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SAR EVALUATION REPORT

Applicant Name:
AcctonWireless Broadband Corp.
3F, No. 1 Creation Rd. III
Science-based Industrial Park Hsinchu 30077
Taiwan, R.O.C

Date of Testing:
6/13/2012
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Document Serial No.:
0Y1206040773-R3.V8Y

FCC ID: **V8YFWA1FUS38000W**

APPLICANT: **ACCTON WIRELESS BROADBAND CORP.**

DUT Type: USB Dongle
Application Type: Certification
FCC Rule Part(s): CFR §2.1093
Model(s): US330-3.8, US330, US330-3.8-FLF-81, US330-3.8-FLF-81RT, US330-3.8-FLF-8F
Test Device Serial No.: AWB 1

Band & Mode	Tx Frequency	Individual Antenna Conducted Power [dBm]	SAR
			1 gm Body (W/kg)
WIMAX - 5 MHz Bandwidth	3652.5 - 3672.5 MHz	16.08	0.80
WIMAX - 10 MHz Bandwidth	3655 - 3670 MHz	19.80	
Simultaneous SAR per KDB 690783 D01:			1.50 W/kg

Note: Powers in the above table represent output powers for the SAR test configurations and may not represent the highest output powers for all configurations for each mode.

Note: This revised Test Report (S/N: 0Y1206040773-R3.V8Y) supersedes and replaces the previously issued test report on the same subject EUT for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE C95.1-1992 and has been tested in accordance with the measurement procedures specified in FCC/OET Bulletin 65 Supplement C (2001), IEEE 1528-2003 and in applicable Industry Canada Radio Standards Specifications (RSS); for North American frequency bands only.

I attest to the accuracy of data. All measurements reported herein were performed by me 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. Test results reported herein relate only to the item(s) tested.

PCTEST certifies that no party to this application has been subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.

Randy Ortanez
President

ACCREDITED
TESTING LABORATORY
CERTIFICATE #2041.01

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1 DEVICE UNDER TEST

1.1 Device Overview

Band & Mode	Tx Frequency
WIMAX	3652.5 - 3672.5 MHz

1.2 DUT Antenna Locations

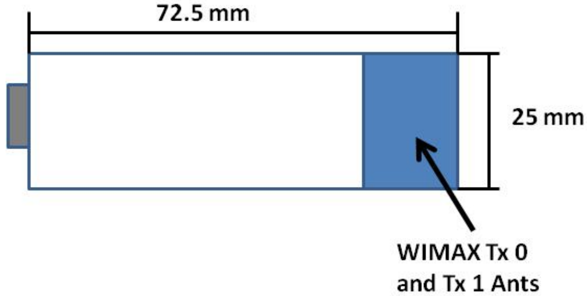


Figure 1-1
DUT Antenna Locations

1.3 Simultaneous Transmission Capabilities

According to KDB 648474 D01, transmitters are considered to be transmitting simultaneously when there is overlapping transmission, with the exception of transmissions during network hand-offs with maximum hand-off duration less than 30 seconds. Possible transmission paths for the DUT are shown in Figure **1-2** and are color-coded to indicate communication modes which share the same path. Modes which share the same transmission path cannot transmit simultaneously with one another.

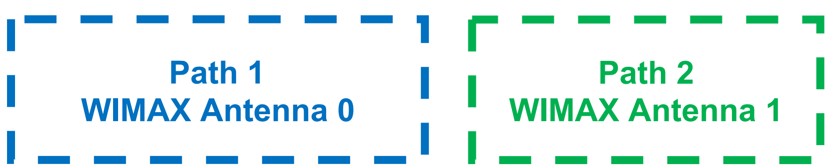


Figure 1-2
Simultaneous Transmission Paths

This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis according to KDB 447498 D01 3) procedures.

The manufacturer has confirmed that the antenna paths must be operating using the same signal configuration (modulation, bandwidth) when operating simultaneously.

1.4 SAR Test Exclusions Applied

Per FCC KDB Publication 447498 D01 6)c), only one channel is required when the device operates with a 10 MHz bandwidth and only two channels are required when operating with a 5 MHz bandwidth.

Per April 2010 TCB Workshop Slides, This device supports two coding rates (1/2 and 3/4) that are rated to the same maximum output power and therefore SAR tests with only the lowest coding rate (1/2) were required.

Per October 2010 TCB Workshop Slides, 16 -QAM was not required to be tested since the output power for 16-QAM was not more than 0.25 higher than QPSK and the QPSK SAR was less than 0.8 W/kg.

1.5 Test Software Limitations

The manufacturer has confirmed that the device will operate using a 29:18 DL:UL symbol ratio but that the test software was limited to configuring providing 15 traffic symbols for 10 MHz bandwidth and providing 18 traffic symbols for 5 MHz bandwidth. All control symbols were disabled. The SAR results were scaled to match the operation of the device on the network. See Section 8.6 for details on SAR correction factors.

1.6 Power Reduction for SAR

There is no power reduction for any band/mode implemented in this device for SAR purposes.

1.7 FCC Guidance Applied

- FCC KDB 447498 (Simultaneous)
- FCC KDB 447498 D02 (Dongle Test Procedures)
- FCC KDB 865664 (3-6 GHz)
- FCC KDB 615223 (WIMAX)
- April/October 2010 TCB Workshop Notes (WIMAX)

2 WIMAX CHECKLIST PER KDB 615223

Description	Parameter	Comment
FCC ID	V8YFWA1FUS38000W	Identify all related FCC ID
Radio Service	Part 90Z	Rule parts
Transmit Frequency Range (MHz)	5 MHz BW: 3652.5 – 3672.5 MHz 10MHz BW: 3655 - 3670 MHz	System parameter
System/Channel Bandwidth (MHz)	5MHz/10MHz	System parameter
System Profile	Revision 1.7.0	Defined by WiMAX Forum
Modulation Schemes	QPSK 16QAM	Identify all applicable UL modulations
Number of DL OFDMA Symbols per Frame	Max:29	Identify the allowed & maximum symbols, including both traffic & control symbols
Number of UL OFDMA Symbols per Frame	Max:18	
DL:UL Symbol Ratio	Max 29:18	For determining UL duty factor
UL Zone Types (FUSC, PUSC, OFUSC, OPUSC, AMC, TUSC1,	PUSC only.	Describe separately the symbol and sub-carrier/sub-channel structures
Number and type of UL Control Symbols	3 PUSC symbols (used for ranging, CQICH and ACK/NACK)	Identify the allowed and tested / to be tested parameters; include separate explanations on the types

The full WIMAX checklist is located in the operational description.

3 INTRODUCTION

The FCC has adopted the guidelines for evaluating the environmental effects of radio frequency (RF) radiation in ET Docket 93-62 on Aug. 6, 1996 to protect the public and workers from the potential hazards of RF emissions due to FCC-regulated portable devices. [1]

The safety limits used for the environmental evaluation measurements are based on the criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate (SAR) in IEEE/ANSI C95.1-1992 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz [3] and Health Canada RF Exposure Guidelines Safety Code 6 [24]. The measurement procedure described in IEEE/ANSI C95.3-2002 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave [4] is used for guidance in measuring the Specific Absorption Rate (SAR) due to the RF radiation exposure from the Equipment Under Test (EUT). These criteria for SAR evaluation are similar to those recommended by the International Committee for Non-Ionizing Radiation Protection (ICNIRP) in Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields," Report No. Vol 74. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards.

3.1 SAR Definition

Specific Absorption Rate is defined as the time derivative (rate) of the incremental energy (dU) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dV) of a given density (ρ). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body (see Equation 3-1).

Equation 3-1
SAR Mathematical Equation

$$SAR = \frac{d}{dt}\left(\frac{dU}{dm}\right) = \frac{d}{dt}\left(\frac{dU}{\rho\, dv}\right)$$

SAR is expressed in units of Watts per Kilogram (W/kg).

