SAR TEST REPORT

Equipment Under Test	:	WiMAX USB Dongle
Model No.	:	SWU-3400AN
Applicant	:	SEOWON INTECH CO.,LTD.
FCC ID	:	V7MSWU-3400AN
Device Category	:	Portable
Exposure Category	:	General Population/Uncontrolled Exposure
Date of Receipt	:	2011-08-08
Date of Test(s)	:	2011-11-08~2011-11-09
Date of Issue	:	2011-11-14
Max. SAR	:	1.288 W/kg (Scaled Value)

Standards: **FCC Part 2 (Section 2.1093)**
FCC OET Bulletin 65 supplement C (01-01)
IEEE 1528, 2003
ANSI/IEEE C95.1, C95.3

In the configuration tested, the EUT complied with the standards specified above.

Remarks:

Tested by	:	**Fred Jeong**		**2011-11-14**
Approved by	:	**Charles Kim**	C. K. Kim	**2011-11-14**

Contents

<APPENDIX>

A. DASY4 SAR Report
B. Uncertainty Analysis
C. Calibration certificate

1. General Information

1.1 Testing Laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)
18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, 435-040, Korea
Telephone : 82 31 428 5700
FAX : 82 31 427 2371
Homepage : www.kr.sgs.com/ee

1.2 Details of Manufacturer

Manufacturer : SEOWON INTECH CO.,LTD.
Address : 689-47, Gumjung-dong, Gunpo-si, Gyunggi-do, 435-862, Korea
Contact Person : Jack Wang
Phone No. : 82 31 428 9558

1.3 Version of Report

Version Number	Date	Revision
00	2011-08-16	Initial issue
01	2011-10-19	Revision 1
02	2011-11-14	Revision 2

1.4 Description of EUT(s)

EUT Type	: WiMAX USB Dongle
Model	: SWU-3400AN
Serial Number	: KRSD0630U3400AN-00097
Modulation Technology	: OFDMA
Duplex Method	: TDD
Frequency Range	: 2506 ~ 2685 MHz
Channel Bandwidth	: 5 MHz & 10 MHz
Highest 1g SAR (W/kg)	: 1.288 W/kg (Scaled Value)
Highest RF Output Power (dBm)	: 23.65 dBm
Antenna Type(Length)	: Internal
Interface	: USB Port
Applicable Standards	: FCC OET Bulletin 65 Supplement C 01-01 and the following specific FCC test procedures - KDB 447498 D01 Mobile Portable RF Exposure v04 - KDB 615223 D01 802. 16e WiMax SAR Guidance v01 - KDB 447498 D02 SAR Procedures for Dongle Xmtr v02

1.5 Test Environment

Ambient temperature	: (22 ± 2) ° C
Tissue Simulating Liquid	: (22 ± 2) ° C
Relative Humidity	: (55 ± 5) % R.H.

1.6 Test Methodology

The tests documented in this report were performed in accordance with FCC OET Bulletin 65 Supplement C 01-01 and the following specific FCC test procedures;

- KDB 447498 D01 Mobile Portable RF Exposure v04
- KDB 615223 D01 802 16e WiMax SAR Guidance v01
- KDB 447498 D02 SAR Procedures for Dongle Xmtr v02

1.7 EVALUATION PROCEDURES

- Power Reference Measurement Procedures

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The Minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. The minimum distance of probe sensors to surface is 2.5 mm. This distance cannot be smaller than the Distance of sensor calibration points to probe tip as defined in the probe properties (for example, 2 mm for an EX3DV4 probe type).

- The entire evaluation of the spatial peak values is performed within the Post-processing engine (SEMCAD). The system always gives the maximum values for the 1 g and 10 g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

1. The extraction of the measured data (grid and values) from the Zoom Scan.
2. The calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
3. The generation of a high-resolution mesh within the measured volume
4. The interpolation of all measured values from the measurement grid to the high-resolution grid
5. The extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
6. The calculation of the averaged SAR within masses of 1 g and 10 g.

The probe is calibrated at the center of the dipole sensors that is located 1 mm to 2.7 mm away from the probe tip. During measurements, the probe stops shortly above the phantom surface, depending on the probe and the surface detecting system. Both distances are included as parameters in the probe configuration file. The software always knows exactly how far away the measured point is from the surface. As the probe cannot directly measure at the surface, the values between the deepest measured point and the surface must be extrapolated. The angle between the probe axis and the surface normal line is less than 30 degree.

In the Area Scan, the gradient of the interpolation function is evaluated to find all the extreme of the SAR distribution. The uncertainty on the locations of the extreme is less than 1/20 of the grid size. Only local maximum within –2 dB of the global maximum are searched and passed for the Cube Scan measurement. In the Cube Scan, the interpolation function is used to extrapolate the Peak SAR from the lowest measurement points to the inner phantom surface (the extrapolation distance). The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1 % for the 1 g and 10 g cubes, the extrapolation distance should not be larger than 5 mm.

