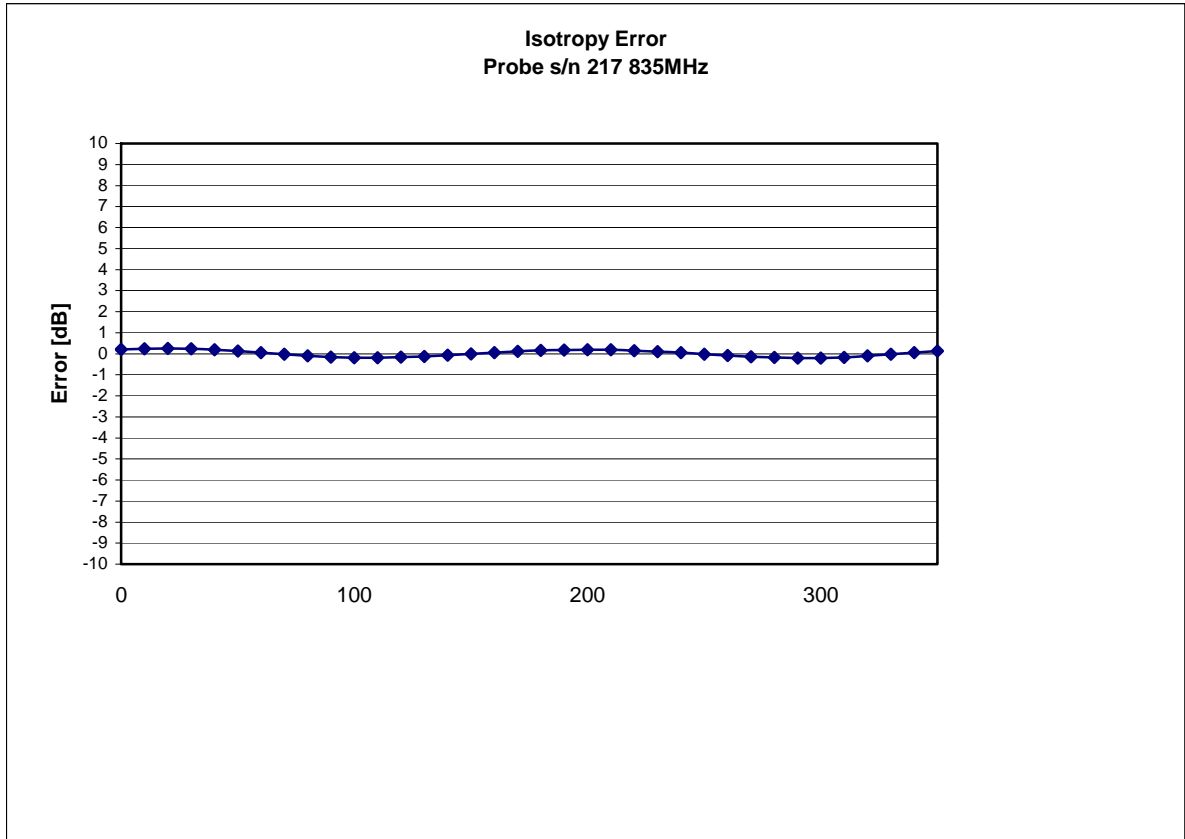
Spatial Resolution:

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 835 MHz (Air)



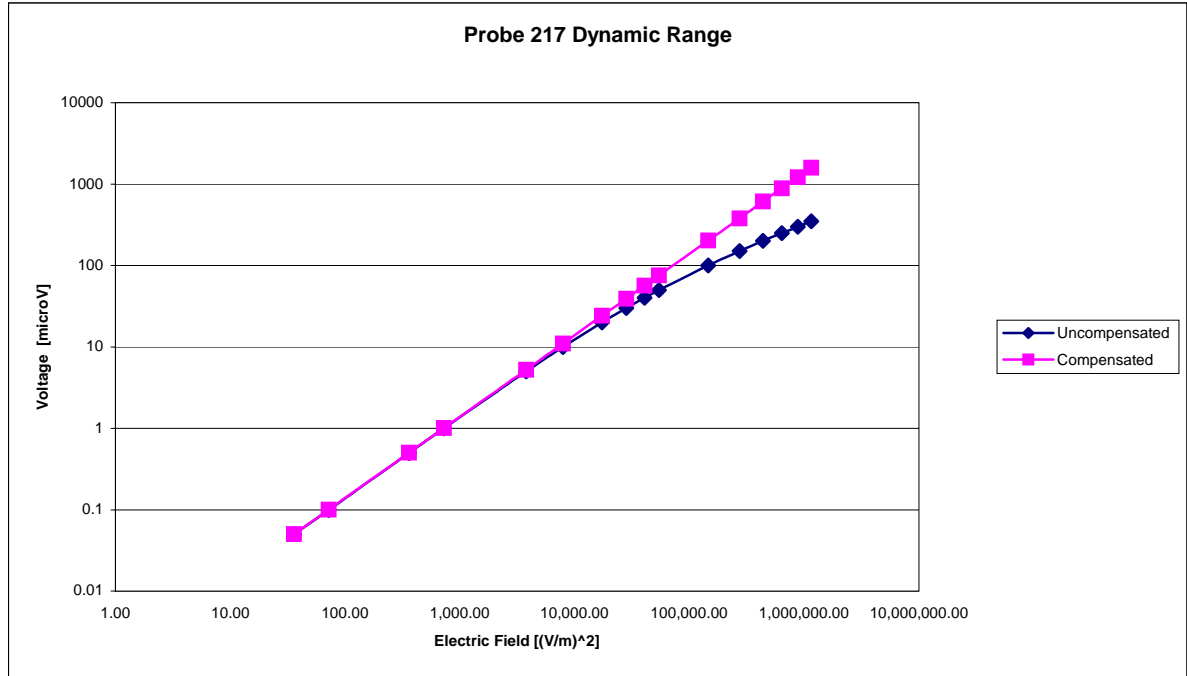
Isotropy Error 835 MHz (Air)



Isotropicity Tissue:

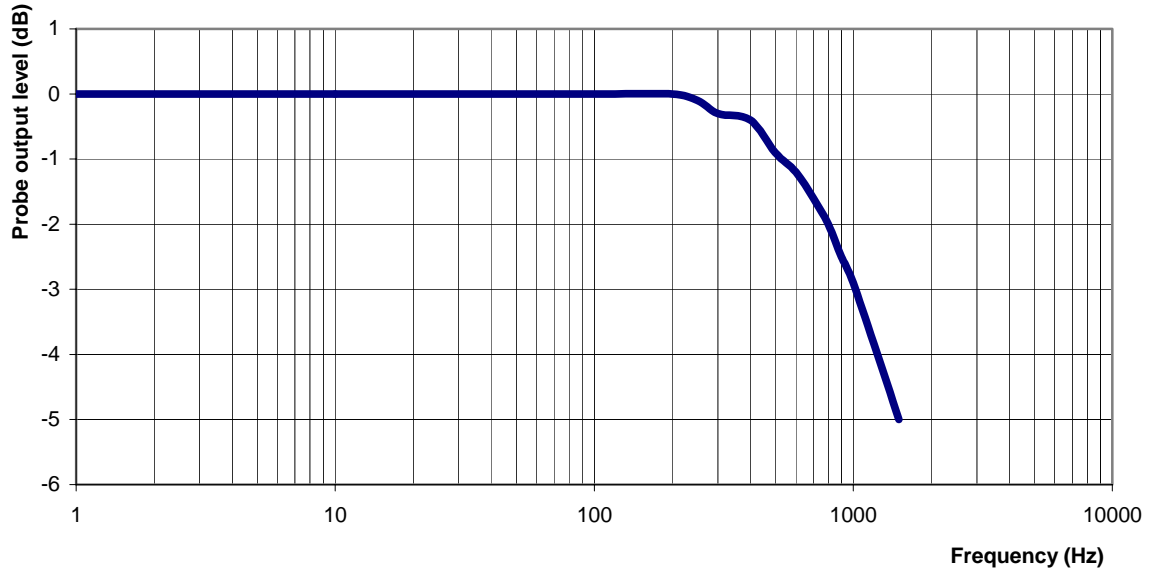
0.10 dB

Dynamic Range



Video Bandwidth

Probe Frequency Characteristics



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

Conversion Factor Uncertainty Assessment Measured

Sensitivity in Body Tissue

Frequency: 835 MHz

Epsilon: 54.9 (+/-5%) **Sigma:** 1.04 S/m (+/-5%)

ConvF

Channel X: 6.1 7%(K=2)

Channel Y: 6.1 7%(K=2)

Channel Z: 6.1 7%(K=2)

To minimize the uncertainty calculation all tissue sensitivity values were calculated using a load impedance of 5 MΩ.

Boundary Effect:

For a distance of 2.5mm the evaluated uncertainty (increase in the probe sensitivity) is less than 2%.

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 2009.

NCL CALIBRATION LABORATORIES

Calibration File No.: CP-1084

Client.: RFEL

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 1900 MHz

BODY Calibration

Manufacturer: APREL Laboratories

Model No.: E-020

Serial No.: 217

Calibration Procedure: SSI/DRB-TP-D01-032-E020-V2

Project No: RFEL-E020-CAL-5477

Calibrated: 21st October 2009

Released on: 28th October 2009

This Calibration Certificate is Incomplete Unless Accompanied with the Calibration Results Summary
This calibration has been conducted in line with the SCC ISO-IEC 17025 Scope of Accreditation
Accredited Laboratory Number 48

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-D01-032-E020-V2 E-Field Probe Calibration Procedure. The results contained within this report are for APREL E-Field Probe E-020 217.

References

SSI/DRB-TP-D01-032-E020-V2 E-Field Probe Calibration Procedure

IEEE 1528 "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques"

SSI-TP-011 Tissue Calibration Procedure

IEC 62209 "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 1 & 2: Procedure to determine the Specific Absorption Rate (SAR) for hand-held devices used in close proximity of the ear (frequency range of 300 MHz to 3 GHz)"

IEEE 1309 Draft Standard for Calibration of Electromagnetic Field Sensors and Probes, Excluding Antennas, from 9kHz to 40GHz

Conditions

Probe 217 was a 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

Calibration Results Summary

Probe Type:	E-Field Probe E-020
Serial Number:	217
Frequency:	1900 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

*Resistive to recommended tissue recipes per IEEE-1528

Sensitivity in Air

Channel X:	1.2 $\mu\text{V}/(\text{V}/\text{m})^2$
Channel Y:	1.2 $\mu\text{V}/(\text{V}/\text{m})^2$
Channel Z:	1.2 $\mu\text{V}/(\text{V}/\text{m})^2$
Diode Compression Point:	95 mV

Sensitivity in Body Tissue Measured

Frequency: 1900 MHz

Epsilon: 54.6 (+/-5%) **Sigma:** 1.55 S/m (+/-5%)

ConvF

Channel X: 4.85

Channel Y: 4.85

Channel Z: 4.85

Tissue sensitivity values were calculated using the load impedance of the APREL Laboratories Daq-Paq.

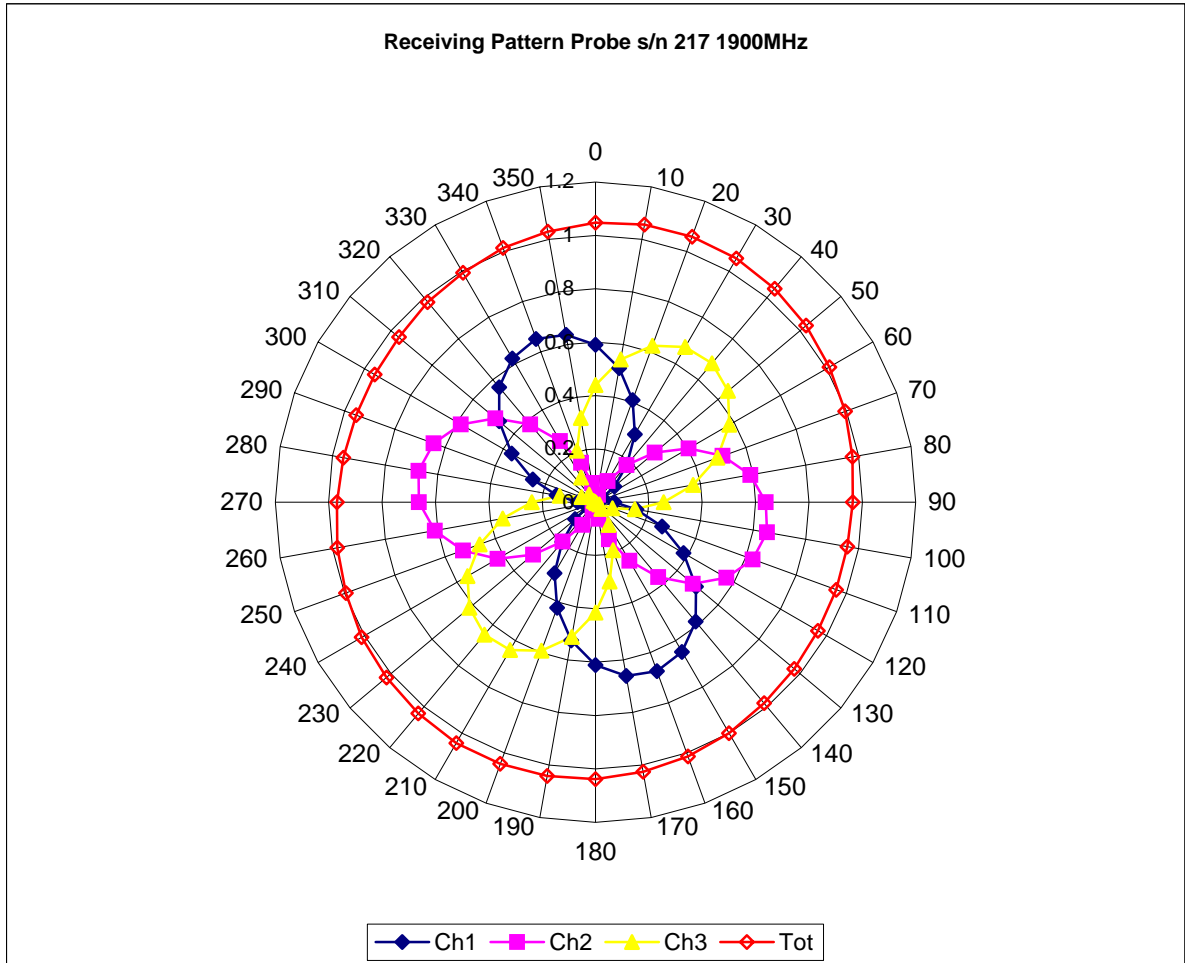
Boundary Effect:

Uncertainty resulting from the boundary effect is less than 2% for the distance between the tip of the probe and the tissue boundary, when less than 2.44mm.

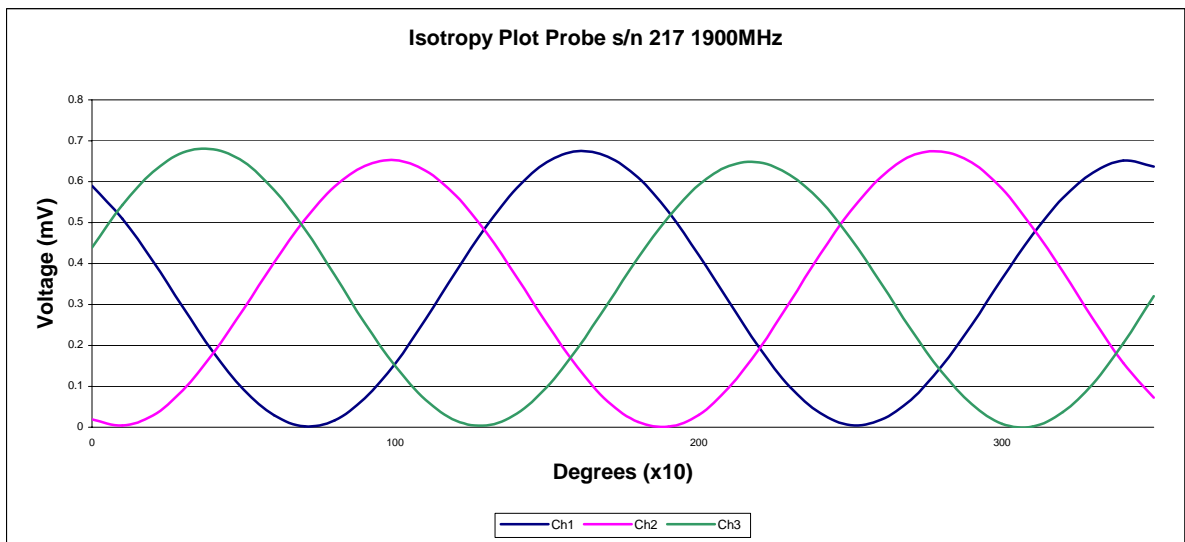
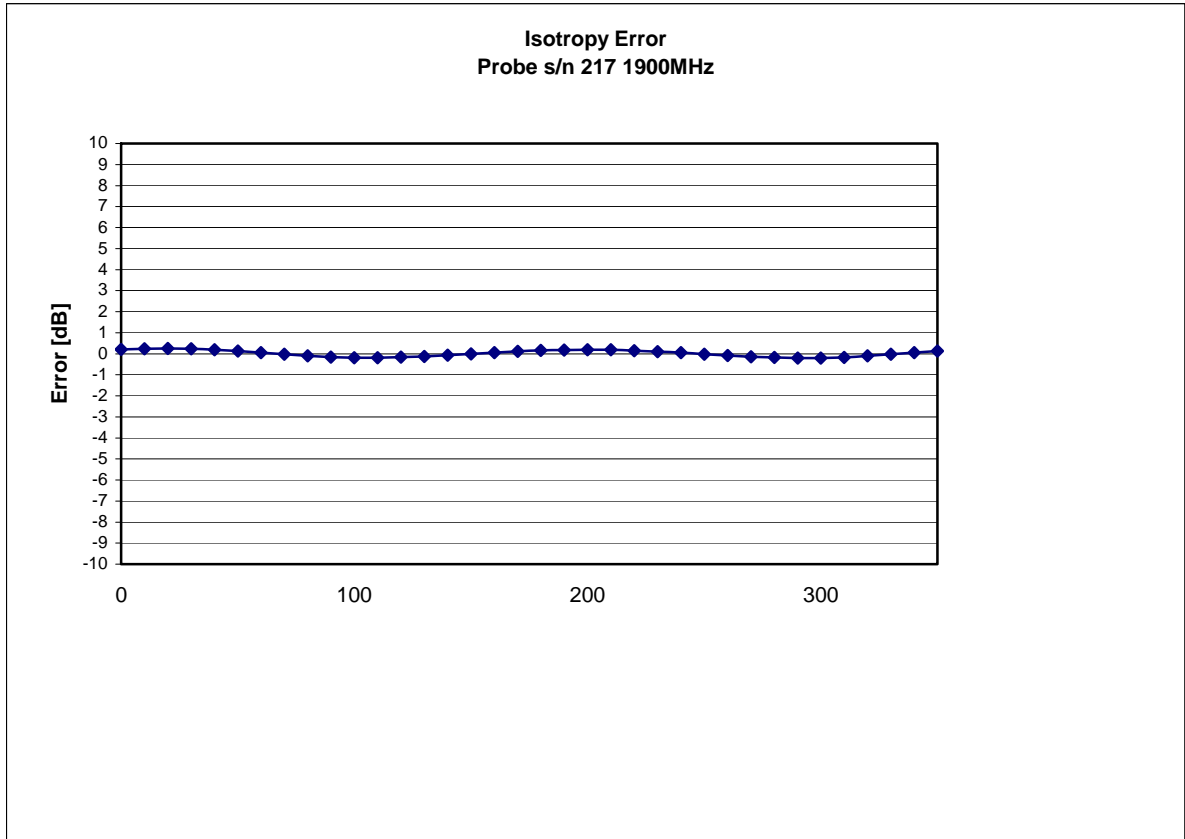
Spatial Resolution:

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 1900 MHz (Air)



