SAR TEST REPORT

HCT CO., LTD

EUT Type:	USB Modem
FCC ID:	XHG-U600
Model:	U600 | Trade Name | Diffon corporation
Date of Issue:	Apr. 05, 2010
Test report No.:	HCTA1004FS04
Test Laboratory:	**HCT CO., LTD.** SAN 136-1, AMI-RI, BUBAL-EUP, ICHEON-SI, KYOUNGKI-DO, 467-701, KOREA TEL: +82 31 639 8565 FAX: +82 31 639 8525
Applicant :	**Diffon corporation** Digital Tower Aston 1505, 505-15 Gasan, Geumcheon, Seoul, Korea Tel: +82-2-2082-8222 Fax: +82-2-2082-8922
Testing has been carried out in accordance with:	47CFR §2.1093 FCC OET Bulletin 65(Edition 97-01), Supplement C (Edition 01-01) ANSI/ IEEE C95.1 – 2005 IEEE 1528-2003
Test result:	The tested device complies with the requirements in respect of all parameters subject to the test. The test results and statements relate only to the items tested. The test report shall not be reproduced except in full, without written approval of the laboratory.
Signature	Report prepared by : Sun-Hee Kim Test Engineer of SAR Part Approved by : Jae-Sang So Manager of SAR Part

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1. INTRODUCTION

The FCC has adopted the guidelines for evaluating the environmental effects of radio frequency 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.

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 C95.1-2005 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz. 1992 by the Institute of Electrical and Electronics Engineers, Inc., New York, New York 10017. The measurement procedure described in IEEE/ANSI C95.3-1992 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave is used for guidance in measuring 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 National Council on Radiation Protection and Measurements (NCRP) in Biological Effects and Exposure Criteria for Radio frequency Electromagnetic Fields," NCRP Report No. 86 NCRP, 1986, Bethesda, MD 20814. 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.

SAR Definition

Specific Absorption Rate (SAR) is defined as the time derivative of the incremental electromagnetic energy (d*W*) absorbed by (dissipated in) an incremental mass (d*m*) contained in a volume element (d*V*) of a given density (*r*). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body.

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

Figure 2. SAR Mathematical Equation

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

$$SAR = \sigma E^2 / \rho$$

where:

σ = conductivity of the tissue-simulant material (S/m)

ρ = mass density of the tissue-simulant 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 relations 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.

2. DESCRIPTION OF DEVICE

Environmental evaluation measurements of specific absorption rate (SAR) distributions in emulated human head and body tissues exposed to radio frequency (RF) radiation from wireless portable devices for compliance with the rules and regulations of the U.S. Federal Communications Commission (FCC).

EUT Type	USB Modem
FCC ID	XHG-U600
Model(s)	U600
Trade Name	Diffon corporation
Serial Number(s)	#1
Application Type	Certification
Modulation(s)	WIMAX2600
Tx Frequency	2 498.5 MHz – 2 687.5 MHz (5 MHz Bandwidth) 2 501.0 MHz – 2 685.0 MHz (10 MHz Bandwidth)
Rx Frequency	2 498.5 MHz – 2 687.5 MHz (5 MHz Bandwidth) 2 501.0 MHz – 2 685.0 MHz (10 MHz Bandwidth)
FCC Classification	Licensed Non-Broadcast Station Transmitter (TNB)
Production Unit or Identical Prototype	Prototype
Max. SAR	0.921 W/kg WIMAX2600 Body SAR
Date(s) of Tests	Mar. 26, 2010, May 5, 2010
Antenna Type	Intenna

3. DESCRIPTION OF TEST EQUIPMENT

3.1 SAR MEASUREMENT SETUP

These measurements are performed using the DASY4 automated dosimetric assessment system. It is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland. It consists of high precision robotics system (Staubli), robot controller, Pentium III computer, near-field probe, probe alignment sensor, and the generic twin phantom containing the brain 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 Figure.3.1).

A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and remote control, is used to drive the robot motors. The PC consists of the HP Pentium IV 3.0 GHz computer with Windows XP system and SAR Measurement Software DASY4, A/D interface card, monitor, mouse, and keyboard. The Staubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card.

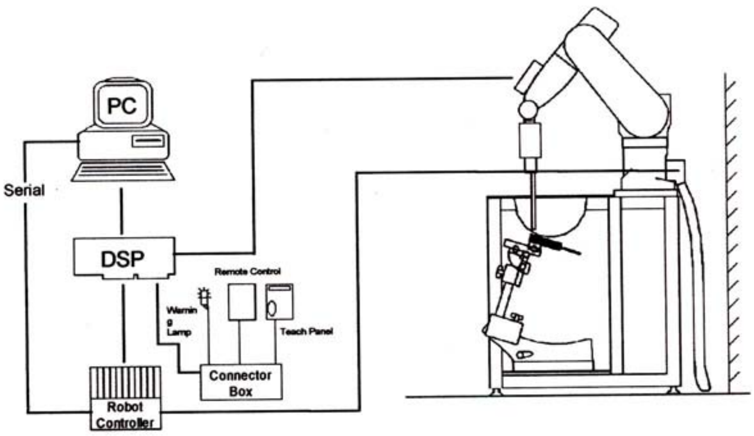


Figure 3.1 HCT SAR Lab. Test Measurement Set-up

The DAE4 consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer. The system is described in detail in.

3.2 DASY E-FIELD PROBE SYSTEM

3.2.1 ES3DV6 Probe Specification

Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	Basic Broad Band Calibration in air Conversion Factors (CF) for HSL 900 and HSL 1810 Additional CF for other liquids and frequencies upon request
Frequency	10 MHz to 4 GHz; Linearity: ± 0.2 dB (30 MHz to 4 GHz)
Directivity	± 0.2 dB in HSL (rotation around probe axis) ± 0.3 dB in tissue material (rotation normal to probe axis)
Dynamic Range	5 µW/g to > 100 mW/g; Linearity: ± 0.2 dB
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 3.9 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.0 mm
Application	General dosimetry up to 4 GHz Dosimetry in strong gradient fields Compliance tests of mobile phones

Figure 4.1 Photograph of the probe and the Phantom

Figure 4.2 ES3DV6 E-field Probe

The SAR measurements were conducted with the dosimetric probe ET3DV6, designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multifiber line ending at the front of the probe tip. It is connected to the EOC box on the robot arm and provides an automatic detection of the phantom surface. Half of the fibers are connected to a pulsed infrared transmitter, the other half to a synchronized receiver. As the probe approaches the surface, the reflection from the surface produces a coupling from the transmitting to the receiving fibers. This reflection increases first during the approach, reaches a maximum and then decreases. If the probe is flatly touching the surface, the coupling is zero. The distance of the coupling maximum to the surface is independent of the surface reflectivity and largely independent of the surface to probe angle.

The DASY4 software reads the reflection during a software approach and looks for the maximum using a 2^{nd} order fitting.

The approach is stopped at reaching the maximum.

3.3 PROBE CALIBRATION PROCESS

3.3.1 E-Probe Calibration

Each probe is calibrated according to a dosimetric assessment procedure with an accuracy better than ± 10 %. The spherical isotropy was evaluated with the proper procedure and found to be better than ± 0.25 dB. The sensitivity parameters (NormX, NormY, NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe is tested.

The free space E-field from amplified probe outputs is determined in a test chamber. This is performed in a TEM cell for frequencies bellow 1 GHz, and in a waveguide above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees.

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The measured free space E-field in the medium correlates to temperature rise in a dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$SAR = C\frac{\Delta T}{\Delta t}$$

where:

Δt = exposure time (30 seconds),

C = heat capacity of tissue (brain or muscle),

ΔT = temperature increase due to RF exposure.

SAR is proportional to $\Delta T / \Delta t$, the initial rate of tissue heating, before thermal diffusion takes place. Now it's possible to quantify the electric field in the simulated tissue by equating the thermally derived SAR to the E- field;

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

where:

σ = simulated tissue conductivity,

ρ = Tissue density (1.25 g/cm^3 for brain tissue)

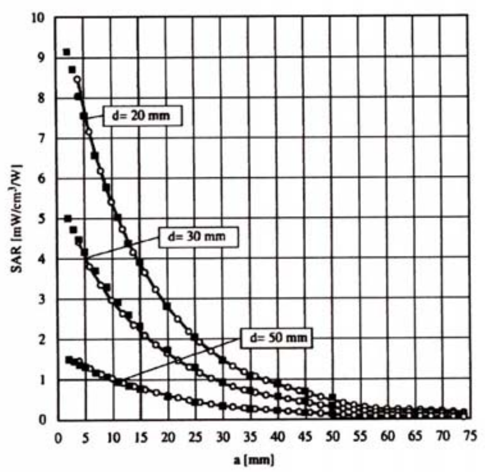


Figure 3.4 E-Field and Temperature measurements at 900 MHz

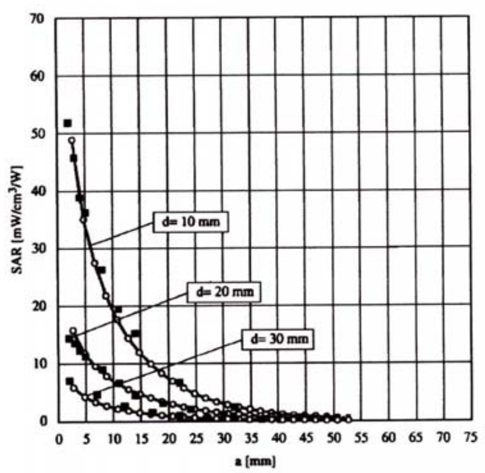


Figure 3.5 E-Field and temperature measurements at 1.8 GHz

3.3.2 Data Extrapolation

The DASY4 software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics. If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given like below;

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

with V_i = compensated signal of channel i (i=x,y,z)
U_i = input signal of channel i (i=x,y,z)
cf = crest factor of exciting field (DASY parameter)
dcp_i = diode compression point (DASY parameter)

From the compensated input signals the primary field data for each channel can be evaluated:

E-field probes:

$$E_i = \sqrt{\frac{V_i}{Norm_i \cdot ConvF}}$$

with V_i = compensated signal of channel i (i = x,y,z)
$Norm_i$ = sensor sensitivity of channel i (i = x,y,z) $\mu V/(V/m)^2$ for E-field probes
ConvF = sensitivity of enhancement in solution
E_i = electric field strength of channel i in V/m

The RSS value of the field components gives the total field strength (Hermetian magnitude):

$$E_{tot} = \sqrt{E_x^2 + E_y^2 + E_z^2}$$

The primary field data are used to calculate the derived field units.

$$SAR = E_{tot}^2 \cdot \frac{\sigma}{\rho \cdot 1000}$$

with SAR = local specific absorption rate in W/g
E_{tot} = total field strength in V/m
σ = conductivity in [mho/m] or [Siemens/m]
ρ = equivalent tissue density in g/cm^3

The power flow density is calculated assuming the excitation field to be a free space field.

$$P_{pwe} = \frac{E_{tot}^2}{3770}$$

with P_{pwe} = equivalent power density of a plane wave in W/cm^2
E_{tot} = total electric field strength in V/m

3.4 SAM Phantom

The SAM Phantom is constructed of a fiberglass shell integrated in a wooden table. The shape of the shell is based on data from an anatomical study designed to determine the maximum exposure in at least 90 % of all users. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents the evaporation of the liquid. Reference markings on the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot.

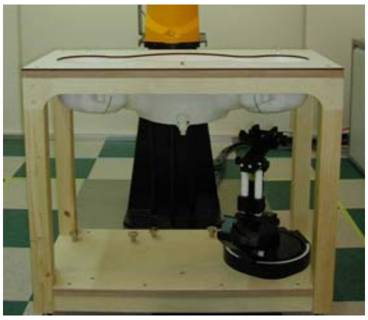


Figure 3.6 SAM Phantom

Shell Thickness	2.0 mm
Filling Volume	about 30 L
Dimensions	810 mm x 1 000 mm x 500 mm (H x L x W)

3.5 Device Holder for Transmitters

In combination with the SAM Phantom V 4.0, the Mounting Device (POM) enables the rotation of the mounted transmitter in spherical coordinates whereby the rotation points is the ear opening. The devices can be easily, accurately, and repeatable positioned according to the FCC and CENELEC specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).

Note: A simulating human hand is not used due to the complex anatomical and geometrical structure of the hand that may produced infinite number of configurations. To produce the Worst-case condition (the hand absorbs antenna output power), the hand is omitted during the tests.

Figure 3.7 Device Holder

3.6 Brain & Muscle Simulating Mixture Characterization

The brain and muscle mixtures consist of a viscous gel using hydrox-ethyl cellulose (HEC) gelling agent and saline solution (see Table 3.1). Preservation with a bacteriacide is added and visual inspection is made to make sure air bubbles are not trapped during the mixing process. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the desired tissue. The mixture characterizations used for the brain and muscle tissue simulating liquids are according to the data by C. Gabriel and G. Hartsgrove.

Ingredients (% by weight)	Frequency (MHz)											
	450		835		915		1 900		2 450		2600	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2	60.8	69.83
Salt (NaCl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04	0.3	0.00
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0	0.0	0.0
HEC	0.98	0.52	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0	0.0	0.0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0	38.9	0.0
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7	0.0	30.17

Salt: 99 % Pure Sodium Chloride
Sugar: 98 % Pure Sucrose
Water: De-ionized, 16M resistivity
HEC: Hydroxyethyl Cellulose
DGBE: 99 % Di(ethylene glycol) butyl ether,[2-(2-butoxyethoxy) ethanol]
Triton X-100(ultra pure): Polyethylene glycol mono[4-(1,1,3,3-tetramethylbutyl)phenyl] ether

Table 3.1 Composition of the Tissue Equivalent Matter

3.7 SAR TEST EQUIPMENT

Manufacturer	Type / Model	S/N	Calib. Date	Calib.Interval	Calib.Due
SPEAG	SAM Phantom	-	N/A	N/A	N/A
Staubli	Robot RX90L	F01/5K09A1/A/01	N/A	N/A	N/A
Staubli	Robot ControllerCS7MB	F99/5A82A1/C/01	N/A	N/A	N/A
HP	Pavilion t000_puffer	KRJ51201TV	N/A	N/A	N/A
SPEAG	Light Alignment Sensor	265	N/A	N/A	N/A
Staubli	Teach Pendant (Joystick)	D221340.01	N/A	N/A	N/A
SPEAG	DAE3	446	May 22, 2009	Annual	May 22, 2010
SPEAG	DAE3	466	July 21, 2009	Annual	July 21, 2010
SPEAG	DAE4	869	Sep. 18, 2009	Annual	Sep. 18, 2010
SPEAG	E-Field Probe ET3DV6	1631	Jun. 24, 2009	Annual	Jun. 24, 2010
SPEAG	E-Field Probe ET3DV6	1798	Feb. 23, 2010	Annual	Feb. 23, 2011
SPEAG	E-Field Probe ES3DV2	3017	July 22, 2009	Annual	July 22, 2010
SPEAG	Validation Dipole D450V2	1007	July 15, 2008	Biennial	July 15, 2010
SPEAG	Validation Dipole D835V2	441	May 25, 2009	Annual	May 25, 2010
SPEAG	Validation Dipole D1800V2	2d007	May 20, 2008	Biennial	May 20, 2010
SPEAG	Validation Dipole D1900V2	5d032	July 20, 2009	Annual	July 20, 2010
SPEAG	Validation Dipole D2450V2	743	Aug. 27, 2008	Biennial	Aug. 27, 2010
SPEAG	Validation Dipole D2600V2	1024	Aug. 12, 2009	Annual	Aug. 12, 2010
Agilent	Power Meter(F) E4419B	MY41291386	Nov. 05, 2009	Annual	Nov. 05, 2010
Agilent	Power Sensor(G) 8481	MY41090870	Nov. 05, 2009	Annual	Nov. 05, 2010
HP	Dielectric Probe Kit 85070C	00721521	N/A	N/A	N/A
HP	Dual Directional Coupler	16072	Nov. 05, 2009	Annual	Nov. 05, 2010
R&S	Base Station CMU200	110740	July 26, 2009	Annual	July 26, 2010
Agilent	Base Station E5515C	GB44400269	Feb. 10, 2010	Annual	Feb. 10, 2011
HP	Signal Generator E4438C	MY42082646	Dec. 24, 2009	Annual	Dec. 24, 2010
HP	Network Analyzer 8753C	3310J01394	Dec. 04, 2009	Annual	Dec. 04, 2010
Tescom	TC-3000/ Bluetooth	3000A490112	Jan. 11, 2009	Annual	Jan. 11, 2011

NOTE:

The E-field probe was calibrated by SPEAG, by the waveguide technique procedure. Dipole Validation measurement is performed by HCT Lab. before each test. The brain simulating material is calibrated by HCT using the dielectric probe system and network analyzer to determine the conductivity and permittivity (dielectric constant) of the brain-equivalent material.

4. SAR MEASUREMENT PROCEDURE

The evaluation was performed with the following procedure:

1. The SAR value at a fixed location above the ear point was measured and was used as a reference value for assessing the power drop.

2. The SAR distribution at the exposed side of the head was measured at a distance of 3.9 mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 20 mm x 20 mm. Based on this data, the area of the maximum absorption was determined by spline interpolation.

3. Around this point, a volume of 32 mm x 32 mm x 30 mm was assessed by measuring 5 x 5 x 7 points. On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

   a. The data at the surface were extrapolated, since the center of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2 mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.
   b. The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g or 10 g) were computed using the 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 integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the average.
   c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

4. The SAR value, at the same location as procedure #1, was re-measured. If the value changed by more than 5 %, the evaluation is repeated.

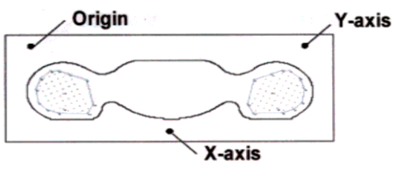


Figure 4.1 SAR Measurement Point in Area Scan

5. DESCRIPTION OF TEST POSITION

5.1 HEAD POSITION

The device was placed in a normal operating position with the Point A on the device, as illustrated in following drawing, aligned with the location of the RE(ERP) on the phantom. With the ear-piece pressed against the head, the vertical center line of the body of the handset was aligned with an imaginary plane consisting of the RE, LE and M. While maintaining these alignments, the body of the handset was gradually moved towards the cheek until any point on the mouth-piece or keypad contacted the cheek. This is a cheek/touch position. For ear/tilt position, while maintain the device aligned with the BM and FN lines, the device was pivot against ERP back for 15º or until the device antenna touch the phantom. Please refer to IEEE 1528-2003 illustration below.