The maximum search is automatically performed after each area scan measurement. It is based on splines in two or three dimensions. The procedure can find the maximum for most SAR distributions even with relatively large grid spacing. After the area scanning measurement, the probe is automatically moved to a position at the interpolated maximum. The following scan can directly use this position for reference, e.g., for a finer resolution grid or the cube evaluations. The 1 g and 10 g peak evaluations are only available for the predefined cube 7x7x7 scans. The routines are verified and optimized for the grid dimensions used in these cube measurements. The measured volume of 30x30x30mm contains about 30 g of tissue. The first procedure is an extrapolation (incl. Boundary correction) to get the points between the lowest measured plane and the surface. The next step uses 3D interpolation to get all points within the measured volume. In the last step, a 1 g cube is placed numerically into the volume and its averaged SAR is calculated. This cube is the moved around until the highest averaged SAR is found. If the highest SAR is found at the edge of the measured volume, the system will issue a warning: higher SAR values might be found outside of the measured volume. In that case the cube measurement can be repeated, using the new interpolated maximum as the center.

1.8 The SAR Measurement System

A photograph of the SAR measurement System is given in Fig. a. This SAR Measurement System uses a Computer-controlled 3-D stepper motor system (Speag Dasy 4 professional system). A Model EX3DV4 3791 E-field probe is used to determine the internal electric fields. The SAR can be obtained from the equation SAR= σ (|Ei|2)/ ρ where σ and ρ are the conductivity and mass density of the tissue-simulant. The DASY4 system for performing compliance tests consists of the following items:

•A standard high precision 6-axis robot (Staubli RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).

•A dosimeter probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.

•A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.

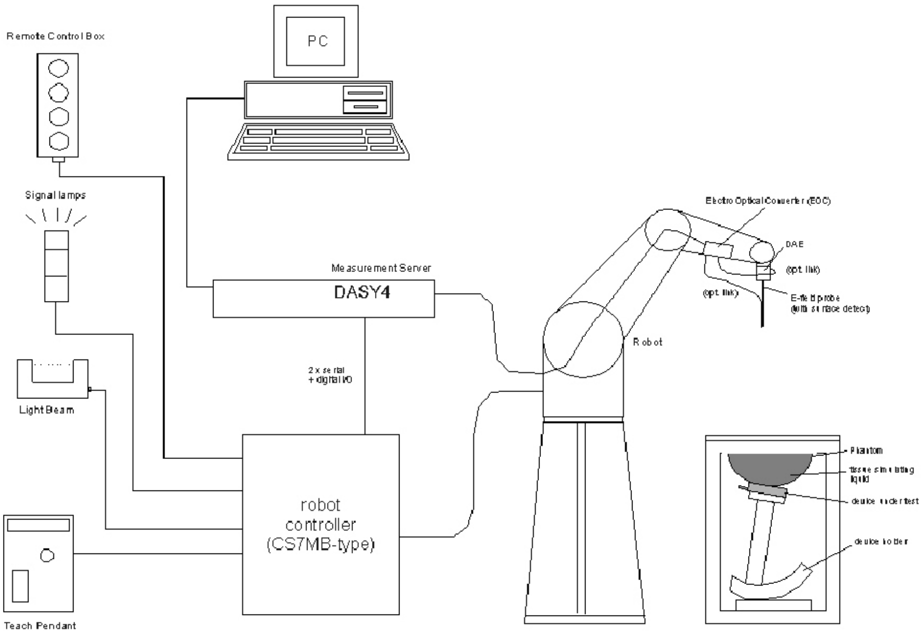


Fig a. The microwave circuit arrangement used for SAR system verification

- The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to the DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 2000 or Windows XP.
- DASY4 software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing body usage.
- The device holder for flat phantom.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing to validate the proper functioning of the system.

1.9 System Components

EX3DV4 E-Field Probe

Construction	**:**	Symmetrical design with triangular core. 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 2600 and HSL5800. Additional CF-Calibration for other liquids and frequencies upon request.
Frequency	**:**	10 MHz to 6 GHz; Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	**:**	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)
Dynamic Range	**:**	10μW/g to > 100 m W/g; Linearity: ± 0.2 dB(noise: typically < 1 μW/g)
Dimensions	**:**	Overall length: 337 mm (Tip length: 20 mm) Tip diameter: 2.5 mm (Body diameter: 12 mm) Distance from probe tip to dipole centers: 1 mm
Application	**:**	High precision dosimetric measurements in any exposure scenario (e.g.,very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%

EX3DV4 E-Field Probe

NOTE:

1. The Probe parameters have been calibrated by the SPEAG. Please reference “APPENDIX C” for the Calibration Certification Report.

SAM Phantom

Construction: 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

Shell Thickness: 2.0 mm ± 0.1 mm

Filling Volume: Approx. 25 liters

SAM Phantom

DEVICE HOLDER

Construction In combination with the Twin SAM Phantom V4.0 / V4.0C or Twin SAM, the Mounting Device (made from POM) enables the rotation of the mounted transmitter in spherical coordinates, whereby the rotation point is the ear opening. The devices can be easily and accurately positioned according to IEC, IEEE, CENELEC, FCC or other specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).

Device Holder

1.10 SAR System Verification

The microwave circuit arrangement for system verification is sketched in Fig. b. The daily system accuracy verification occurs within the flat section of the SAM phantom. A SAR measurement was performed to see if the measured SAR was within +/- 10 % from the target SAR values. These tests were done 2600 MHz. The tests for EUT were conducted within 24 hours after each validation. The obtained results from the system accuracy verification are displayed in the table 1. During the tests, the ambient temperature of the laboratory was in the range (22 ± 2) ° C, the relative humidity was in the range (55 ± 5) % R.H. and the liquid depth above the ear reference points was above 15 cm in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.