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

where:

σ = conductivity of the tissue-simulating material (S/m)
ρ = mass density of the tissue-simulating material (kg/m^3)
E = Total RMS electric field strength (V/m)

NOTE: The primary factors that control rate of energy absorption were found to be the wavelength of the incident field in relation to the dimensions and geometry of the irradiated organism, the orientation of the organism in relation to the polarity of field vectors, the presence of reflecting surfaces, and whether conductive contact is made by the organism with a ground plane.[6]

4 SAR MEASUREMENT SETUP

4.1 Automated SAR Measurement System

Measurements are performed using the DASY automated dosimetric SAR assessment system. The DASY is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland and consists of a high precision robotics system (Staubli), robot controller, desktop computer, near-field probe, probe alignment sensor, and the SAM phantom containing the head or body equivalent material. The robot is a six-axis industrial robot, performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF). See www.speag.com for more information about the specification of the SAR assessment system.

Figure 4-1
SAR Measurement System

Figure 4-2
Near-Field Probe

Table 4-1
Composition of the Tissue Equivalent Matter

Frequency (MHz)	3700
Tissue	Body
Ingredients (% by weight)	
NaCl	0.1
Polysorbate (Tween) 80	20
Water	79.9

5 DOSIMETRIC ASSESSMENT

5.1 Measurement Procedure

The evaluation was performed using the following procedure:

1. The SAR distribution at the exposed side of the head or body was measured at a distance no greater than 5.0 mm from the inner surface of the shell. The area covered the entire dimension of the device-head interface and the horizontal grid resolution was 12mm and 12mm for frequencies in the x and y directions respectively.

2. The point SAR measurement was taken at the maximum SAR region determined from Step 1 to enable the monitoring of SAR fluctuations/drifts during the 1 gram cube evaluation. SAR at this fixed point was measured and used as a reference value.

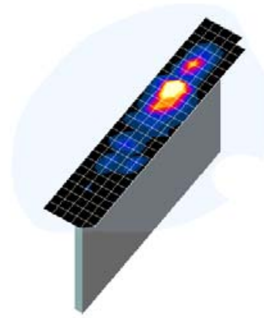


Figure 5-1
Sample SAR Area Scan

3. Based on the area scan data, the peak area of the maximum absorption was determined by spline interpolation. Around this point, a volume of 30mm x 30mm x 28mm (fine resolution volume scan, zoom scan) was assessed by measuring at least 7 x 7 x 8 points. On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure (see references or the DASY manual online for more details):

   a. The data was extrapolated to the surface of the outer-shell of the phantom. The combined distance extrapolated was the combined distance from the center of the dipoles 2.7mm away from the tip of the probe housing plus the 1.2 mm distance between the surface and the lowest measuring point. The extrapolation was based on a least-squares algorithm. A polynomial of the fourth order was calculated through the points in the z-axis (normal to the phantom shell).

   b. After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the “Not a knot” condition (in x, y, and z directions). The volume was then integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were obtained through interpolation, in order to calculate the averaged SAR.

   c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

4. The SAR reference value, at the same location as step 2, was re-measured after the zoom scan was complete to calculate the SAR drift. If the drift deviated by more than 5%, the SAR test and drift measurements were repeated.

6 FCC RF EXPOSURE LIMITS

6.1 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.

6.2 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 6-1
SAR Human Exposure Specified in ANSI/IEEE C95.1-1992 and Health Canada Safety Code 6

HUMAN EXPOSURE LIMITS		
	UNCONTROLLED ENVIRONMENT *General Population* (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT *Occupational* (W/kg) or (mW/g)
SPATIAL PEAK SAR Brain	1.6	8.0
SPATIAL AVERAGE SAR Whole Body	0.08	0.4
SPATIAL PEAK SAR Hands, Feet, Ankles, Wrists	4.0	20

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 SAR TEST CONFIGURATIONS

7.1 SAR test procedure for USB Dongles

(A) Horizontal-Up | (B) Horizontal-Down | (C) Vertical-Front | (D) Vertical-Back

Note: these are USB connector orientations on laptop computers; USB dongles have the reverse configuration for plugging into the corresponding laptop computers.

Figure 7-1
USB Dongle Test Configurations

This device was tested according to KDB Publication 447498 D02. USB orientations (see Figure 7-1) with a device to phantom separation distance of 5 mm or less, according to KDB Publication 447498 D02 requirements. Current generation laptop computers should be used to ensure proper measurement distances. The same test separation distance should be used for all frequency bands and modes in each USB orientation. The typical Horizontal-Up USB connection (A), found in the majority of laptop computers, must be tested using an appropriate laptop computer. A laptop with either Vertical-Front (C) or Vertical-Back (D) USB connection should be used to test one of the vertical USB orientations. If laptop computers are not available for testing the Horizontal-Down (B) or the remaining Vertical USB orientation, a short and high quality USB cable (12 inches or less) may be used for testing these other orientations. It should be ensured that the USB cable does not affect device radiating characteristics and output power of the dongle.

8 WIMAX CONSIDERATIONS

8.1 WIMAX Measured Maximum RF Output Conducted Powers

A. This device is capable of two different Channel Bandwidths (5MHz, 10 MHz), one zone type (PUSC) and two antennas.

B. Specific WIMAX configurations were selected for SAR testing according to WIMAX procedures in FCC KDB 615223 publication D01, and April & October 2010 FCC/TCB Workshop slides. Please see the notes following the SAR data in Section 10 for the determination of the required test configurations.

C. The devices were configured with proprietary test software. This software allows the user to fix the test frequency, modulation, power and coding rate. The manufacturer has confirmed that the device will operate using a 29:18 DL:UL symbol ratio but that the test software was limited to configuring providing 15 traffic symbols for 10 MHz bandwidth and providing 18 traffic symbols for 5 MHz bandwidth. All control symbols were disabled. The SAR results were scaled to match the operation of the device on the network. See Section 8.6 for details on SAR correction factors.

D. The WIMAX powers measured represent the traffic symbol burst average power and were measured on a spectrum analyzer.

Table 8-1
WIMAX RF Output Powers – 5MHz Bandwidth, Antenna 0

Channel	Frequency (MHz)	Modulation	Coding Rate	PUSC		
				5 MHz BW		
				Peak (dBm)	Avg (dBm)	PAR (dB)
Low	3652.5	QPSK	1/2	24.72	16.02	8.70
			3/4	25.00	16.06	8.94
		16QAM	1/2	24.85	16.21	8.64
			3/4	24.76	16.08	8.68
High	3672.5	QPSK	1/2	24.52	15.98	8.54
			3/4	24.64	15.78	8.86
		16QAM	1/2	24.55	16.09	8.46
			3/4	24.40	15.85	8.55

Table 8-2
WIMAX RF Output Powers – 5MHz Bandwidth, Antenna 1

Channel	Frequency (MHz)	Modulation	Coding Rate	PUSC 5 MHz BW Peak (dBm)	PUSC 5 MHz BW Avg (dBm)	PUSC 5 MHz BW PAR (dB)
Low	3652.5	QPSK	1/2	24.70	16.08	8.62
			3/4	24.84	16.15	8.69
		16QAM	1/2	24.77	16.16	8.61
			3/4	24.62	15.95	8.67
High	3672.5	QPSK	1/2	24.65	16.05	8.60
			3/4	24.73	16.01	8.72
		16QAM	1/2	24.70	16.00	8.70
			3/4	24.51	15.94	8.57

Table 8-3
WIMAX RF Output Powers – 10 MHz Bandwidth, Antenna 0

Channel	Frequency (MHz)	Modulation	Coding Rate	PUSC 10 MHz BW Peak (dBm)	PUSC 10 MHz BW Avg (dBm)	PUSC 10 MHz BW PAR (dB)
Mid	3662.5	QPSK	1/2	28.29	19.72	8.57
			3/4	28.33	19.69	8.64
		16QAM	1/2	28.30	19.81	8.49
			3/4	28.20	19.27	8.93

Table 8-4
WIMAX RF Output Powers – 10 MHz Bandwidth, Antenna 1

Channel	Frequency (MHz)	Modulation	Coding Rate	PUSC 10 MHz BW Peak (dBm)	PUSC 10 MHz BW Avg (dBm)	PUSC 10 MHz BW PAR (dB)
Mid	3662.5	QPSK	1/2	28.34	19.80	8.54
			3/4	28.36	19.77	8.59
		16QAM	1/2	28.34	19.76	8.58
			3/4	28.23	19.39	8.84

RF Cable losses provided by EMC lab.