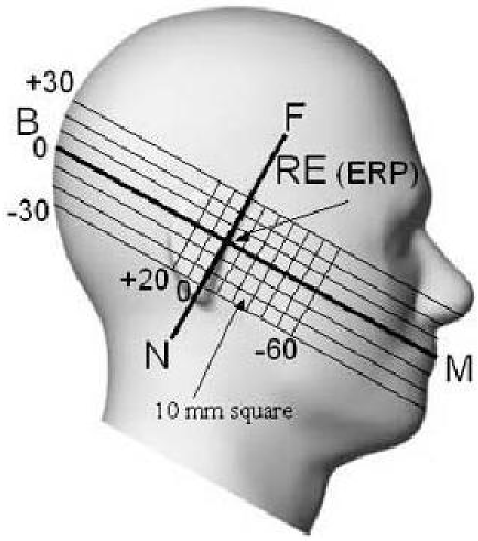


Figure 5.1 Side view of the phantom

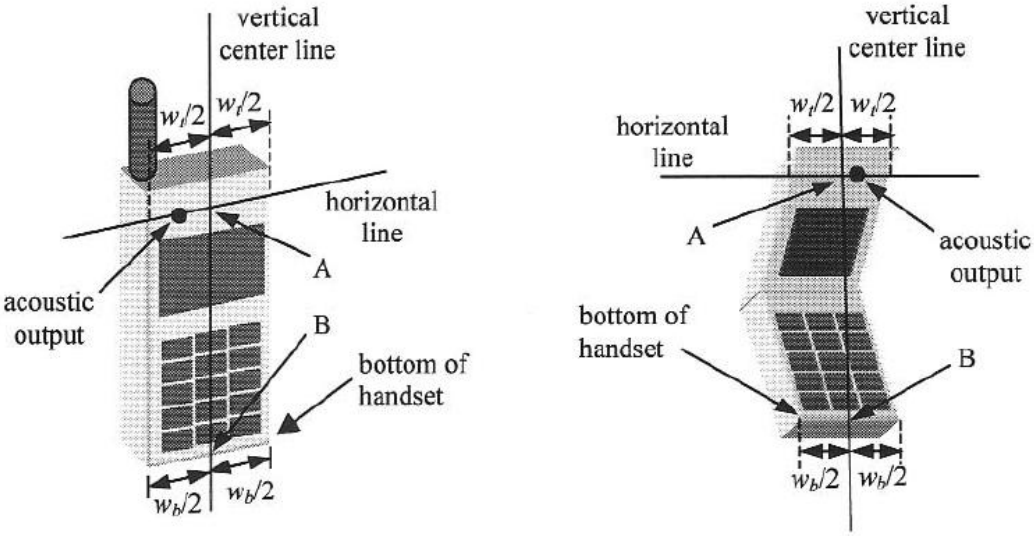


Figure 5.2 Handset vertical and horizontal reference lines

5.2 Body Holster/Belt Clip Configurations

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration. A device with a headset output is tested with a headset connected to the device. Body dielectric parameters are used.

Accessories for Body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are tested with each accessory. If multiple accessory share an identical metallic component (i.e. the same metallic belt-clip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

Body-worn accessories may not always be supplied or available as options for some Devices intended to be authorized for body-worn use. In this case, a test configuration with a separation distance between the back of the device and the flat phantom is used.

Since this EUT does not supply any body worn accessory to the end user a distance of 5 mm from the EUT back surface to the liquid interface is configured for the generic test.

"See the Test SET-UP Photo"

Transmitters that are designed to operate in front of a person’s face, as in push-to-talk configurations, are tested for SAR compliance with the front of the device positioned to face the flat phantom. For devices that are carried next to the body such as a shoulder, waist or chest-worn transmitters, SAR compliance is tested with the accessory(ies), Including headsets and microphones, attached to the device and positioned against a flat phantom in a normal use configuration.

In all cases SAR measurements are performed to investigate the worst-case positioning. Worstcase positioning is then documented and used to perform Body SAR testing.

5.3 Test Configurations

According to KDB 447498, the device that can be connected to a host through a cable must be tested with the device positioned in all applicable orientations against the flat phantom. And a separation distance $\leq$ 0.5 cm is required for USB-dongle transmitters.

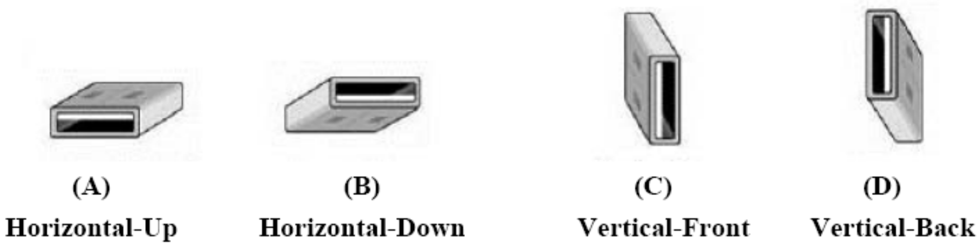


Figure 5.3 USB Connector Orientations Implemented on Laptop Computers

Therefore, the EUT was tested in following orientations;

1) Configuration 1: Front side of the EUT was tested with the direct-connection to the host device with Horizontal-Up (A), and separation distance between EUT and Phantom is 5 mm.

2) Configuration 2: Back side of the EUT was connected to the host device with Horizontal-Down (B) using a USB cable, and separation distance between EUT and Phantom is 5 mm.

3) Configuration 3: Right side of the EUT was connected to the host device with Vertical-Front (C)using a USB cable, and separation distance between EUT and Phantom is 5 mm.

4) Configuration 4: Left side of the EUT was tested with the direct-connection to the host device with Vertical-Back (D), and separation distance between EUT and Phantom is 5 mm.

5) Configuration 5: Top side of the EUT was tested with the direct-connection to the host device, and separation distance between EUT and Phantom is 5 mm.

Note;

This USB cable was used to operate this unit in the highest RF performance capability for SAR testing.

6. MEASUREMENT UNCERTAINTY

Measurement uncertainties in SAR measurements are difficult to quantify due to several variables including biological, physiological, and environmental. However, we estimate the measurement uncertainties in SAR to be less than 15 % - 25 %.

According to ANSI/IEEE C95.3, the overall uncertainties are difficult to assess and will vary with the type of meter and usage situation. However, accuracy's of 1 dB to ± 3 dB can be expected in practice, with greater uncertainties in near-field situations and at higher frequencies (shorter wavelengths), or areas where large reflecting objects are present. Under optimum measurement conditions, SAR measurement uncertainties of at least ± 2 dB can be expected.

According to CENELEC, typical worst-case uncertainty of field measurements is 5 dB. For well-defined modulation characteristics the uncertainty can be reduced to ± 3 dB.

Frequency (MHz)	Error Description	Tol (± %)	Prob. dist.	Div.	c_i	Standard Uncertainty (± %)	v_{eff}	Combined Uncertainty (± %)	k	Expanded STD Uncertainty (± %)
	1. Measurement System									
	Probe Calibration	5.50	N	1	1	5.50	∞			
	Axial Isotropy	4.70	R	1.73	0.7	1.90	∞			
	Hemispherical Isotropy	9.60	R	1.73	0.7	3.88	∞			
	Boundary Effects	1.00	R	1.73	1	0.58	∞			
	Linearity	4.70	R	1.73	1	2.71	∞			
	System Detection Limits	1.00	R	1.73	1	0.58	∞			
	Readout Electronics	0.30	N	1.00	1	0.30	∞			
	Response Time	0.8	R	1.73	1	0.46	∞			
	Integration Time	2.6	R	1.73	1	1.50	∞			
	RF Ambient Noise	3.00	R	1.73	1	1.73	∞			
	RF Ambient Reflection	3.00	R	1.73	1	1.73	∞			
	Probe Positioner	0.40	R	1.73	1	0.23	∞			
	Probe Positioning	2.90	R	1.73	1	1.67	∞			
	Max SAR Eval	1.00	R	1.73	1	0.58	∞			
	2.Test Sample Related									
	Device Positioning	1.80	N	1.00	1	1.80	9			
	Device Holder	3.60	N	1.00	1	3.60	5			
	Power Drift	5.00	R	1.73	1	2.89	∞			
	3.Phantom and Setup									
	Phantom Uncertainty	4.00	R	1.73	1	2.31	∞			
	Liquid Conductivity(target)	5.00	R	1.73	0.64	1.85	∞			
	Liquid Permitivity(target)	5.00	R	1.73	0.6	1.73	∞			
835 (Head)	Liquid Conductivity(meas.)	1.22	N	1	0.64	0.78	∞	10.32	2	20.63
	Liquid Permitivity(meas.)	1.45	N	1	0.6	0.87	∞			
835 (Body)	Liquid Conductivity(meas.)	0.21	N	1	0.64	0.13	∞	10.29	2	20.57
	Liquid Permitivity(meas.)	1.43	N	1	0.6	0.86	∞			
1900 (Head)	Liquid Conductivity(meas.)	0.00	N	1	0.64	0.00	∞	10.49	2	20.99
	Liquid Permitivity(meas.)	3.75	N	1	0.6	2.25	∞			
1900 (Body)	Liquid Conductivity(meas.)	1.97	N	1	0.64	1.26	∞	10.33	2	20.67
	Liquid Permitivity(meas.)	0.60	N	1	0.6	0.36	∞			
2600 (Head)	Liquid Conductivity(meas.)	3.06	N	1	0.64	1.96	∞	10.62	2	21.25
	Liquid Permitivity(meas.)	3.33	N	1	0.6	2.00	∞			
2600 (Body)	Liquid Conductivity(meas.)	0.93	N	1	0.64	0.60	∞	10.49	2	20.99
	Liquid Permitivity(meas.)	3.62	N	1	0.6	2.17	∞			

Table 6.1 Breakdown of Errors

7. ANSI/ IEEE C95.1 - 2005 RF EXPOSURE LIMITS

HUMAN EXPOSURE	UNCONTROLLED ENVIRONMENT General Population (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT Occupational (W/kg) or (mW/g)
SPATIAL PEAK SAR * (Brain)	1.60	8.00
SPATIAL AVERAGE SAR ** (Whole Body)	0.08	0.40
SPATIAL PEAK SAR *** (Hands / Feet / Ankle / Wrist)	4.00	20.00

Table 7.1 Safety Limits for Partial Body Exposure

NOTES:

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

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

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

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

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).

8. SYSTEM VERIFICATION

8.1 Tissue Verification

Freq. [MHz]	Date	Liquid	Liquid Temp.[°C]	Parameters	Target Value	Measured Value	Deviation [%]	Limit [%]
2600	Mar.26, 2010	Head	21.4	ε r	39	37.7	- 3.33	± 5
				σ	1.96	2.20	+ 3.06	± 5
2600	Mar.26, 2010	Body	21.4	ε r	52.5	50.60	- 3.62	± 5
				σ	2.16	2.18	+ 0.93	± 5
2600	May 5, 2010	Head	21.3	ε r	39	38.1	- 2.31	± 5
				σ	1.96	1.90	- 3.06	± 5
2600	May 5, 2010	Body	21.3	ε r	52.5	51.4	- 2.10	± 5
				σ	2.16	2.17	+ 0.46	± 5

8.2 System Validation

Prior to assessment, the system is verified to the ± 10 % of the specifications at 2 600MHz by using the system validation kit. (Graphic Plots Attached)

* *Input Power: 100 mW

Freq. [MHz]	Date	Liquid	Liquid Temp. [°C]	SAR Average	Target Value (SPEAG) (mW/g)	* Measured Value (mW/g)	Deviation [%]	Limit [%]
2 600	Mar.26, 2010	Head	21.3	1 g	57.3	5.90	+ 2.97	± 10
2 600	May 5, 2010	Head	21.3	1 g	57.3	5.85	+ 2.09	± 10

9.Devices with WIMAX

9.1 802.16e/WiMAX Device and System Operating Parameters

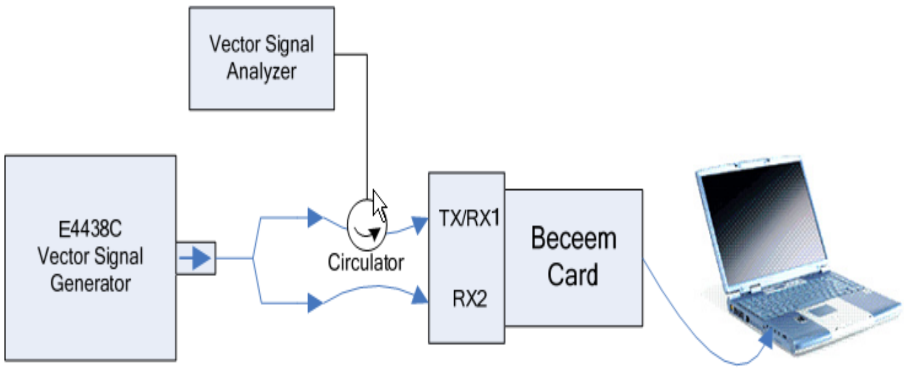
Table 1: 802.16e/WiMAX Device and System Operating Parameters

Description	Parameter		Comment
FCC ID	XHG-U600		Identify all related FCC ID
Radio Service	Part 27 subpart M		Rule parts
Transmit Frequency Range (MHz)	2496MHz-2690MHz		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
Sampling Factor	28/25		System parameter
Sampling Frequency (MHz)	5.6MHz	11.2MHz	(F_s)
Sample Time (ns)	178.58ns	89.3ns	($1/F_s$)
FFT Size (N_{FFT})	512	1024	(N_{FFT})
Sub-Carrier Spacing (MHz)	10.9375kHz		(Δf)
Useful Symbol time (µs)	91.43µs		($T_b=1/\Delta f$)
Guard Time (µs)	11.43us		($T_g=T_b/cp$); cp = cyclic prefix
OFDMA Symbol time (µs)	102.85714us		($T_s=T_b+T_g$)
Frame Size (ms)	5ms		System parameter
TTG + RTG (us or number of symbols)	165.7143µs		Idle time, system parameter
Number of DL OFDMA symbols per Frame	29		Identify the allowed & maximum symbols, including both traffic & control symbols
Number of UL OFDMA Symbols per Frame	18		
DL:UL Symbol Ratios	29:18		Identify all applicable DL:UL ratios; used to determine UL duty factor
Power Class (dBm)	Power Class 2, 23±1dBm		Identify power class and tolerance
Wave1 / Wave2	Wave2, 2Rx+1Tx Diversity		Describe antenna diversity info and MIMO requirements separately
UL Zone Types (FUSC, PUSC, OFUSC, OPUSC, AMC, TUSC1, TUSC2)	Segmented PUSC Unsegmented PUSC		Describe separately the symbol and sub-carrier/sub-channel structures applicable to each zone type

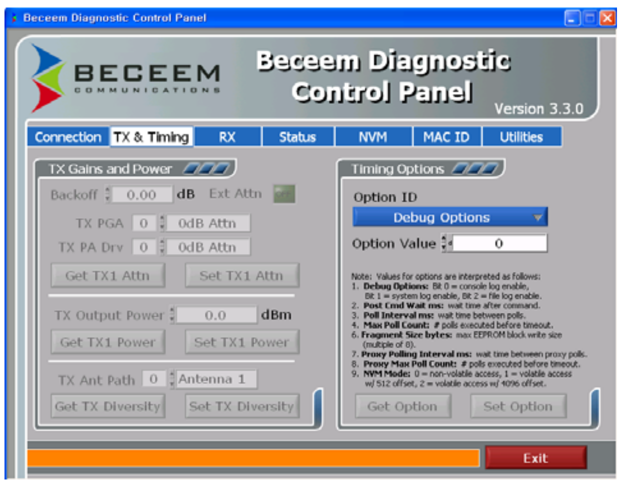
Maximum Number of UL Sub-carriers	409	841	Identify the allowed and tested or to be tested parameters; include separated explanations on the control symbol configuration used in the power measurements and show the maximum power level is determined for the control symbols
Measured UL Burst Maximum Average Power	5 MHz 16QAM1/2: 23.49 dBm 10 MHz 16QAM1/2: 23.12 dBm		
UL Control Symbol Configuration	3 PUSC symbols (used for ranging, CQICH and ACK/NACK)		
UL Control Symbol Maximum Average Power	65.69 mW	29.30 mW	
UL Burst Peak-to-Average Power Ratio (PAR)	For 5 MHz Channel BW is between 6.24~6.43 dB(ANT1) 5.89~6.49 dB(ANT2) For 10 MHz Channel BW is between 6.28~6.40 dB(ANT1) 6.32~6.42 dB(ANT2)		Identify the expected range and measured/tested PAR; explain separately the methods used or to be used to address SAR probe calibration and measurement error issues
Frame Averaged UL Transmission Duty Factor (%)	Duty Factor = 15 * 102.86us / 5000us = 30.86 % CF= 3.24 5000 us/15*102.857 us		Show calculations separately and explain how the applicable *cf factor (duty factor)* used or to be use in the SAR measurements is derived and how the control symbols are accounted for

9.2. Information on Test Equipment and Measurement Results

Table 2: Information on Test Equipment and Measurement Results

<table>
<tr><th>Equipment/Results</th><th>Description</th></tr>
<tr><td>Test Software</td><td>Test Software</td></tr>
<tr><td>Signal Generator</td><td rowspan="2">For the purposes of measuring SAR an Agilent Signal Generator (specify model number) is used to emulate the Base Station. The signal generator is loaded with a frame that simulates the Basestation downlink. A drawing of the setup is shown below.


1. Drawing of test setup
The DUT receives and demodulates the DL frame. This frame instructs the DUT to transmit during the UL frame, with a specified data burst size, in a specific zone (PUSC) and a specific modulation (QPSK ½ ¾ or 16QAM ½ ¾).

The DUT is configured using the Beceem Diagnostic Control Panel. This is a software tool which runs on the laptop that is connected to the dongle. The Diagnostic Control panel instructs the Dongle to transmit at maximum power and tells the dongle which antenna to transmit with (Antenna 1 or Antenna 2).


2. Screen dump of the Beceem Diagnostic Control Panel</td></tr>
<tr><td>Communication Test Set, Protocol Simulator</td></tr>
</table>

Signal Generator

Frame Profile loaded in Vector Signal Generator:

Test Vector File Name	BW	DL/UL Symbols
T_10_D29U18_4Q12	10 MHz	29/18
T_10_D29U18_4Q34	10 MHz	29/18
T_10_D29U18_16Q12	10 MHz	29/18
T_10_D29U18_16Q34	10 MHz	29/18
T_5_D29U18_4Q12	5 MHz	29/18
T_5_D29U18_4Q34	5 MHz	29/18
T_5_D29U18_16Q12	5 MHz	29/18
T_5_D29U18_16Q34	5 MHz	29/18

Agilent ESG Vector Signal Generator / Model :E4438C is used in conjunction with Diffon supplied radio profile to configure the Diffon WiMAX U600 module for the SAR evaluation. ESG Vector Signal Generator is loaded with the downlink signal, containing the respective FCH, DL-MAP and UL-MAP required by the test device to configure the uplink transmission. The waveform is configured for a DL:UL symbol ratio of 29:18 , but since there was no energy in the control symbols, the effective power is only across 15 data symbols. On the PC and downloaded to the VSG. The test device can synchronize itself to the signal received from VSG, both in frequency and time. It then modulates the DL-MAP and UL-MAP transmitted in the downlink sub-frame and determine the DL:UL symbol ratio. The downlink burst is repeated in each frame, every 5 ms, to simulate the normal transmission from a WiMAX base station. The UL-MAP received by the device is used to configure the uplink burst with all data symbols and sub-channels active. For TDD systems, both uplink and downlink transmissions are at the same frequency. The output power of the VSG is kept at least 80 dB lower than the test device to avoid interfering with the SAR measurements. The ESG is connected directly into the WiMAX card so as to allow the card to enter into transmit mode.