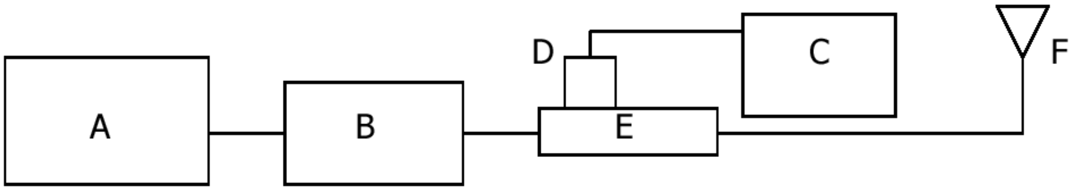


Fig b. The microwave circuit arrangement used for SAR system verification

A. Agilent Model E4421B Signal Generator
B. EMPOWER Model 2001-BBS3Q7ECK Amplifier
C. Agilent Model E4419B Power Meter
D. Agilent Model 9300H Power Sensor
E. Agilent Model 777D Dual directional coupling
F. Reference dipole Antenna

Photo of the dipole Antenna

System Validation Results

Validation Kit	Tissue Frequency (MHz)	Tissue Type	Amb. Temp (°C)	Liquid Temp (°C)	Input Power (W)	Measured SAR 1 g	Target SAR 1 g (1 W)	Normalized SAR 1 g (1 W)	Deviation (%)	Date
D2600V2 S/N: 1038	2600	Body	21.9	22.2	0.10	**5.63 W/kg**	56.4 W/kg	**56.3 W/kg**	**-0.18**	2011-11-08
D2600V2 S/N: 1038	2600	Body	21.9	22.0	0.10	**5.60 W/kg**	56.4 W/kg	**56.0 W/kg**	**-0.71**	2011-11-09

<Table 1> Results system validation

1.11 Tissue Simulant Fluid for the Frequency Band

The dielectric properties for this simulant fluid were measured by using the Agilent Model 85070D Dielectric Probe (rates frequency band 200 MHz to 20 GHz) in conjunction with Agilent E5070B Network Analyzer (300 KHz - 3 GHz) by using a procedure detailed in Section V.

f (MHz)	Tissue type	Limits / Measured	Dielectric Parameters		
			Permittivity	Conductivity	Simulated Tissue Temp(℃)
2506	Body	Measured, 2011-11-08	**53.1**	**2.06**	22.2
		Recommended Limits	52.6	2.03	21.0 ~ 23.0
		Deviation(%)	0.95	1.48	-
2593	Body	Measured, 2011-11-08	**52.8**	**2.19**	22.2
		Recommended Limits	52.5	2.16	21.0 ~ 23.0
		Deviation(%)	0.57	1.39	-
2600	Body	Measured, 2011-11-08	**52.8**	**2.19**	22.2
		Recommended Limits	52.5	2.16	21.0 ~ 23.0
		Deviation(%)	0.57	1.39	-
2685	Body	Measured, 2011-11-08	**52.4**	**2.28**	22.2
		Recommended Limits	52.4	2.28	21.0 ~ 23.0
		Deviation(%)	0	0	-
2506	Body	Measured, 2011-11-09	**53.1**	**2.06**	22.0
		Recommended Limits	52.6	2.03	21.0 ~ 23.0
		Deviation(%)	0.95	1.48	-
2593	Body	Measured, 2011-11-09	**52.8**	**2.18**	22.0
		Recommended Limits	52.5	2.16	21.0 ~ 23.0
		Deviation(%)	0.57	0.93	-
2600	Body	Measured, 2011-11-09	**52.7**	**2.19**	22.0
		Recommended Limits	52.5	2.16	21.0 ~ 23.0
		Deviation(%)	0.38	1.39	-
2685	Body	Measured, 2011-11-09	**52.4**	**2.28**	22.0
		Recommended Limits	52.4	2.28	21.0 ~ 23.0
		Deviation(%)	0	0	-

<Table 2>

The composition of the brain tissue simulating liquid

The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

Ingredients (% by weight)	Frequency (MHz)										
	450		835		915		1900		2450		2600
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2	73.2
Salt (NaCl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04	0.05
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	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
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.1	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	0.0
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7	27.2
Dielectric Constant	43.42	58.0	42.54	56.1	42.0	56.8	39.9	54.0	39.8	52.5	52.5
Conductivity (S/m)	0.85	0.83	0.91	0.95	1.0	1.07	1.42	1.45	1.88	1.78	2.16

<Table 3>

Salt: 99 $^{+}$% Pure Sodium Chloride Sugar: 98 $^{+}$% Pure Sucrose

Water: De-ionized, 16 $M\Omega^{+}$ 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

1.12 Test Standards and Limits

According to FCC 47CFR §2.1093(d) The limits to be used for evaluation are based generally on criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate (‘‘SAR’’) in Section 4.2 of ‘‘IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz,’’ ANSI/IEEE C95.3–2003, Copyright 2003 by the Institute of Electrical and Electronics Engineers, Inc., New York, New York 10017. 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, Section 17.4.5. Copyright NCRP, 1986, Bethesda, Maryland 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. The criteria to be used are specified in paragraphs (d)(1) and (d)(2) of this section and shall apply for portable devices transmitting in the frequency range from 100 kHz to 6 GHz. Portable devices that transmit at frequencies above 6 GHz are to be evaluated in terms of the MPE limits specified in § 1.1310 of this chapter. Measurements and calculations to demonstrate compliance with MPE field strength or power density limits for devices operating above 6 GHz should be made at a minimum distance of 5 cm from the radiating source.