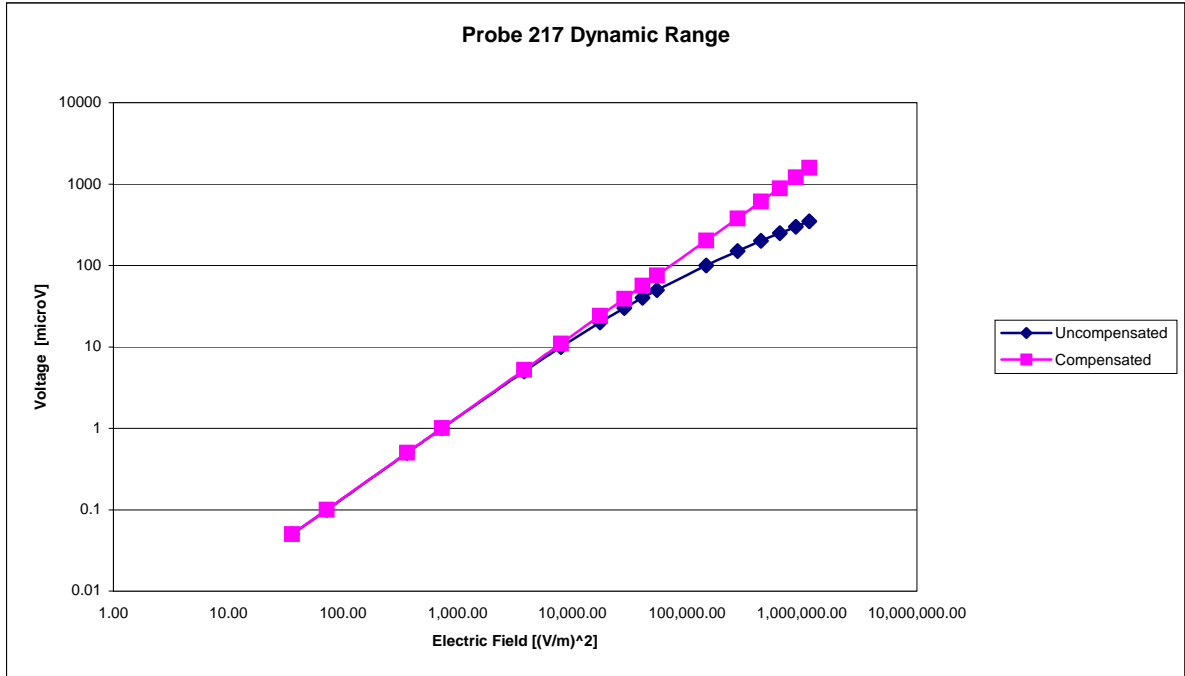
Isotropy Error 1900 MHz (Air)



Isotropicity Tissue:

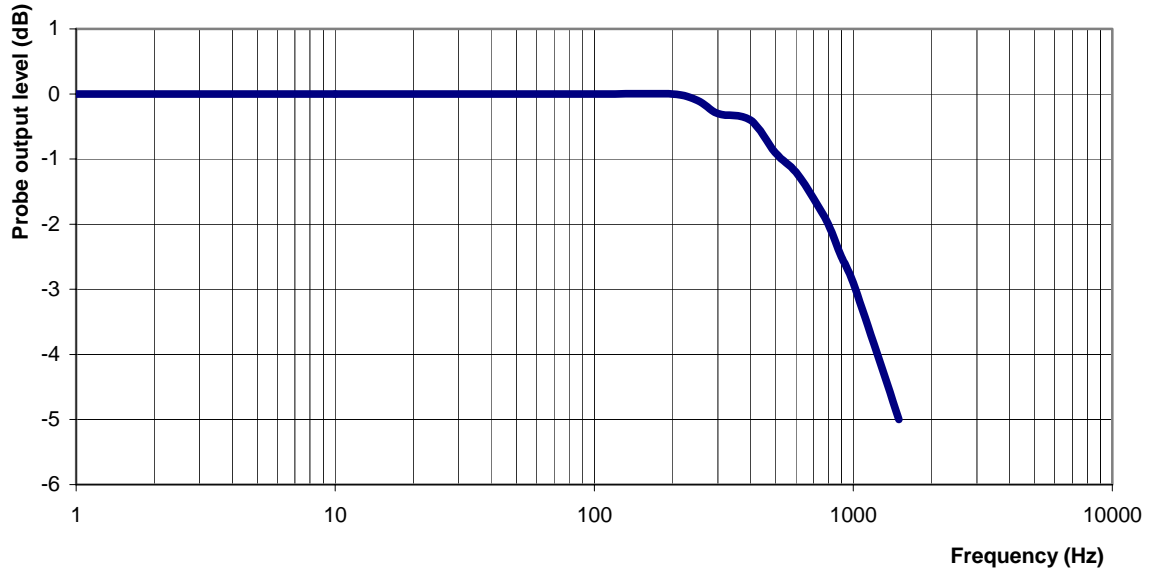
0.10 dB

Dynamic Range



Video Bandwidth

Probe Frequency Characteristics



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

Conversion Factor Uncertainty Assessment Measured

Sensitivity in Body Tissue

Frequency: 1900 MHz

Epsilon: 54.6 (+/-5%) **Sigma:** 1.55 S/m (+/-5%)

ConvF

Channel X: 4.85 7%(K=2)

Channel Y: 4.85 7%(K=2)

Channel Z: 4.85 7%(K=2)

To minimize the uncertainty calculation all tissue sensitivity values were calculated using a load impedance of 5 MΩ.

Boundary Effect:

For a distance of 2.5mm the evaluated uncertainty (increase in the probe sensitivity) is less than 2%.

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 2009.

NCL CALIBRATION LABORATORIES

Calibration File No.: CP-1165

Client.: RFEL

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 2600 MHz

Manufacturer: APREL Laboratories

Model No.: E-020

Serial No.: 215

Body Calibration

Calibration Procedure: SSI/DRB-TP-D01-032-E020-V2

Project No: RFEL-E-020-Cal-5539

Calibrated: 22 September 2010

Released on: 27 September 2010

This Calibration Certificate is Incomplete Unless Accompanied with the Calibration Results Summary
This calibration has been conducted in line with the SCC ISO-IEC 17025 Scope of Accreditation
Accredited Laboratory Number 48

Released By: _____

NCL CALIBRATION LABORATORIES

17 Bentley Ave
NEPEAN, ONTARIO
CANADA K2E 6T7

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-D01-032-E020-V2 E-Field Probe Calibration Procedure. The results contained within this report are for APREL E-Field Probe E-020 215.

References

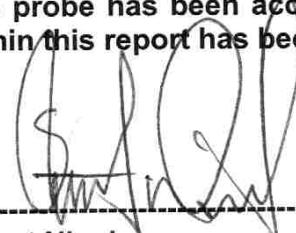
SSI/DRB-TP-D01-032-E020-V2 E-Field Probe Calibration Procedure
IEEE 1528 "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques"
IEEE 1309 "IEEE Standard for Calibration of Electromagnetic Field Sensors and Probes, Excluding Antennas, from 9 KHz to 40 GHz" 2005
SSI-TP-011 Tissue Calibration Procedure
IEC 62209 "Human exposure to radio frequency fields from handheld and body-mounted wireless communication devices –Human models, instrumentation and procedures Part 1 & 2: Procedure to determine the Specific Absorption Rate (SAR) for handheld devices used in close proximity of the ear (frequency range of 200MHz to 3GHz)"

Conditions

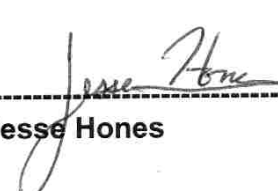
Probe 215 was a re-calibration.

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

Calibration Results Summary

Probe Type:	E-Field Probe E-020
Serial Number:	215
Frequency:	2600 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

*Resistive to recommended tissue recipes per IEEE-1528

Sensitivity in Air

Channel X:	$1.2 \mu\text{V}/(\text{V}/\text{m})^2$
Channel Y:	$1.2 \mu\text{V}/(\text{V}/\text{m})^2$
Channel Z:	$1.2 \mu\text{V}/(\text{V}/\text{m})^2$
Diode Compression Point:	95 mV

Sensitivity in Body Tissue Measured

Frequency: 2600 MHz
Epsilon: 51.95 (+/-5%) **Sigma:** 2.08 S/m (+/-5%)

ConvF

Channel X: 4.7 @ 2600MHz +/- 5%
Channel Y: 4.7 @ 2600MHz +/- 5%
Channel Z: 4.7 @ 2600MHz +/- 5%

Tissue sensitivity values were calculated using the load impedance of the APREL Laboratories Daq-Paq.

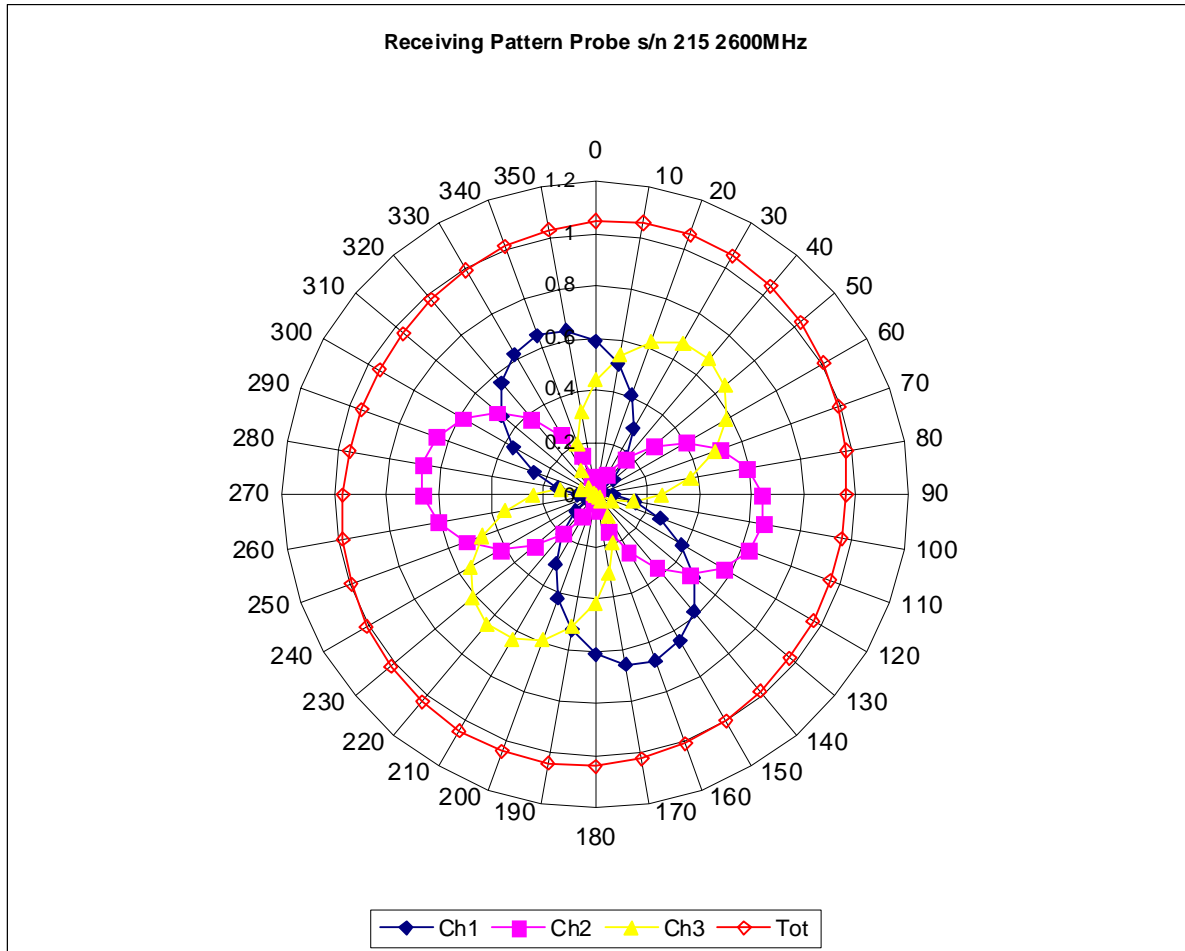
Boundary Effect:

Uncertainty resulting from the boundary effect is less than 2% for the distance between the tip of the probe and the tissue boundary, when less than 2.44mm.

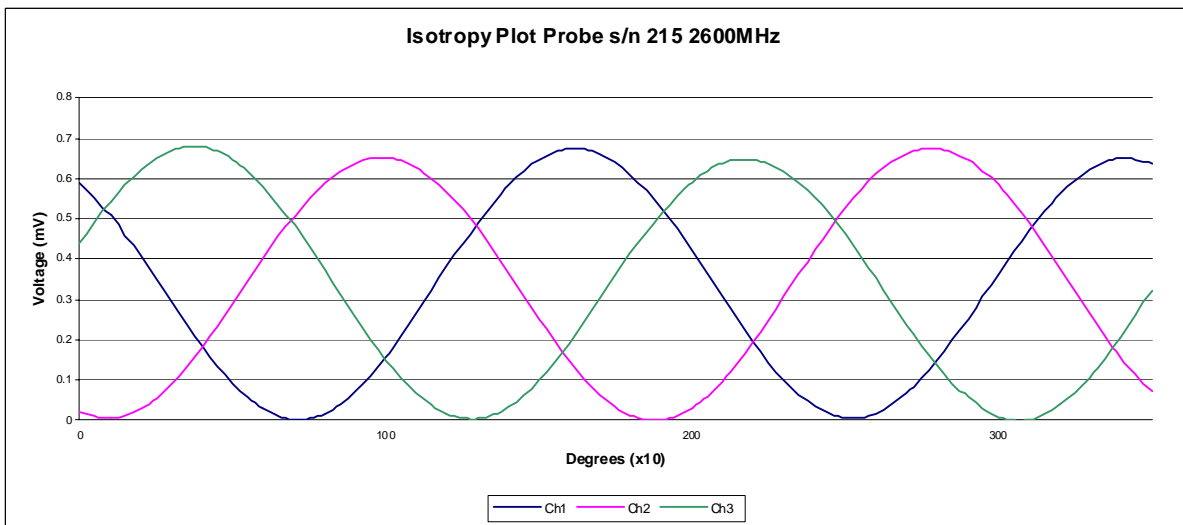
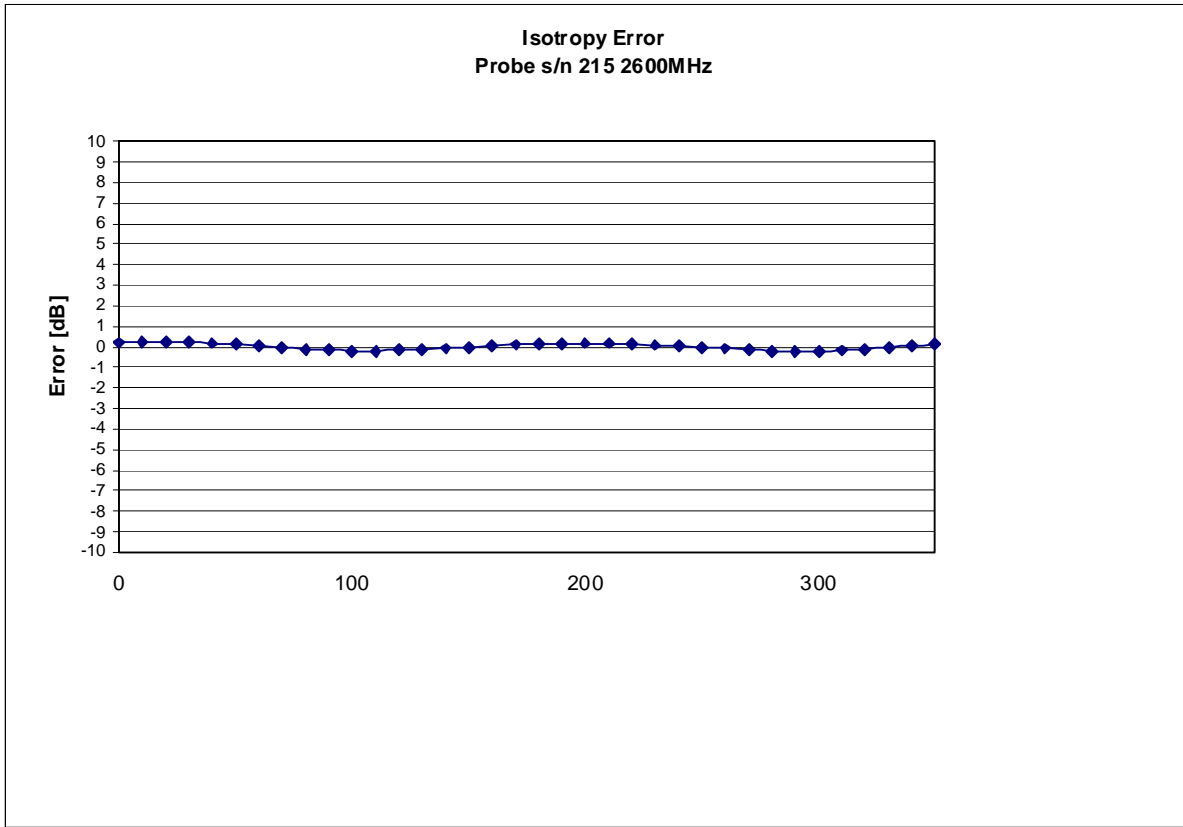
Spatial Resolution:

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 2600 MHz (Air)



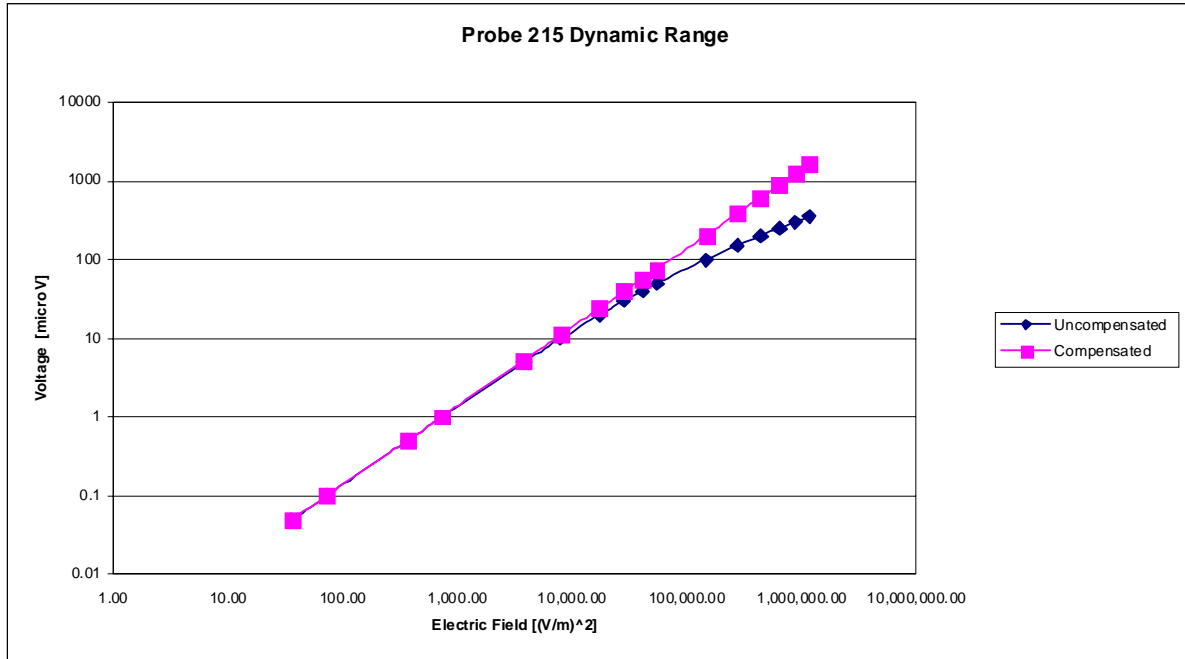
Isotropy Error 2600 MHz (Air)



Isotropicity Tissue:

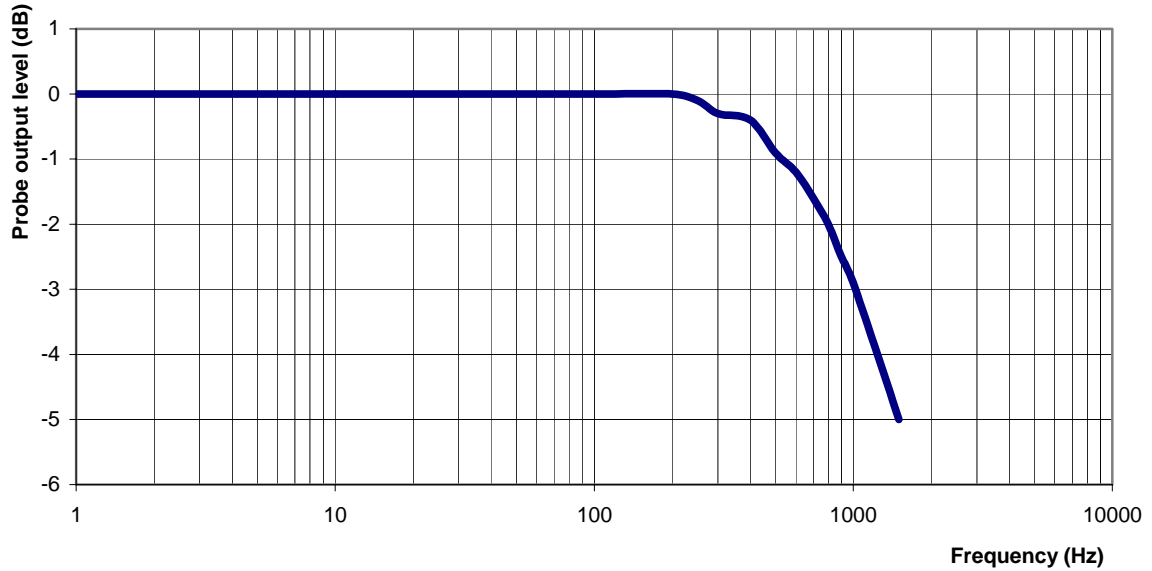
0.10 dB

Dynamic Range



Video Bandwidth

Probe Frequency Characteristics



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

Conversion Factor Uncertainty Assessment Measured

Sensitivity in Body Tissue

Frequency: 2600 MHz
Epsilon: 51.95 (+/-5%) **Sigma:** 2.08 S/m (+/-5%)

ConvF

Channel X: 4.7 7%(K=2)
Channel Y: 4.7 7%(K=2)
Channel Z: 4.7 7%(K=2)

To minimize the uncertainty calculation all tissue sensitivity values were calculated using a load impedance of 5 MΩ.