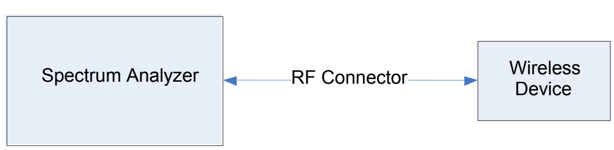


Figure 8-1
Power Measurement Setup

8.2 Variation from Expected SAR to do WIMAX PAR

The error due to the PAR of WIMAX was between 7-10%.

8.3 Probe Linearity Data and Linearity Graphs

SAR linearity was measured for the zone type, bandwidth, channel and mode that was tested for SAR per April 2010 FCC/TCB Workshop guidance. Please note that, according to October 2010 FCC/TCB Workshop notes, 16-QAM test reduction was not required for SAR given the conducted power measurements and SAR measurements. Therefore 16-QAM linearity plots were not required. See the notes following the SAR data in Section 10 for the description of test configurations used for the SAR assessment.

In order to achieve the appropriate SAR levels for linearity for this handset since the measured SAR was low, the EUT was positioned at 0.0 cm from the flat phantom. For each modulation, antenna and bandwidth tested for SAR, the probe was moved to the peak SAR location. Then the point SAR readings from the DASY software were measured using the multi-meter function and recorded while decreasing the RF powers starting from the a power level closest to 10 mW to highest maximum output power according to the FCC KDB 615223 publication guidance for testing WIMAX for SAR.

Table 8-5
WIMAX PUSC QPSK Linearity for 5 MHz Bandwidth, Tx Antenna 0

SAR (W/kg)	Zone	PUSC		
	Modulation	QPSK		
	Power (mW)	13.032	21.928	46.452
5 MHz	point SAR	0.4970	0.8420	1.8200
	linear line	0.4970	0.8363	1.7715
	ε	0.0%	0.7%	2.7%

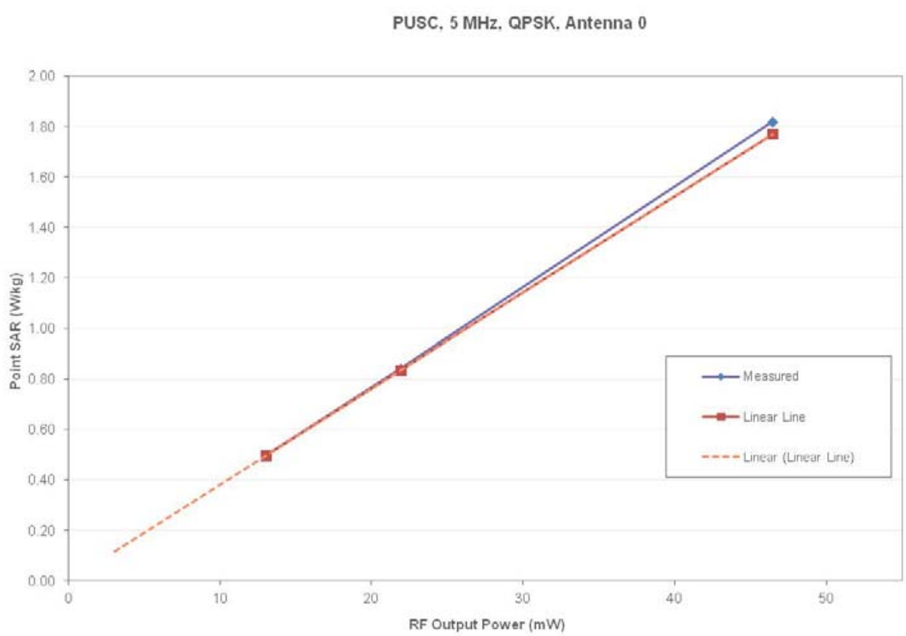


Table 8-6
WIMAX PUSC QPSK Linearity for 10 MHz Bandwidth, Tx Antenna 0

SAR (W/kg)	Zone	PUSC			
	Modulation	QPSK			
	Power (mW)	9.977	19.011	38.371	97.051
10 MHz	point SAR	0.1050	0.2110	0.4300	1.1100
	linear line	0.1050	0.2001	0.4038	1.0214
	ε	0.0%	5.5%	6.5%	8.7%

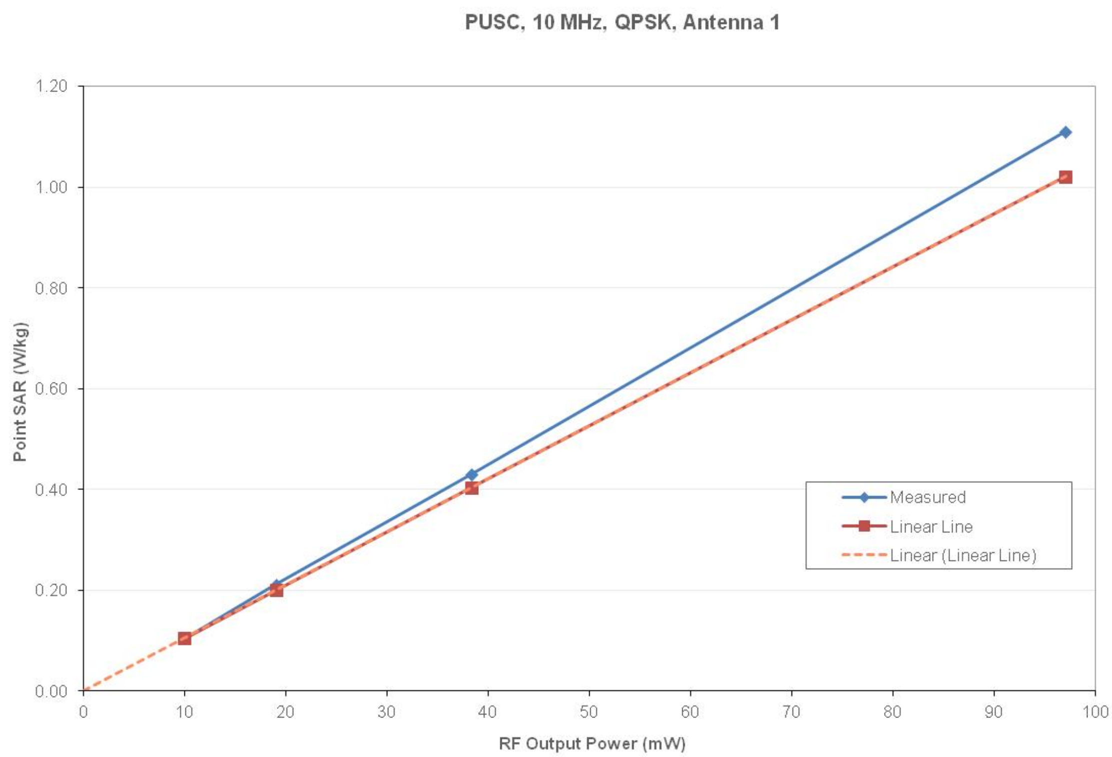


Table 8-7
WIMAX PUSC QPSK Linearity for 5 MHz Bandwidth, Tx Antenna 1

SAR (W/kg)	Zone	PUSC		
	Modulation	QPSK		
	Power (mW)	10.328	25.823	49.091
5 MHz	point SAR	0.1510	0.3990	0.7700
	linear line	0.1510	0.3775	0.7177
	ε	0.0%	5.7%	7.3%