(1) Limits for Occupational/Controlled exposure: 0.4 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 8 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 20 W/kg, as averaged over an 10 grams of tissue (defined as a tissue volume in the shape of a cube). Occupational/Controlled limits apply when persons are exposed as a consequence of their employment provided these persons are fully aware of and exercise control over their exposure. Awareness of exposure can be accomplished by use of warning labels or by specific training or education through appropriate means, such as an RF safety program in a work environment.

(2) Limits for General Population/Uncontrolled exposure: 0.08 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 1.6 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 4 W/kg, as averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube). General Population/Uncontrolled limits apply when the general public may be exposed, or when persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or do not exercise control over their exposure. Warning labels placed on consumer devices such as cellular telephones will not be sufficient reason to allow these devices to be evaluated subject to limits for occupational/controlled exposure in paragraph (d)(1) of this section.(Table .4)

Human Exposure	**Uncontrolled Environment General Population**	**Controlled Environment Occupational**
Partial Peak SAR (Partial)	1.60 m W/g	8.00 m W/g
Partial Average SAR (Whole Body)	0.08 m W/g	0.40 m W/g
Partial Peak SAR (Hands/Feet/Ankle/Wrist)	4.00 m W/g	20.00 m W/g

<Table 4> RF exposure limits

1.13 Test Configuration Positions

KDB 447498 D02 SAR Procedures for Dongle Xmtr v02 _Nov. 2009

The procedures are intended for USB dongle transmitters with internal antennas.

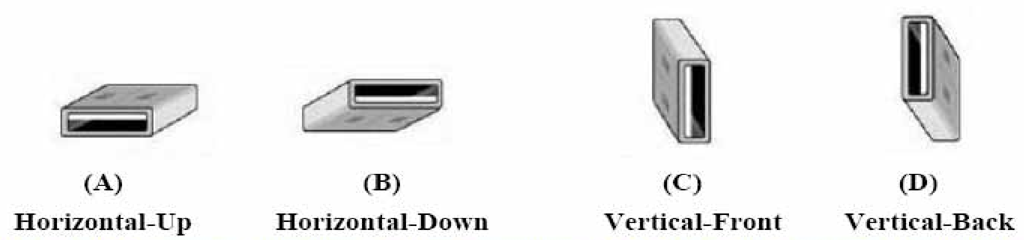
<Simple Dongle Procedures>

Test all USB orientations [see figure below] with a device-to-phantom separation distance of 5mm or less, according to KDB 447498 requirements. These test orientations are intended for the exposure conditions found in typical laptop/notebook/netbook or tablet computers with either horizontal or vertical USB connector configurations at various locations in the keyboard section of the computer. Current generation portable host computers should be used to establish the required SAR measurement separation distance. The same test separation distance must be used to test all frequency bands and modes in each USB orientation. The typical Horizontal-Up USB connection (A), found in the majority of host computers, must be tested using an appropriate host computer. A host computer with either Vertical-Front (C) or Vertical-Back (D) USB connection should be used to test one of the vertical USB orientations. If a suitable host computer is not available for testing the Horizontal-Down (B) or the remaining vertical USB orientation, a high quality USB cable, 12 inches or less, may be used for testing these other orientations. It must be documented that the USB cable does not influence the radiating characteristics and output power of the transmitter.

<Other SAR Test Considerations>

Dongles with certain spacers, contours or tapering added to the housing should generally be tested according to the 5 mm test separation requirement required for simple dongles, which is based on overall host platform, device and user operating configurations and exposure conditions of a peripheral device as compared to individual use conditions.

USB dongle transmitters must show compliance at a test separation distance of 5 mm. When the SAR is ≥ 1.2 W/kg, applications for equipment certification require a PBA for TCB approval. When the SAR is ≥ 1.2 W/kg, especially for SAR > 1.5 W/kg, certain caution statements, labels and other means to ensure compliance may be required.



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

USB Connector Orientations Implemented on Laptop Computers

**Please refer to the test setup photographs file for understanding real setup position.

1.14 Description of Supported Units

The EUT has been tested with other necessary accessories or supported units. The following supported units or accessories were used to perform SAR tests for this device.