Boundary Effect:

For a distance of 2.5mm the evaluated uncertainty (increase in the probe sensitivity) is less than 2%.

Conversion Factor Validity:

The conversion factor is valid to +/- 5% of 2600MHz.

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 2010.

Appendix E – Dipole Calibration Data Sheets

NCL CALIBRATION LABORATORIES

Calibration File No: DC-1179
Project Number: RFEL-DC-835B-5549

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.

Validation Dipole

Manufacturer: APREL Laboratories

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

Frequency: 835 MHz

Serial No: 180-00561

Customer: RFEL

Body Calibration

Calibrated: 16th November 2010
Released on: 16th November 2010

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) 820-4162

NCL Calibration Laboratories

Division of APREL Laboratories.

Conditions

Dipole 180-00561 was a new 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 device has been accurately conducted and that all information contained within this report has been reviewed for accuracy.

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

Calibration Results Summary

The following results relate the Calibrated Dipole and should be used as a quick reference for the user.

Mechanical Dimensions

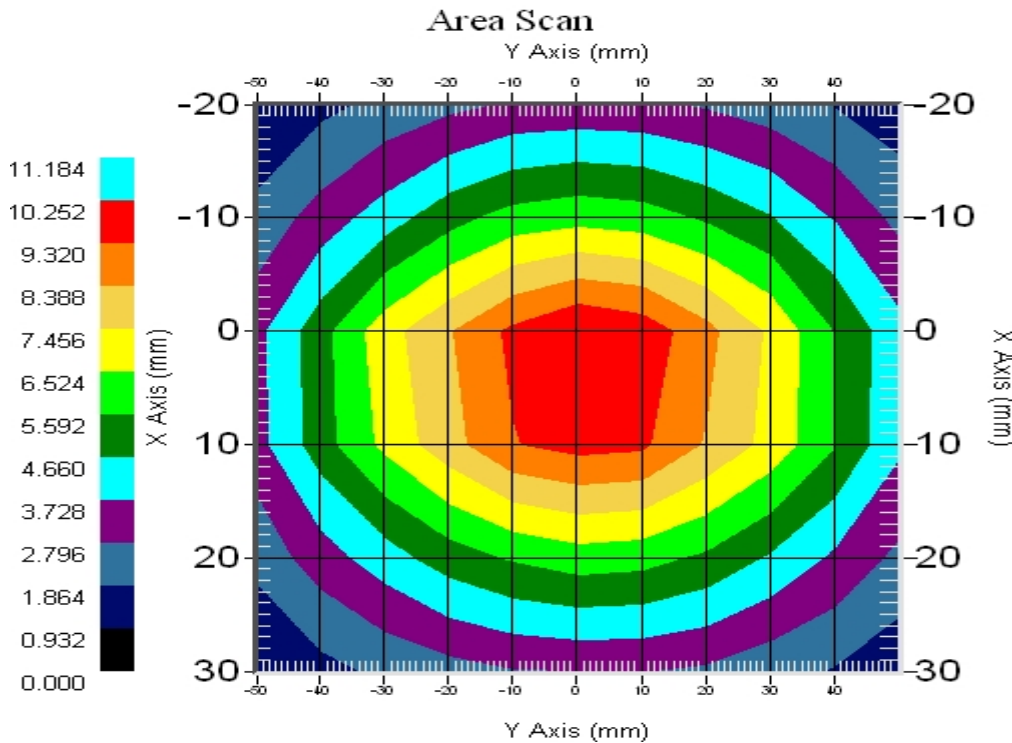
Length: 161.0 mm
Height: 89.8 mm

Electrical Specification

SWR: 1.143U
Return Loss: -24.058 dB
Impedance: 55.519 Ω

System Validation Results

Frequency	1 Gram	10 Gram	Peak
835 MHz	9.81	6.3	14.87



Introduction

This Calibration Report has been produced in line with the SSI Dipole Calibration Procedure SSI-TP-018-ALSAS. The results contained within this report are for Validation Dipole 180-00561. The calibration routine consisted of a three-step process. Step 1 was a mechanical verification of the dipole to ensure that it meets the mechanical specifications. Step 2 was an Electrical Calibration for the Validation Dipole, where the SWR, Impedance, and the Return loss were assessed. Step 3 involved a System Validation using the ALSAS-10U, along with APREL E-020 130 MHz to 26 GHz E-Field Probe Serial Number 2225.

References

SSI-TP-018-ALSAS Dipole Calibration Procedure

SSI-TP-016 Tissue Calibration Procedure

IEEE 1528 "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques"

Conditions

Dipole 180-00561 was a new calibration.

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

Temperature of the Tissue: 20 °C +/- 0.5°C

Dipole Calibration Results

Mechanical Verification

APREL Length	APREL Height	Measured Length	Measured Height
161.0 mm	89.8 mm	162.1 mm	89.8 mm

Tissue Validation

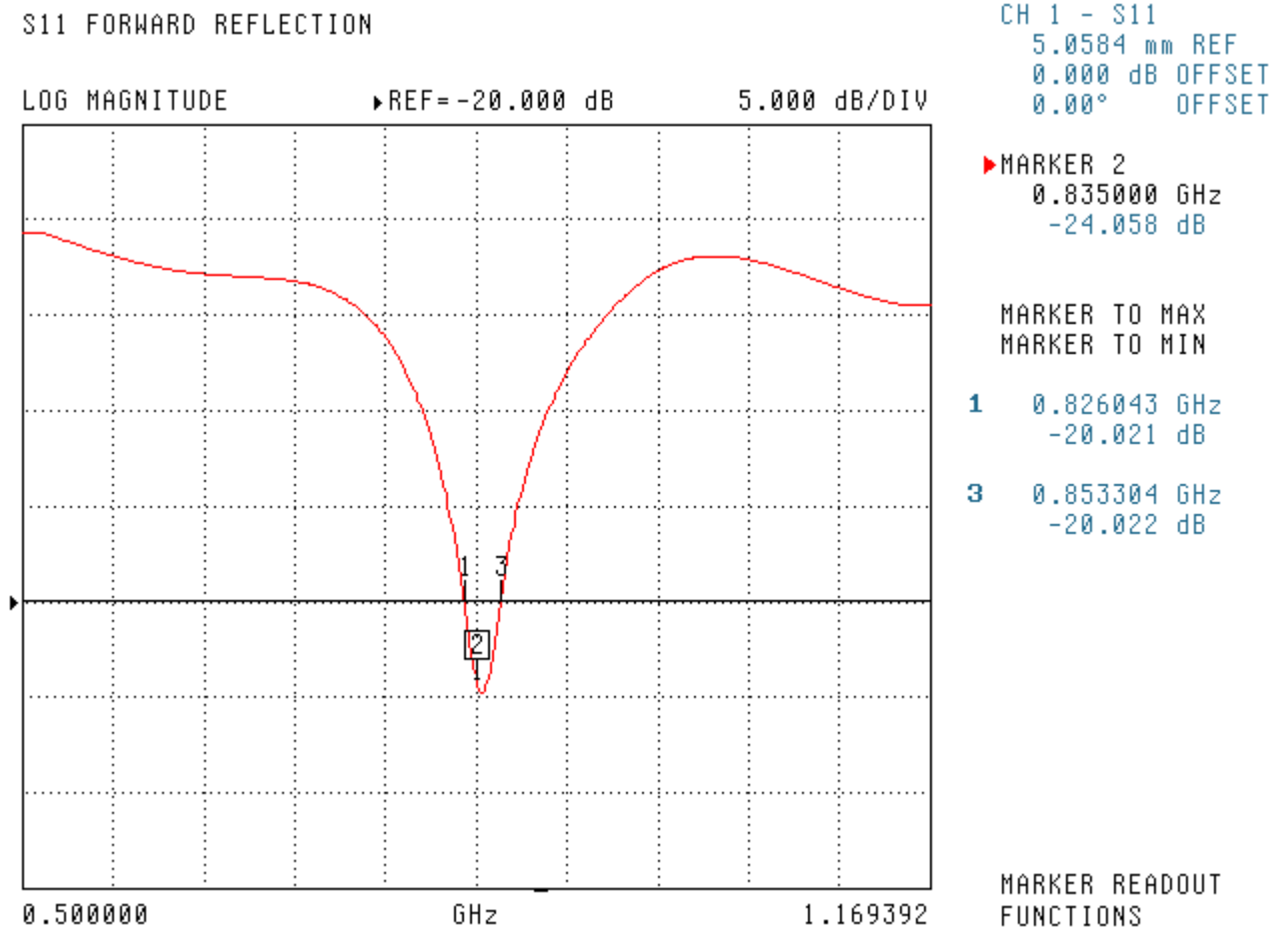
Body Tissue 835MHz	Measured
Dielectric constant, ϵ_r	57.19
Conductivity, σ [S/m]	0.97

Electrical Calibration

Test	Result
S11 RL	-24.058dB
SWR	1.143U
Impedance	55.519 Ω

The Following Graphs are the results as displayed on the Vector Network Analyzer.

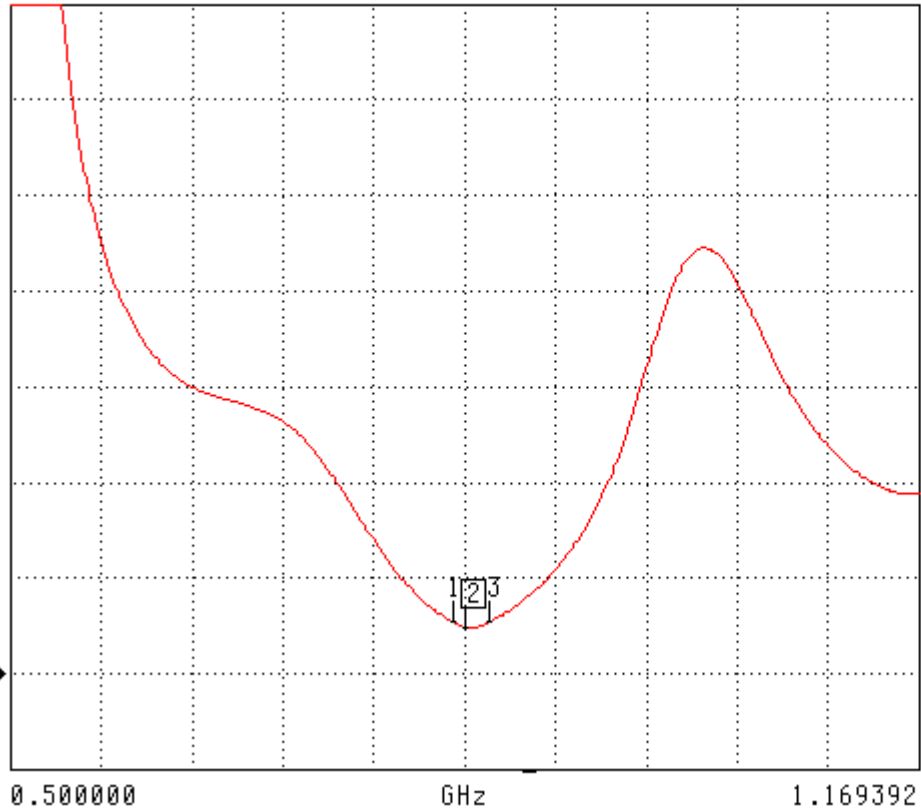
S11 Parameter Return Loss



SWR

S11 FORWARD REFLECTION

SWR REF=172.168 mU 2.000 U/DIV



CH 1 - S11
5.0584 mm REF
0.000 dB OFFSET
0.00° OFFSET

MARKER 2
0.835000 GHz
1.143 U

MARKER TO MAX
MARKER TO MIN

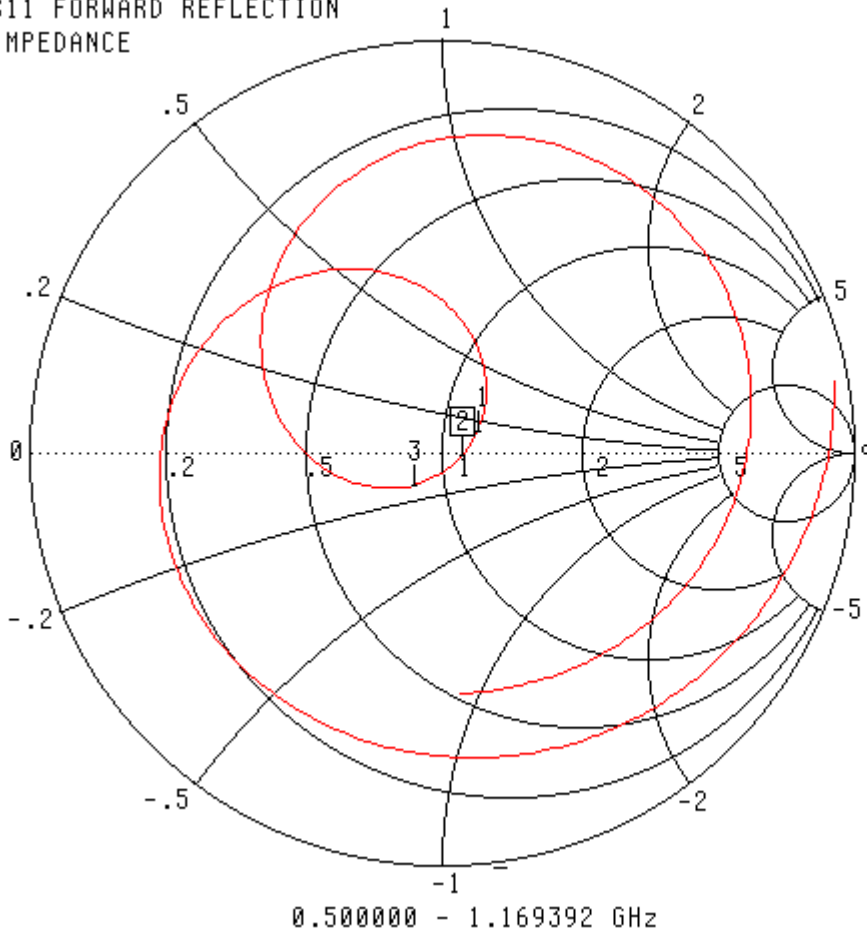
1 0.826043 GHz
1.245 U

3 0.853304 GHz
1.242 U

MARKER READOUT
FUNCTIONS

Smith Chart Dipole Impedance

S11 FORWARD REFLECTION
IMPEDANCE



CH 1 - S11
5.0584 mm REF
0.000 dB OFFSET
0.00° OFFSET

▶ MARKER 2
0.835000 GHz
55.519 Ω
-1.124 jΩ

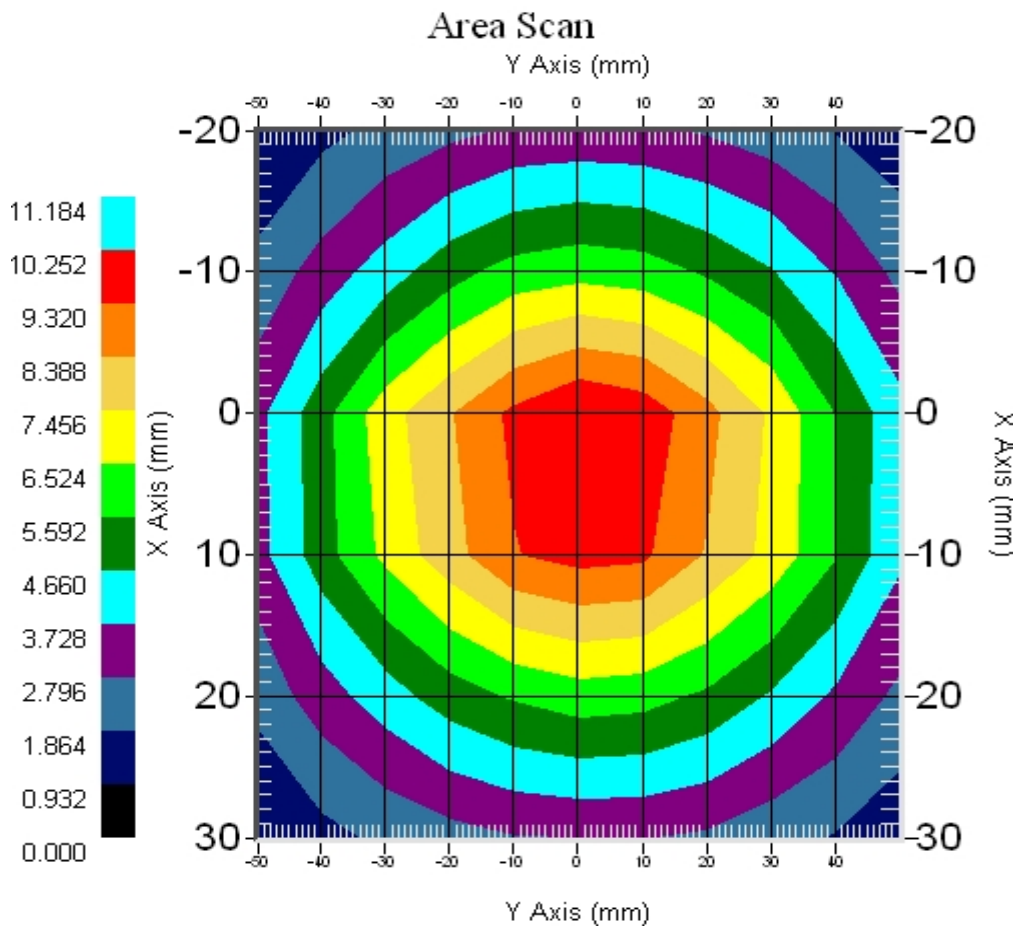
MARKER TO MAX
MARKER TO MIN

1 0.826043 GHz
59.648 Ω
6.084 jΩ
3 0.853304 GHz
43.349 Ω
-7.171 jΩ

MARKER READOUT
FUNCTIONS

System Validation Results Using the Electrically Calibrated Dipole

Body Tissue Frequency	1 Gram	10 Gram	Peak Above Feed Point
835 MHz	9.81	6.3	14.87



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 2010.

NCL CALIBRATION LABORATORIES

Calibration File No: DC-1180
Project Number: RFEL-DC-1900B-5550

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.

Validation Dipole

Manufacturer: APREL Laboratories

Part number: ALS-D-1900-S-2

Frequency: 1900 MHz

Serial No: 210-00713

Customer: RFEL

Body Calibration

Calibrated: 16 November 2010
Released on: 16th November 2010

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) 820-4162

NCL Calibration Laboratories

Division of APREL Laboratories.

Conditions

Dipole 210-00713 was new and taken from stock prior to 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 device has been accurately conducted and that all information contained within this report has been reviewed for accuracy.



Stuart Nicol



C. Teodorian

Calibration Results Summary

The following results relate the Calibrated Dipole and should be used as a quick reference for the user.