Communication Test Set

Modulation and channel bandwidth selection is loaded to Vector Signal Generator. when evaluating QPSK/16QAM with 10MHz channel Bandwidth, radio profile name "T_10_D29U18_4Q12,T_10_D29U18_4Q34,T_10_D29U18_16Q12,T_10_D29U18_16Q34" is active on the Vector Signal Generator.
when evaluating QPSK/16QAM with 5MHz channel Bandwidth, radio profile name "T_5_D29U18_4Q12, T_5_D291U18_4Q34, T_5_D291U18_16Q12, T_5_D29U18_16Q34" is active on the Vector Signal Generator.

Parameter Value	**Frame definition for 10 MHz RC10**			
	Test Vector Name			
	T_10_D29U18_4Q12	T_10_D29U18_4Q34	T_10_D29U18_16Q12	T_10_D29U18_16Q34
Band Width	10MHz	10MHz	10MHz	10MHz
FFT size	1024	1024	1024	1024
DL/UL ratio	29/18	29/18	29/18	29/18
Down link				
Zone profiles	Zone 1 – PUSC	Zone 1 – PUSC	Zone 1 – PUSC	Zone 1 – PUSC
Burst profile / MCS	MCS: QPSK R1/2	MCS: QPSK R3/4	MCS: QAM16 R1/2	MCS : QAM16 R3/4
Up Link				
Zone profiles	Zone 1 – PUSC	Zone 1 – PUSC	Zone 1 – PUSC	Zone 1 – PUSC
Burst profile / MCS	MCS: QPSK R1/2	MCS: QPSK R3/4	MCS: QAM16 R1/2	MCS : QAM16 R3/4

Parameter Value	**Frame definition for 5 MHz RCT**			
	Test Vector Name			
	T_5_D29U18_4Q12	T_5_D29U18_4Q34	T_5_D29U18_16Q12	T_5_D291U18_16Q34
Band Width	5MHz	5MHz	5MHz	5MHz
FFT size	512	512	512	512
DL/UL ratio	29/18	29/18	29/18	29/18
Down link				
Zone profiles	Zone 1 – PUSC	Zone 1 – PUSC	Zone 1 – PUSC	Zone 1 – PUSC
Burst profile / MCS	MCS: QPSK R1/2	MCS: QPSK R3/4	MCS:QAM16 R1/2	MCS:QAM16 R3/4
Up Link				
Zone profiles	Zone 1 – PUSC	Zone 1 – PUSC	Zone 1 – PUSC	Zone 1 – PUSC
Burst profile / MCS	MCS: QPSK R1/2	MCS: QPSK R3/4	MCS:QAM16 R1/2	MCS:QAM16 R3/4

SAR Test Signal Characteristics and Structure	The Test frame loaded into the Signal Generator has the structure 29:18 corresponding the DL:UL ratio used by operators in the US. The UL consists of 18 symbols. The first three symbols are for control signaling and the remaining 15 symbols are used for the data burst. There are a total of 16 (4x2x2) different frames corresponding to the allowed modulation (QPSK ½, QPSK 3/4, 16QAM ½, 16QAM 3/4) and zone (PUSC) and bandwidths (5 MHz /10 MHz). The testing was done using a common 29:18 ratio. 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 of the 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. The correct duty factor should be (15*102.86 us)/5000 us=30.86 %. This agrees with the above calculated duty cycle (30.86%) of this device. Using this calculation method eliminates all the other transmit time, guard time, etc, and only uses the transmit time. The DUT does not transmit during the control symbols. Hence a correction needs to be applied to the SAR measurements to account for this.

Output Power Measurement

1. Description of how the power is measured. Time gated using MXA(N9020A)
   Functionality
   - 20 Hz to 3.6 , 8.4, 13. 6 or 26.5 GHz
   - Up to 300% faster than other mid-performance class spectrum and signal analyzers
   - Analog baseband IQ inputs with 40 MHz baseband bandwidth (optional)
   - View configuration choices for MXA Instrument Hardware

   Performance
   - ±0.23 dB absolute amplitude accuracy
   - +15 dBm third order intercept (TOI)
   - -154 dBm displayed average noise level (DANL)
   - -78 dBc W-CDMA ACLR dynamic range (with noise correction on)

   Measurement Applications & Software
   - LTE, W-CDMA, HSDPA/HSUPA, phase noise and more.
   - Advanced analysis of more than 70 signal formats, software runs inside the MXA.
   - MATLAB® data analysis software for general purpose data analysis, visualization, and measurement automation. Automation & Communication Interface
   - LXI class C compliant, SCPI and IVI-COM
   - USB 2.0, 1000Base-T LAN, GPIB
   - Programming remote language compatibility with PSA, 8566/68, and 856x
   - Common X-Series user interface / Open Windows® XP operating system

The maximum average conducted output power was measured at uplink burst-on period with different modulation. The same setup and device operation configurations were used for SAR & EMC power Measurements. Power was Measured with a spectrum analyzer (N9020A) and the device was connected to the vector signal generator through a circulator.

ANT 1

5 MHz Channel BW					
Channel	Frequency (MHz)	QPSK 1/2 (dBm)	QPSK 3/4 (dBm)	16QAM 1/2 (dBm)	16QAM 3/4 (dBm)
low	2498.5	23.44	23.45	23.49	23.36
middle	2593	23.11	23.15	23.09	22.97
high	2687.5	23.07	23.04	23.11	22.99
10 MHz Channel BW					
Channel	Frequency (MHz)	QPSK 1/2 (dBm)	QPSK 3/4 (dBm)	16QAM 1/2 (dBm)	16QAM 3/4 (dBm)
low	2501	22.98	23.04	23.12	22.96
middle	2593	22.87	22.63	22.75	22.70
high	2685	22.75	22.79	22.77	22.74

ANT 2

5 MHz Channel BW					
Channel	Frequency (MHz)	QPSK 1/2 (dBm)	QPSK 3/4 (dBm)	16QAM 1/2 (dBm)	16QAM 3/4 (dBm)
low	2498.5	23.31	23.32	23.49	23.33
middle	2593	23.12	23.20	23.27	23.10
high	2687.5	22.98	22.99	23.16	23.07

10 MHz Channel BW					
Channel	Frequency (MHz)	QPSK 1/2 (dBm)	QPSK 3/4 (dBm)	16QAM 1/2 (dBm)	16QAM 3/4 (dBm)
low	2501	22.76	22.74	22.97	22.90
middle	2593	22.60	22.57	22.63	22.60
high	2685	22.68	22.66	22.57	22.54

Note: Spectrum Analyzer with Channel Power function and Gate On Peak power: RBW=300 kHz; VBW = 1 MHz with Peak detection, sweep time = 50 ms, Average power: RBW=300 kHz; VBW = 1 MHz with Average detection, sweep time = 50 ms

ANT 1

5 MHz Max. Power **10 MHz Max. Power**

ANT 2

5 MHz Max. Power **10 MHz Max. Power**

9.3 Scaling Factor

	ANT	Maximum Power of 3 Control Symbol	Correction Factor
5 MHz	1	73.82	(73.82 * 3 + Maximum rated output power * 15)/ (Actual Measured Output Power *15)
	2	73.82	(73.82 * 3 + Maximum rated output power * 15)/ (Actual Measured Output Power *15)
10 MHz	1	35.86	(35.86 * 3 + Maximum rated output power * 15)/ (Actual Measured Output Power * 15)
	2	35.86	(35.86 * 3 + Maximum rated output power * 15)/ (Actual Measured Output Power * 15)

For example;

Max rated power of **5 MHz** is 24 dBm =251 mW

The maximum power in 5 MHz control traffic is 73.82 mW (5/17 of 251 mW)

At 2498.5 MHz , 16QAM 1/2

Scaled factor for 5 MHz bandwidth = (73.82 mW * 3 + 15 * 251 mW)/(15 * 223.36 mW) =**1.190**

Max rated power of **10 MHz** is 24 dBm = 251 mW

The maximum power in 10 MHz control traffic is 35.86 mW (5/35 of 251 mW)

At 2501 MHz , 16QAM 1/2

Scaled factor for 10 MHz bandwidth = (35.86 mW * 3 + 15 * 251 mW)/(15 * 198.15 mW) =**1.303**

BW 5 MHz

TX antenna		ANT 1		ANT 2	
Channel (GHz)	Modulation	Measured Average Power (dBm)	Scaling Factor	Measured Average Power (dBm)	Scaling Factor
2498.5	QPSK 1/2	23.44	1.204	23.31	1.240
	QPSK 3/4	23.45	1.201	23.32	1.237
	16QAM 1/2	23.49	1.190	23.49	1.190
	16QAM 3/4	23.36	1.226	23.33	1.235
2593	QPSK 1/2	23.11	1.299	23.12	1.296
	QPSK 3/4	23.15	1.287	23.20	1.272
	16QAM 1/2	23.09	1.305	23.27	1.252
	16QAM 3/4	22.97	1.341	23.10	1.302
2687.5	QPSK 1/2	23.07	1.311	22.98	1.338
	QPSK 3/4	23.04	1.320	22.99	1.335
	16QAM 1/2	23.11	1.299	23.16	1.284
	16QAM 3/4	22.99	1.335	23.07	1.311

BW 10 MHz

TX antenna		ANT 1		ANT 2	
Channel (GHz)	Modulation	Measured Average Power (dBm)	Scaling Factor	Measured Average Power (dBm)	Scaling Factor
2501	QPSK 1/2	22.98	1.300	22.76	1.367
	QPSK 3/4	23.04	1.282	22.74	1.374
	16QAM 1/2	23.12	1.259	22.97	1.303
	16QAM 3/4	22.96	1.306	22.90	1.324
2593	QPSK 1/2	22.87	1.333	22.60	1.419
	QPSK 3/4	22.63	1.409	22.57	1.429
	16QAM 1/2	22.75	1.371	22.63	1.409
	16QAM 3/4	22.70	1.386	22.60	1.419
2685	QPSK 1/2	22.75	1.371	22.68	1.393
	QPSK 3/4	22.79	1.358	22.66	1.399
	16QAM 1/2	22.77	1.364	22.57	1.429
	16QAM 3/4	22.74	1.374	22.54	1.438

9.4 Duty Cycle & Time Vector Slots

5 MHz Channel BW					
Channel	**Frequency (MHz)**	**QPSK 1/2 (%)**	**QPSK 3/4 (%)**	**16QAM 1/2 (%)**	**16QAM 3/4 (%)**
low	2498.5	30.82	30.70	30.70	30.82
middle	2593	30.46	30.82	31.06	30.70
high	2687.5	30.70	30.58	30.82	30.70
10 MHz Channel BW					
Channel	**Frequency (MHz)**	**QPSK 1/2 (dBm) (%)**	**QPSK 3/4 (%)**	**16QAM 1/2 (%)**	**16QAM 3/4 (%)**
low	2501	30.58	30.70	30.66	30.96
middle	2593	30.89	30.70	30.89	30.70
high	2685	31.01	30.58	31.06	30.73