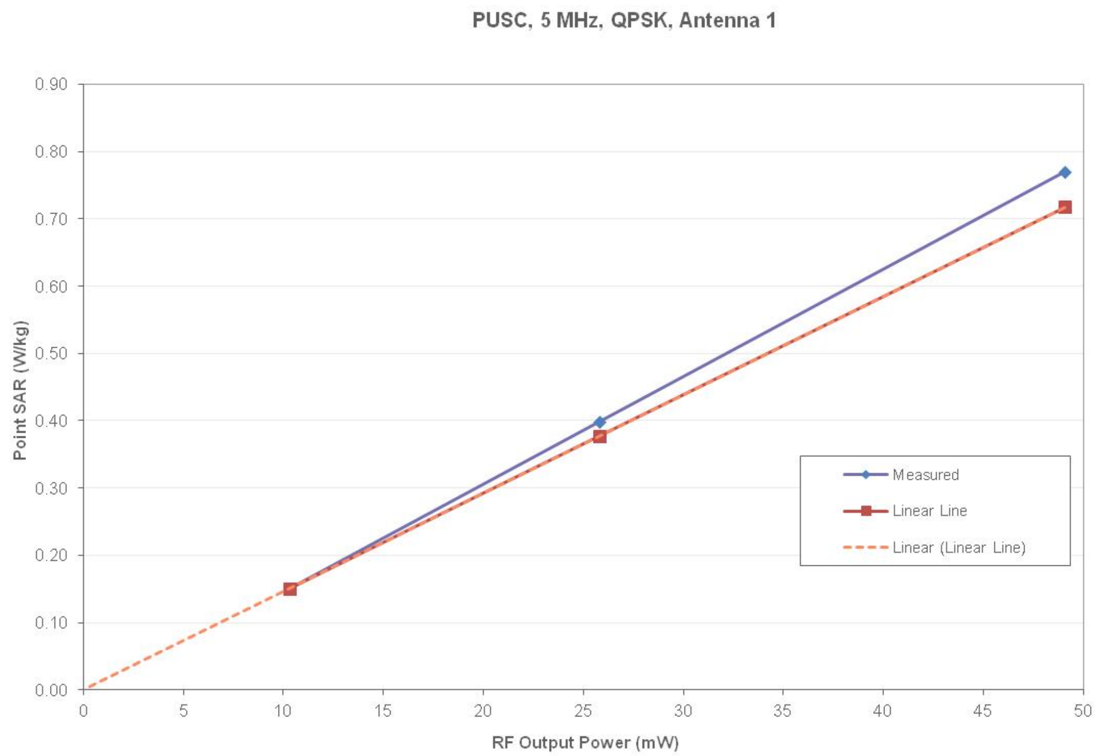
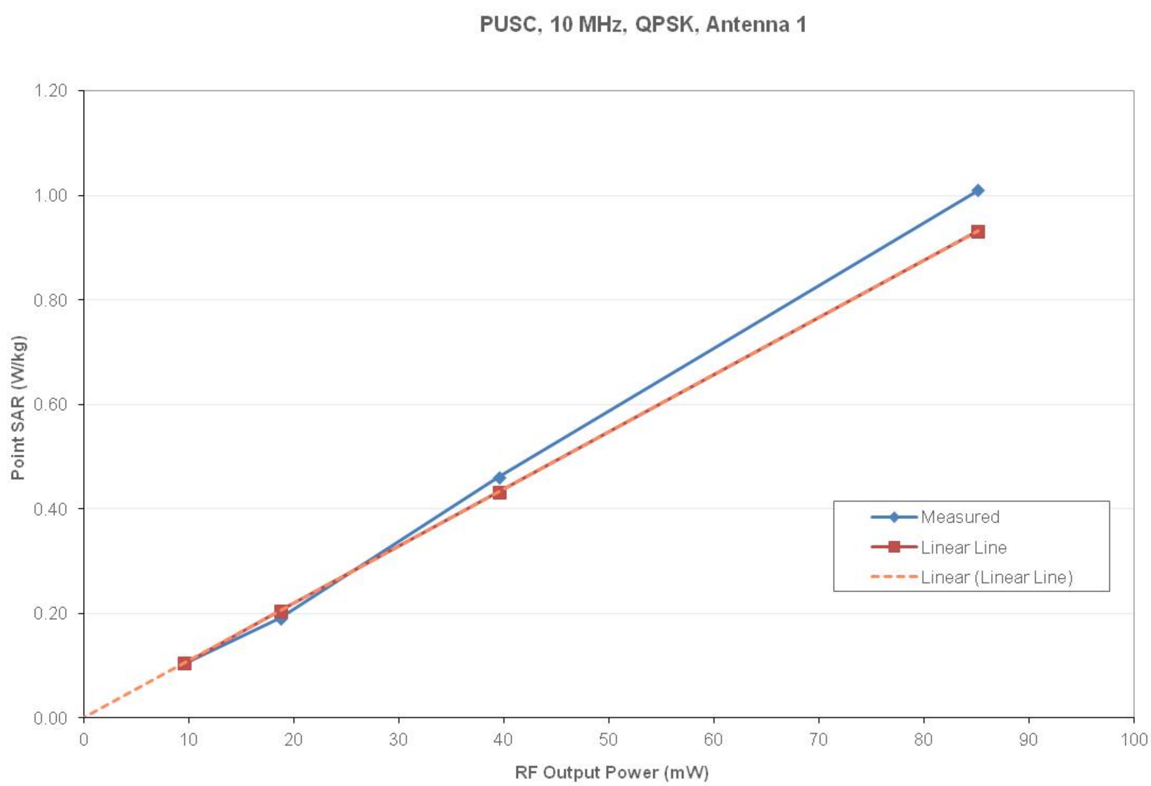


Table 8-8
WIMAX PUSC QPSK Linearity for 10 MHz Bandwidth, Tx Antenna 1

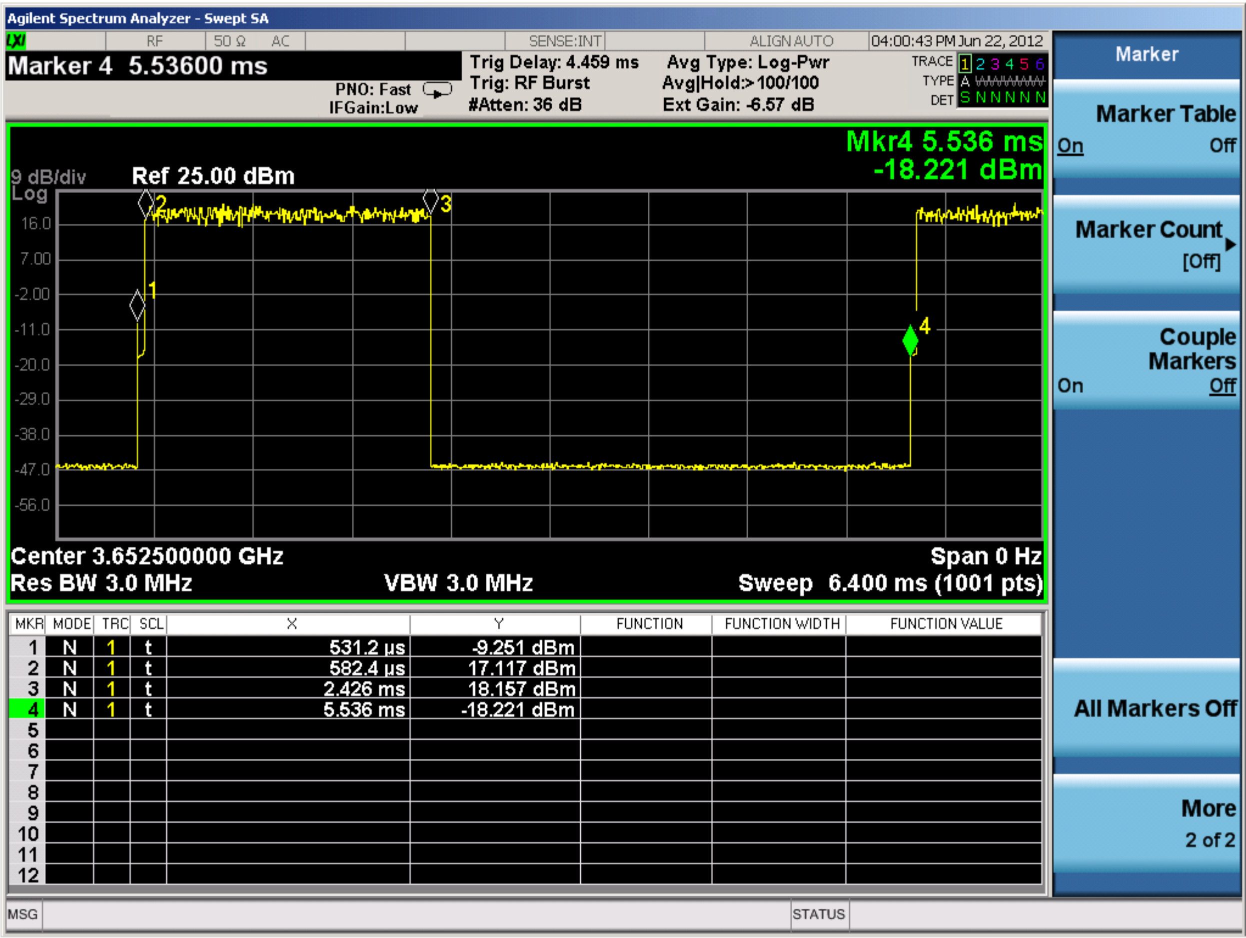
SAR (W/kg)	Zone	PUSC			
	Modulation	QPSK			
	Power (mW)	9.594	18.707	39.537	85.114
10 MHz	point SAR	0.1050	0.1910	0.4610	1.0100
	linear line	0.1050	0.2047	0.4327	0.9315
	ε	0.0%	-6.7%	6.5%	8.4%