Mechanical Dimensions

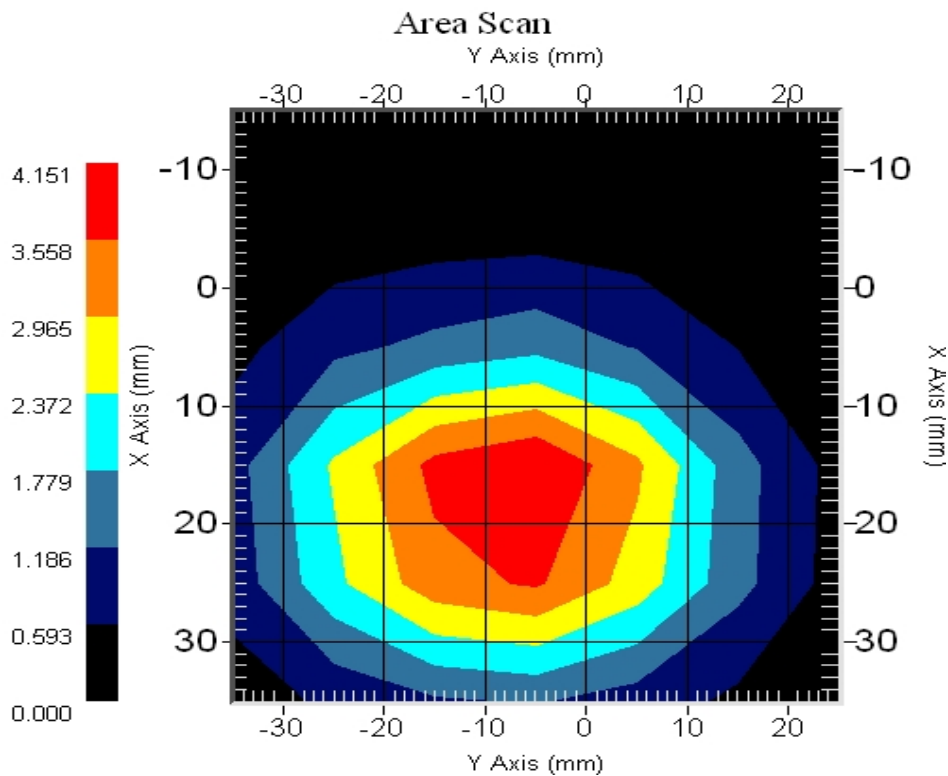
Length: 67.1 mm
Height: 38.9 mm

Electrical Specification

SWR: 1.122U
Return Loss: -24.913dB
Impedance: 53.469Ω

System Validation Results

Frequency	1 Gram	10 Gram	Peak
1900 MHz	40.9	20.9	71.7



Introduction

This Calibration Report has been produced in line with the SSI Dipole Calibration Procedure SSI-TP-018-ALSAS. The results contained within this report are for Validation Dipole 210-00713. The calibration routine consisted of a three-step process. Step 1 was a mechanical verification of the dipole to ensure that it meets the mechanical specifications. Step 2 was an Electrical Calibration for the Validation Dipole, where the SWR, Impedance, and the Return loss were assessed. Step 3 involved a System Validation using the ALSAS-10U, along with APREL E-020 130 MHz to 26 GHz E-Field Probe Serial Number 226.

References

SSI-TP-018-ALSAS Dipole Calibration Procedure
SSI-TP-016 Tissue Calibration Procedure
IEEE 1528 "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques"

Conditions

Dipole 210-00713 was new taken from stock.

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

Temperature of the Tissue: 20 °C +/- 0.5°C

Dipole Calibration Results

Mechanical Verification

APREL Length	APREL Height	Measured Length	Measured Height
68.0 mm	39.5 mm	67.1mm	38.9 mm

Tissue Validation

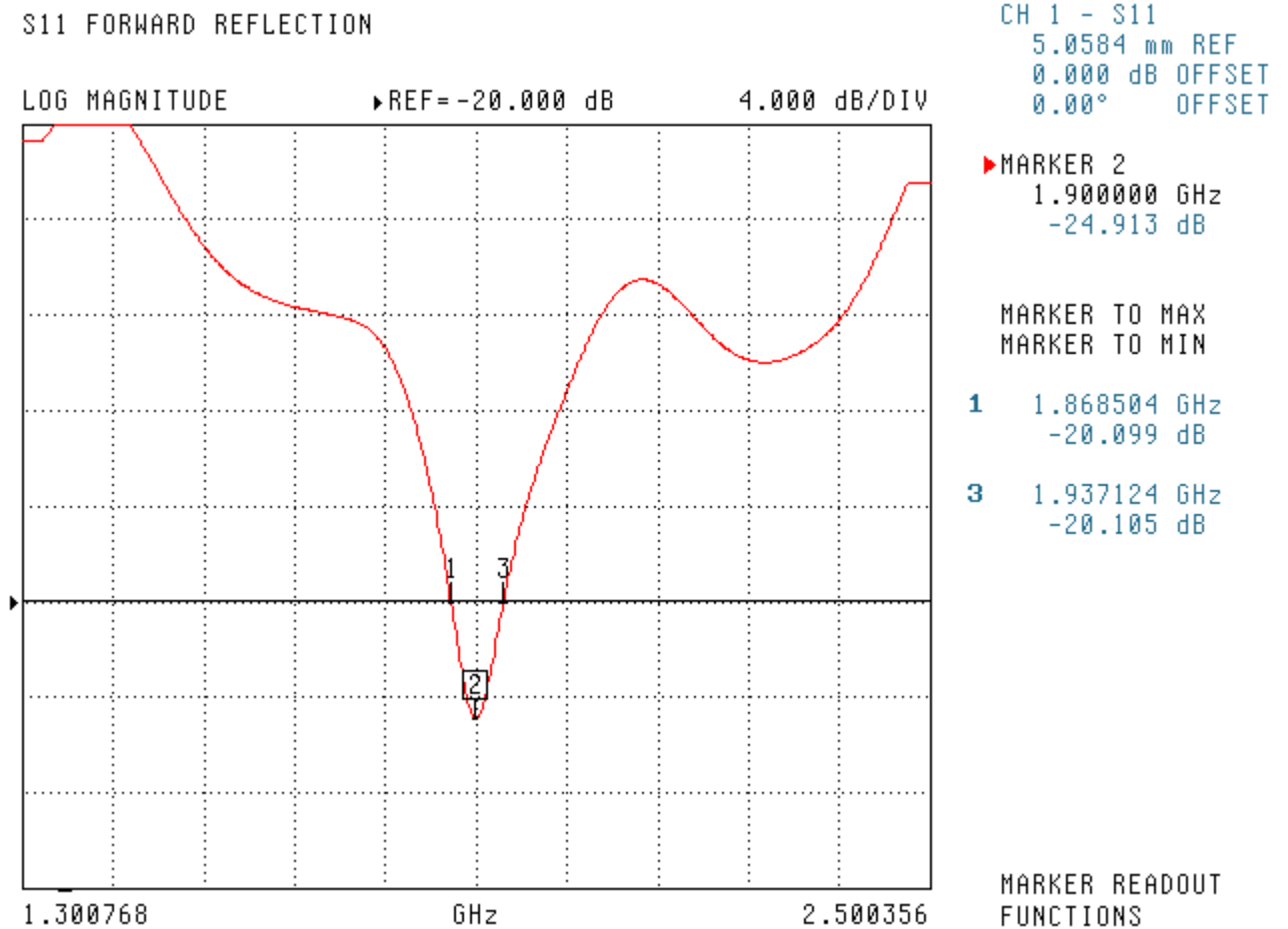
Body Tissue 1900 MHz	Measured
Dielectric constant, ϵ_r	53.87
Conductivity, σ [S/m]	1.55

Electrical Calibration

Test	Result
S11 R/L	-24.913dB
SWR	1.122U
Impedance	53.469 Ω

The Following Graphs are the results as displayed on the Vector Network Analyzer.

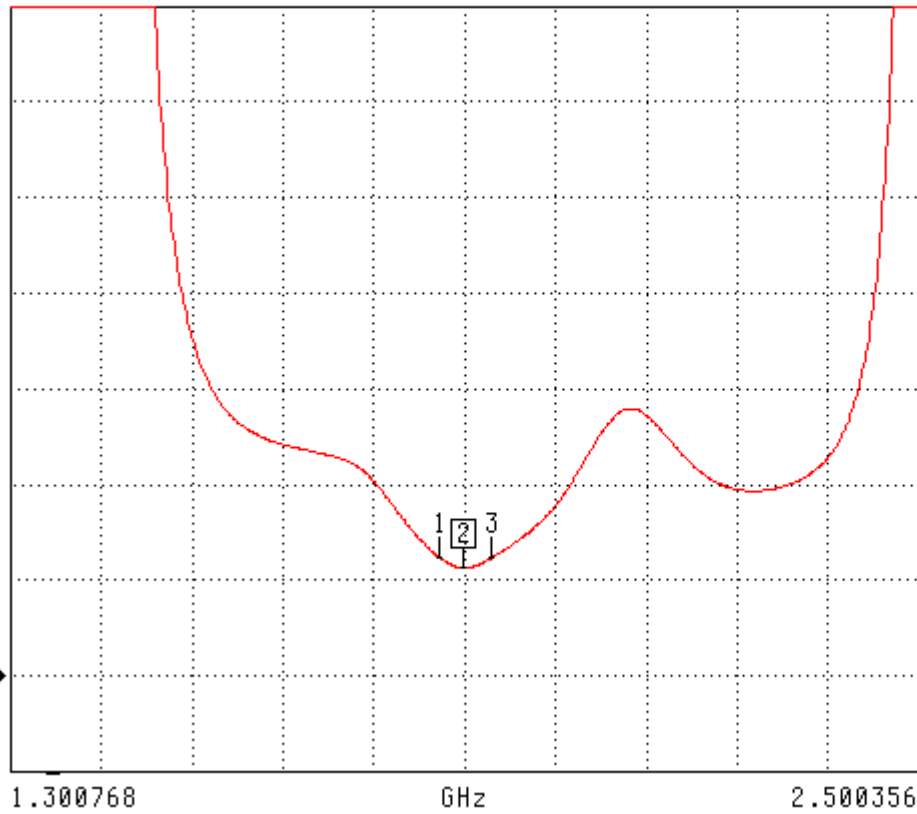
S11 Parameter Return Loss



SWR

S11 FORWARD REFLECTION

SWR REF=0.000 pU 1.000 U/DIV



CH 1 - S11
5.0584 mm REF
0.000 dB OFFSET
0.00° OFFSET

▶ MARKER 2
1.900000 GHz
1.122 U

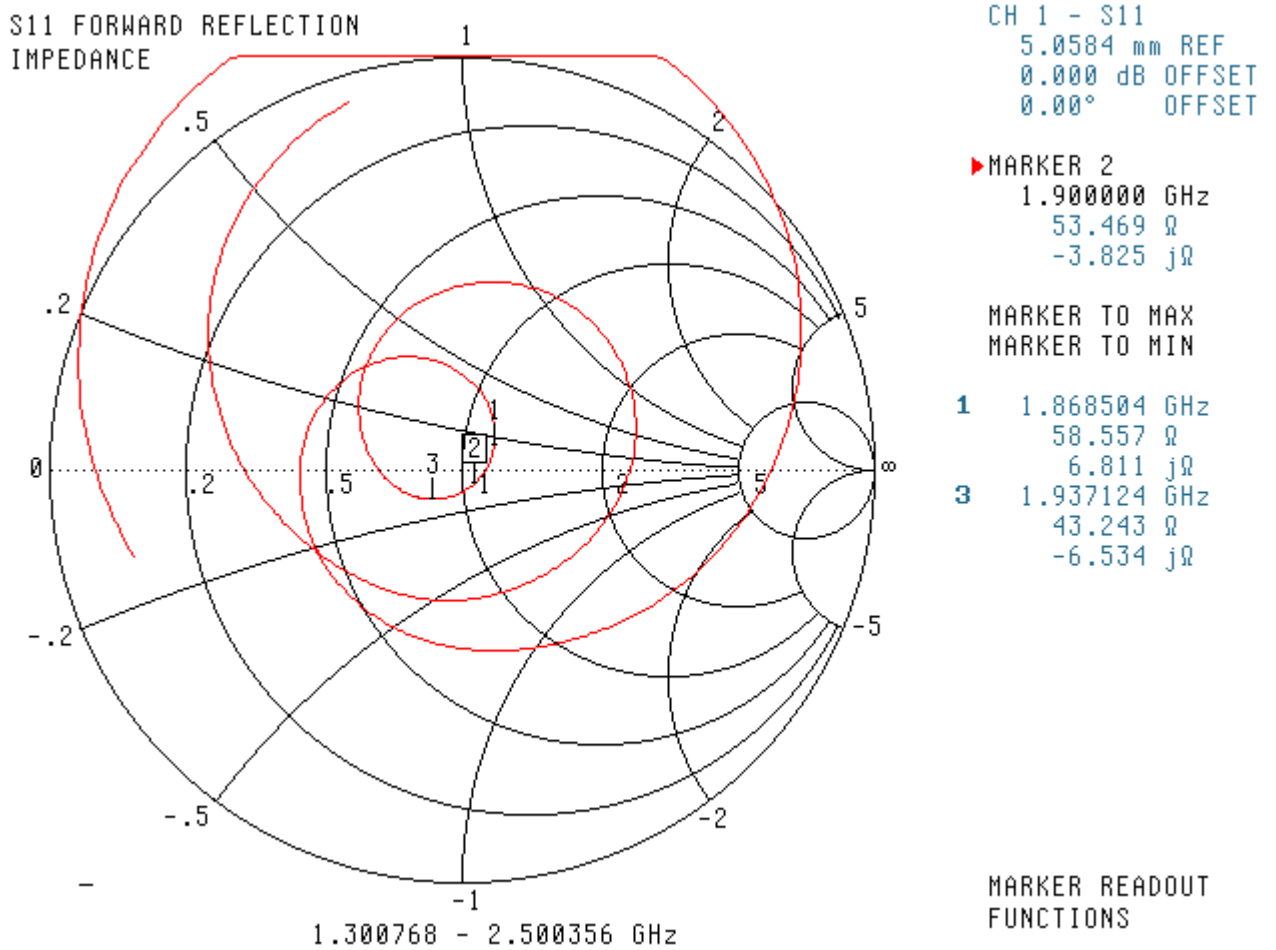
MARKER TO MAX
MARKER TO MIN

1 1.868504 GHz
1.231 U

3 1.937124 GHz
1.226 U

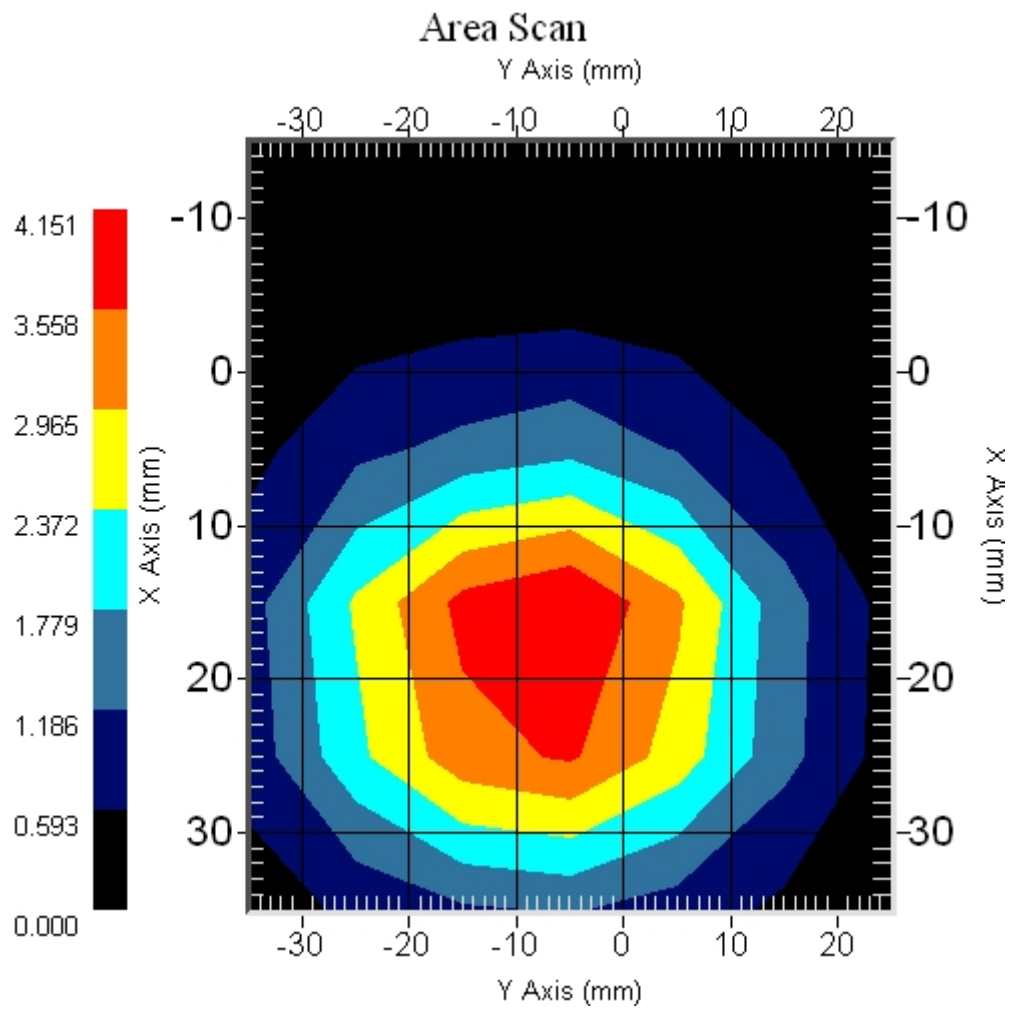
MARKER READOUT
FUNCTIONS

Smith Chart Dipole Impedance



System Validation Results Using the Electrically Calibrated Dipole

Body Tissue Frequency	1 Gram	10 Gram	Peak Above Feed Point
1900 MHz	40.9	20.9	71.7



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 2010.

NCL CALIBRATION LABORATORIES

Calibration File No: DC-1116
Project Number: RFEL-2600-Dipole-5482

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.

APREL Validation Dipole

Manufacturer: APREL Laboratories

Part number: ALS-D-2600-S-2

Frequency: 2600 MHz

Serial No: 225-00903

Customer: RFEL

BODY Calibration

Calibrated: 18th January 2010
Released on: 19th January 2010

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

Released By: _____

NCL CALIBRATION LABORATORIES

17 Bentley Avenue
NEPEAN, ONTARIO
CANADA K2E 6T7

Division of APREL Lab.
TEL: (613) 820-2730
FAX: (613) 820-4161

NCL Calibration Laboratories

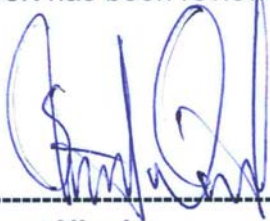
Division of APREL Laboratories.

Conditions

Dipole 225-00903 was new and taken from stock prior to 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 device has been accurately conducted and that all information contained within this report has been reviewed for accuracy.



Stuart Nicol



C. Teodorian

Calibration Results Summary

The following results relate the Calibrated Dipole and should be used as a quick reference for the user.

Mechanical Dimensions

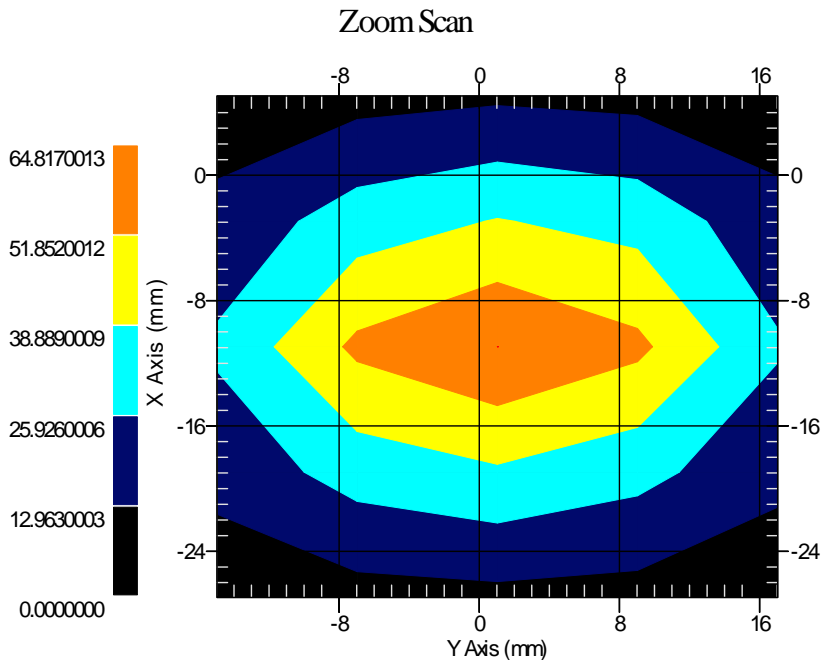
Length: 48.8 mm
Height: 32.8 mm

Electrical Specification

SWR: 1.013U
Return Loss: -43.521dB
Impedance: 49.355 ohm

System Validation Results

Frequency	1 Gram	10 Gram	Peak
2600 MHz	56.42	24.68	119



Introduction

This Calibration Report has been produced in line with the SSI Dipole Calibration Procedure SSI-TP-018-ALSAS. The results contained within this report are for Validation Dipole 225-00903. The calibration routine consisted of a three-step process. Step 1 was a mechanical verification of the dipole to ensure that it meets the mechanical specifications. Step 2 was an Electrical Calibration for the Validation Dipole, where the SWR, Impedance, and the Return loss were assessed. Step 3 involved a System Validation using the ALSAS-10U, along with APREL E-020 130 MHz to 26 GHz E-Field Probe Serial Number 225.