-Supported Units

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Laptop (Horizontal case)	Fujitsu	S7111	R7700328	FCC Doc Approved
2	Laptop (Vertical case)	Lenovo	LVK-MLBLGN7658(B)	R8-CYYV2	FCC Doc Approved
3	Vector Signal Generator	Rohde Schwarz	SMJ100A	100882	N/A
4	WiMax CM Test Tool	GCT	N/A	V3.27.0.0	N/A

-Accessory

NO.	USB Cable(Length)
1	USB Extension Cable (30 cm)

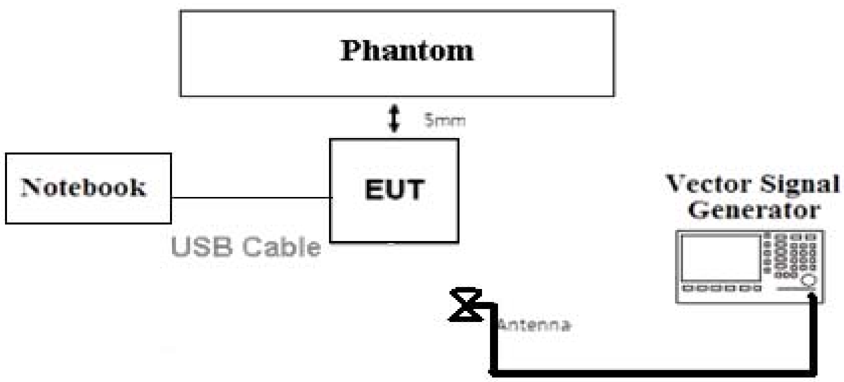
1.15 WiMAX DEVICE & SYSTEM OPERATION PARAMETERS

Description	Parameter	Comment
FCC ID	V7MSWU-3400AN	Identify all related FCC ID
Radio Service	FCC Part 27	Rule parts
Transmit Frequency Range (MHz)	2506 MHz-2685 MHz (5 &10MHz BW)	System parameter
System/Channel Bandwidth (MHz)	5 MHz / 10 MHz	System parameter
System Profile	Release 1.0 (Revision 1.7.1 2008)Band Class 3 Radio Profile 3A	Defined by WiMAX Forum
Modulation Schemes	QPSK, 16QAM	Identify all applicable UL modulations
Sampling Factor	28/25	System parameter
Sampling Frequency (MHz)	5 MHZ BW:5.6MHz 10MHz BW:11.2MHz	(Fs)
Sample Time (ns)	5MHz BW:178usec 10MHz BW:89.3usec	(1/Fs)
FFT Size (NFFT)	5MHz BW:512 10MHz BW:1024	(NFFT)
Sub-Carrier Spacing (kHz)	5MHz BW:10.9kHz 10MHz BW:10.9kHz	(If)
Useful Symbol time (as)	Symbol timing (NOT including guard time): 91.43us	(Tb=1/Δf)
Guard Time (as)	1/8 symbol:11.43us	(Tag=Tb/cp); cp = cyclic prefix
OFDMA Symbol Time (as)	102.86usec	(Ts=Tibet)
Frame Size (ms)	5 ms	System parameter
TTG + RTG (as or number of symbols)	165.7usec	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 Ratio	29/18	Identity all applicable DL:UL ratios; used to determine UL duty factor
Power Class (dBm)	Power Class 2, 23 ± 0.7 dBm	Identify power class and tolerance
Wave1 / Wave2	Wave 2, 2Rx+1Tx Diversity	Describe antenna diversity info and MIMO requirements separately
UL Zone Types (FUSC, PUSC, OFUSC, OPUSC, AMC, TUSC1, TUSC2)	PUSC, AMC	Describe separately the symbol and sub-carrier/sub-channel structures applicable to each zone type

Maximum Number of UL Sub- Carriers	10MHz PUSC : 840 10MHz AMC : 864	5MHz PUSC : 408 5MHz AMC : 432	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 AMC_QPSK1/2: 23.65 dBm 10 MHz AMC_16QAM1/2: 23.55 dBm			
Number and type of UL Control Symbols	3 PUSC symbols (used for ranging, CQICH and ACK/NACK)			
UL Control Symbol Maximum Average Power	5MHz BW : 68.16 mW	10MHz BW:32.35 mW	**Cal**	231.74mW x 5/17= 68.16 mW 226.46mW x 5/35= 32.35 mW
UL Burst Peak-to-Average Power Ratio (PAR)	Average, peak and PAR are measured simultaneously and presented in the measurement plots. PAR ratio is 7.19~7.96 dB		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(Crest Factor)= 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	

1.16 Information of Test Equipment and Measurement Results

The WiMAX CM test tool and DM is used on the laptop. The WiMAX CM test tool is used to instruct the USB Dongle to go full power. The SWU-3400AN (EUT) is plugged to the USB port of the notebook using the USB extension cable (30cm). The WiMAX CM test tool on the laptop should be required for the SAR testing to control The Maximum Transmitting power, frequency selection and TX/RX status.