8.4 Spectrum Analyzer Plots for WIMAX

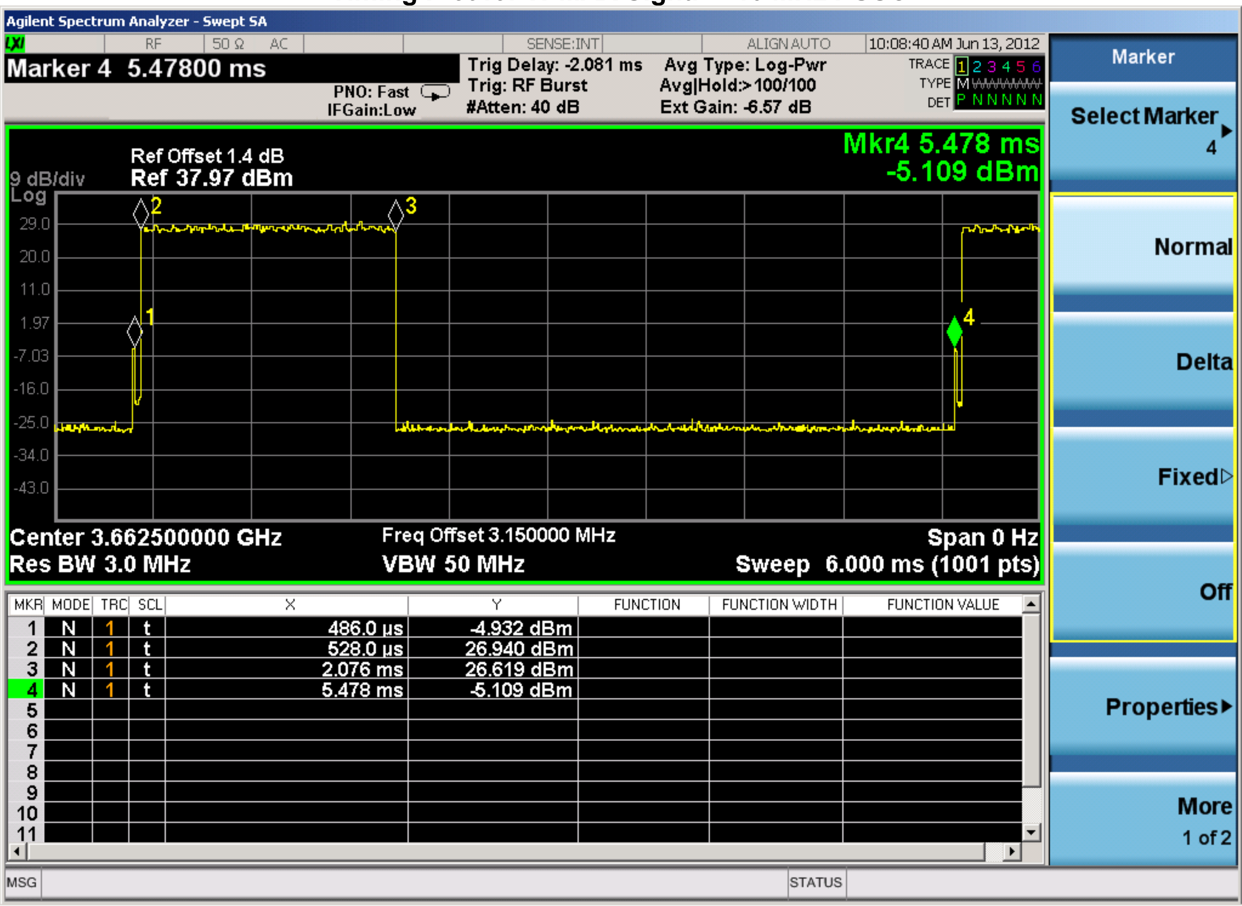
Timing plots for the signal were analyzed to confirm control and traffic symbol duration.

Figure 14-2
Timing Plot for WIMAX Signal – 5 MHz PUSC



Note: Both QPSK and 16-QAM Modulations have identical timing plots. Please see Section 8.5 for calculated frame averaged duty cycle.

Figure 14-3
Timing Plot for WIMAX Signal – 10 MHz PUSC



Note: Both QPSK and 16-QAM Modulations have identical timing plots. Please see Section 8.5 for calculated frame averaged duty cycle.

8.5 DASY Crest Factor Calculations

For 5 MHz:

Theoretical Frame Averaged Duty Cycle: 18/48 = 0.375

Calculated Frame Averaged Duty Cycle = $\frac{(2.426-0.5824)}{(5.536-0.5312)} = 0.37$

Theoretical Conversion Factor (cf): 1/0.375 = **2.7**

The duty factor is the same for all channels and modulations.

For 10 MHz:

Theoretical Frame Averaged Duty Cycle: 15/48 = 0.3125

Calculated Frame Averaged Duty Cycle = $\frac{(2.076-0.528)}{(5.478-0.486)} = 0.31$

Theoretical Conversion Factor (cf): 1/0.3125 = **3.2**

The duty factor is the same for all channels and modulations.

8.6 WIMAX Error Correction Scaling Factors

The WIMAX error correction scaling factors below in Table 8-9 and Table 8-10 were applied to the measured SAR results per April 2010 FCC/TCB Workshop Guidance.

Control channels for PUSC occupy 5 slots for operations in the 5MHz and 10MHz bandwidths. For the 10 MHz bandwidth, there are 35 total slots. For the 5 MHz bandwidth, there are 17 total slots. This device transmits 15 traffic symbols and 3 control symbols for all modulations and bandwidths.

The maximum rated power for WIMAX is 50.12 mW for 5 MHz Bandwidth. Since this device operates with 5 Control symbol slots out of 17 total slots, the control symbol power is calculated to be 14.74 mW, based on the maximum rated power.

The maximum rated power for WIMAX is 100.00 mW for 10 MHz Bandwidth. Since this device operates with 5 Control symbol slots out of 35 total slots, the control symbol power is calculated to be 14.29 mW, based on the maximum rated power..

The test software available was limited to providing 18 traffic symbols in the uplink for 5 MHz bandwidth and 15 traffic symbols in the uplink for 10 MHz bandwidth. The manufacturer has confirmed that maximum downlink/uplink ratio allowed to this device on the network is 29:18, using 3 control symbols. Therefore, the SAR results were scaled by taking account the theoretical number of traffic symbols (15) compared to the measured/tested traffic symbols (18 for 5 MHz bandwidth, 15 for 10 MHz bandwidth).