References

SSI-TP-018-ALSAS Dipole Calibration Procedure

SSI-TP-016 Tissue Calibration Procedure

IEEE 1528 "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques"

Conditions

Dipole 225-00903 was new taken from stock.

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

Temperature of the Tissue: 20 °C +/- 0.5°C

Dipole Calibration Results

Mechanical Verification

Measured Length	Measured Height
48.8 mm	32.8 mm

Tissue Validation

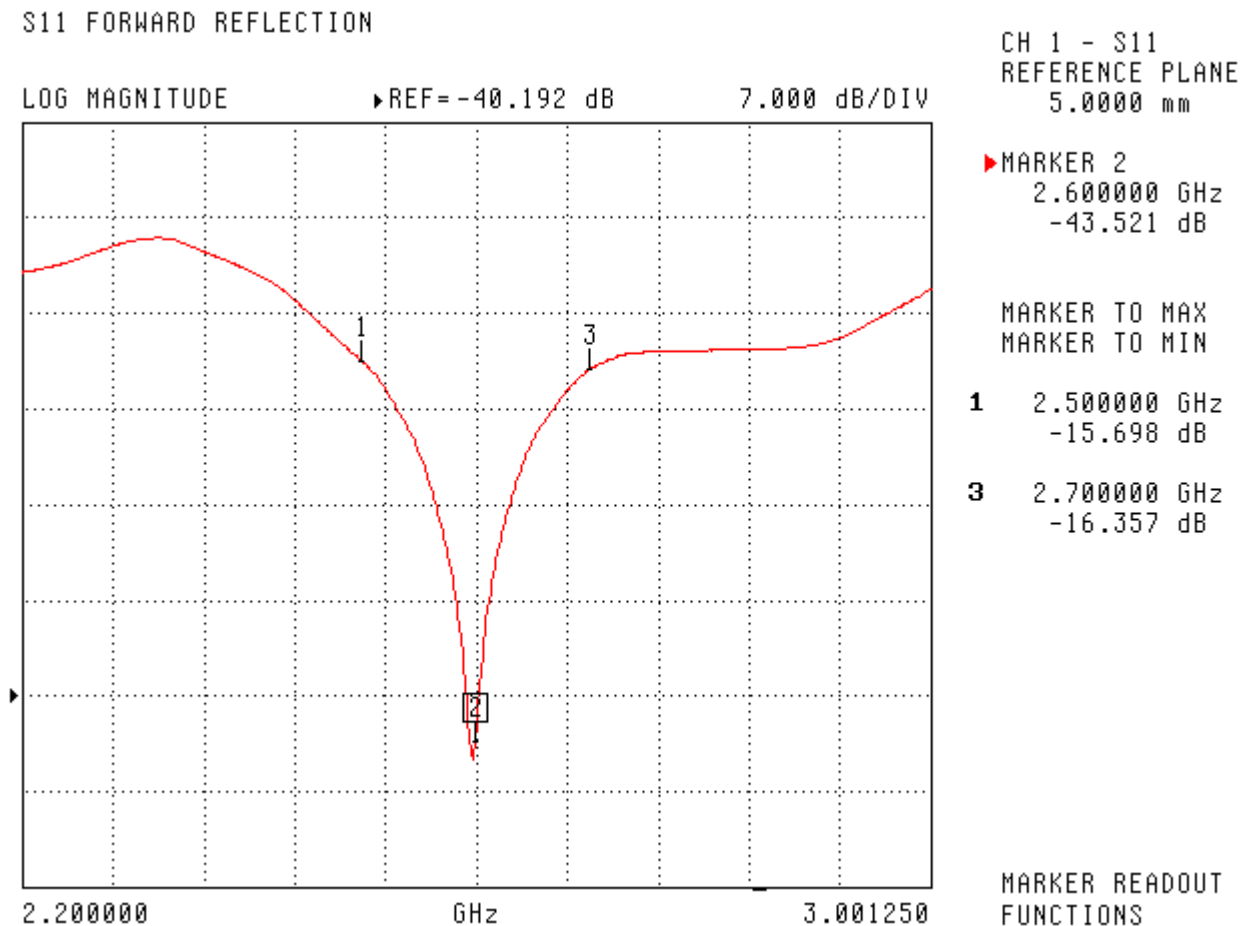
Body Tissue 2600 MHz	Measured
Dielectric constant, ϵ_r	51.15
Conductivity, σ [S/m]	2.13

Electrical Calibration

Test	Result
S11 R/L	-43.521
SWR	1.013U
Impedance	49.355Ω

The Following Graphs are the results as displayed on the Vector Network Analyzer.

S11 Parameter Return Loss



SWR

S11 FORWARD REFLECTION

SWR REF=670.142 mU 300.000 mU/DIV

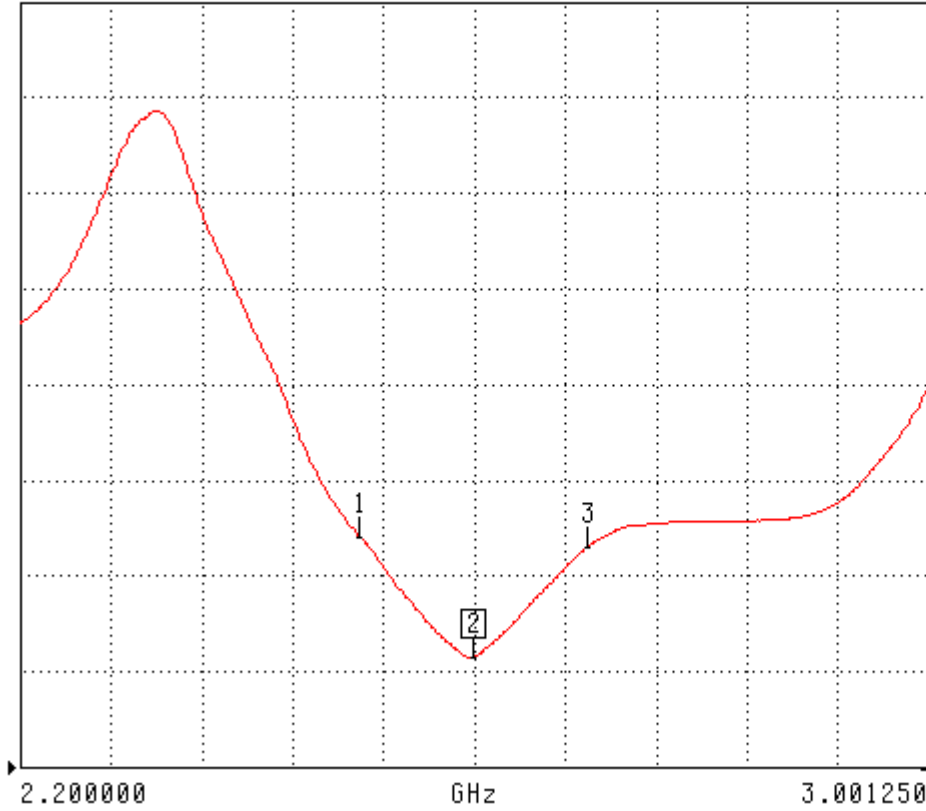
CH 1 - S11
REFERENCE PLANE
5.0000 mm

▶ MARKER 2
2.600000 GHz
1.013 U

MARKER TO MAX
MARKER TO MIN

1 2.500000 GHz
1.393 U

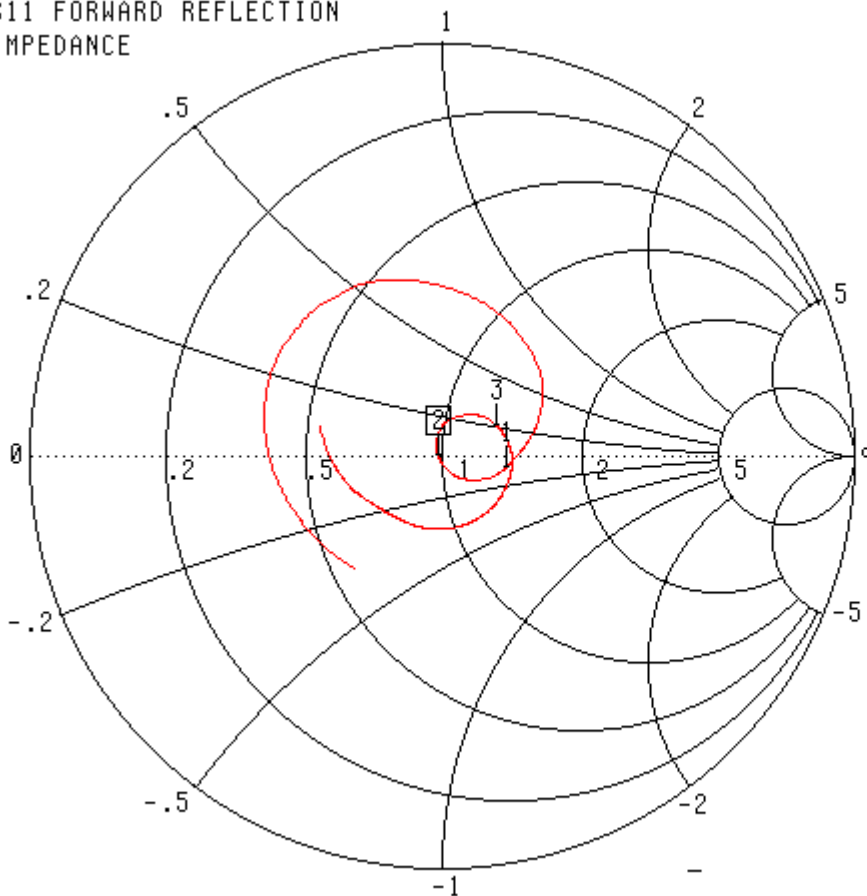
3 2.700000 GHz
1.359 U



MARKER READOUT
FUNCTIONS

Smith Chart Dipole Impedance

S11 FORWARD REFLECTION
IMPEDANCE



CH 1 - S11
REFERENCE PLANE
5.0000 mm

▶ MARKER 2
2.600000 GHz
49.355 Ω
150.779 $j\Omega$

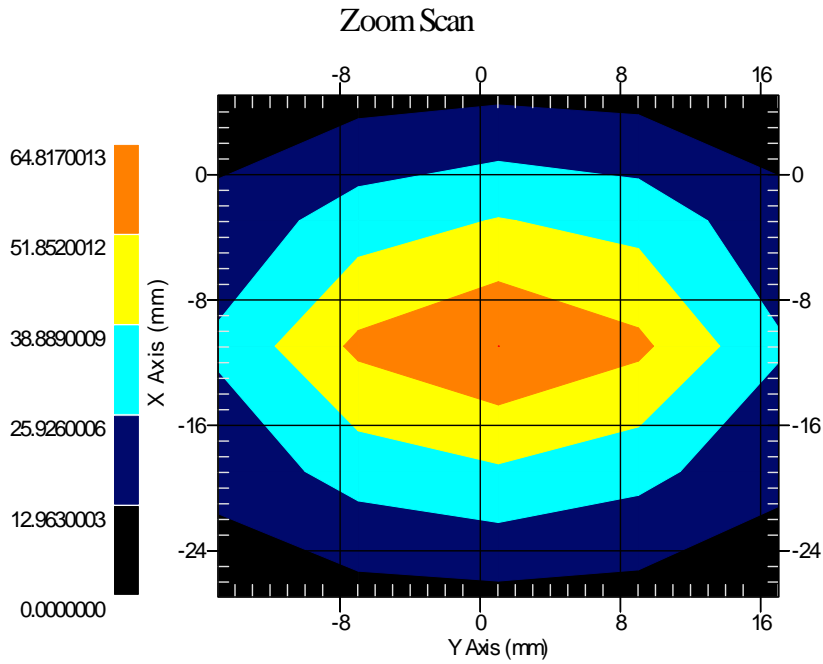
MARKER TO MAX
MARKER TO MIN

1	2.500000 GHz
	69.141 Ω
	-4.034 $j\Omega$
3	2.700000 GHz
	64.623 Ω
	9.606 $j\Omega$

MARKER READOUT
FUNCTIONS

System Validation Results Using the Electrically Calibrated Dipole

Body Tissue Frequency	1 Gram	10 Gram	Peak Above Feed Point
2600 MHz	56.42	24.68	119



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 2009.

Appendix F – Phantom Calibration Data Sheets

NCL CALIBRATION LABORATORIES

Calibration File No.: RFE-273

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 National Standards.

Thickness of the UniPhantom is 2 mm \pm 10%
Pinna thickness is 6 mm \pm 10%

Resolution:	0.01 mm	Calibrated to:	0.0 mm
Stability:	OK	Accuracy:	< 0.1 mm

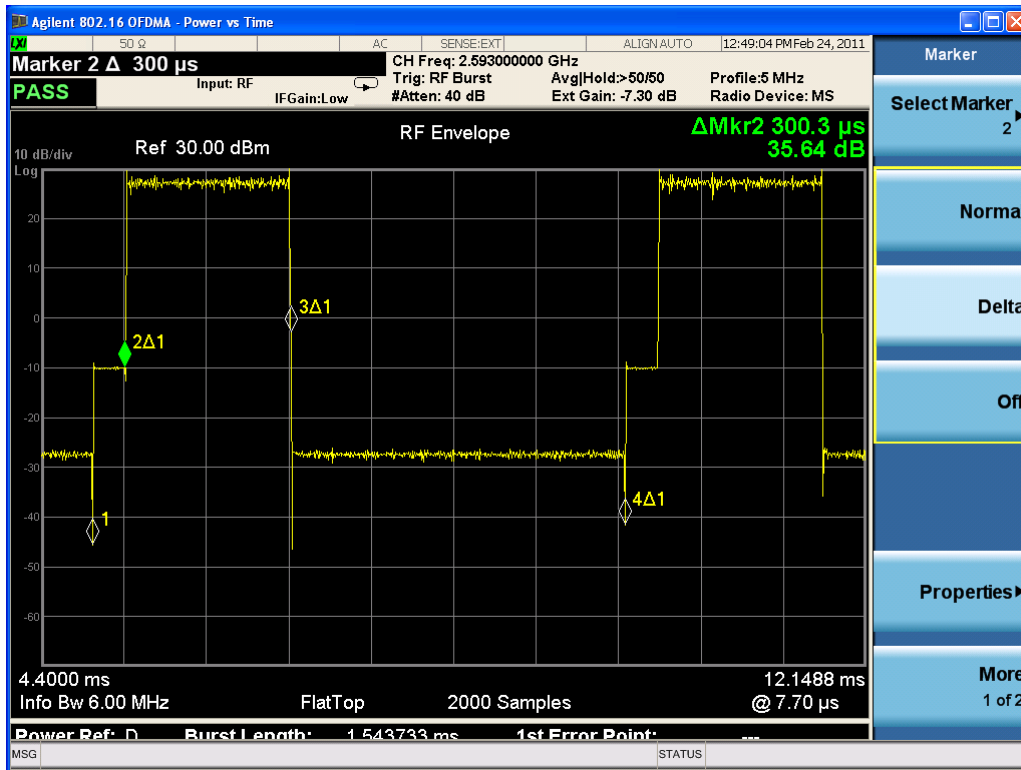
Calibrated By: Karen K. Feb 17/04.

NCL CALIBRATION LABORATORIES

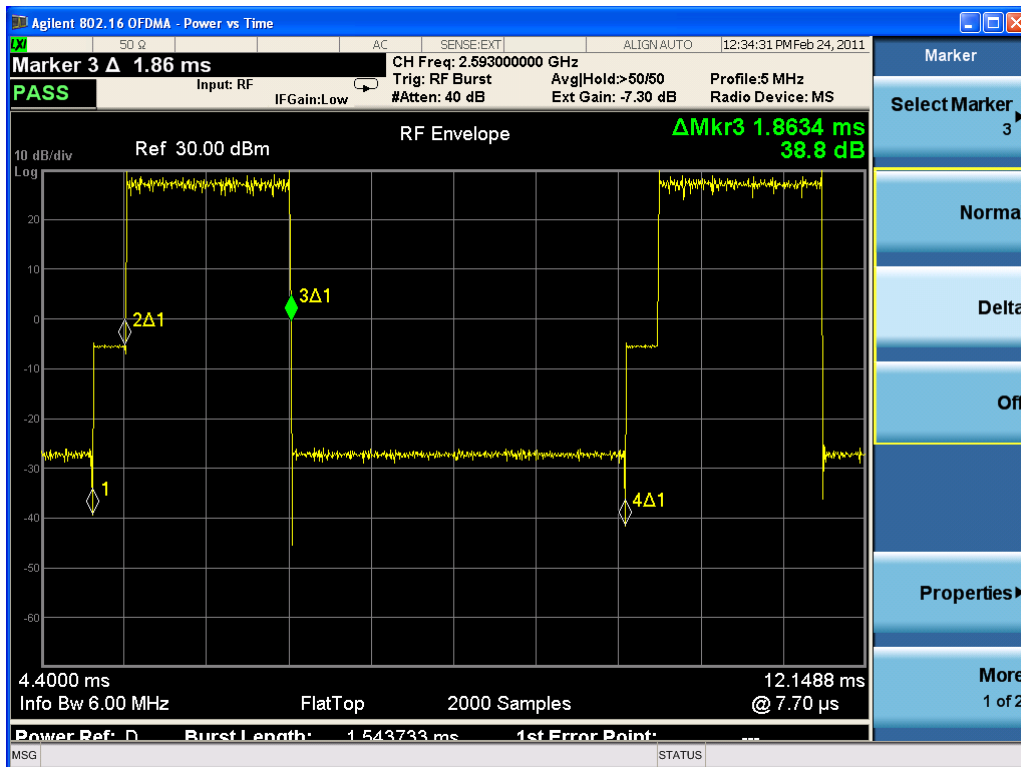
51 SPECTRUM WAY
NEPEAN, ONTARIO
CANADA K2R 1E6