Duty Cycle calculated formula = (mark 3 – Mark 2) / (Mark 4 – Mark 1) * 100 %

Spectrum Analyzer setting

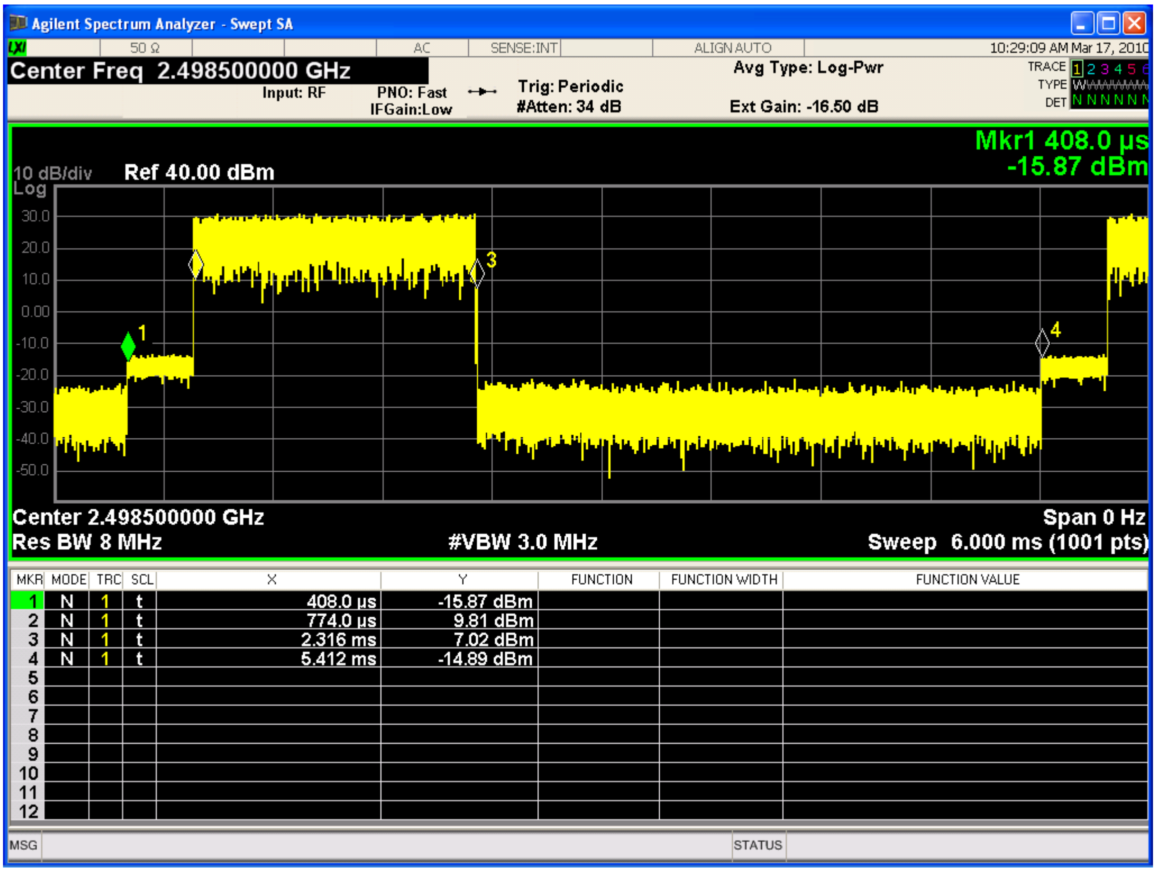
Sweep time 6 ms

RBW 8 MHz

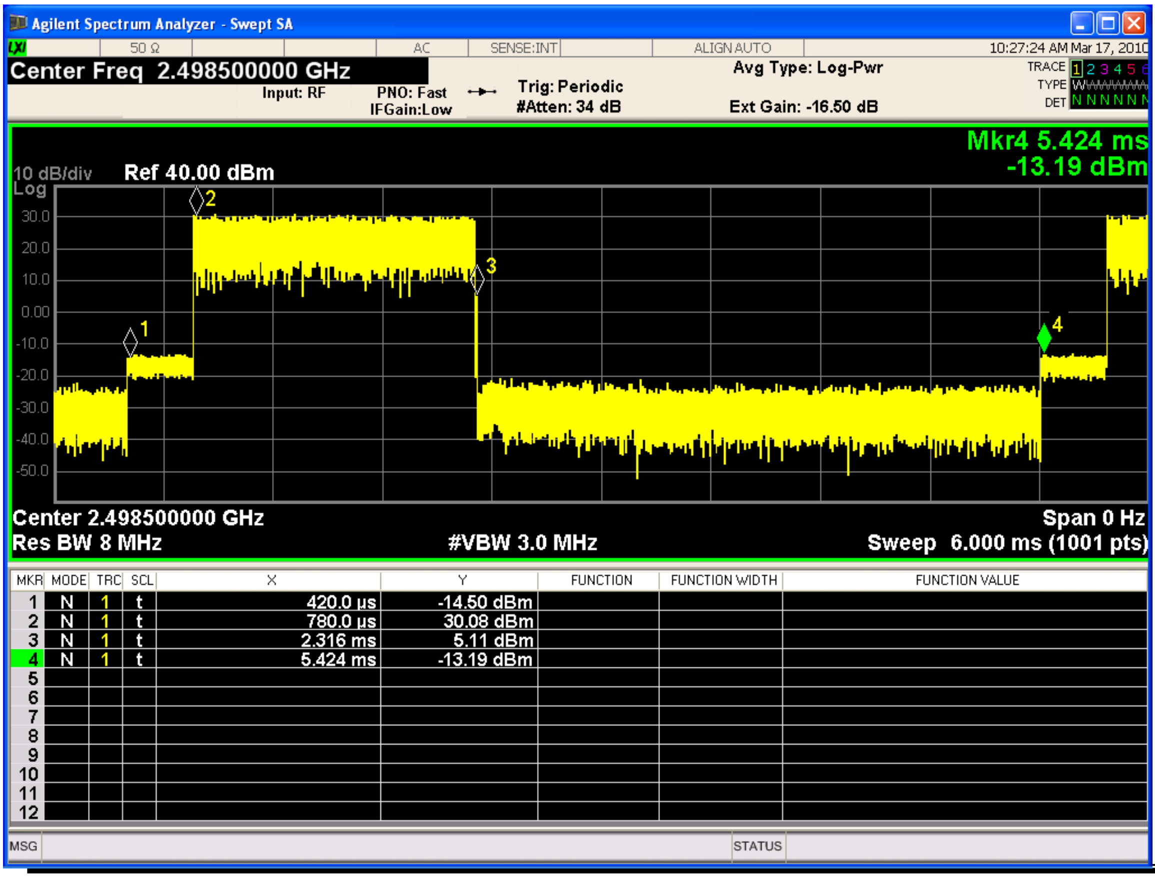
VBW 3 MHz

Span 0 Hz

5MHz 2498.5 MHz QPSK 1/2



5MHz 2498.5 MHz QPSK 3/4



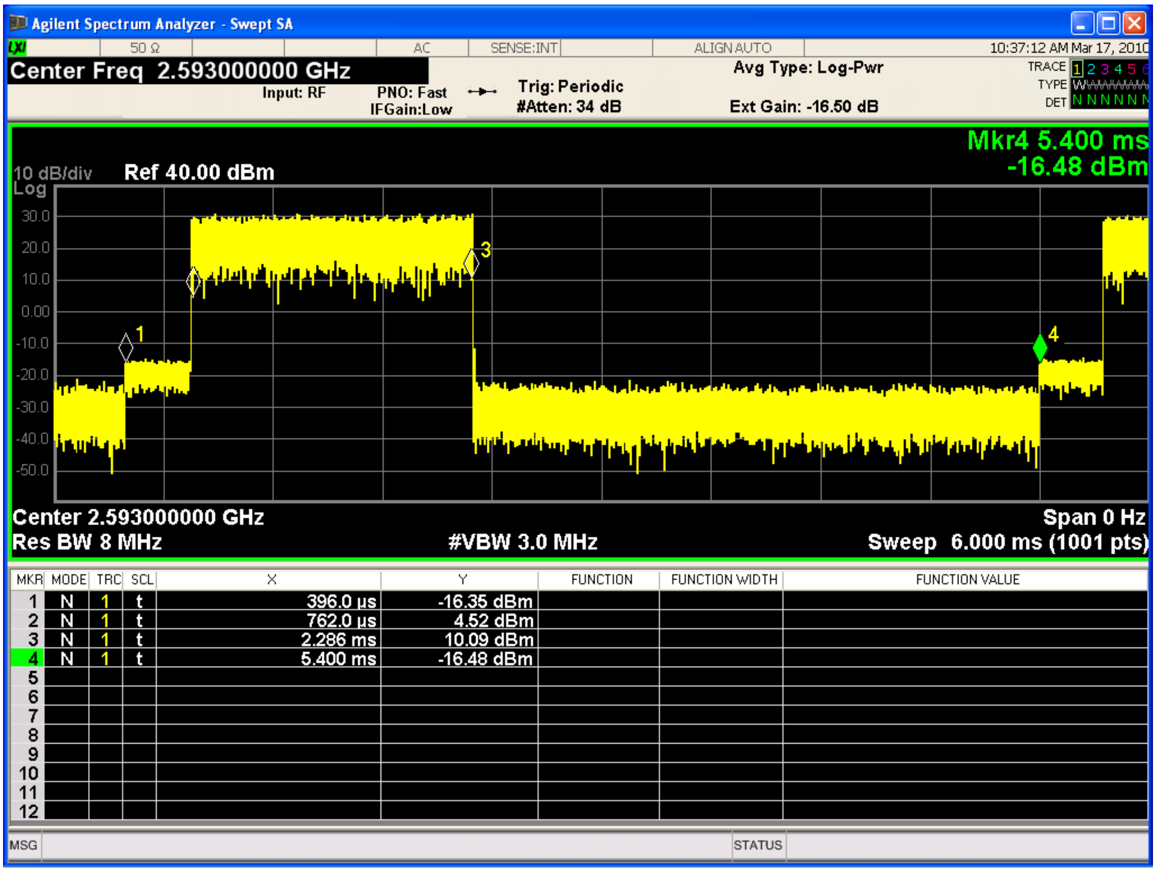
5MHz 2498.5 MHz 16QAM 1/2

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	t	396.0 µs	-25.05 dBm			
2	N	1	t	774.0 µs	14.75 dBm			
3	N	1	t	2.310 ms	-22.07 dBm			
4	N	1	t	5.412 ms	-11.59 dBm			

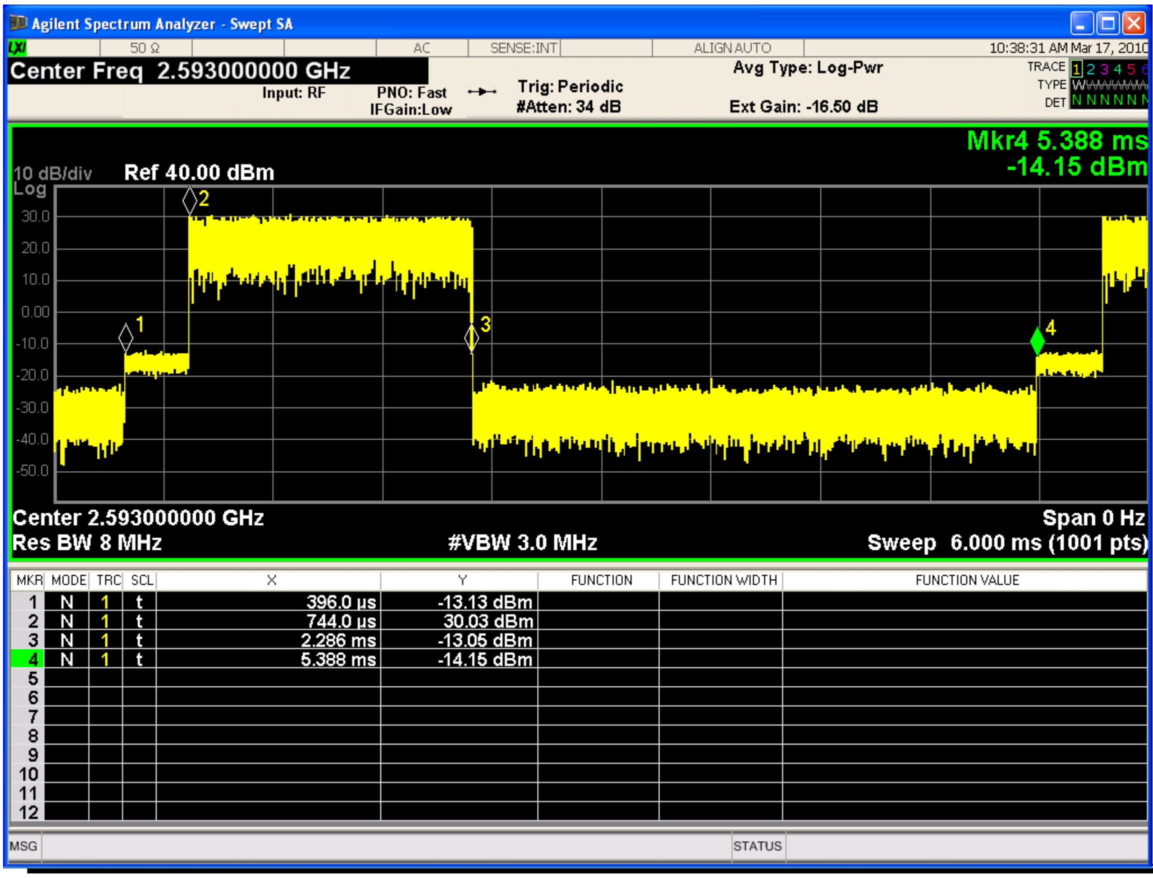
5MHz 2498.5 MHz 16QAM 3/4

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	t	396.0 µs	-14.75 dBm			
2	N	1	t	750.0 µs	13.60 dBm			
3	N	1	t	2.292 ms	28.83 dBm			
4	N	1	t	5.388 ms	-17.17 dBm			