Error Correction Scaling Factors were calculated based on the following equation:

$$Scaling\ Factor = \frac{\left(P_{Max} * \frac{\#\ of\ Control\ Slots\ Occupied}{\#\ of\ Slots\ (total)}\right) * \#\ of Control\ Symbols + P_{Max} * \#\ of\ Traffic\ Symbols (Theoretical)}{P * \#\ of\ Traffic\ Symbols\ (measured)}$$

Given:
P_{Max} = Maximum Rated Power (mW)
P = Measured Maximum Output Power (mW)

The following is a sample calculation of the SAR Scaling factors:

$$SAR\ Scaling\ Factor\ (Antenna\ 0, Low\ Ch., QPSK 1/2, 5\ MHz\ Bandwidth) = \frac{\left(50.12 * \frac{5}{17}\right) * 3 + 50.12 * 15}{39.99 * 18} = 1.11$$

$$SAR\ Scaling\ Factor\ (Antenna\ 1, Mid. Ch., QPSK 1/2, 10\ MHz\ Bandwidth) = \frac{\left(100 * \frac{5}{35}\right) * 3 + 100 * 15}{95.50 * 15} = 1.08$$

Table 8-9
WIMAX Scaling Factors – Antenna 0

Frequency [MHz]	Channel	Zone Type	Modulation	BW	Coding Rate	Tune Up Max in mW	CS+TS Slots	CS Slots	1 Control Symbol Power [a*c/b] (mW)	Combined power of CS [d*3] (mW)	Measured Average RF Output Power		SAR Scaling Factor
											dBm	mW	
3662.5	Mid	PUSC	QPSK	10 MHz	1/2	100.00	35	5	14.29	42.86	19.72	93.76	1.10
		PUSC	16QAM	10 MHz	1/2	100.00	35	5	14.29	42.86	19.81	95.72	1.07
		PUSC	QPSK	10 MHz	3/4	100.00	35	5	14.29	42.86	19.69	93.11	1.10
		PUSC	16QAM	10 MHz	3/4	100.00	35	5	14.29	42.86	19.27	84.53	1.22
3652.5	Low	PUSC	QPSK	5 MHz	1/2	50.12	17	5	14.74	44.22	16.02	39.99	1.11
		PUSC	16QAM	5 MHz	1/2	50.12	17	5	14.74	44.22	16.21	41.78	1.06
		PUSC	QPSK	5 MHz	3/4	50.12	17	5	14.74	44.22	16.06	40.36	1.10
		PUSC	16QAM	5 MHz	3/4	50.12	17	5	14.74	44.22	16.08	40.55	1.09
3672.5	High	PUSC	QPSK	5 MHz	1/2	50.12	17	5	14.74	44.22	15.98	39.63	1.12
		PUSC	16QAM	5 MHz	1/2	50.12	17	5	14.74	44.22	16.09	40.64	1.09
		PUSC	QPSK	5 MHz	3/4	50.12	17	5	14.74	44.22	15.78	37.84	1.17
		PUSC	16QAM	5 MHz	3/4	50.12	17	5	14.74	44.22	15.85	38.46	1.15

Table 8-10
WIMAX Scaling Factors –Antenna 1

Frequency [MHz]	Channel	Zone Type	Modulation	BW	Coding Rate	Tune Up Max in mW	CS+TS Slots	CS Slots	1 Control Symbol Power [a*c/b] (mW)	Combined power of CS [d*3] (mW)	Measured Average RF Output Power		SAR Scaling Factor
											dBm	mW	
3662.5	Mid	PUSC	QPSK	10 MHz	1/2	100.00	35	5	14.29	42.86	19.80	95.50	1.08
		PUSC	16QAM	10 MHz	1/2	100.00	35	5	14.29	42.86	19.76	94.62	1.09
		PUSC	QPSK	10 MHz	3/4	100.00	35	5	14.29	42.86	19.77	94.84	1.08
		PUSC	16QAM	10 MHz	3/4	100.00	35	5	14.29	42.86	19.39	86.90	1.18
3652.5	Low	PUSC	QPSK	5 MHz	1/2	50.12	17	5	14.74	44.22	16.08	40.55	1.09
		PUSC	16QAM	5 MHz	1/2	50.12	17	5	14.74	44.22	16.16	41.30	1.07
		PUSC	QPSK	5 MHz	3/4	50.12	17	5	14.74	44.22	16.15	41.21	1.07
		PUSC	16QAM	5 MHz	3/4	50.12	17	5	14.74	44.22	15.95	39.36	1.12
3672.5	High	PUSC	QPSK	5 MHz	1/2	50.12	17	5	14.74	44.22	16.05	40.27	1.10
		PUSC	16QAM	5 MHz	1/2	50.12	17	5	14.74	44.22	16.00	39.81	1.11
		PUSC	QPSK	5 MHz	3/4	50.12	17	5	14.74	44.22	16.01	39.90	1.11
		PUSC	16QAM	5 MHz	3/4	50.12	17	5	14.74	44.22	15.94	39.26	1.13

The power for each configuration is within the tune-up maximum of 20 dBm for 10 MHz bandwidth and 17 dBm for 5 MHz Bandwidth.

9 SYSTEM VERIFICATION

9.1 Tissue Verification

Table 9-1
Measured Tissue Properties

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (C°)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	% dev σ	% dev ε
6/13/2012	3700B	22.6	3645	3.562	53.25	3.483	51.120	2.27%	4.17%
			3685	3.629	53.19	3.530	51.070	2.80%	4.15%
			3725	3.675	53.17	3.577	51.020	2.74%	4.21%

The above measured tissue parameters were used in the DASY software to perform interpolation via the DASY software to determine actual dielectric parameters at the test frequencies (per IEEE 1528 6.6.1.2). The SAR test plots may slightly differ from the table above since the DASY software rounds to three significant digits.

9.2 Measurement Procedure for Tissue verification

1) The network analyzer and probe system was configured and calibrated.
2) The probe was immersed in the sample which was placed in a nonmetallic container. Trapped air bubbles beneath the flange were minimized by placing the probe at a slight angle.
3) The complex admittance with respect to the probe aperture was measured
4) The complex relative permittivity ε' can be calculated from the below equation (Pournaropoulos and Misra):

$$Y = \frac{j2\omega\varepsilon_r\varepsilon_0}{[\ln(b/a)]^2}\int_a^b\int_a^b\int_0^\pi \cos\phi' \frac{\exp\left[-j\omega r(\mu_0\varepsilon_r'\varepsilon_0)^{1/2}\right]}{r} d\phi' d\rho' d\rho$$

where *Y* is the admittance of the probe in contact with the sample, the primed and unprimed coordinates refer to source and observation points, respectively, $r^2 = \rho^2 + \rho'^2 - 2\rho\rho'\cos\phi'$, ω is the angular frequency, and $j = \sqrt{-1}$.

9.3 Test System Verification

Prior to assessment, the system is verified to ±10% of the manufacturer SAR measurement on the reference dipole at the time of calibration.

Table 9-2
System Verification Results

System Verification TARGET & MEASURED											
Tissue Frequency (MHz)	Tissue Type	Date:	Amb. Temp (°C)	Liquid Temp (°C)	Input Power (W)	Dipole SN	Probe SN	Measured SAR_{1g} (W/kg)	1 W Target SAR_{1g} (W/kg)	1 W Normalized SAR_{1g} (W/kg)	Deviation (%)
3700	Body	06/13/2012	23.0	21.4	0.100	1002	3645	6.41	61.400	64.100	4.40%