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

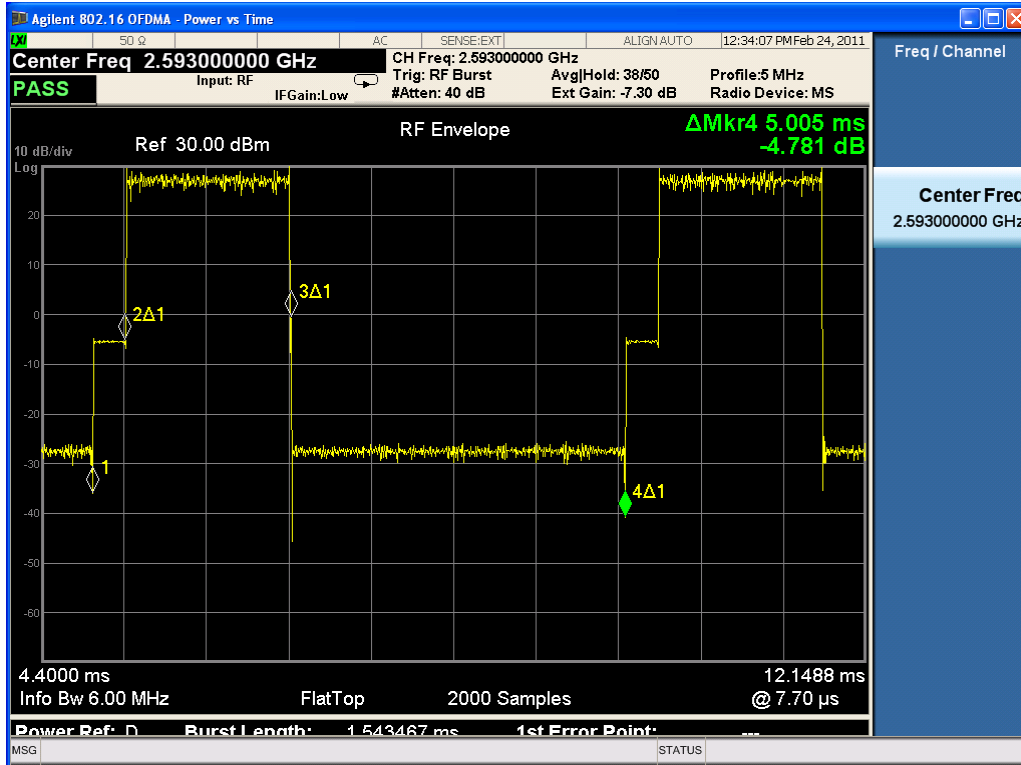
Appendix G – Additional Plots



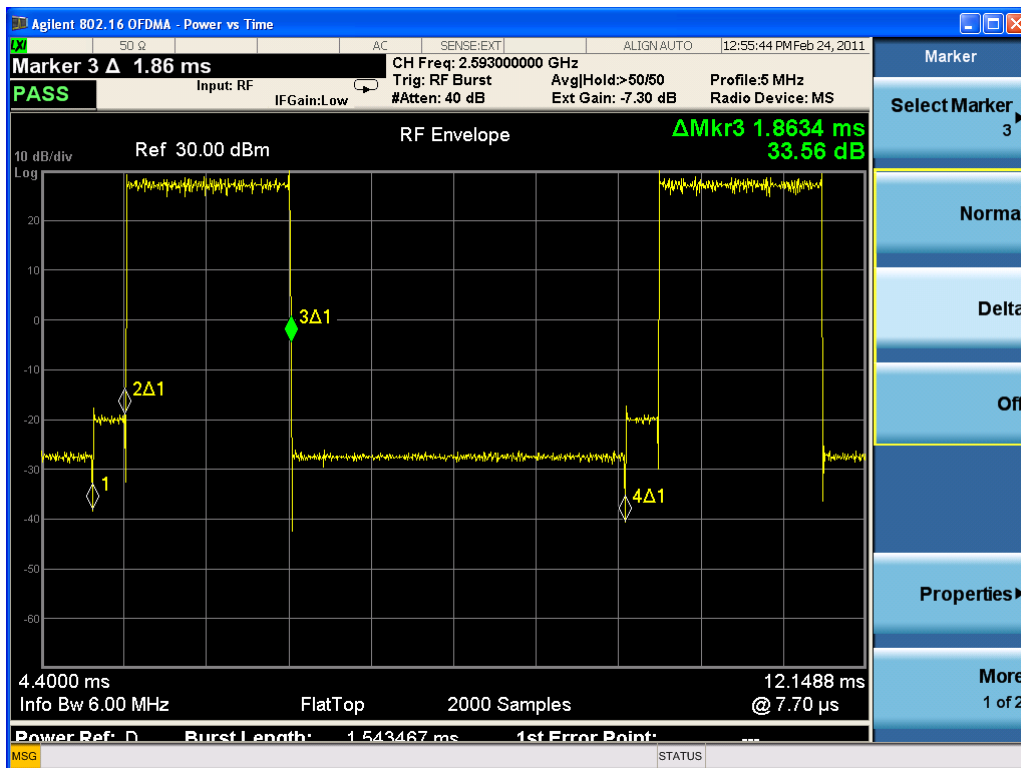
5MHz QPSK1/2 PUSC 2.593GHz DL: 29, UL: 18



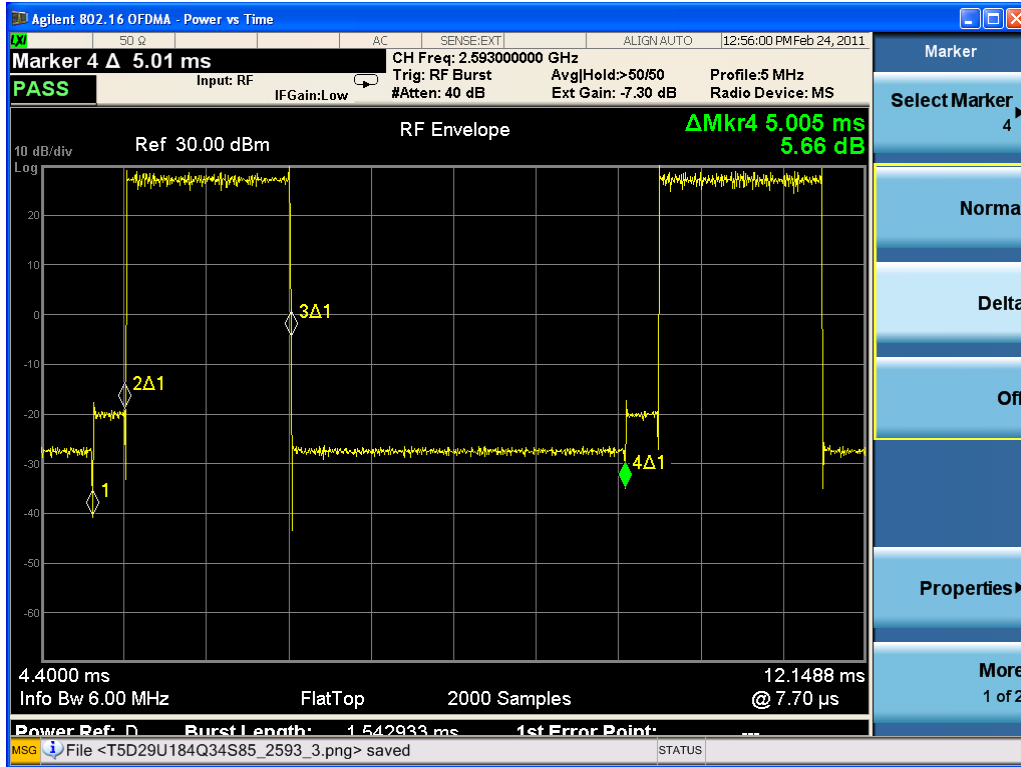
5MHz QPSK1/2 PUSC 2.593GHz DL: 29, UL: 18



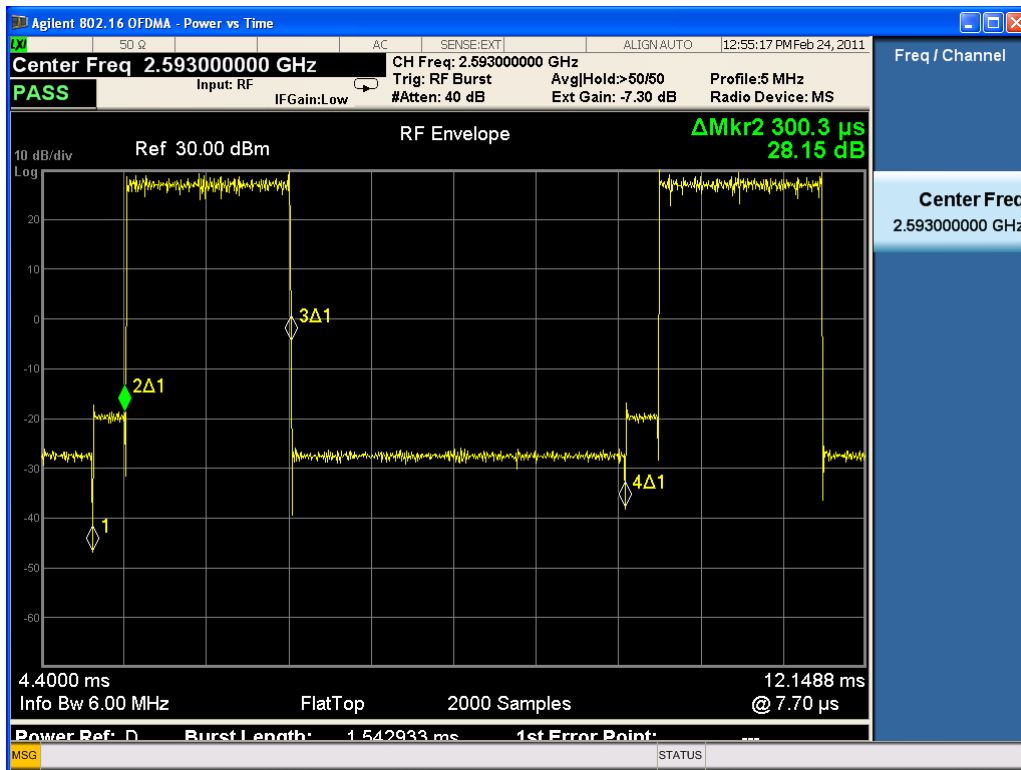
5MHz QPSK1/2 PUSC 2.593GHz DL: 29, UL: 18



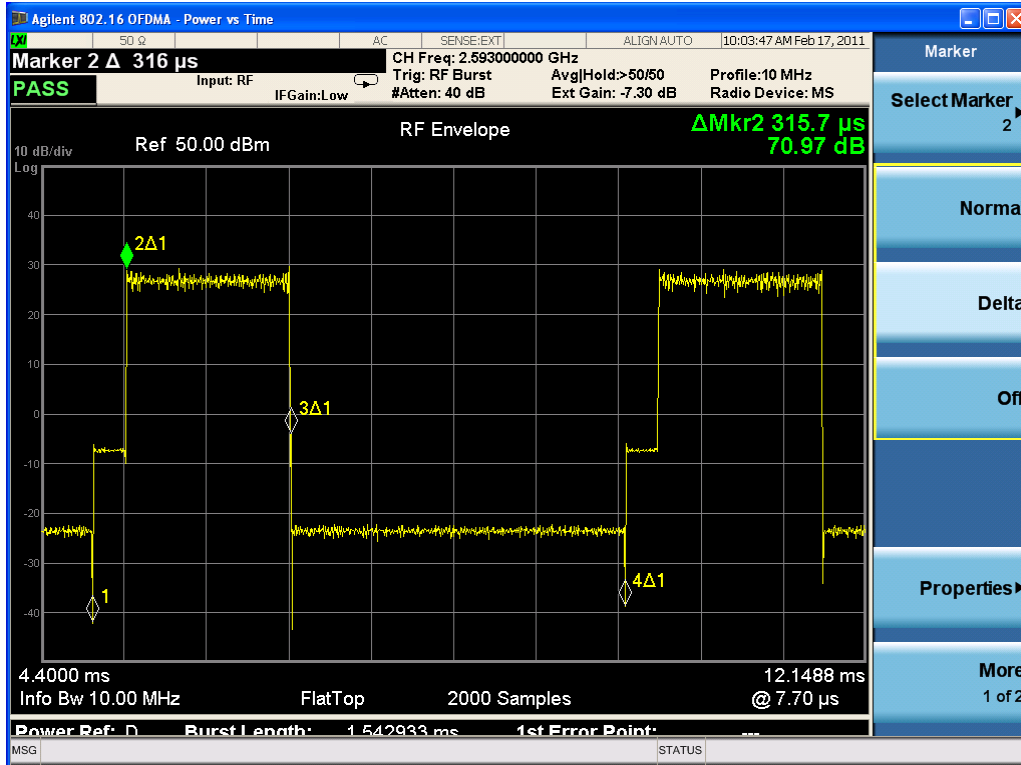
5MHz QPSK3/4 PUSC 2.593GHz DL: 29, UL: 18



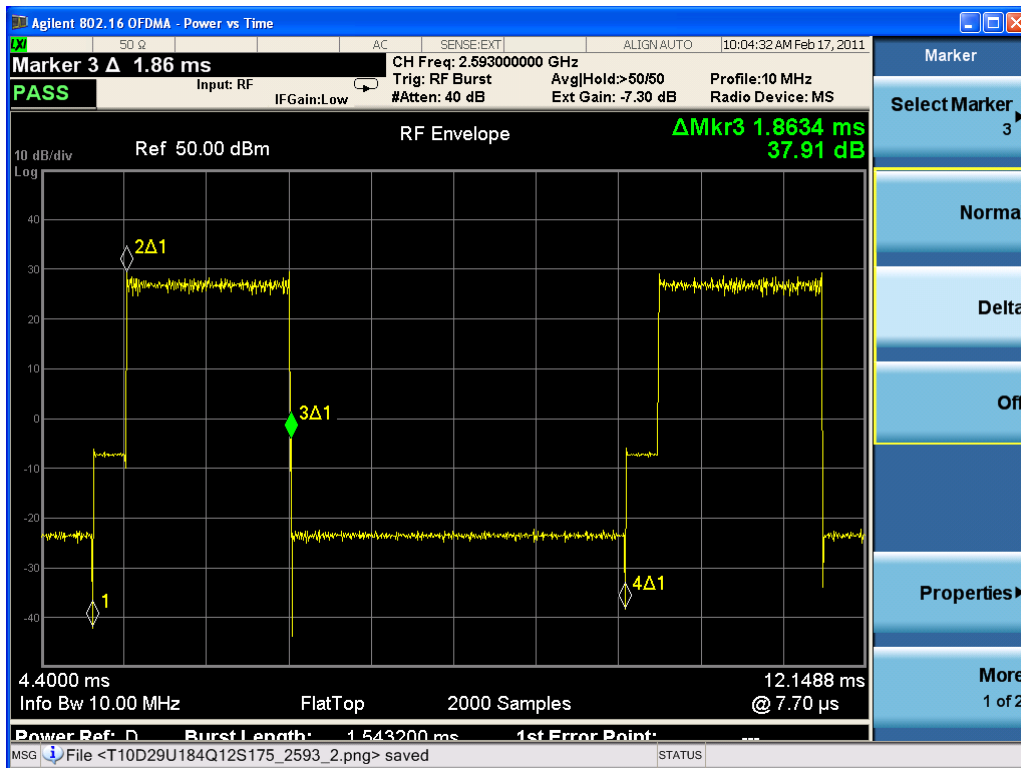
5MHz QPSK3/4 PUSC 2.593GHz DL: 29, UL: 18



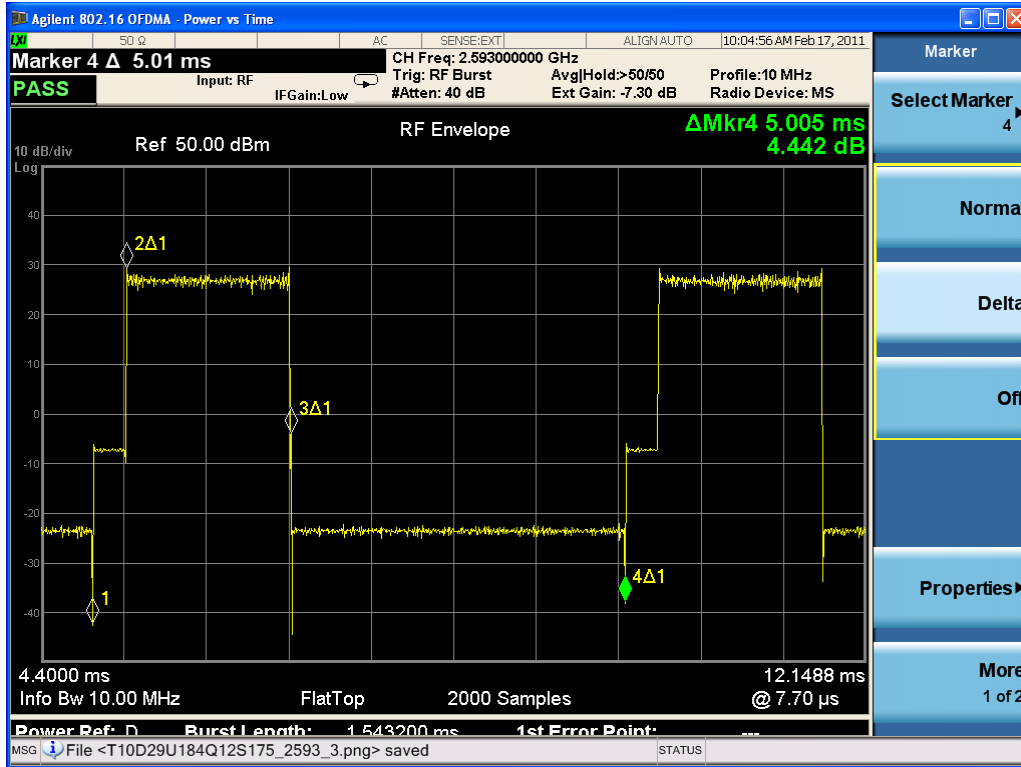
5MHz QPSK3/4 PUSC 2.593GHz DL: 29, UL: 18



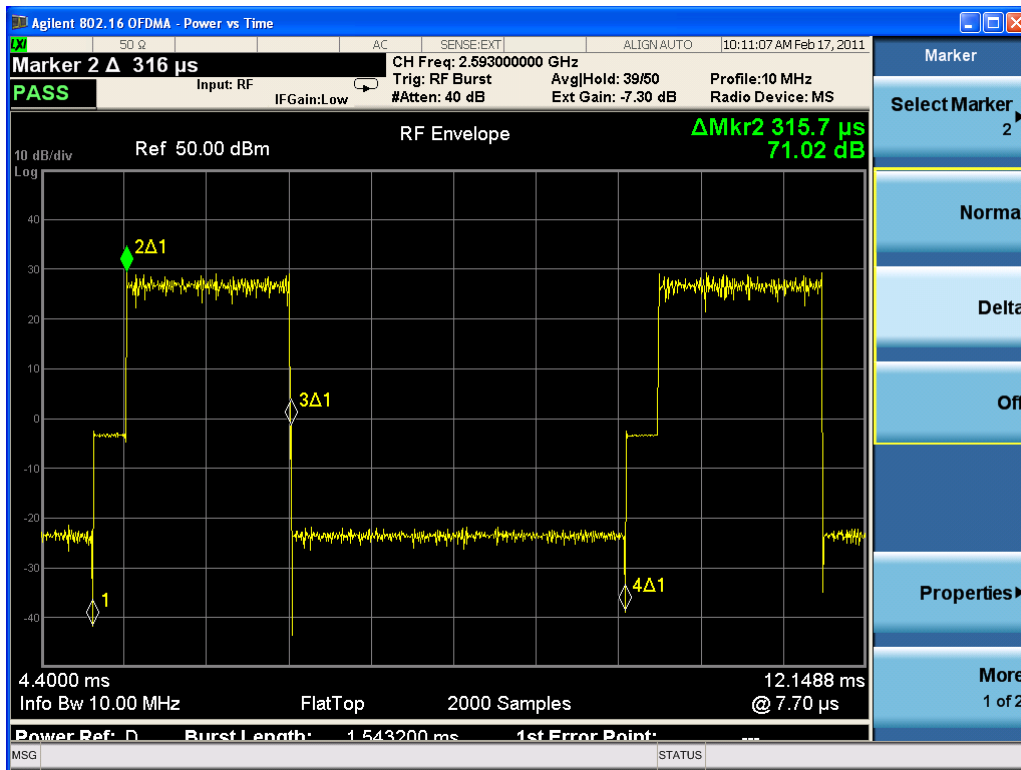
10MHz QPSK1/2 PUSC 2.593GHz DL: 29, UL: 18