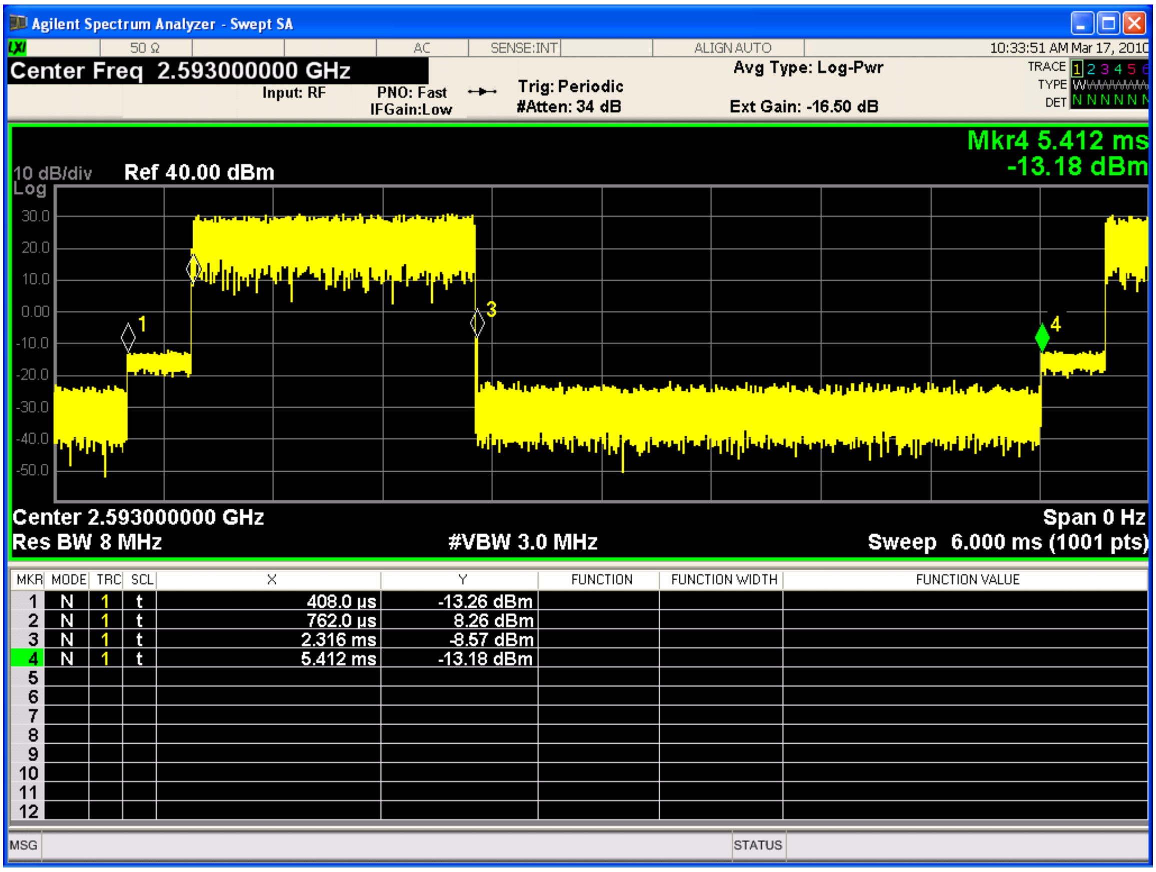
5MHz 2593 MHz QPSK 1/2



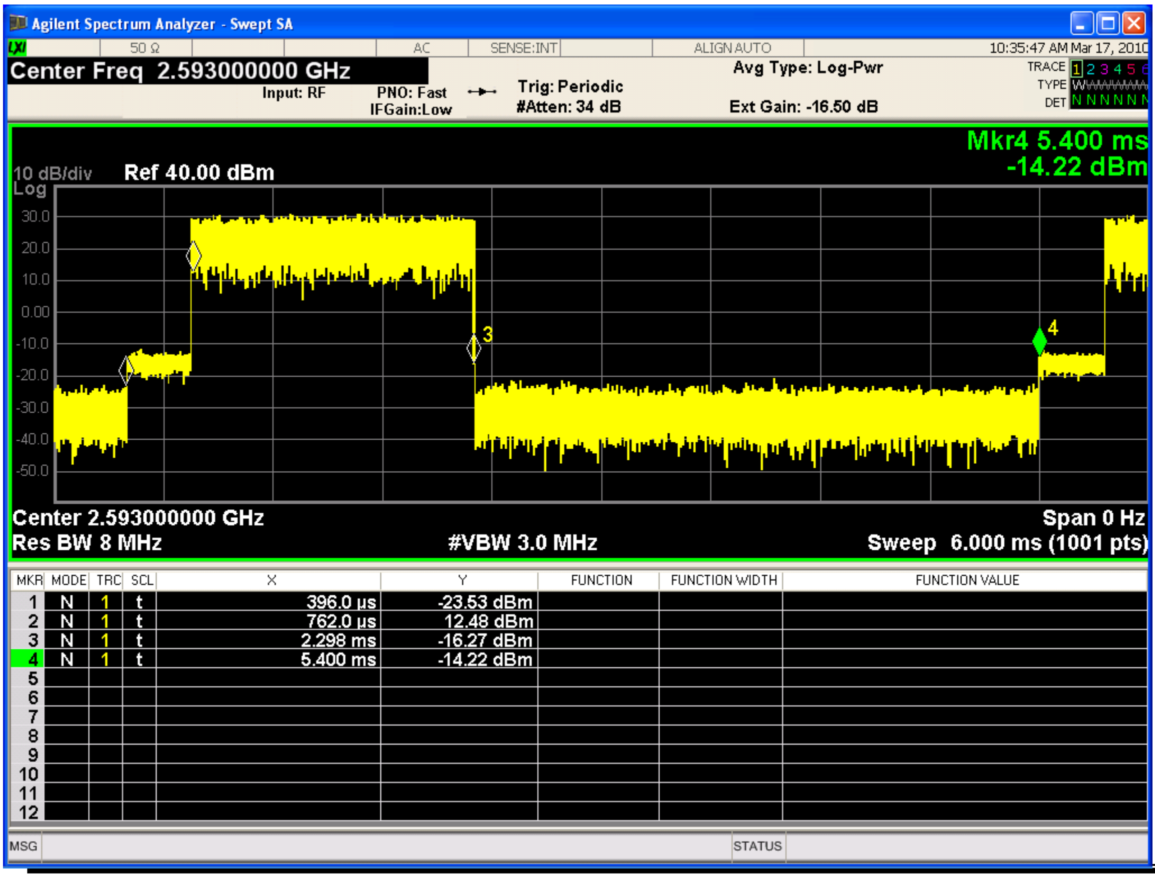
5MHz 2593 MHz QPSK 3/4



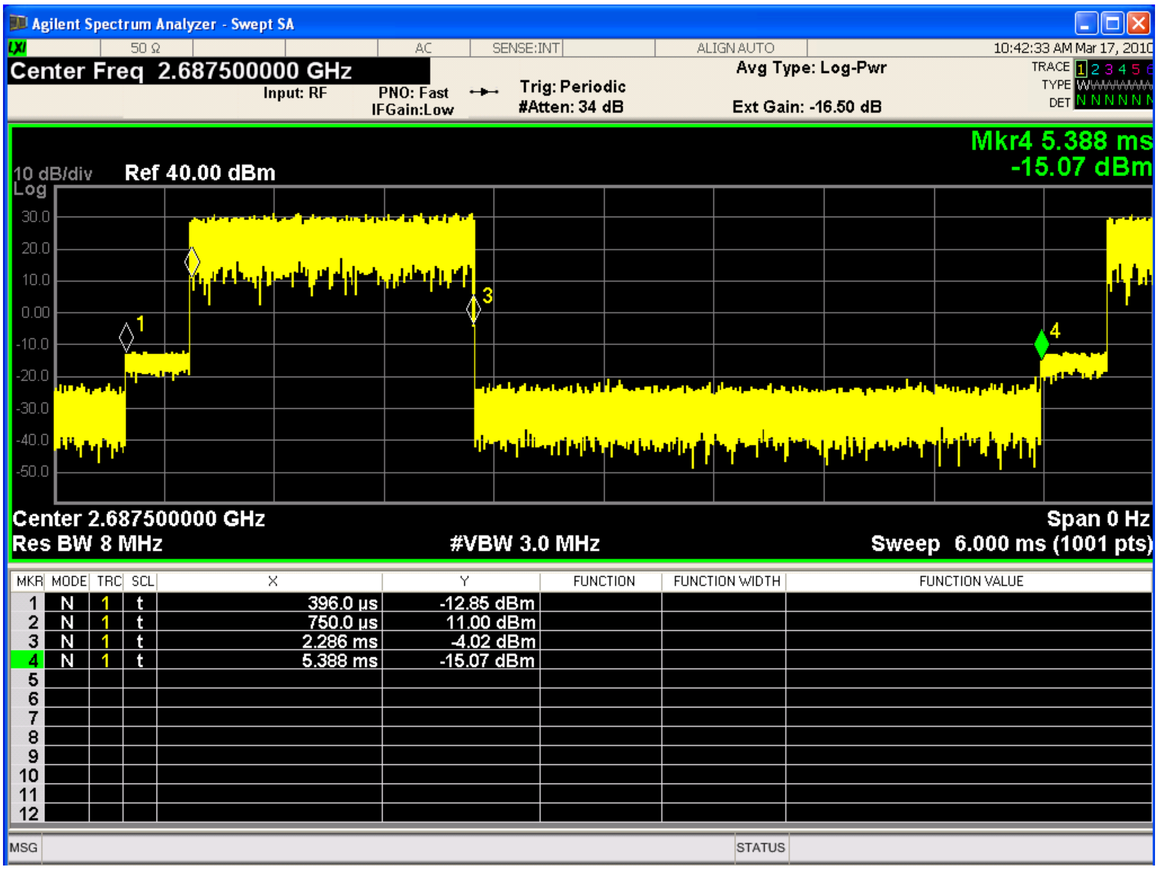
5MHz 2593 MHz 16QAM 1/2



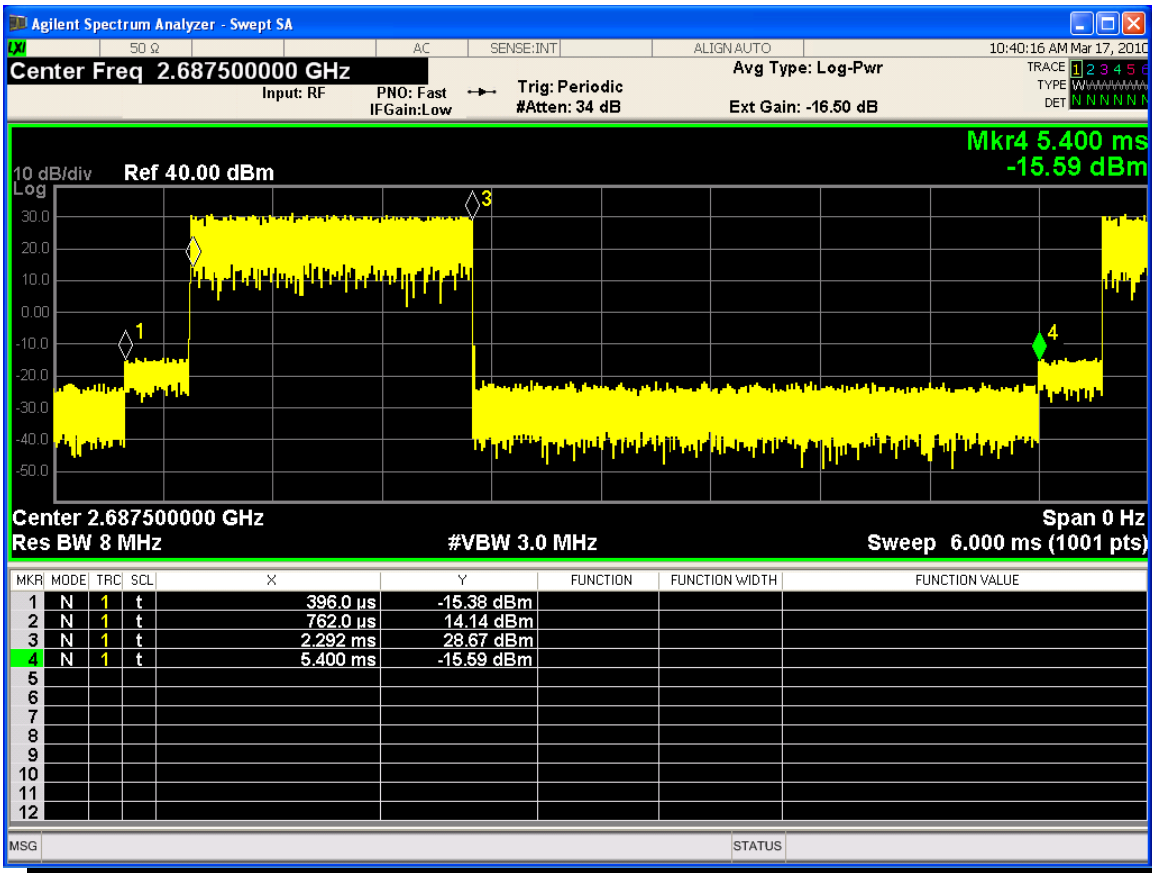
5MHz 2593 MHz 16QAM 3/4



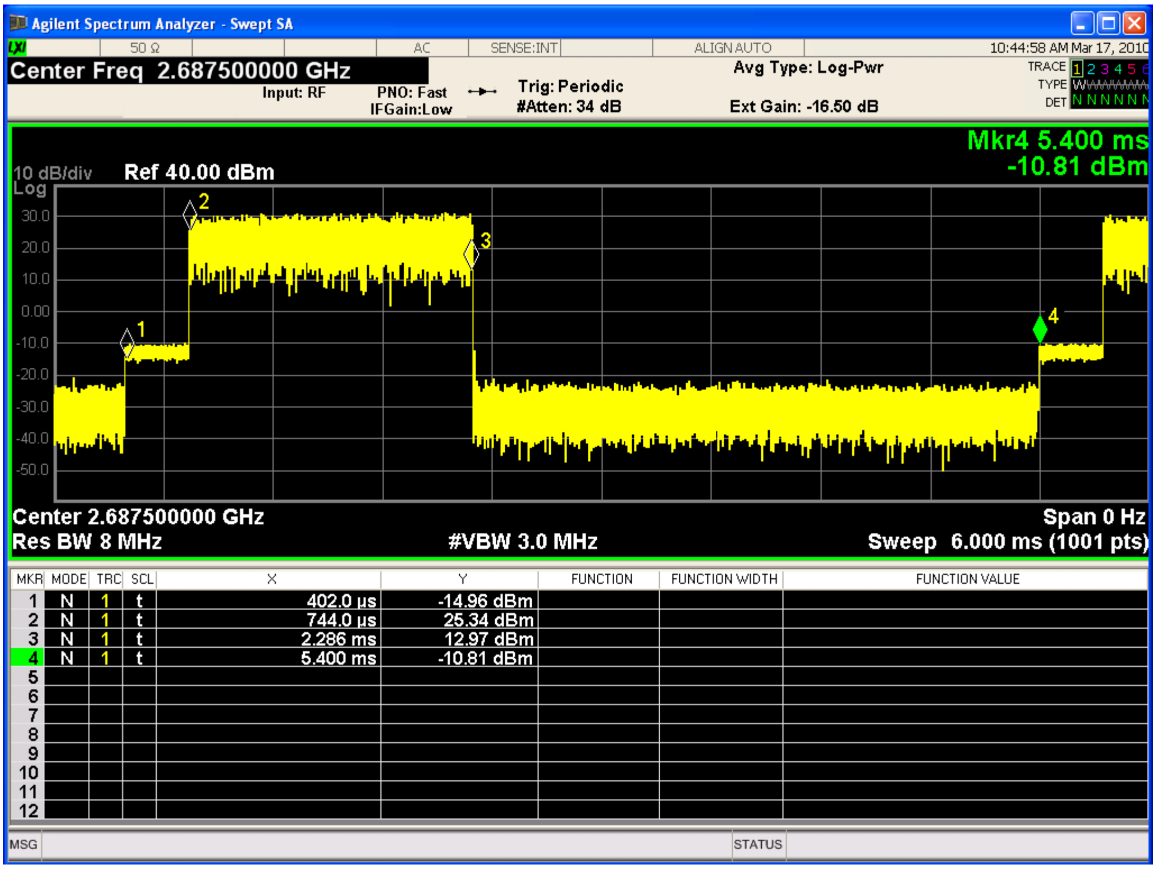
5MHz 2687.5 MHz QPSK 1/2



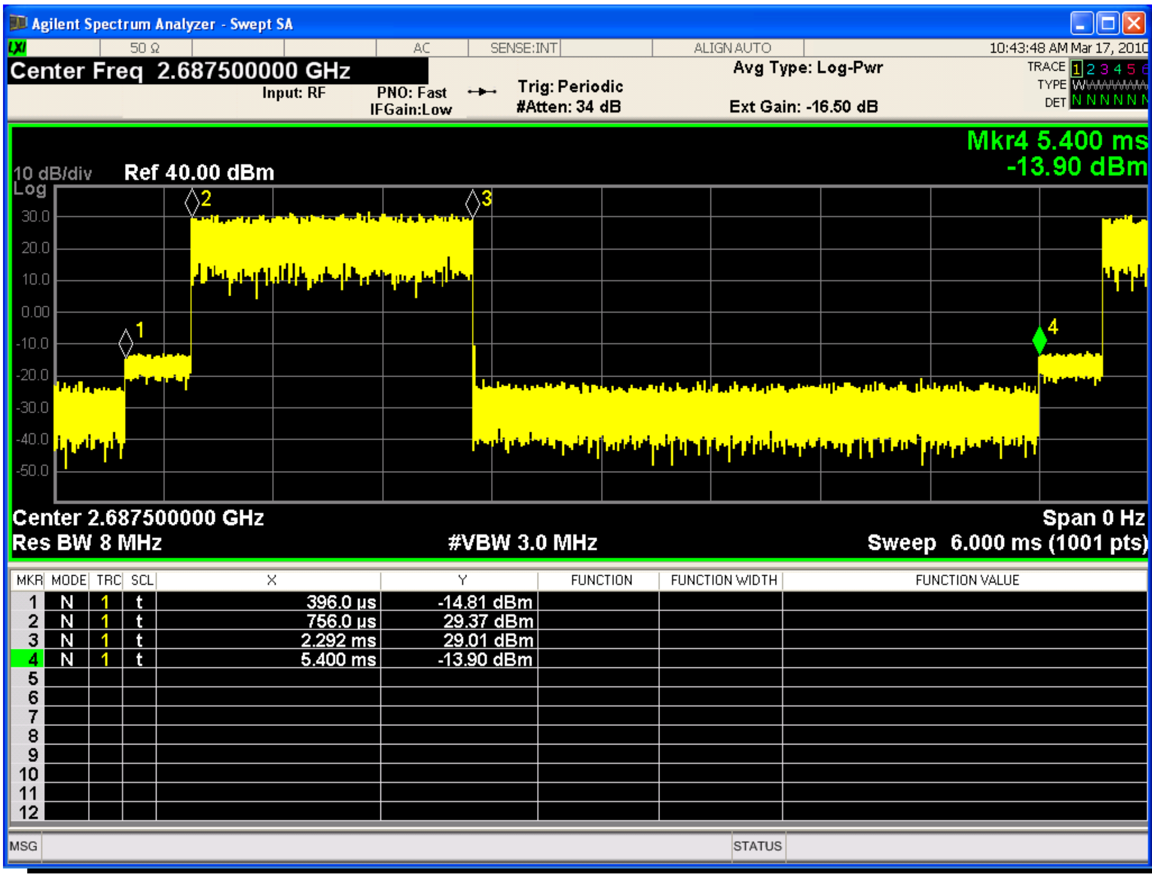
5MHz 2687.5 MHz QPSK 3/4



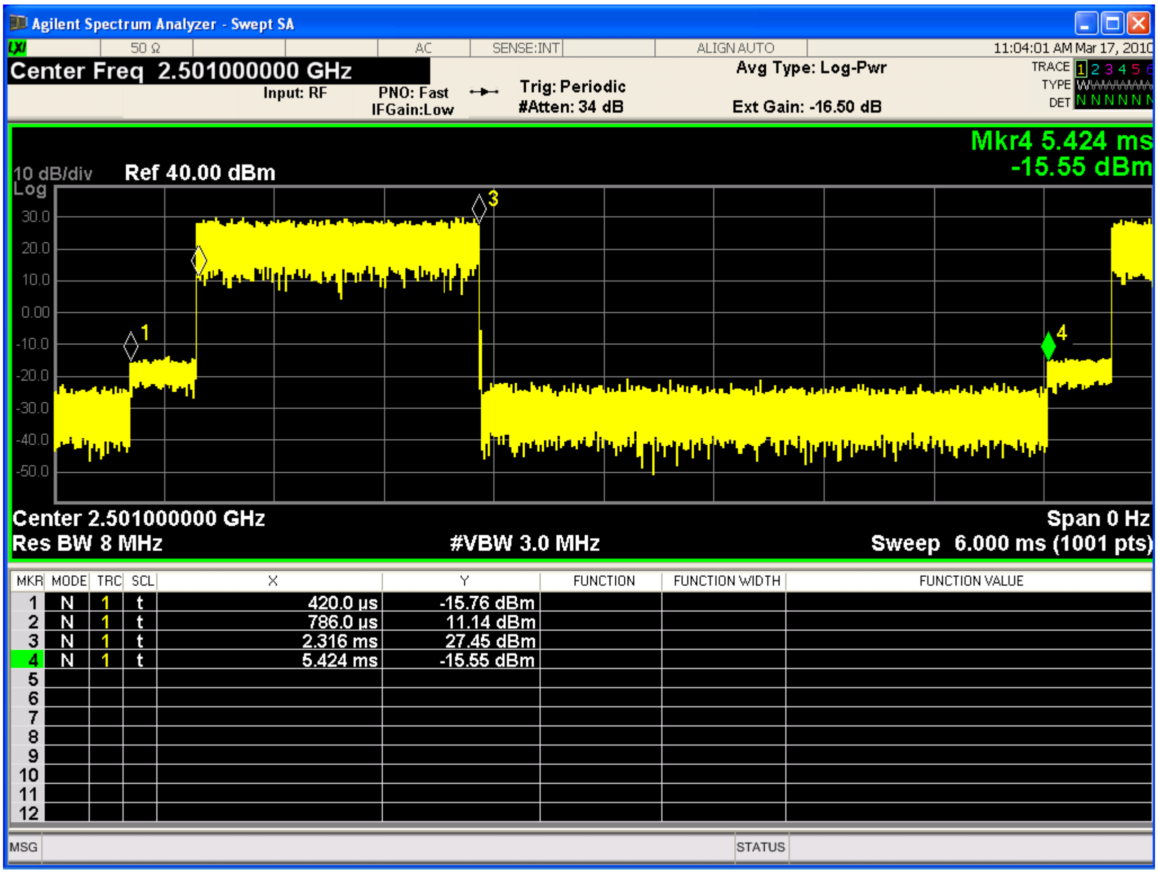
5MHz 2687.5 MHz 16QAM 1/2



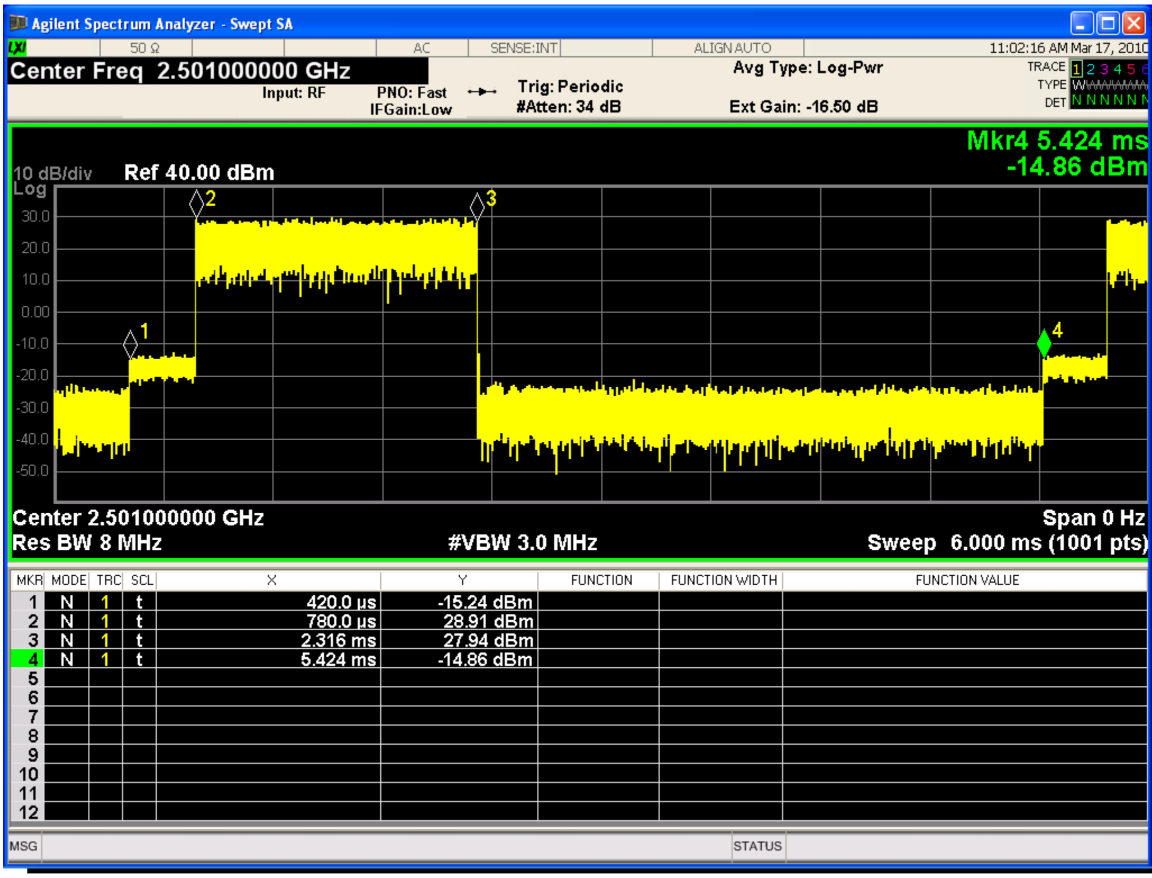
5MHz 2687.5 MHz 16QAM 3/4



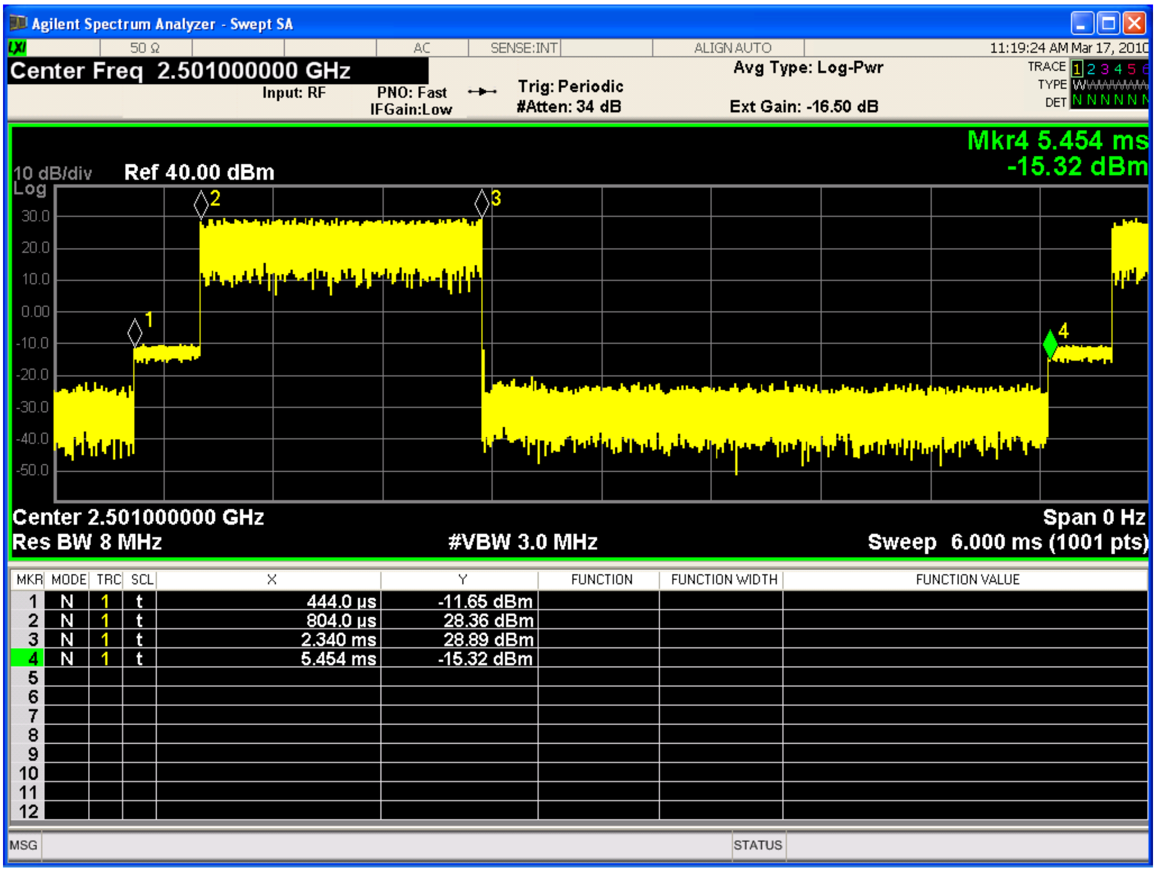
10MHz 2501 MHz QPSK 1/2



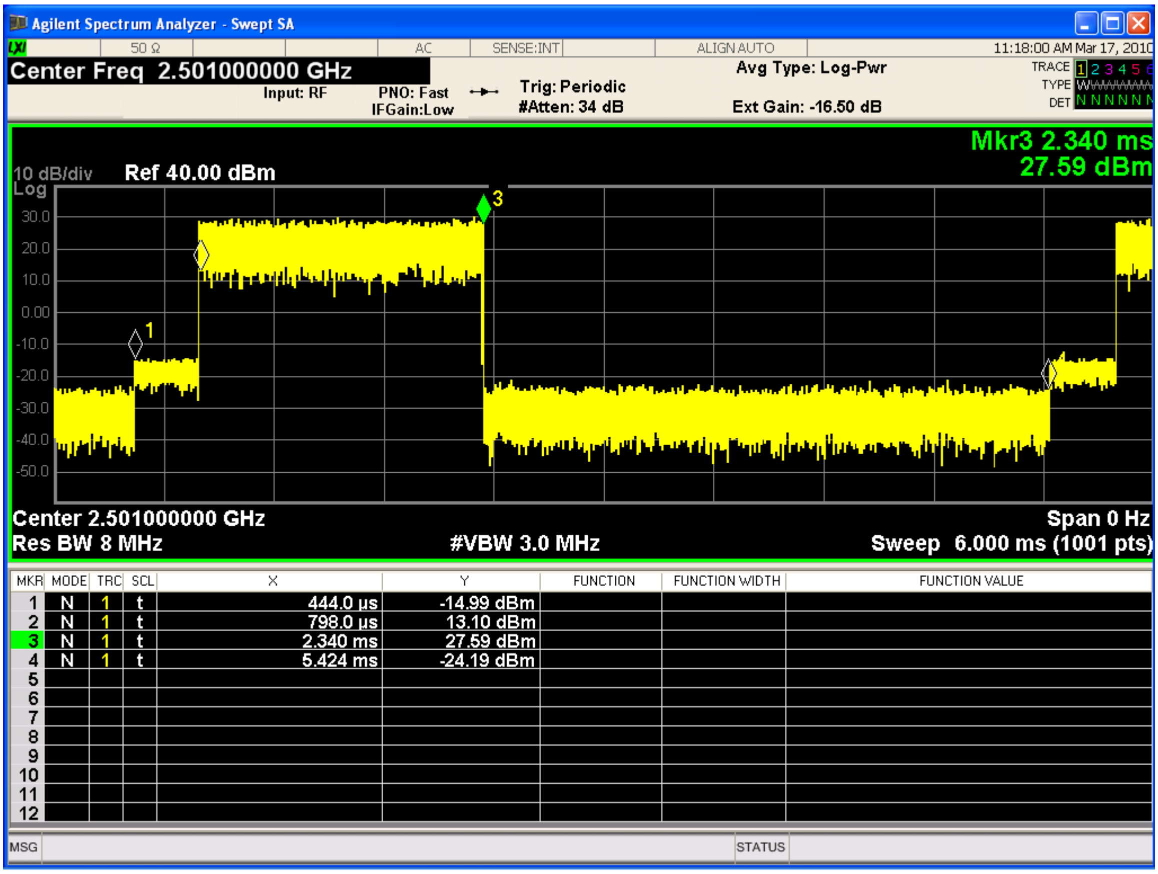
10MHz 2501 MHz QPSK 3/4



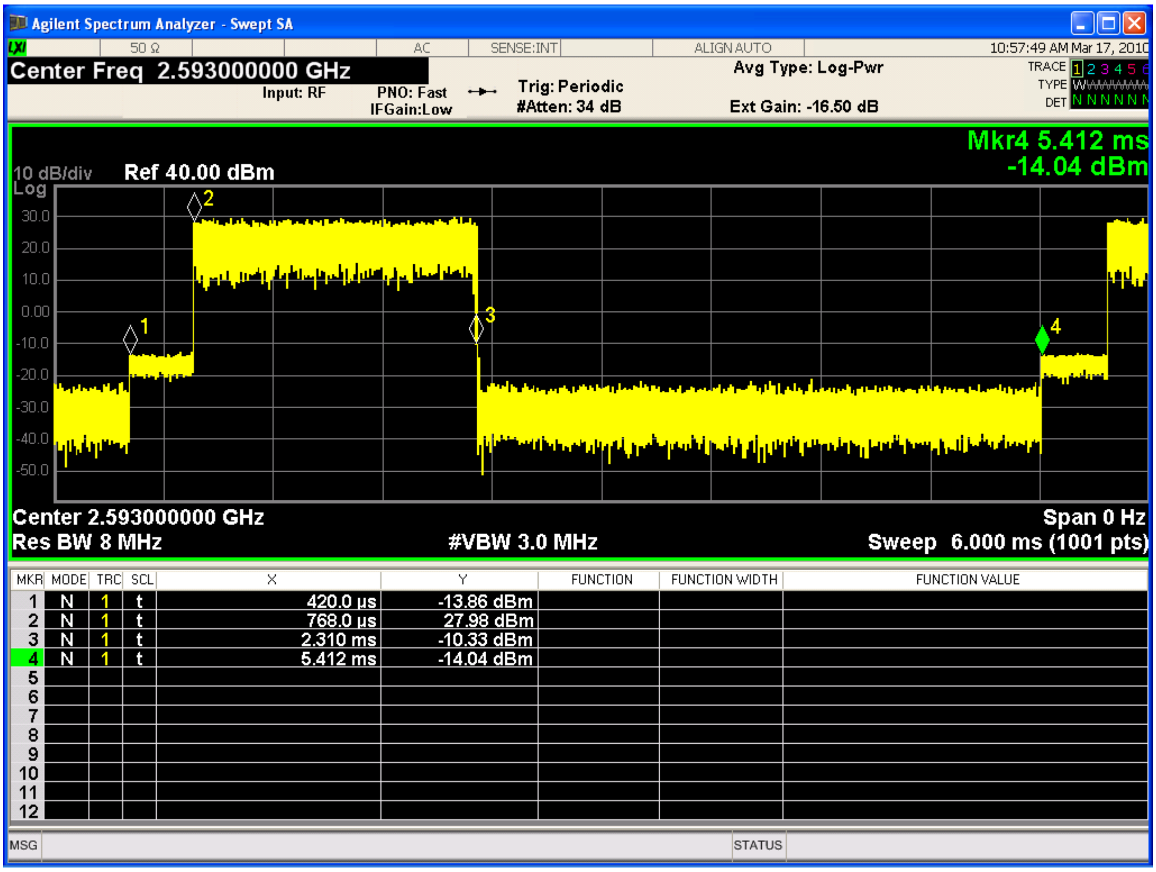
10MHz 2501 MHz 16QAM 1/2



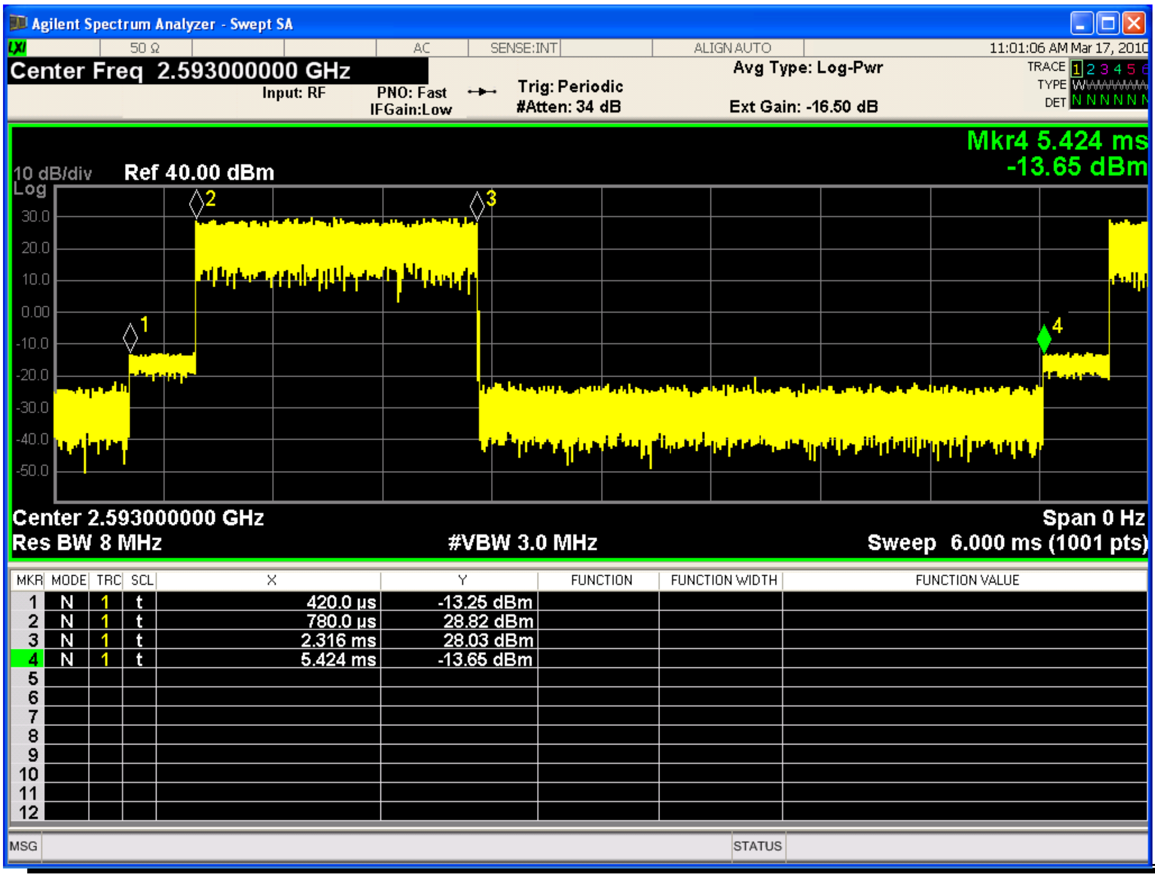
10MHz 2501 MHz 16QAM 3/4



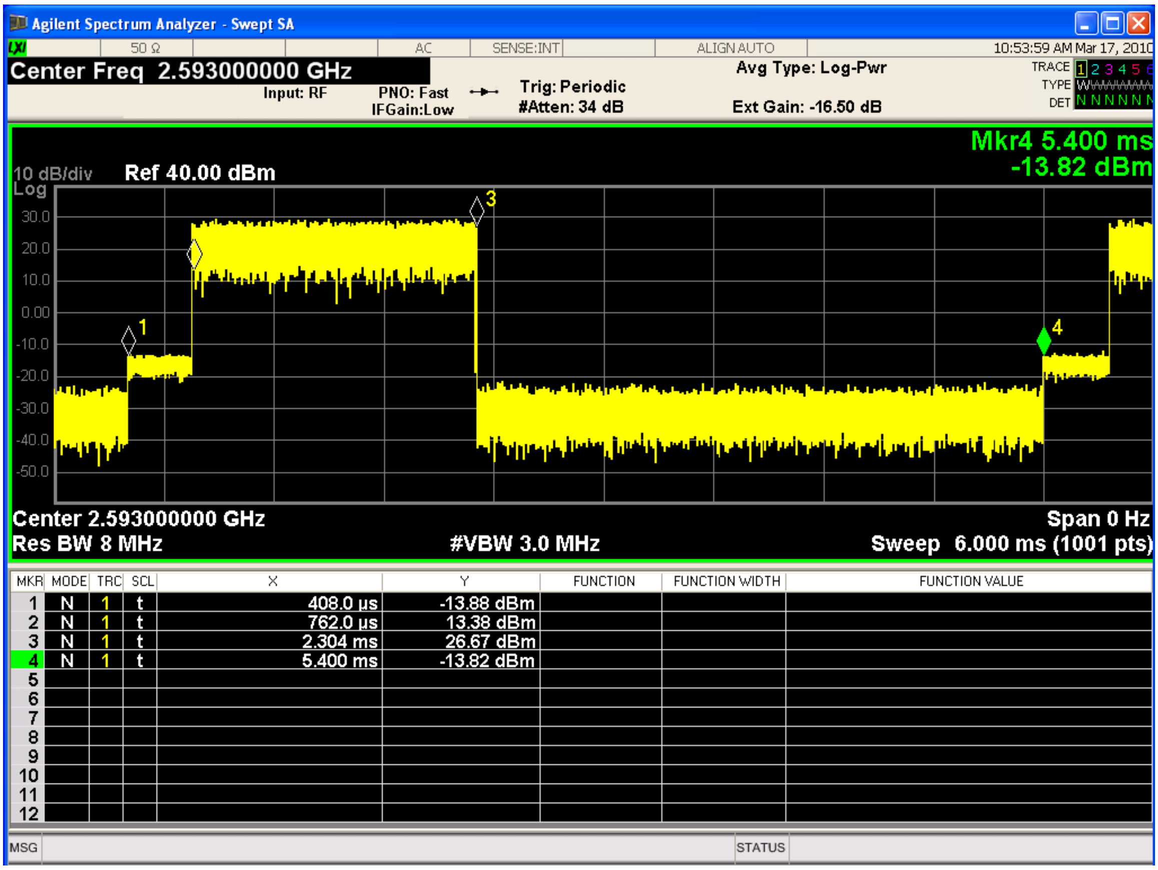
10MHz 2593 MHz QPSK 1/2



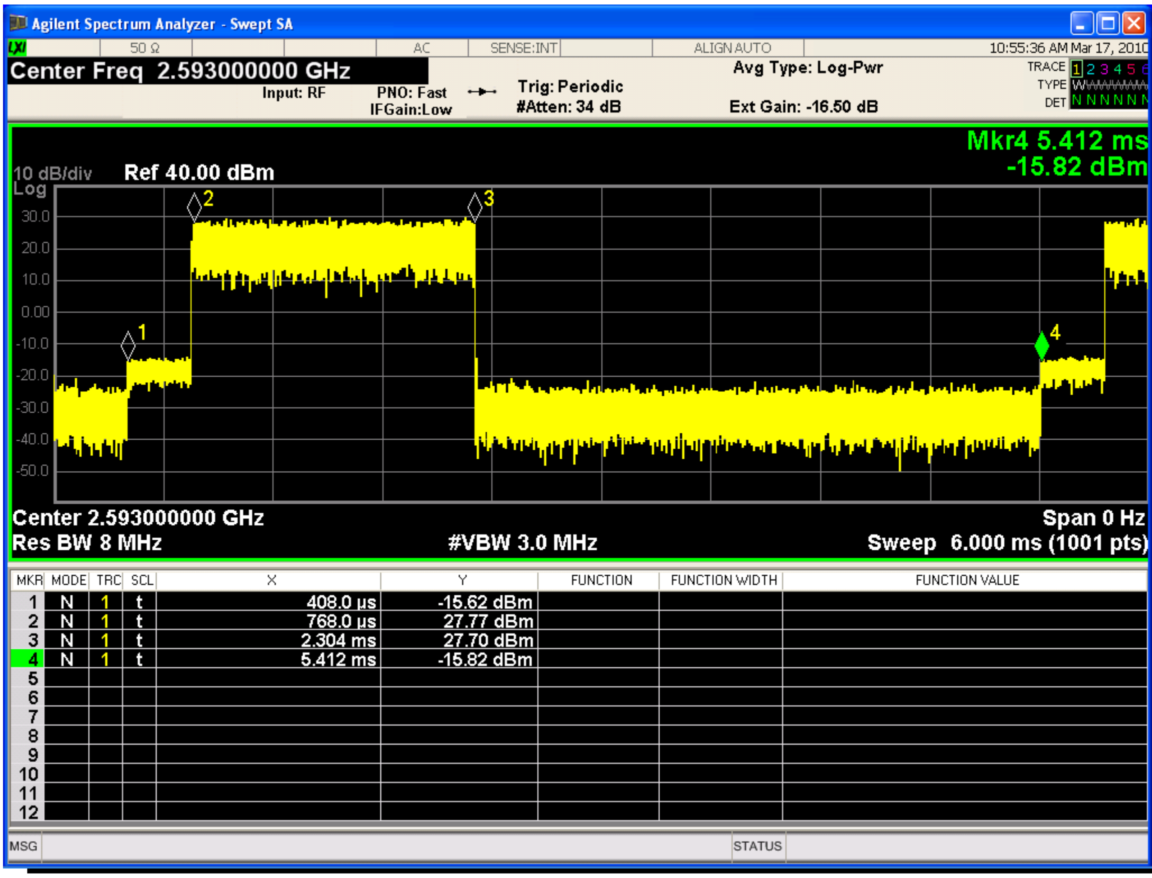
10MHz 2593 MHz QPSK 3/4



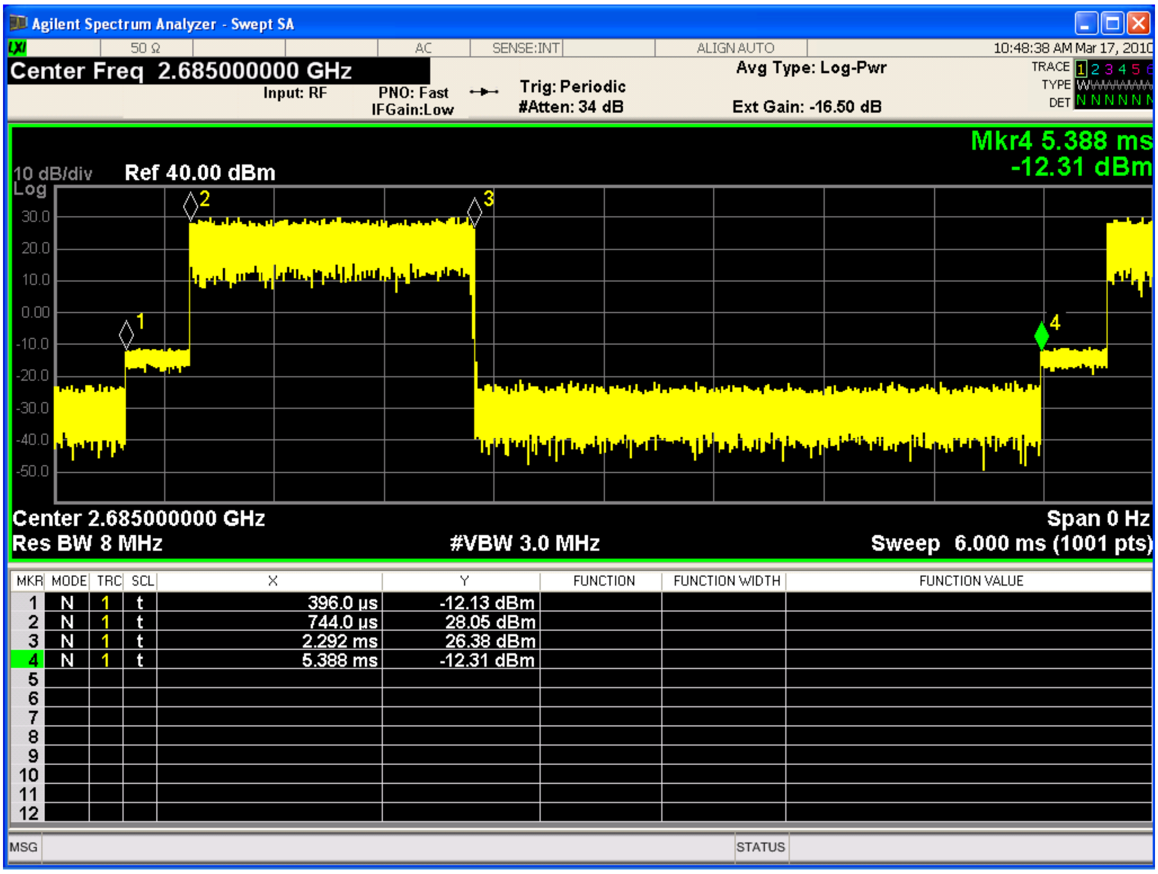
10MHz 2593 MHz 16QAM 1/2



10MHz 2593 MHz 16QAM 3/4

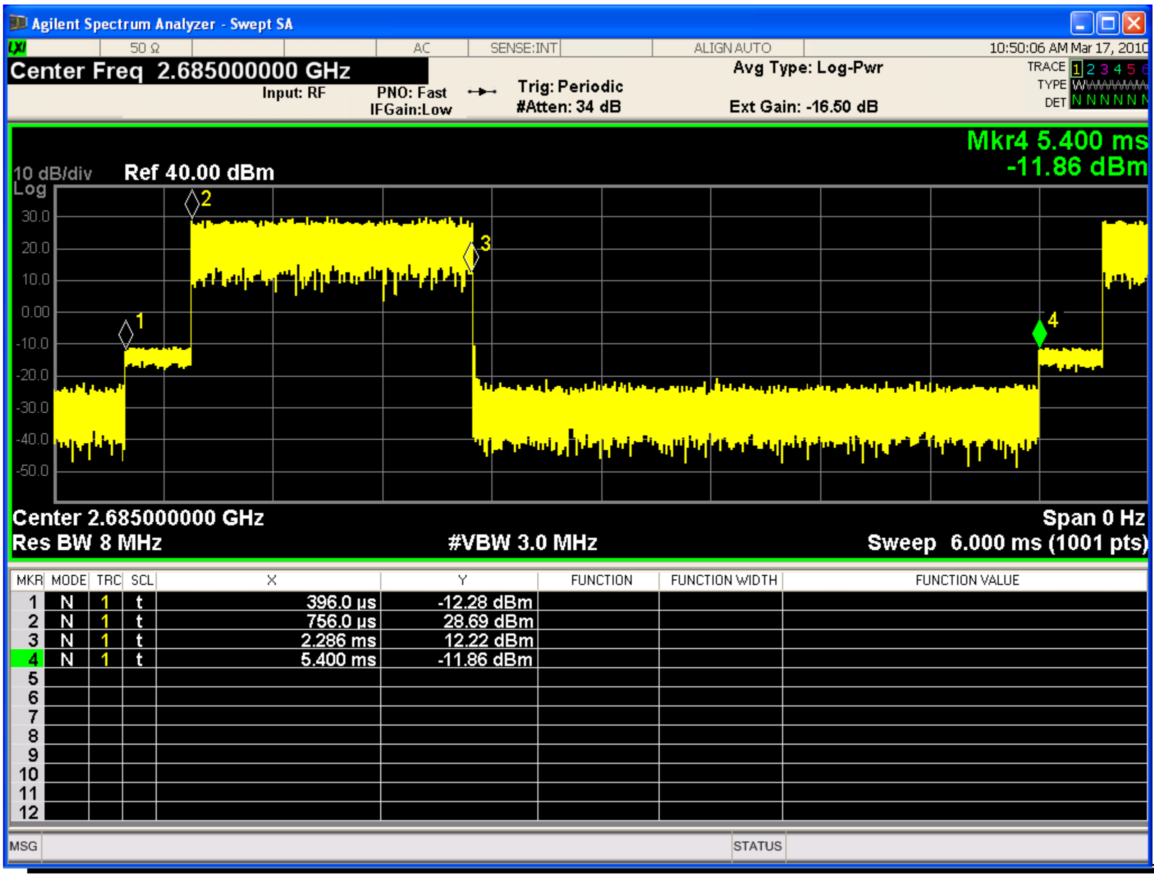


10MHz 2685 MHz QPSK 1/2



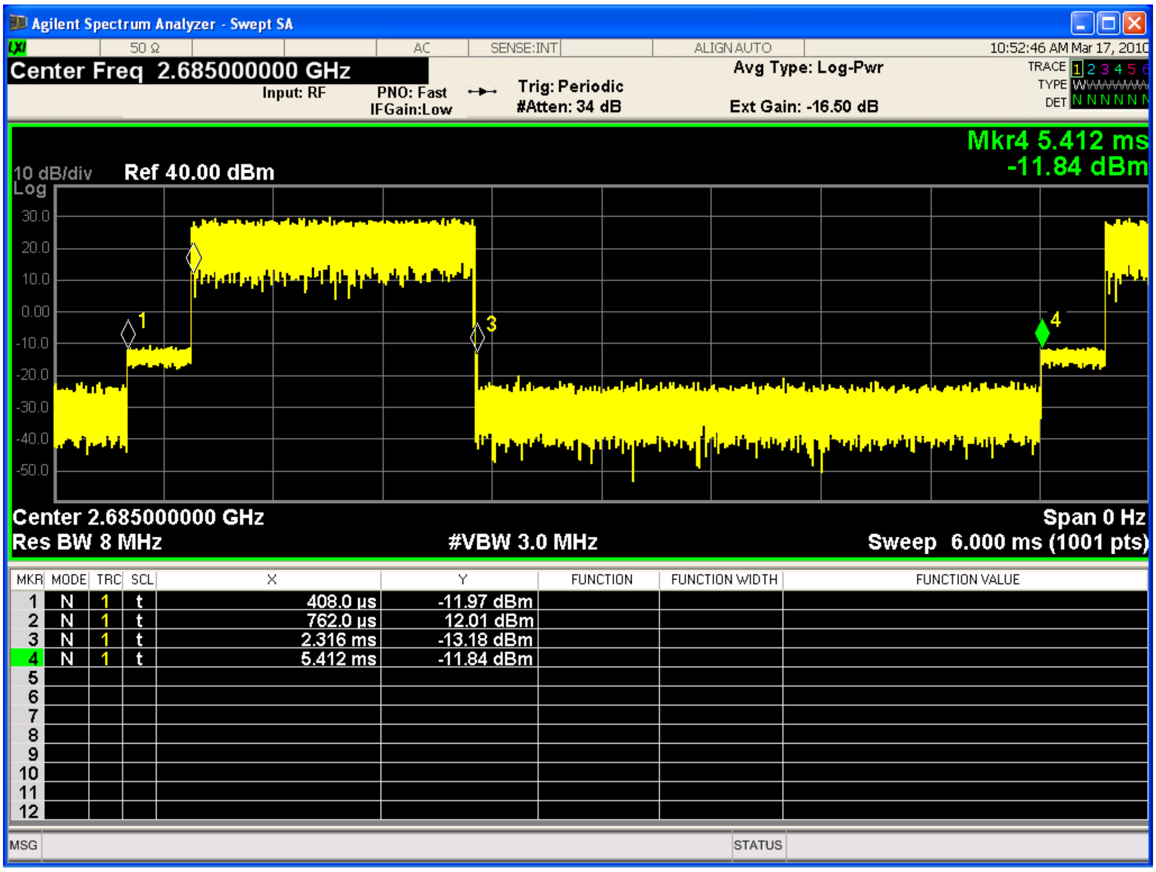
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	t	396.0 µs	-12.13 dBm			
2	N	1	t	744.0 µs	28.05 dBm			
3	N	1	t	2.292 ms	26.38 dBm			
4	N	1	t	5.388 ms	-12.31 dBm			

10MHz 2685 MHz QPSK 3/4

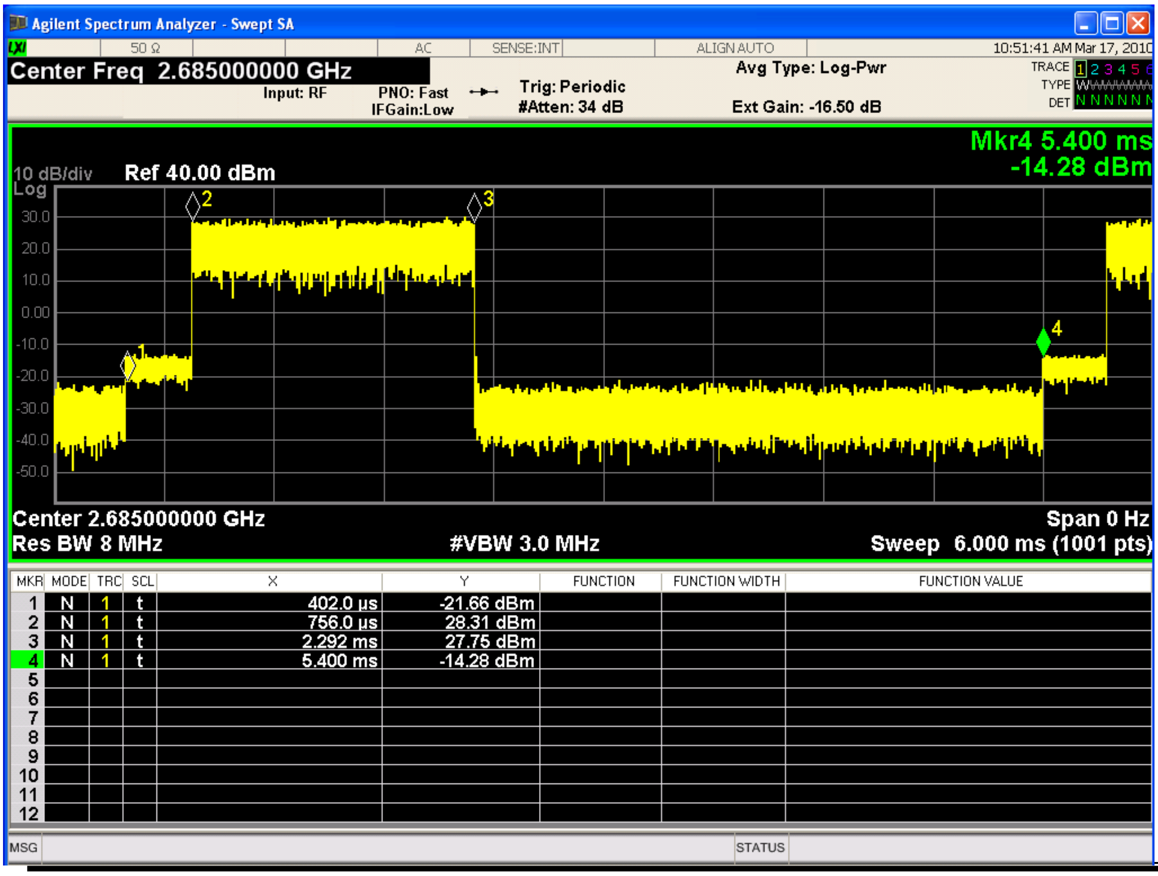


MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	t	396.0 µs	-12.28 dBm			
2	N	1	t	756.0 µs	28.69 dBm			
3	N	1	t	2.286 ms	12.22 dBm			
4	N	1	t	5.400 ms	-11.86 dBm			

10MHz 2685 MHz 16QAM 1/2