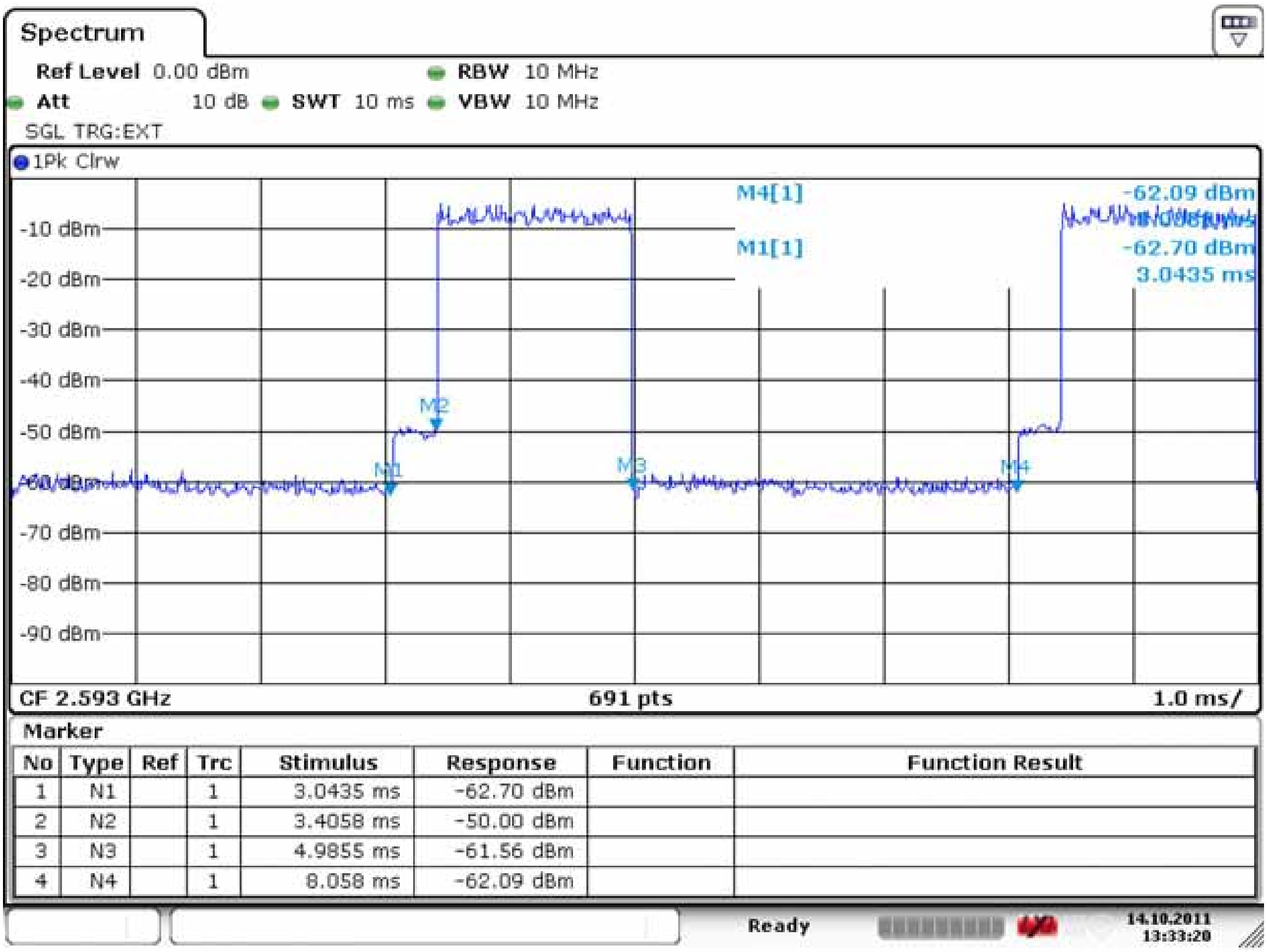


<SAR Test Setup Diagram>

1.17 Duty Cycle and Time Vector slot

-Test Condition

Channel	Modulation	Bandwidth	Zone Type
Middle	QPSK 1/2	5 MHz	PUSC



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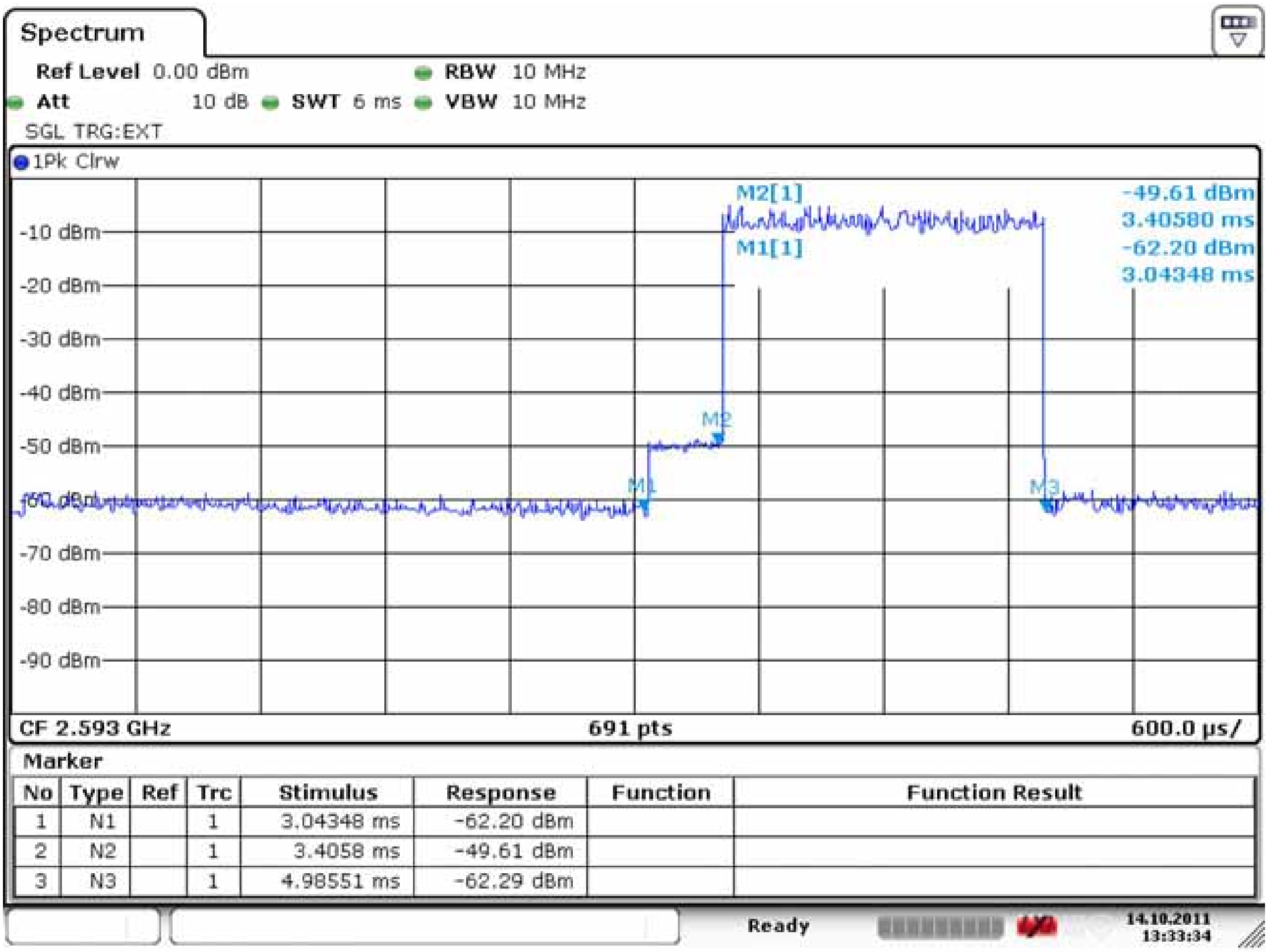


Date: 14.OCT.2011 13:33:34