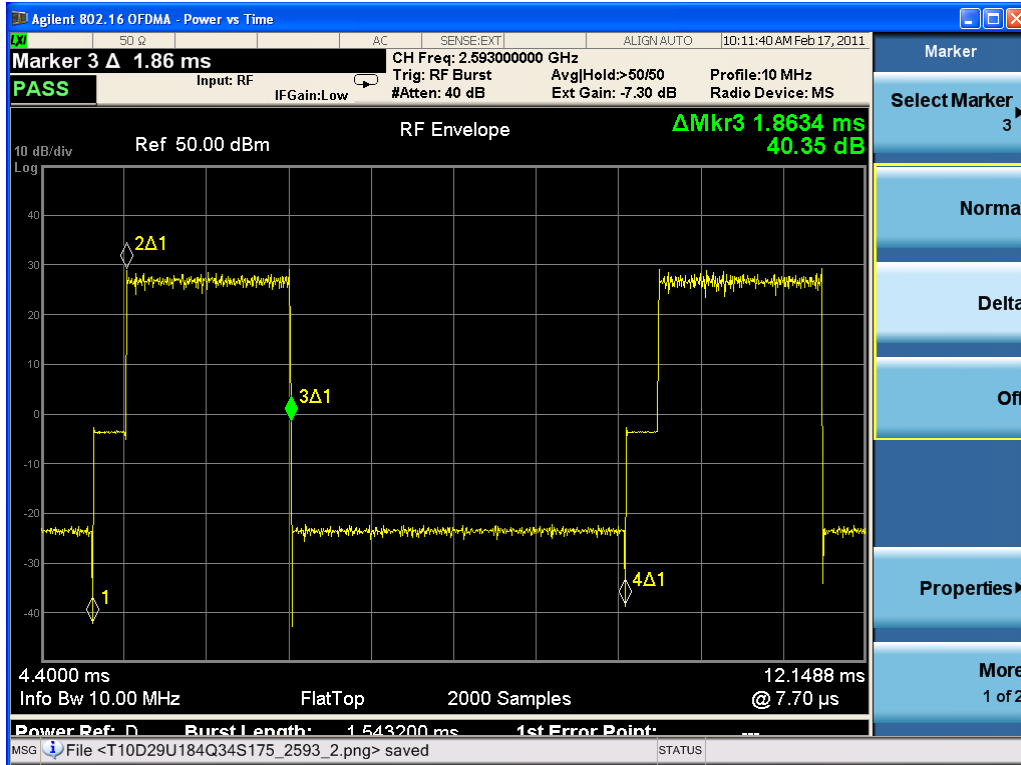
10MHz QPSK1/2 PUSC 2.593GHz DL: 29, UL: 18



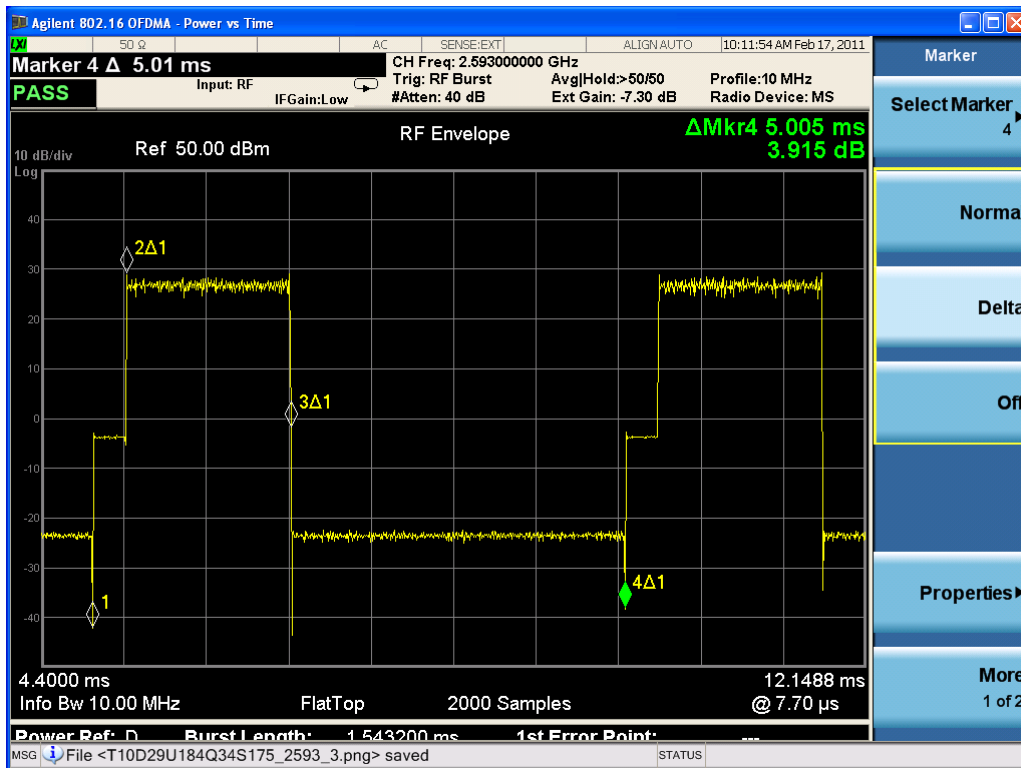
10MHz QPSK1/2 PUSC 2.593GHz DL: 29, UL: 18



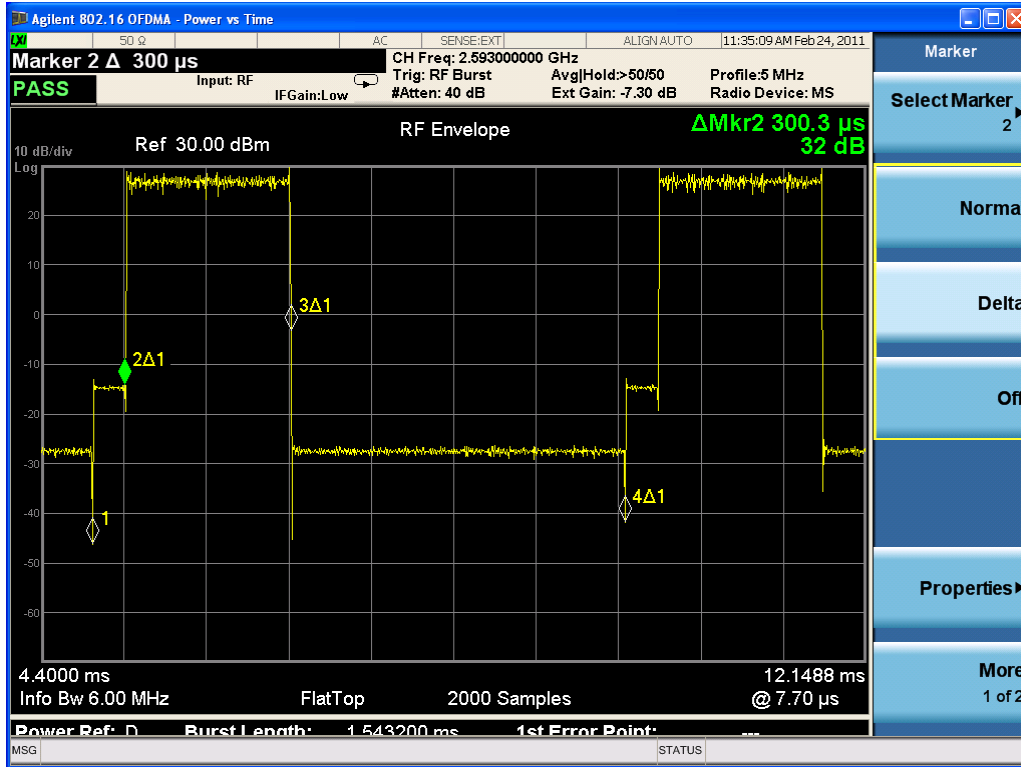
10MHz QPSK3/4 PUSC 2.593GHz DL: 29, UL: 18



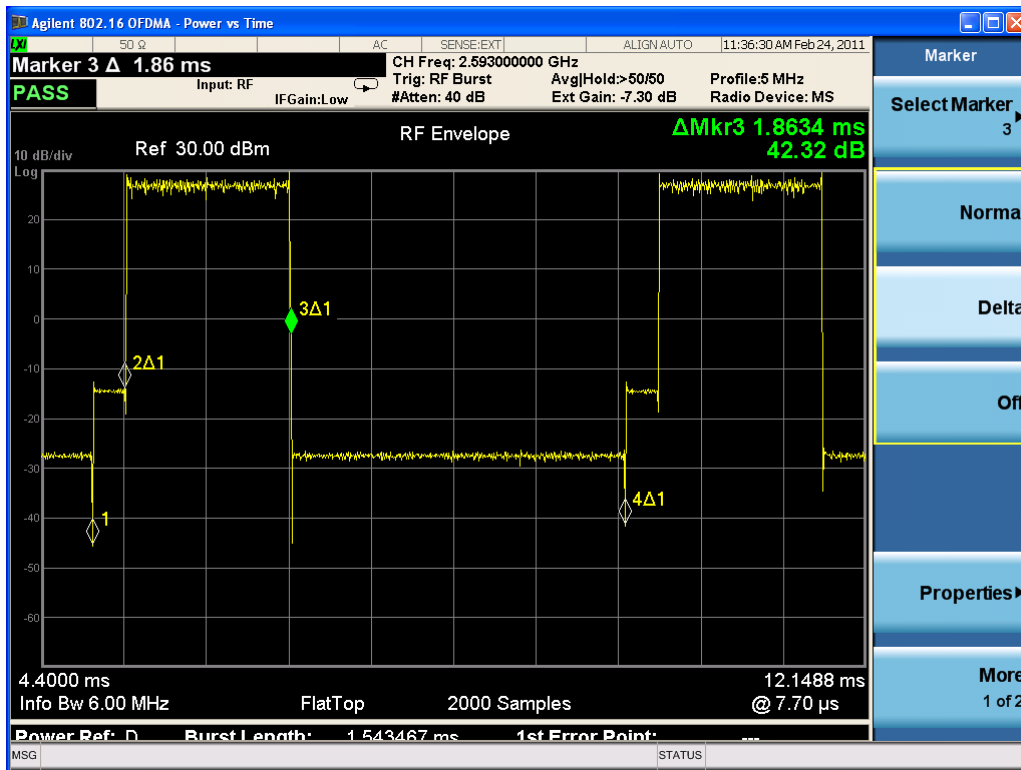
10MHz QPSK3/4 PUSC 2.593GHz DL: 29, UL: 18



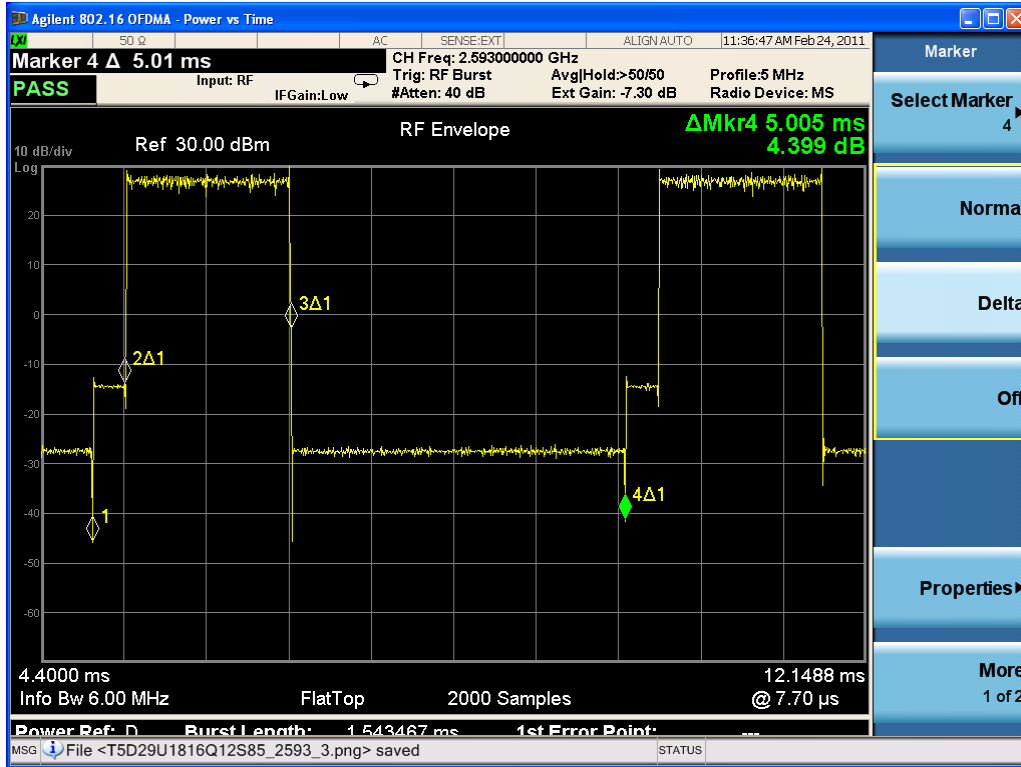
10MHz QPSK3/4 PUSC 2.593GHz DL: 29, UL: 18



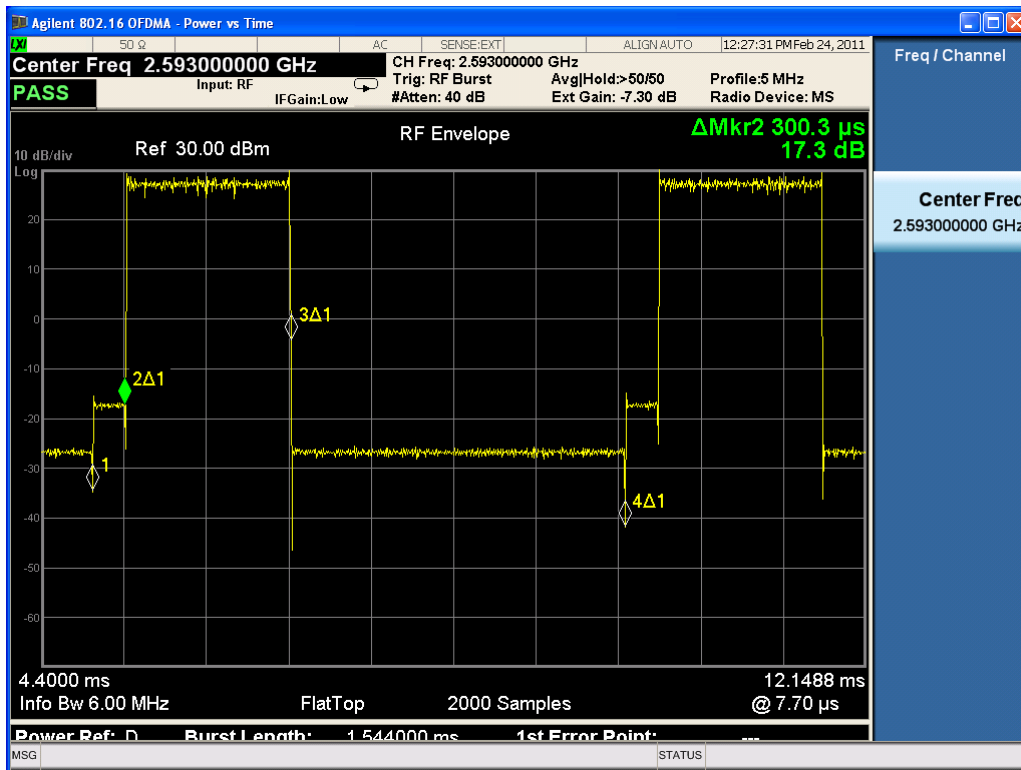
5MHz 16QAM1/2 PUSC 2.593GHz DL: 29, UL: 18



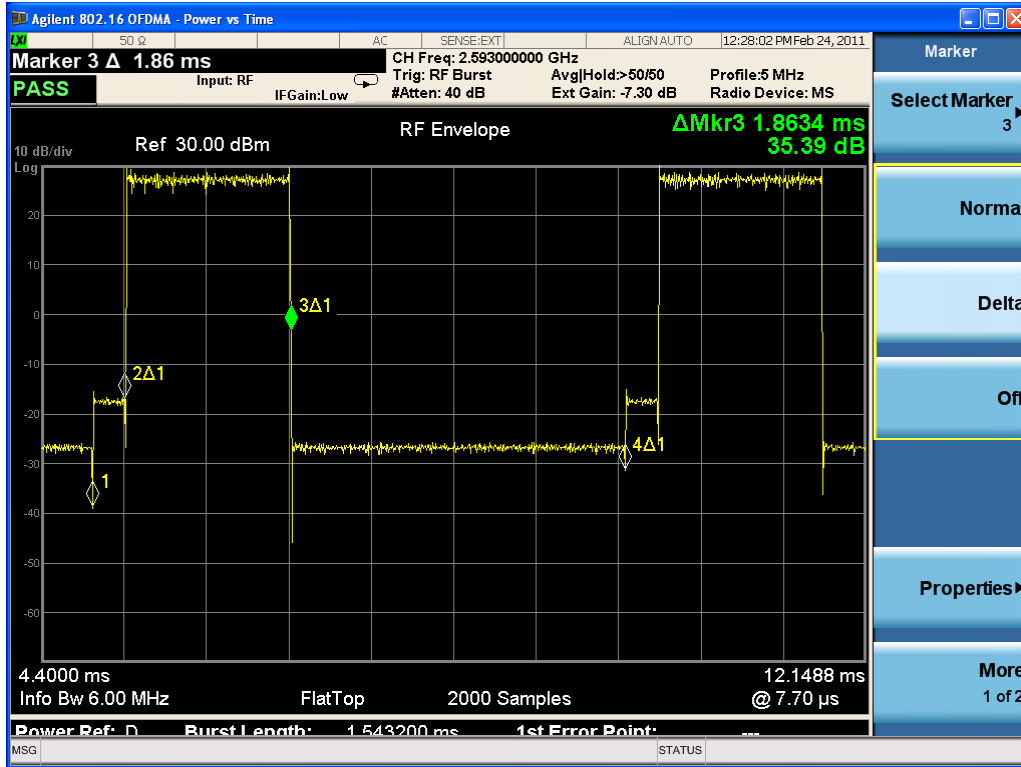
5MHz 16QAM1/2 PUSC 2.593GHz DL: 29, UL: 18



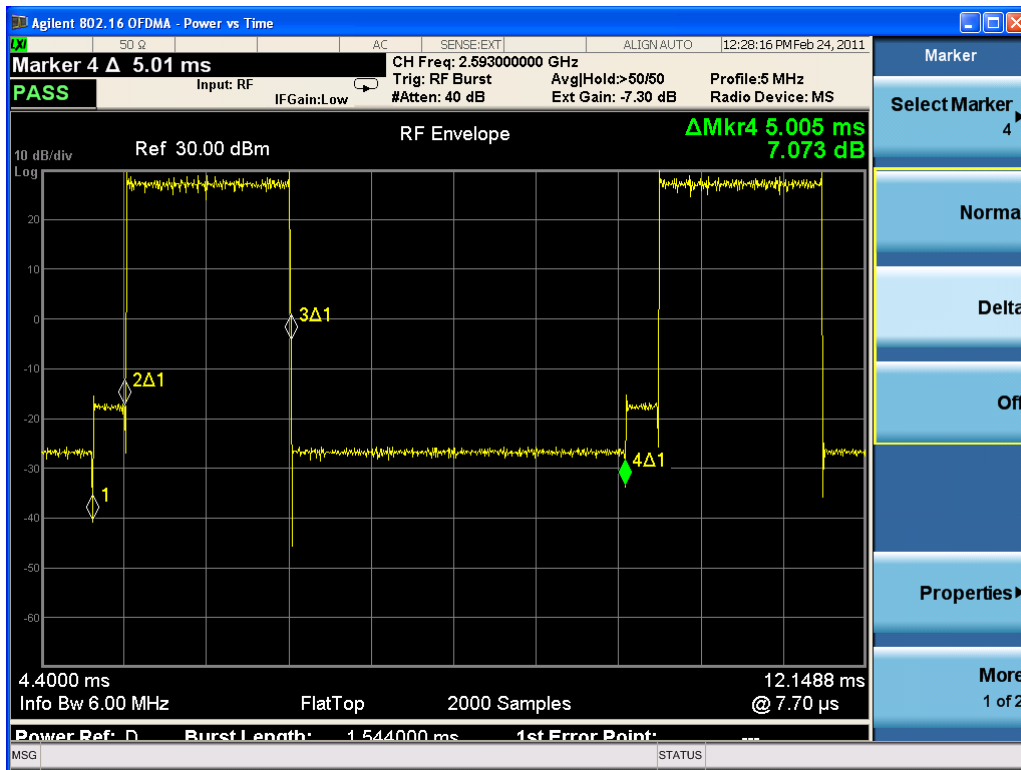
5MHz 16QAM1/2 PUSC 2.593GHz DL: 29, UL: 18