10MHz 2685 MHz 16QAM 3/4



9.5 PAPR and SAR Error Considerations

9.5.1 PEAK TO AVERAGE Conducted Power RATIO

BW 5 MHz

TX Antenna		ANT 1			ANT 2		
Channel (GHz)	Modulation	Average Power (dBm)	Peak Power (dBm)	PAR (dB)	Average Power dBm)	Peak Power (dBm)	PAR (dB)
2498.5	QPSK 1/2	23.44	29.80	6.36	23.31	29.72	6.41
	QPSK 3/4	23.45	29.86	6.41	23.32	29.57	6.25
	16QAM 1/2	23.49	29.80	6.31	23.49	29.66	6.17
	16QAM 3/4	23.36	29.68	6.32	23.33	29.63	6.30
2593	QPSK 1/2	23.11	29.39	6.28	23.12	29.55	6.43
	QPSK 3/4	23.15	29.58	6.43	23.20	29.41	6.21
	16QAM 1/2	23.09	29.39	6.30	23.27	29.49	6.22
	16QAM 3/4	22.97	29.29	6.32	23.10	29.36	6.26
2687.5	QPSK 1/2	23.07	29.38	6.31	22.98	29.47	6.49
	QPSK 3/4	23.04	29.45	6.41	22.99	29.30	6.31
	16QAM 1/2	23.11	29.35	6.24	23.16	29.05	5.89
	16QAM 3/4	22.99	29.29	6.30	23.07	29.34	6.27

BW 10 MHz

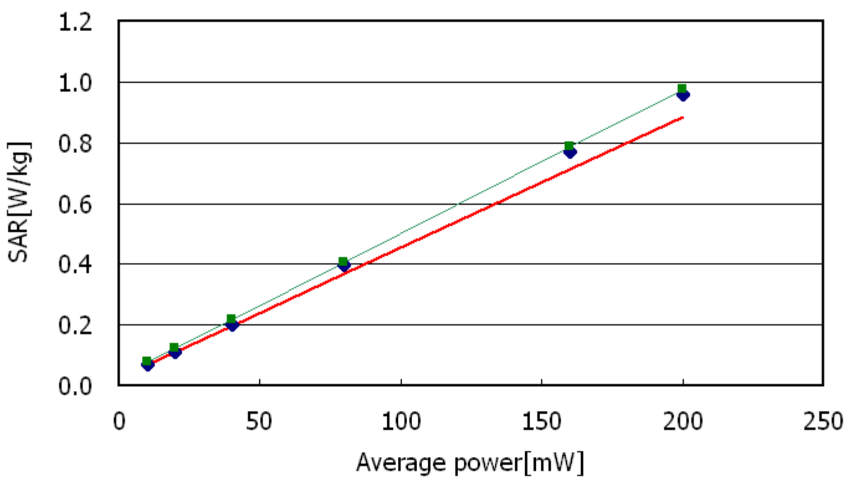
TX Antenna		ANT 1			ANT 2		
Channel (GHz)	Modulation	Average Power (dBm)	Peak Power (dBm)	PAR (dB)	Average Power dBm)	Peak Power (dBm)	PAR (dB)
2501	QPSK 1/2	22.98	29.36	6.38	22.76	29.15	6.39
	QPSK 3/4	23.04	29.35	6.31	22.74	29.09	6.35
	16QAM 1/2	23.12	29.52	6.40	22.97	29.36	6.39
	16QAM 3/4	22.96	29.27	6.31	22.90	29.32	6.42
2593	QPSK 1/2	22.87	29.15	6.28	22.60	28.92	6.32
	QPSK 3/4	22.63	28.95	6.32	22.57	28.92	6.35
	16QAM 1/2	22.75	29.12	6.37	22.63	28.97	6.34
	16QAM 3/4	22.70	29.01	6.32	22.60	29.01	6.42
2685	QPSK 1/2	22.75	29.13	6.38	22.68	29.02	6.34
	QPSK 3/4	22.79	29.10	6.31	22.66	28.98	6.32
	16QAM 1/2	22.77	29.17	6.40	22.57	28.96	6.39
	16QAM 3/4	22.74	29.10	6.36	22.54	28.93	6.38

9.5.2 SAR Error considerations