<Plot 2>

-Duty Cycle Calculation

Bust length (Plot 1) = Mark 4 – Mark 1 = 8.058 ms – 3.044 ms = 5 ms
15 symbols UL time (Plot 2) = Mark 3 – Mark 2 = 4.986 ms – 3.406 ms = 1.58 ms

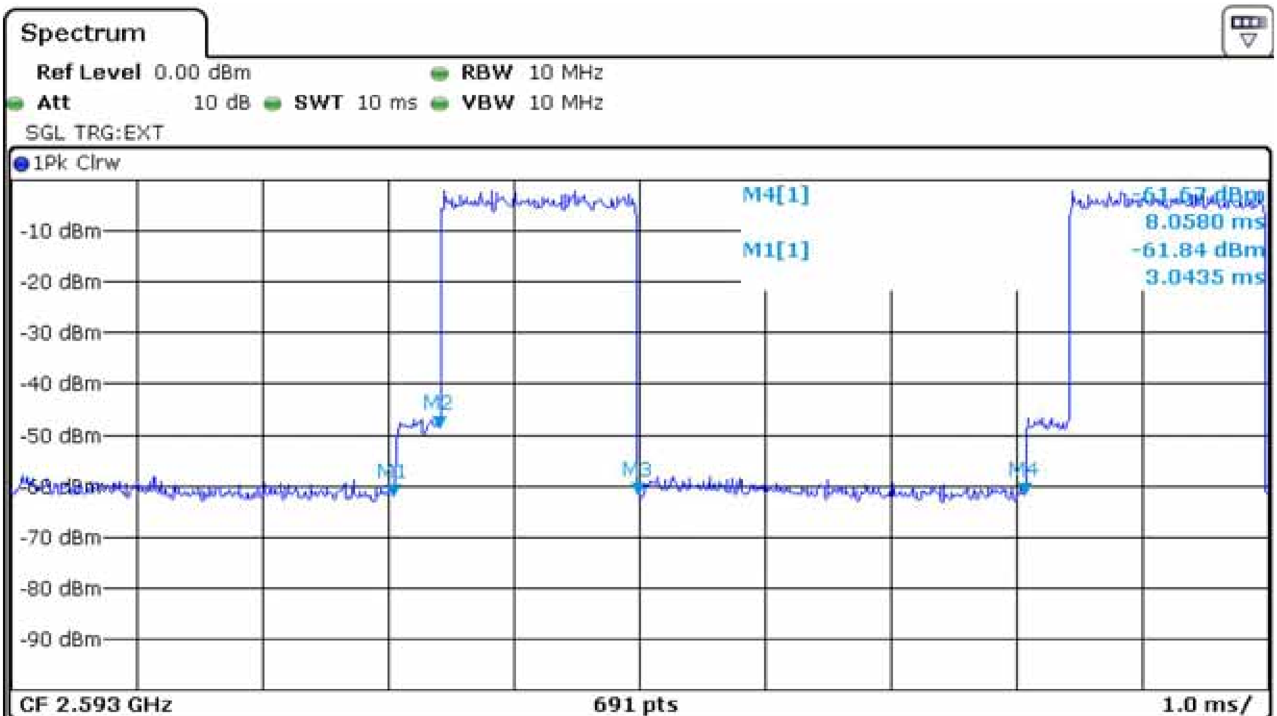
Duty Cycle = 15 symbols UL time / (frame length x 100%)
= 1.58 / (5 x 100%)
= **31.6** %