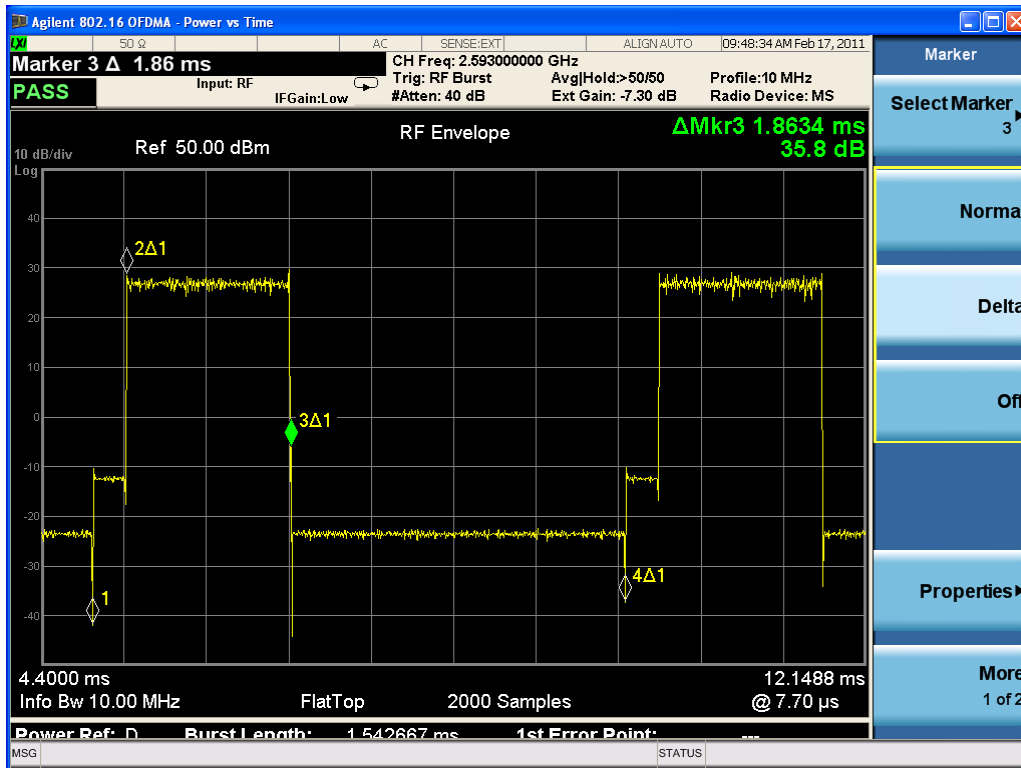
5MHz 16QAM3/4 PUSC 2.593GHz DL: 29, UL: 18



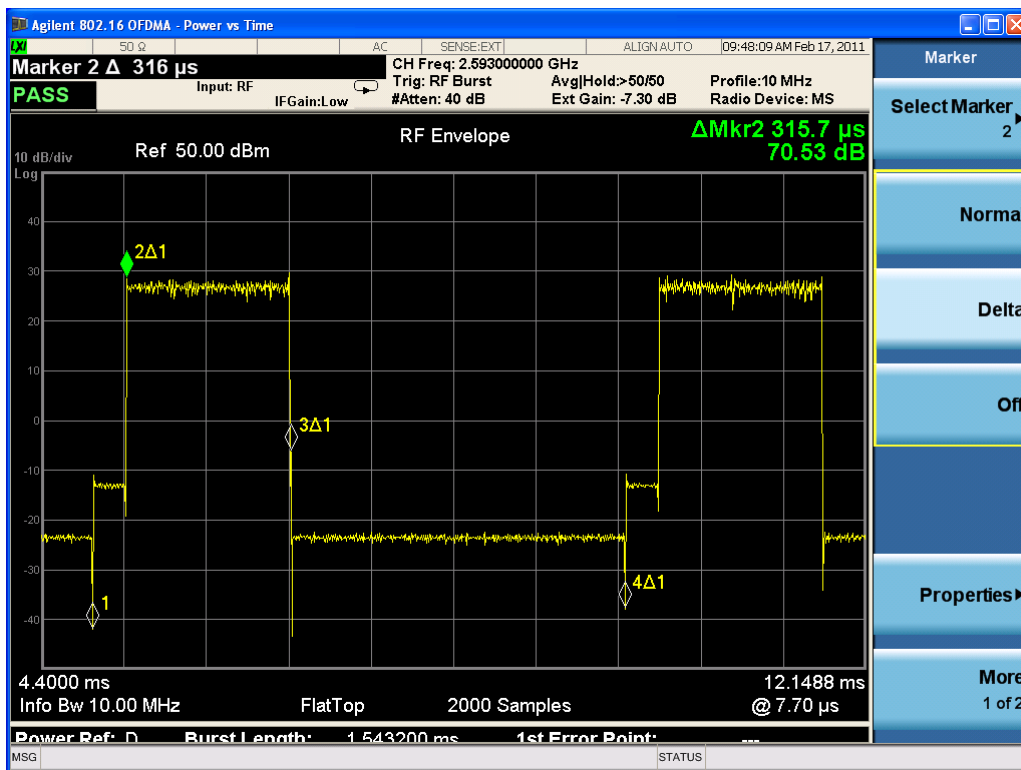
5MHz 16QAM3/4 PUSC 2.593GHz DL: 29, UL: 18



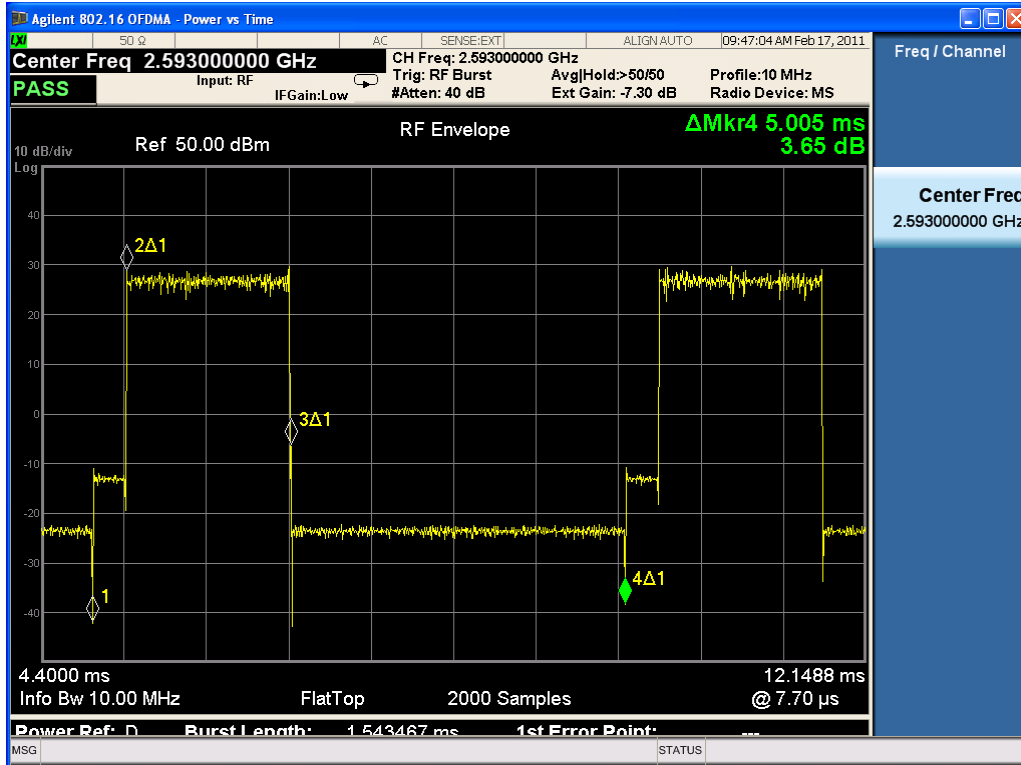
5MHz 16QAM3/4 PUSC 2.593GHz DL: 29, UL: 18



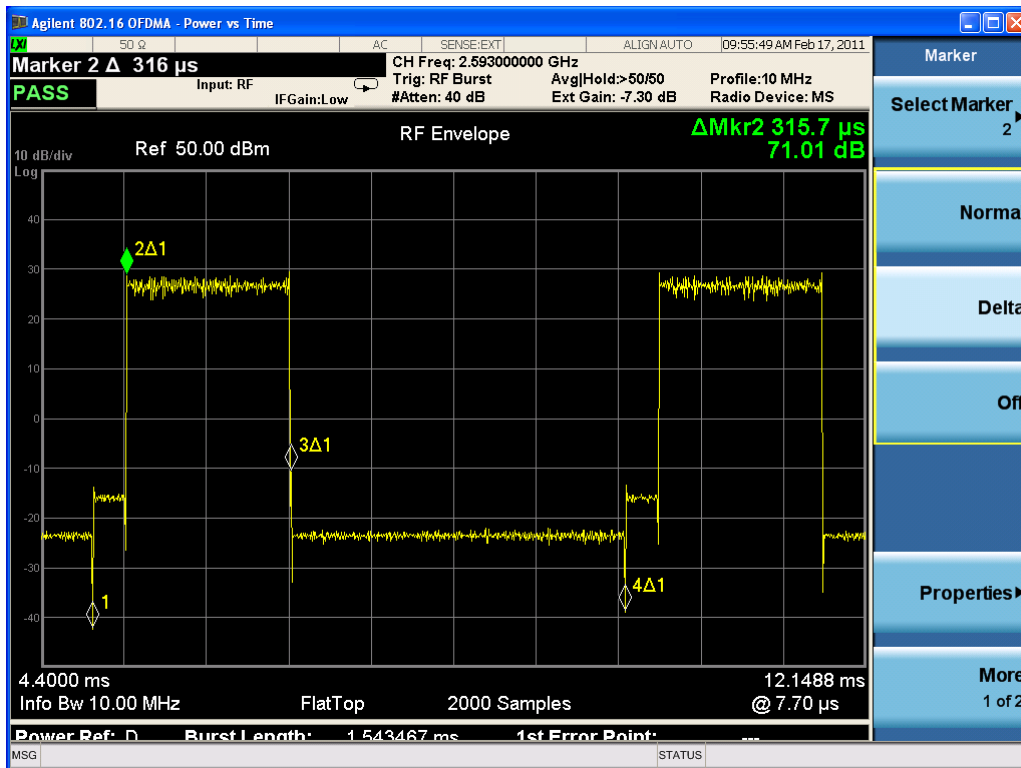
10MHz 16QAM1/2 PUSC 2.593GHz DL: 29, UL: 18



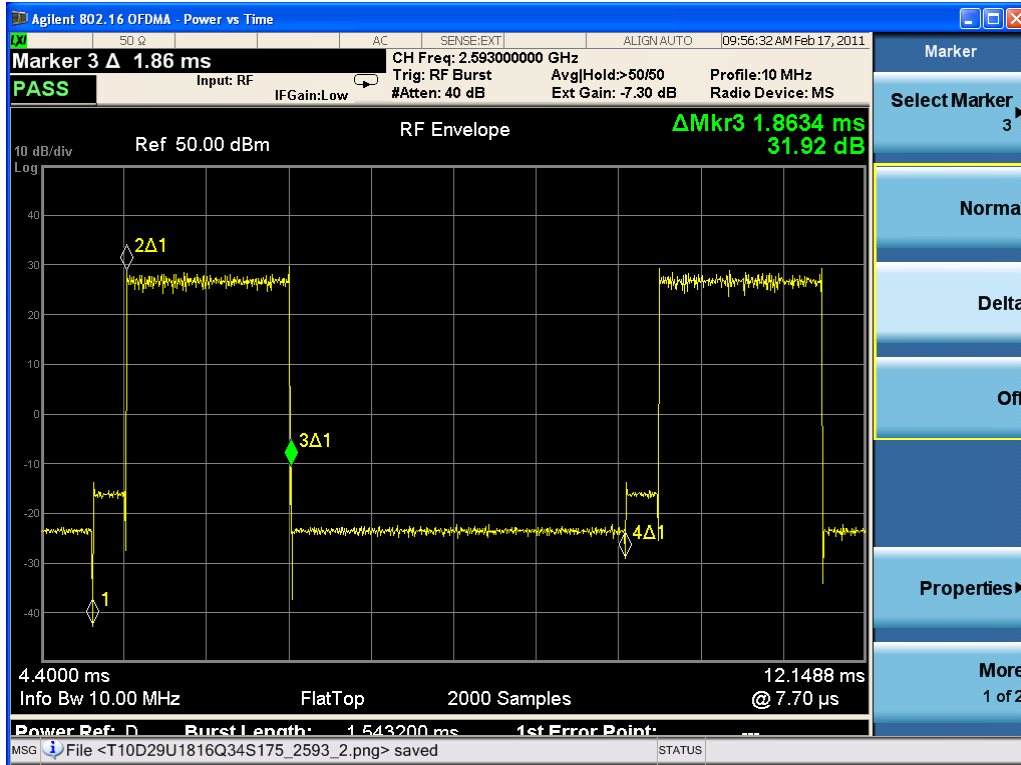
10MHz 16QAM1/2 PUSC 2.593GHz DL: 29, UL: 18



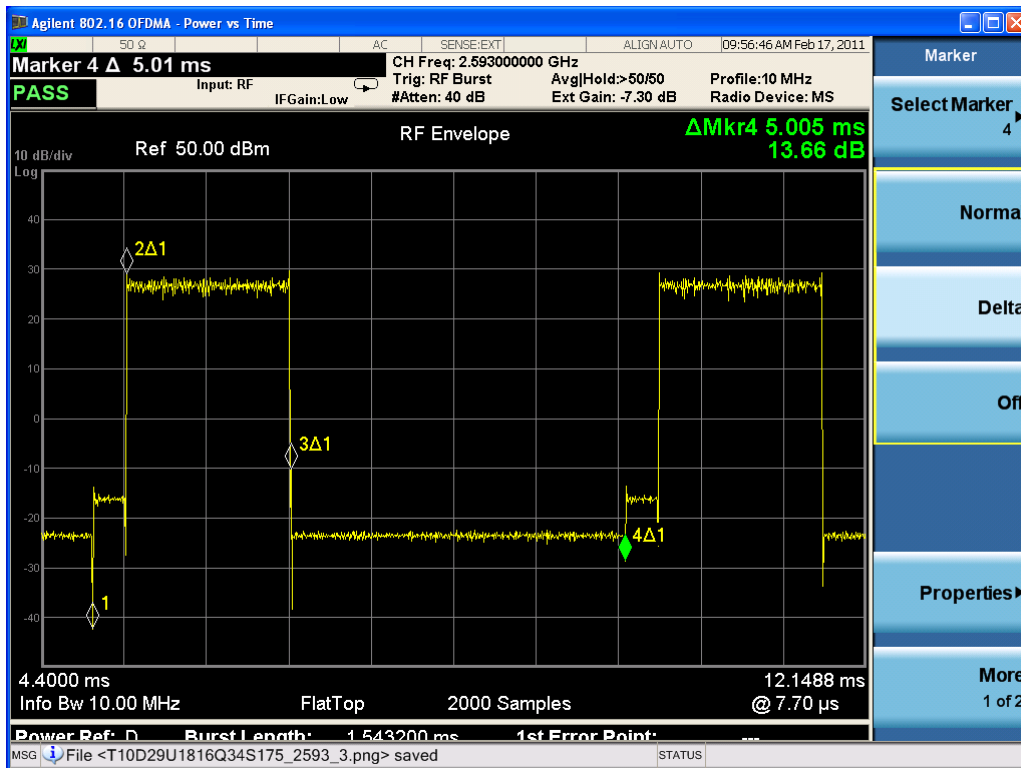
10MHz 16QAM1/2 PUSC 2.593GHz DL: 29, UL: 18



10MHz 16QAM3/4 PUSC 2.593GHz DL: 29, UL: 18

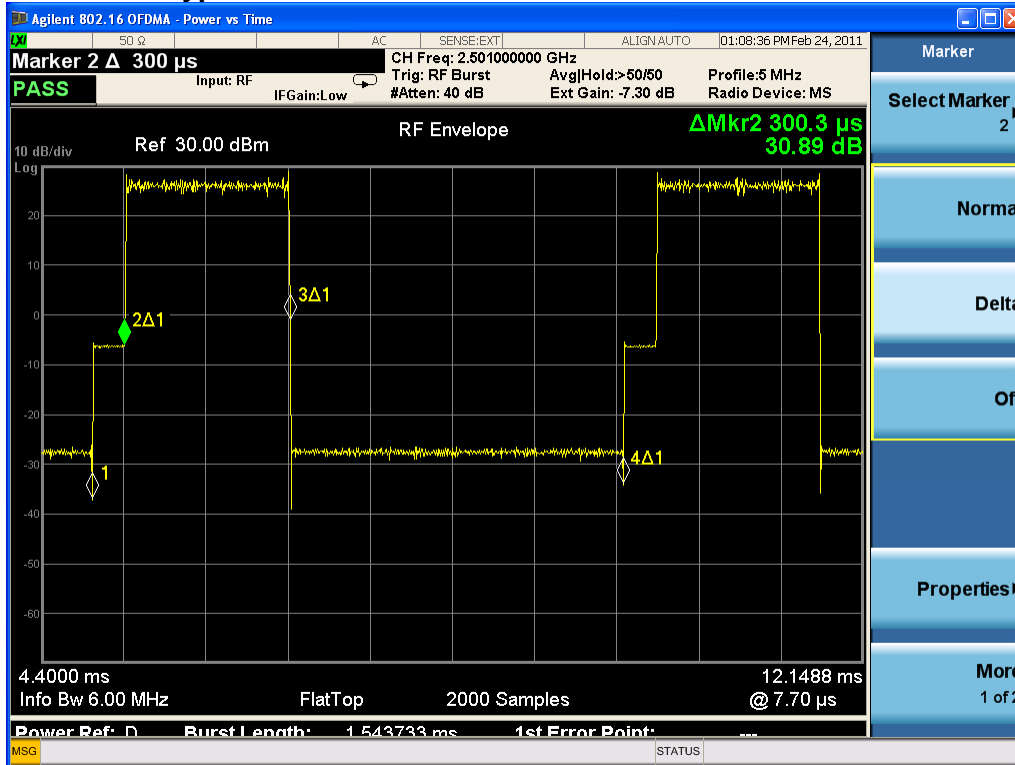


10MHz 16QAM3/4 PUSC 2.593GHz DL: 29, UL: 18

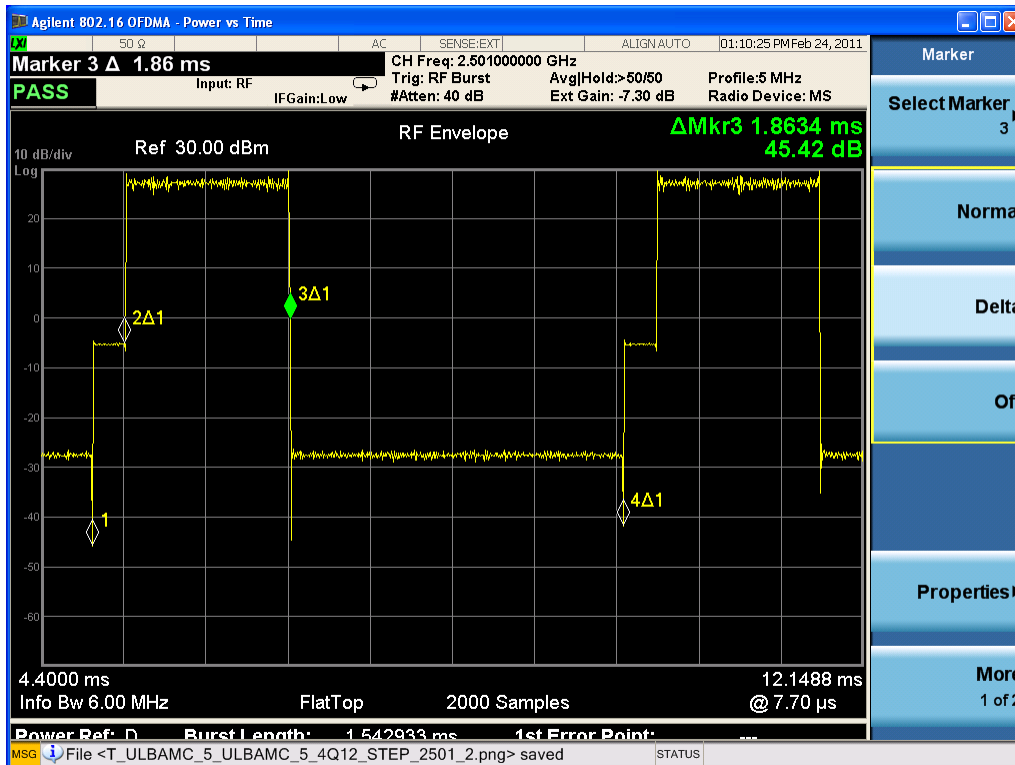


10MHz 16QAM3/4 PUSC 2.593GHz DL: 29, UL: 18

These plots are representative of the other AMC Zone channels, bandwidths, and modulation types.



5MHz QPSK1/2 AMC 2.501GHz DL: 29, UL: 18



5MHz QPSK1/2 AMC 2.501GHz DL: 29, UL: 18



5MHz QPSK1/2 AMC 2.501GHz DL: 29, UL: 18