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. If the duty factor were non-periodic, compensation is typically not possible and substantial SAR measurement error could be expected. 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, from approximately 10 mW or less, in 3 dB steps, until the maximum power level is reached. 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. The results indicate that at approximately 200 mW SAR could be overestimated by 8 %. This type of measurement error is dependent on the signal characteristics; the results demonstrate that there is no SAR underestimation.

5 MHz 16QAM 1/2 was used for single point SAR measurement since it was the highest one.
Test Configuration: Horizontal A

Average Power (mW)	10	20	40	80	160	200
Single Point SAR (W/kg)	0.069	0.112	0.201	0.399	0.769	0.957
Reference Line (W/kg)	0.069	0.112	0.198	0.370	0.714	0.886
Deviation (%) from Ref. Line	0	0	1.52	7.84	7.70	8.01



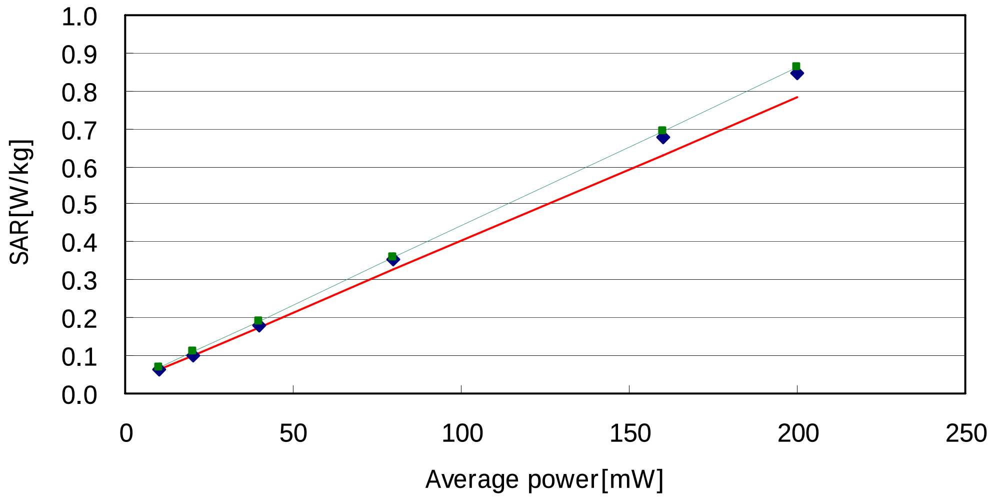
Reference Line (Red Line)
Measured SAR value (Blue point)
10 % from the Reference Line (Green Line)

According to the linearity calculation, estimated SAR value was calculated as follow;

$y = a * x + b$
$a = (0.112-0.069)/(20-10) = 0.0043$
$b = y-0.0043 * x = 0.112- (0.0043 * 20) = 0.026$
$\therefore\ y = 0.0043 * x + 0.026$

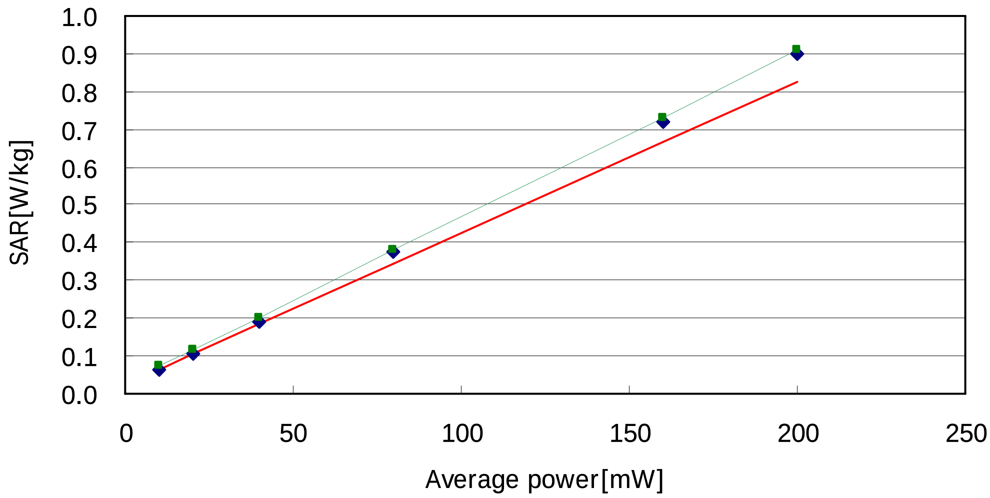
10 MHz 16QAM 1/2

Average Power (mW)	10	20	40	80	160	200
Single Point SAR (W/kg)	0.061	0.099	0.178	0.353	0.680	0.846
Reference Line (W/kg)	0.061	0.099	0.175	0.327	0.631	0.783
Deviation (%) from Ref. Line	0	0	1.55	7.87	7.72	7.99