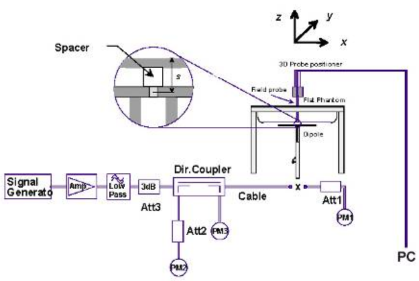


Figure 9-1
System Verification Setup Diagram

Figure 9-2
System Verification Setup Photo

10 SAR DATA SUMMARY

10.1 Standalone Body SAR Data

Table 10-1
WIMAX Body SAR Data – Antenna 0

MEASUREMENT RESULTS												
FREQUENCY		Antenna	Mode	Bandwidth [MHz]	Conducted Power [dBm]	Power Drift [dB]	Modulation	Spacing	Side	SAR (1g)	Scaling Factor	Scaled SAR (1g)
MHz	Ch.									(W/kg)		(W/kg)
3652.50	Low	Antenna 0	WIMAX	5	16.02	-0.15	QPSK	0.5 cm	Horizontal Up	0.554	1.106	0.613
3662.50	Mid	Antenna 0	WIMAX	10	19.72	-0.16	QPSK	0.5 cm	Horizontal Up	0.496	1.097	0.544
3652.50	Low	Antenna 0	WIMAX	5	16.02	-0.10	QPSK	0.5 cm	Horizontal Down	0.723	1.106	**0.799**
3662.50	Mid	Antenna 0	WIMAX	10	19.72	-0.17	QPSK	0.5 cm	Horizontal Down	0.596	1.097	0.654
3652.50	Low	Antenna 0	WIMAX	5	16.02	-0.19	QPSK	0.5 cm	Tip	0.230	1.106	0.254
3662.50	Mid	Antenna 0	WIMAX	10	19.72	-0.14	QPSK	0.5 cm	Tip	0.162	1.097	0.178
3652.50	Low	Antenna 0	WIMAX	5	16.02	-0.02	QPSK	0.5 cm	Vertical Front	0.208	1.106	0.230
3662.50	Mid	Antenna 0	WIMAX	10	19.72	-0.01	QPSK	0.5 cm	Vertical Front	0.151	1.097	0.166
3652.50	Low	Antenna 0	WIMAX	5	16.02	-0.05	QPSK	0.5 cm	Vertical Back	0.594	1.106	0.657
3662.50	Mid	Antenna 0	WIMAX	10	19.72	-0.05	QPSK	0.5 cm	Vertical Back	0.475	1.097	0.521
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Body 1.6 W/kg (mW/g) averaged over 1 gram					

Table 10-2
WIMAX Body SAR Data – Antenna 1

MEASUREMENT RESULTS												
FREQUENCY		Antenna	Mode	Bandwidth [MHz]	Conducted Power [dBm]	Power Drift [dB]	Modulation	Spacing	Side	SAR (1g)	Scaling Factor	Scaled SAR (1g)
MHz	Ch.									(W/kg)		(W/kg)
3652.50	Low	Antenna 1	WIMAX	5	16.08	-0.08	QPSK	0.5 cm	Horizontal Up	0.409	1.091	0.446
3662.50	Mid	Antenna 1	WIMAX	10	19.80	-0.02	QPSK	0.5 cm	Horizontal Up	0.379	1.077	0.408
3652.50	Low	Antenna 1	WIMAX	5	16.08	0.00	QPSK	0.5 cm	Horizontal Down	0.643	1.091	0.701
3662.50	Mid	Antenna 1	WIMAX	10	19.80	-0.02	QPSK	0.5 cm	Horizontal Down	0.536	1.077	0.577
3652.50	Low	Antenna 1	WIMAX	5	16.08	0.12	QPSK	0.5 cm	Tip	0.122	1.091	0.133
3662.50	Mid	Antenna 1	WIMAX	10	19.80	0.04	QPSK	0.5 cm	Tip	0.089	1.077	0.095
3652.50	Low	Antenna 1	WIMAX	5	16.08	-0.04	QPSK	0.5 cm	Vertical Front	0.670	1.091	**0.731**
3662.50	Mid	Antenna 1	WIMAX	10	19.80	0.08	QPSK	0.5 cm	Vertical Front	0.333	1.077	0.359
3652.50	Low	Antenna 1	WIMAX	5	16.08	-0.05	QPSK	0.5 cm	Vertical Back	0.148	1.091	0.161
3662.50	Mid	Antenna 1	WIMAX	10	19.80	0.03	QPSK	0.5 cm	Vertical Back	0.140	1.077	0.151
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Body 1.6 W/kg (mW/g) averaged over 1 gram					

10.2 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used were according to KDB Publication 447498 D02.
2. Tissue parameters and temperatures are listed on the SAR plots.
3. Liquid tissue depth was at least 15.0 cm. To confirm the proper SAR liquid depth, the z-axis plots from the system verifications were included since the system verifications were performed using the same liquid, probe and DAE as the SAR tests in the same time period.
4. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
5. Per KDB 447498 D01, only one channel was required for SAR testing when the device was operating with at 10 MHz bandwidth and two channels were required when the device operated with a 5 MHz bandwidth. Low channel (the highest output power) was tested for all configurations. High channel SAR was not required when each test configuration is at least 3.0 dB lower than the SAR limit.
6. IBM ThinkPad notebooks were used as hosts for testing the modem configurations
7. A spacing of 0.5 cm was used for all sides of the modem per KDB Publication 447498 D02 for USB dongles.
8. Per KDB 447498 D02, all configurations were measured using a laptop when possible. When a suitable host computer was not available for testing (Horizontal Down), a high quality USB cable less than 12 inches was used for SAR testing.
9. The tip of the dongle was required to be evaluated for SAR since the antennas were located within 1 cm of the edge of the device, per KDB 447498 D02.
10. SAR Test configurations per FCC KDB Publication 615223 and April/Oct. 2010 FCC/TCB Workshop Notes :
    a. This device supports two coding rates (1/2 and 3/4) that are rated to the same maximum output power and therefore SAR tests with only the lowest coding rate (1/2) were required.
    b. 16 QAM was not required to be tested since the output power for 16-QAM was not more than 0.25 higher than QPSK and the QPSK SAR was less than 0.8 W/kg.
    c. WIMAX SAR was scaled to reflect normal device operation (See Section 8.6 for more information).
    d. For 5 MHz bandwidth, the device was configured to operate with 18 traffic symbols active and the 3 control symbols inactive. The SAR result was then scaled up to the maximum tune up power to simulate operating with 15 traffic symbols and 3 control symbols.
    e. For 10 MHz bandwidth, the device was configured to operate with 15 traffic symbols active and the 3 control symbols inactive. The SAR result was then scaled up to the maximum tune up power to simulate 15 traffic symbols and 3 control symbols.
    f. SAR plots reflect measured SAR values.
    g. Crest Factor used for the SAR system for the WIMAX signal for 5 MHz bandwidth was 1/(18/48) = 2.7.
    h. Crest Factor used for the SAR system for the WIMAX signal for 10 MHz bandwidth was 1/(15/48) = 3.2.
    i. The scaled SAR was used to determine test reduction scenarios.

11 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

11.1 Introduction

This device contains multiple transmitters that may operate simultaneously and therefore, require a simultaneous transmission analysis according to KDB Publication 447498 D01 3) procedures .

The manufacturer has confirmed that the antenna paths must be operating using the same signal configuration (modulation, bandwidth) when operating simultaneously.

11.2 Body SAR Simultaneous Transmission Analysis

Table 11-1
Simultaneous Transmission Scenario (5 MHz Bandwidth at 0.5 cm)

Simult Tx	Configuration	WIMAX SAR (W/kg)	WIMAX SAR (W/kg)	Σ SAR (W/kg)
	Antenna	0	1	0+1
Body SAR	Horizontal Up	0.613	0.446	1.059
	Horizontal Down	0.799	0.701	**1.501**
	Tip	0.254	0.133	0.387
	Vertical Front	0.230	0.731	0.961
	Vertical Back	0.657	0.161	0.818

Note: The scaled SAR values were used to determine simultaneous transmission compliance.

Table 11-2
Simultaneous Transmission Scenario (10 MHz Bandwidth at 0.5 cm)

Simult Tx	Configuration	WIMAX SAR (W/kg)	WIMAX SAR (W/kg)	Σ SAR (W/kg)
	Antenna	0	1	0+1
Body SAR	Horizontal Up	0.544	0.408	0.952
	Horizontal Down	0.654	0.577	**1.231**
	Tip	0.178	0.095	0.273
	Vertical Front	0.166	0.359	0.524
	Vertical Back	0.521	0.151	0.672

Note: The scaled SAR values were used to determine simultaneous transmission compliance.

11.3 Simultaneous Transmission Conclusion

The above numerical summed SAR was below the SAR limit. Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit. No volumetric SAR summation is required per FCC KDB Publication 648474.