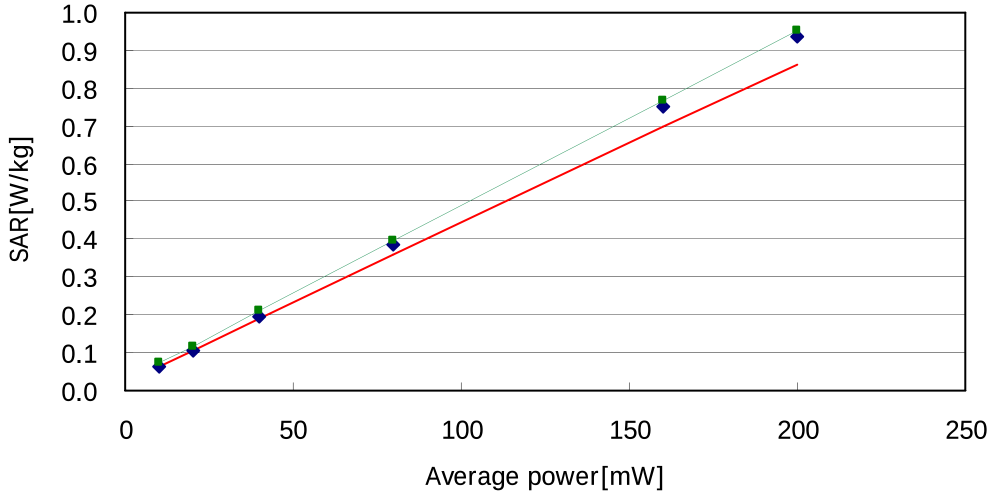
5 MHz QPSK 1/2

Average Power (mW)	10	20	40	80	160	200
Single Point SAR (W/kg)	0.065	0.105	0.188	0.374	0.721	0.897
Reference Line (W/kg)	0.065	0.105	0.185	0.345	0.665	0.825
Deviation (%) from Ref. Line	0	0	1.88	8.44	8.41	8.71



10 MHz QPSK 1/2

Average Power (mW)	10	20	40	80	160	200
Single Point SAR (W/kg)	0.066	0.108	0.197	0.385	0.750	0.935
Reference Line (W/kg)	0.066	0.108	0.192	0.360	0.696	0.864
Deviation (%) from Ref. Line	0	0	2.66	7.04	7.79	8.19



10. SAR TEST DATA SUMMARY

10.1 Measurement Results (WIMAX2600 5MHz 16QAM 1/2) Ant 1

Frequency	Conducted Power (dBm)		Configuration	Separation Distance	Antenna Type	Measured SAR(mW/g)	Scaling Factor	Scaled SAR(mW/g)
MHz	Begin	End						
2 593	23.09	23.08	Horizontal up	5 mm	Intenna	0.252	1.305	0.329
2498.5	23.49	23.35	Horizontal down	5 mm	Intenna	0.324	1.190	0.386
2 593	23.09	23.01	Horizontal down	5 mm	Intenna	0.660	1.305	0.861
2687.5	23.11	23.09	Horizontal down	5 mm	Intenna	0.338	1.299	0.439
2 593	23.09	23.16	Vertical front	5 mm	Intenna	0.356	1.305	0.465
2 593	23.09	23.21	Vertical back	5 mm	Intenna	0.136	1.305	0.177
2 593	23.09	23.05	Top	5 mm	Intenna	0.041	1.305	0.054
ANSI/ IEEE C95.1 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population					**Body 1.6 W/kg (mW/g)** Averaged over 1 gram			

NOTES:

1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
2 All modes of operation were investigated and the worst-case are reported.
3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
4 Tissue parameters and temperatures are listed on the SAR plot.
5 Power Supply Power supplied through host device (TOSHIBA)
6 Test Signal Call Mode ☐ Manual Test cord ☒ Base Station Simulator
7 All side of the phone were tested and the worst-case side is reported.
9 Test Configuration ☐ With Holster ☒ Without Holster
The EUT was fixed by using a Styrofoam to avoid perturbation due to the device holder clamps.
10 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

10.2 Measurement Results (WIMAX2600 5MHz 16QAM 3/4) Ant 1

Frequency	Conducted Power (dBm)		Configuration	Separation Distance	Antenna Type	Measured SAR(mW/g)	Scaling Factor	Scaled SAR(mW/g)
MHz	Begin	End						
2 593	22.97	22.89	Horizontal up	5 mm	Intenna	0.239	1.341	0.320
2498.5	23.36	23.44	Horizontal down	5 mm	Intenna	0.289	1.226	0.354
2 593	22.97	23.01	Horizontal down	5 mm	Intenna	0.657	1.341	0.881
2687.5	22.99	23.08	Horizontal down	5 mm	Intenna	0.339	1.335	0.453
2 593	22.97	23.08	Vertical front	5 mm	Intenna	0.339	1.341	0.455
2 593	22.97	22.99	Vertical back	5 mm	Intenna	0.141	1.341	0.189
2 593	22.97	22.87	Top	5 mm	Intenna	0.039	1.341	0.052
ANSI/ IEEE C95.1 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population					**Body 1.6 W/kg (mW/g)** Averaged over 1 gram			

NOTES:

1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
2 All modes of operation were investigated and the worst-case are reported.
3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
4 Tissue parameters and temperatures are listed on the SAR plot.
5 Power Supply Power supplied through host device (TOSHIBA)
6 Test Signal Call Mode ☐ Manual Test cord ☒ Base Station Simulator
7 All side of the phone were tested and the worst-case side is reported.
9 Test Configuration ☐ With Holster ☒ Without Holster
The EUT was fixed by using a Styrofoam to avoid perturbation due to the device holder clamps.
10 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

10.3 Measurement Results (WIMAX2600 5MHz QPSK 1/2) Ant 1

Frequency	Conducted Power (dBm)		Configuration	Separation Distance	Antenna Type	Measured SAR(mW/g)	Scaling Factor	Scaled SAR(mW/g)
MHz	Begin	End						
2 593	23.11	23.04	Horizontal up	5 mm	Intenna	0.243	1.299	0.316
2498.5	23.44	23.51	Horizontal down	5 mm	Intenna	0.299	1.204	0.360
2 593	23.11	23.01	Horizontal down	5 mm	Intenna	0.675	1.299	0.877
2687.5	23.07	23.08	Horizontal down	5 mm	Intenna	0.338	1.311	0.443
2 593	23.11	23.26	Vertical front	5 mm	Intenna	0.325	1.299	0.422
2 593	23.11	23.24	Vertical back	5 mm	Intenna	0.142	1.299	0.184
2 593	23.11	23.12	Top	5 mm	Intenna	0.041	1.299	0.053
ANSI/ IEEE C95.1 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population					**Body 1.6 W/kg (mW/g)** Averaged over 1 gram			

NOTES:

1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
2 All modes of operation were investigated and the worst-case are reported.
3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
4 Tissue parameters and temperatures are listed on the SAR plot.
5 Power Supply Power supplied through host device (TOSHIBA)
6 Test Signal Call Mode ☐ Manual Test cord ☒ Base Station Simulator
7 All side of the phone were tested and the worst-case side is reported.
9 Test Configuration ☐ With Holster ☒ Without Holster
The EUT was fixed by using a Styrofoam to avoid perturbation due to the device holder clamps.
10 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

10.4 Measurement Results (WIMAX2600 5MHz QPSK 3/4) Ant 1

Frequency	Conducted Power (dBm)		Configuration	Separation Distance	Antenna Type	Measured SAR(mW/g)	Scaling Factor	Scaled SAR(mW/g)
MHz	Begin	End						
2 593	23.15	23.01	Horizontal up	5 mm	Intenna	0.241	1.287	0.310
2498.5	23.45	23.31	Horizontal down	5 mm	Intenna	0.302	1.201	0.363
2 593	23.15	23.02	Horizontal down	5 mm	Intenna	0.672	1.287	0.865
2687.5	23.04	23.15	Horizontal down	5 mm	Intenna	0.355	1.320	0.469
2 593	23.15	23.25	Vertical front	5 mm	Intenna	0.299	1.287	0.385
2 593	23.15	23.19	Vertical back	5 mm	Intenna	0.137	1.287	0.176
2 593	23.15	23.05	Top	5 mm	Intenna	0.038	1.287	0.049
ANSI/ IEEE C95.1 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population					**Body 1.6 W/kg (mW/g)** Averaged over 1 gram			

NOTES:

1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
2 All modes of operation were investigated and the worst-case are reported.
3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
4 Tissue parameters and temperatures are listed on the SAR plot.
5 Power Supply Power supplied through host device (TOSHIBA)
6 Test Signal Call Mode ☐ Manual Test cord ☒ Base Station Simulator
7 All side of the phone were tested and the worst-case side is reported.
9 Test Configuration ☐ With Holster ☒ Without Holster
The EUT was fixed by using a Styrofoam to avoid perturbation due to the device holder clamps.
10 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

10.5 Measurement Results (WIMAX2600 10MHz 16QAM 1/2) Ant 1

Frequency	Conducted Power (dBm)		Configuration	Separation Distance	Antenna Type	Measured SAR(mW/g)	Scaling Factor	Scaled SAR(mW/g)
MHz	Begin	End						
2 593	22.75	22.83	Horizontal up	5 mm	Intenna	0.267	1.371	0.366
2 501	23.12	22.99	Horizontal down	5 mm	Intenna	0.269	1.259	0.339
2 593	22.75	22.91	Horizontal down	5 mm	Intenna	0.672	1.371	0.921
2 685	22.77	22.87	Horizontal down	5 mm	Intenna	0.372	1.364	0.507
2 593	22.75	22.79	Vertical front	5 mm	Intenna	0.252	1.371	0.345
2 593	22.75	22.85	Vertical back	5 mm	Intenna	0.140	1.371	0.192
2 593	22.75	22.67	Top	5 mm	Intenna	0.038	1.371	0.052
ANSI/ IEEE C95.1 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population					**Body 1.6 W/kg (mW/g)** Averaged over 1 gram			

NOTES:

1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
2 All modes of operation were investigated and the worst-case are reported.
3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
4 Tissue parameters and temperatures are listed on the SAR plot.
5 Power Supply Power supplied through host device (TOSHIBA)
6 Test Signal Call Mode ☐ Manual Test cord ☒ Base Station Simulator
7 All side of the phone were tested and the worst-case side is reported.
9 Test Configuration ☐ With Holster ☒ Without Holster
The EUT was fixed by using a Styrofoam to avoid perturbation due to the device holder clamps.
10 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

10.6 Measurement Results (WIMAX2600 10MHz 16QAM 3/4) Ant 1

Frequency	Conducted Power (dBm)		Configuration	Separation Distance	Antenna Type	Measured SAR(mW/g)	Scaling Factor	Scaled SAR(mW/g)
MHz	Begin	End						
2 593	22.70	22.84	Horizontal up	5 mm	Intenna	0.321	1.386	0.445
2 501	22.96	23.01	Horizontal down	5 mm	Intenna	0.267	1.306	0.349
2 593	22.70	22.89	Horizontal down	5 mm	Intenna	0.625	1.386	0.866
2 685	22.74	22.77	Horizontal down	5 mm	Intenna	0.313	1.374	0.430
2 593	22.70	22.75	Vertical front	5 mm	Intenna	0.419	1.386	0.581
2 593	22.70	22.82	Vertical back	5 mm	Intenna	0.131	1.386	0.182
2 593	22.70	22.85	Top	5 mm	Intenna	0.035	1.386	0.049
ANSI/ IEEE C95.1 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population					**Body 1.6 W/kg (mW/g)** Averaged over 1 gram			

NOTES:

1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
2 All modes of operation were investigated and the worst-case are reported.
3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
4 Tissue parameters and temperatures are listed on the SAR plot.
5 Power Supply Power supplied through host device (TOSHIBA)
6 Test Signal Call Mode ☐ Manual Test cord ☒ Base Station Simulator
7 All side of the phone were tested and the worst-case side is reported.
9 Test Configuration ☐ With Holster ☒ Without Holster
The EUT was fixed by using a Styrofoam to avoid perturbation due to the device holder clamps.
10 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

10.7 Measurement Results (WIMAX2600 10MHz QPSK 1/2) Ant 1

Frequency	Conducted Power (dBm)		Configuration	Separation Distance	Antenna Type	Measured SAR(mW/g)	Scaling Factor	Scaled SAR(mW/g)
MHz	Begin	End						
2 593	22.87	22.98	Horizontal up	5 mm	Intenna	0.242	1.333	0.323
2 501	22.98	23.03	Horizontal down	5 mm	Intenna	0.276	1.300	0.359
2 593	22.87	22.89	Horizontal down	5 mm	Intenna	0.625	1.333	0.833
2 685	22.75	22.90	Horizontal down	5 mm	Intenna	0.309	1.371	0.424
2 593	22.87	22.96	Vertical front	5 mm	Intenna	0.420	1.333	0.560
2 593	22.87	22.88	Vertical back	5 mm	Intenna	0.131	1.333	0.175
2 593	22.87	22.79	Top	5 mm	Intenna	0.036	1.333	0.048
ANSI/ IEEE C95.1 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population					**Body 1.6 W/kg (mW/g)** Averaged over 1 gram			

NOTES:

1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
2 All modes of operation were investigated and the worst-case are reported.
3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
4 Tissue parameters and temperatures are listed on the SAR plot.
5 Power Supply Power supplied through host device (TOSHIBA)
6 Test Signal Call Mode ☐ Manual Test cord ☒ Base Station Simulator
7 All side of the phone were tested and the worst-case side is reported.
9 Test Configuration ☐ With Holster ☒ Without Holster
The EUT was fixed by using a Styrofoam to avoid perturbation due to the device holder clamps.
10 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

10.8 Measurement Results (WIMAX2600 10MHz QPSK 3/4) Ant 1

Frequency	Conducted Power (dBm)		Configuration	Separation Distance	Antenna Type	Measured SAR(mW/g)	Scaling Factor	Scaled SAR(mW/g)
MHz	Begin	End						
2 593	22.63	22.75	Horizontal up	5 mm	Intenna	0.229	1.409	0.323
2 501	23.04	23.01	Horizontal down	5 mm	Intenna	0.280	1.282	0.359
2 593	22.63	22.65	Horizontal down	5 mm	Intenna	0.618	1.409	0.871
2 685	22.79	22.84	Horizontal down	5 mm	Intenna	0.333	1.358	0.452
2 593	22.63	22.59	Vertical front	5 mm	Intenna	0.420	1.409	0.592
2 593	22.63	22.68	Vertical back	5 mm	Intenna	0.133	1.409	0.187
2 593	22.63	22.66	Top	5 mm	Intenna	0.037	1.409	0.052
ANSI/ IEEE C95.1 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population					**Body 1.6 W/kg (mW/g)** Averaged over 1 gram			

NOTES:

1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
2 All modes of operation were investigated and the worst-case are reported.
3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
4 Tissue parameters and temperatures are listed on the SAR plot.
5 Power Supply Power supplied through host device (TOSHIBA)
6 Test Signal Call Mode ☐ Manual Test cord ☒ Base Station Simulator
7 All side of the phone were tested and the worst-case side is reported.
9 Test Configuration ☐ With Holster ☒ Without Holster
The EUT was fixed by using a Styrofoam to avoid perturbation due to the device holder clamps.
10 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

10.9 Measurement Results(WIMAX2600 5MHz) Ant 2

Frequency	Conducted Power (dBm)		Configuration	Separation Distance	Antenna Type	Modulation	Measured SAR(mW/g)	Scaling Factor	Scaled SAR(mW/g)
MHz	Begin	End							
2 593	23.27	23.14	Horizontal down	5 mm	Intenna	16QAM1/2	0.076	1.252	0.095
2 593	23.10	23.05	Horizontal down	5 mm	Intenna	16QAM3/4	0.078	1.302	0.102
2 593	23.12	23.05	Horizontal down	5 mm	Intenna	QPSK1/2	0.076	1.296	0.098
2 593	23.20	23.13	Horizontal down	5 mm	Intenna	QPSK3/4	0.112	1.272	0.142
2 593	23.20	23.15	Horizontal up	5 mm	Intenna	QPSK3/4	0.032	1.272	0.041
2 593	23.20	23.12	Vertical front	5 mm	Intenna	QPSK3/4	0.009	1.272	0.011
2 593	23.20	23.09	Vertical back	5 mm	Intenna	QPSK3/4	0.017	1.272	0.022
2 593	23.20	23.24	Top	5 mm	Intenna	QPSK3/4	0.017	1.272	0.022
ANSI/ IEEE C95.1 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population					**Body 1.6 W/kg (mW/g)** Averaged over 1 gram				

NOTES:

1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
2 All modes of operation were investigated and the worst-case are reported.
3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
4 Tissue parameters and temperatures are listed on the SAR plot.
5 Power Supply Power supplied through host device (TOSHIBA)
6 Test Signal Call Mode ☐ Manual Test cord ☒ Base Station Simulator
7 All side of the phone were tested and the worst-case side is reported.
9 Test Configuration ☐ With Holster ☒ Without Holster
The EUT was fixed by using a Styrofoam to avoid perturbation due to the device holder clamps.
10 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

10.10 Measurement Results(WIMAX2600 10MHz) Ant 2

Frequency	Conducted Power (dBm)		Configuration	Separation Distance	Antenna Type	Modulation	Measured SAR(mW/g)	Scaling Factor	Scaled SAR(mW/g)
MHz	Begin	End							
2 593	22.63	22.75	Horizontal down	5 mm	Intenna	16QAM1/2	0.075	1.409	0.106
2 593	22.60	22.74	Horizontal down	5 mm	Intenna	16QAM3/4	0.068	1.419	0.096
2 593	22.60	22.55	Horizontal down	5 mm	Intenna	QPSK1/2	0.070	1.419	0.099
2 593	22.57	22.60	Horizontal down	5 mm	Intenna	QPSK3/4	0.071	1.429	0.101
ANSI/ IEEE C95.1 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population					**Body 1.6 W/kg (mW/g)** Averaged over 1 gram				

NOTES:

1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
2 All modes of operation were investigated and the worst-case are reported.
3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
4 Tissue parameters and temperatures are listed on the SAR plot.
5 Power Supply Power supplied through host device (TOSHIBA)
6 Test Signal Call Mode ☐ Manual Test cord ☒ Base Station Simulator
7 All side of the phone were tested and the worst-case side is reported.
9 Test Configuration ☐ With Holster ☒ Without Holster
The EUT was fixed by using a Styrofoam to avoid perturbation due to the device holder clamps.
10 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

11. CONCLUSION

The SAR measurement indicates that the EUT complies with the RF radiation exposure limits of the ANSI/ IEEE C95.1 2005.

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.

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