12 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8648D	(9kHz-4GHz) Signal Generator	10/10/2011	Annual	10/10/2012	3613A00315
Agilent	85070E	Dielectric Probe Kit	3/8/2012	Annual	3/8/2013	MY44300633
Agilent	8648D	Signal Generator	4/3/2012	Annual	4/3/2013	3629U00687
Agilent	8753E	(30kHz-6GHz) Network Analyzer	4/3/2012	Annual	4/3/2013	US37390350
Agilent	8753E	(30kHz-6GHz) Network Analyzer	4/4/2012	Annual	4/4/2013	JP38020182
Agilent	E8257D	(250kHz-20GHz) Signal Generator	4/5/2012	Annual	4/5/2013	MY45470194
Agilent	85047A	S-Parameter Test Set	N/A			2904A00579
Amplifier Research	5S1G4	5W, 800MHz-4.2GHz	CBT		CBT	21910
Anritsu	ML2438A	Power Meter	10/13/2011	Annual	10/13/2012	1070030
Anritsu	MA2411B	Pulse Sensor	10/13/2011	Annual	10/13/2012	1027293
Anritsu	ML2495A	Power Meter	10/13/2011	Annual	10/13/2012	1039008
Anritsu	MA2481A	Power Sensor	2/14/2012	Annual	2/14/2013	5318
Anritsu	MA2481A	Power Sensor	2/14/2012	Annual	2/14/2013	5442
Anritsu	ML2438A	Power Meter	2/14/2012	Annual	2/14/2013	1190013
Anritsu	ML2438A	Power Meter	2/14/2012	Annual	2/14/2013	98150041
Anritsu	MA2481A	Power Sensor	2/14/2012	Annual	2/14/2013	5821
Anritsu	MA2481A	Power Sensor	2/14/2012	Annual	2/14/2013	8013
Anritsu	MA2481A	Power Sensor	2/14/2012	Annual	2/14/2013	2400
Anritsu	MA2481A	Power Sensor	4/5/2012	Annual	4/5/2013	5605
COMTECH	AR85729-5/5759B	Solid State Amplifier	CBT		CBT	M3W1A00-1002
COMTech	AR85729-5	Solid State Amplifier	CBT		CBT	M1S5A00-009
Control Company	61220-416	Long-Stem Thermometer	2/15/2011	Biennial	2/15/2013	111331322
Control Company	61220-416	Long-Stem Thermometer	2/15/2011	Biennial	2/15/2013	111331323
Control Company	36934-158	Wall-Mounted Thermometer	1/4/2012	Biennial	1/4/2014	122014497
Control Company	36934-158	Wall-Mounted Thermometer	1/4/2012	Biennial	1/4/2014	122014488
Gigatronics	80701A	(0.05-18GHz) Power Sensor	10/12/2011	Annual	10/12/2012	1833460
Gigatronics	8651A	Universal Power Meter	10/12/2011	Annual	10/12/2012	8650319
Intelligent Weigh	PD-3000	Electronic Balance	3/27/2012	Annual	3/27/2013	11081534
MCL	BW-N6W5+	6dB Attenuator	CBT		CBT	1139
MiniCircuits	VLF-6000+	Low Pass Filter	CBT		CBT	N/A
MiniCircuits	VLF-6000+	Low Pass Filter	CBT		CBT	N/A
MiniCircuits	SLP-2400+	Low Pass Filter	CBT		CBT	R8979500903
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT		CBT	N/A
Narda	4014C-6	4 - 8 GHz SMA 6 dB Directional Coupler	CBT		CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT		CBT	9406
Narda	BW-S3W2	Attenuator (3dB)	CBT		CBT	120
Rohde & Schwarz	SMIQ03B	Signal Generator	4/5/2012	Annual	4/5/2013	DE27259
Rohde & Schwarz	NRVD	Dual Channel Power Meter	4/8/2011	Biennial	4/8/2013	101695
Seekonk	NC-100	Torque Wrench (8" lb)	11/29/2011	Triennial	11/29/2014	21053
Seekonk	NC-100	Torque Wrench (8" lb)	3/5/2012	Triennial	3/5/2015	N/A
Seekonk	NC-100	Torque Wrench (8" lb)	3/5/2012	Triennial	3/5/2015	N/A
SPEAG	EX3DV4	SAR Probe	10/26/2011	Annual	10/26/2012	3645
Speag	DAK-3.5	Dielectric Assessment Kit	12/1/2011	Annual	12/1/2012	1031
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/12/2012	Annual	4/12/2013	1333
SPEAG	D3700V2	3700 MHz SAR Dipole	5/14/2012	Annual	5/14/2013	1002
Tektronix	RSA-6114A	Real Time Spectrum Analyzer	4/5/2012	Annual	4/5/2013	B010177
VWR	36934-158	Wall-Mounted Thermometer	1/21/2011	Biennial	1/21/2013	111286445
VWR	36934-158	Wall-Mounted Thermometer	1/21/2011	Biennial	1/21/2013	111286460
Agilent	N9020A	MXA Signal Analyzer	10/10/2011	Annual	10/10/2012	US46470561

Note: CBT (Calibrated Before Testing). Prior to testing, the measurement paths containing an amplifier, cable, attenuator, coupler or filter were connected to a calibrated source (i.e. a signal generator) to determine the losses of the measurement path. The power meter offset was then adjusted to compensate for the measurement system losses. This level offset is stored within the power meter before measurements are made. This calibration verification procedure applies to the system verification and output power measurements. The calibrated reading is then taken directly from the power meter after compensation of the losses for all final power measurements.

13 MEASUREMENT UNCERTAINTIES

Applicable for frequencies up to 6 GHz.

a	b	c	d	e= f(d,k)	f	g	h = c x f/e	i = c x g/e	k
Uncertainty Component	**IEEE 1528 Sec.**	**Tol. (± %)**	**Prob. Dist.**	**Div.**	**c_i 1gm**	**c_i 10 gms**	**1gm u_i (± %)**	**10gms u_i (± %)**	**v_i**
Measurement System									
Probe Calibration	E.2.1	6.55	N	1	1.0	1.0	6.6	6.6	∞
Axial Isotropy	E.2.2	0.25	N	1	0.7	0.7	0.2	0.2	∞
Hemishperical Isotropy	E.2.2	1.3	N	1	1.0	1.0	1.3	1.3	∞
Boundary Effect	E.2.3	0.4	N	1	1.0	1.0	0.4	0.4	∞
Linearity	E.2.4	0.3	N	1	1.0	1.0	0.3	0.3	∞
System Detection Limits	E.2.5	5.1	N	1	1.0	1.0	5.1	5.1	∞
Readout Electronics	E.2.6	1.0	N	1	1.0	1.0	1.0	1.0	∞
Response Time	E.2.7	0.8	R	1.73	1.0	1.0	0.5	0.5	∞
Integration Time	E.2.8	2.6	R	1.73	1.0	1.0	1.5	1.5	∞
RF Ambient Conditions	E.6.1	3.0	R	1.73	1.0	1.0	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	R	1.73	1.0	1.0	0.2	0.2	∞
Probe Positioning w/ respect to Phantom	E.6.3	2.9	R	1.73	1.0	1.0	1.7	1.7	∞
Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation	E.5	1.0	R	1.73	1.0	1.0	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	E.4.2	6.0	N	1	1.0	1.0	6.0	6.0	287
Device Holder Uncertainty	E.4.1	3.32	R	1.73	1.0	1.0	1.9	1.9	∞
Output Power Variation - SAR drift measurement	6.6.2	5.0	R	1.73	1.0	1.0	2.9	2.9	∞
Phantom & Tissue Parameters									
Phantom Uncertainty (Shape & Thickness tolerances)	E.3.1	4.0	R	1.73	1.0	1.0	2.3	2.3	∞
Liquid Conductivity - deviation from target values	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity - measurement uncertainty	E.3.3	3.8	N	1	0.64	0.43	2.4	1.6	6
Liquid Permittivity - deviation from target values	E.3.2	5.0	R	1.73	0.60	0.49	1.7	1.4	∞
Liquid Permittivity - measurement uncertainty	E.3.3	4.5	N	1	0.60	0.49	2.7	2.2	6
Combined Standard Uncertainty (k=1)			RSS				12.4	12.0	299
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=2				24.7	24.0	

The above measurement uncertainties are according to IEEE Std. 1528-2003

14 CONCLUSION

14.1 Measurement Conclusion

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

Please note that the absorption and distribution of electromagnetic energy in the body are very complex phenomena that depend 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 various factors may interact with one another to vary the specific biological outcome of an exposure to electromagnetic fields, any protection guide should consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables. [3]

15 REFERENCES

[1] Federal Communications Commission, ET Docket 93-62, Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation, Aug. 1996.

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