Duty Factor = 15 * 102.86us / 5000us
= **30.86** %

CF (Crest Factor) = 5000 us/15*102.857 us
= **3.24**

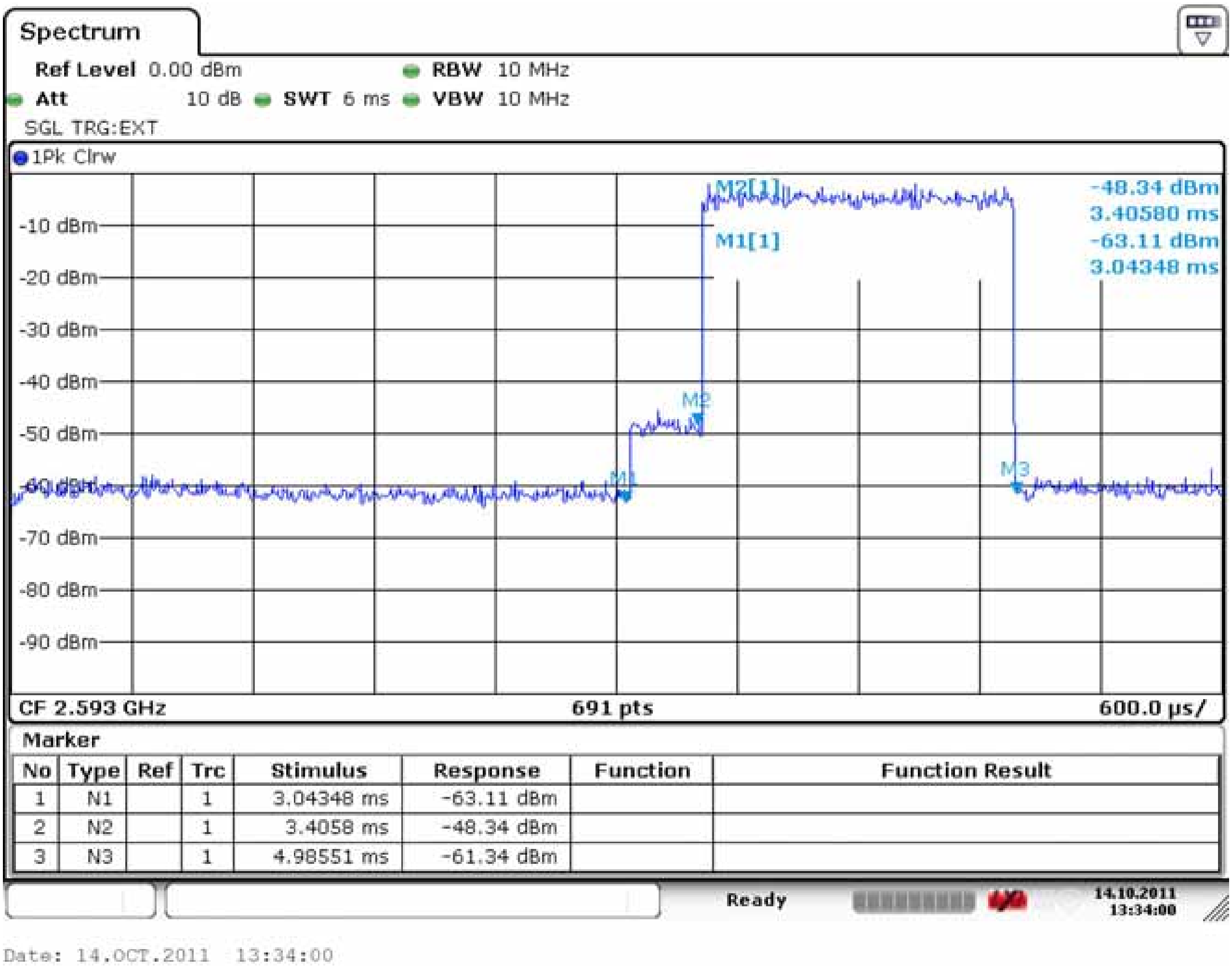
-Test Condition

Channel	Modulation	Bandwidth	Zone Type
Middle	QPSK 3/4	5 MHz	PUSC



No	Type	Ref	Trc	Stimulus	Response	Function	Function Result
1	N1		1	3.0435 ms	-61.84 dBm		
2	N2		1	3.4058 ms	-48.47 dBm		
3	N3		1	4.9855 ms	-61.74 dBm		
4	N4		1	8.058 ms	-61.67 dBm		

<Plot 1>



<Plot 2>

-Duty Cycle Calculation

Bust length (Plot 1) = Mark 4 – Mark 1 = 8.058 ms – 3.044 ms = 5 ms
15 symbols UL time (Plot 2) = Mark 3 – Mark 2 = 4.986 ms – 3.406 ms = 1.58 ms

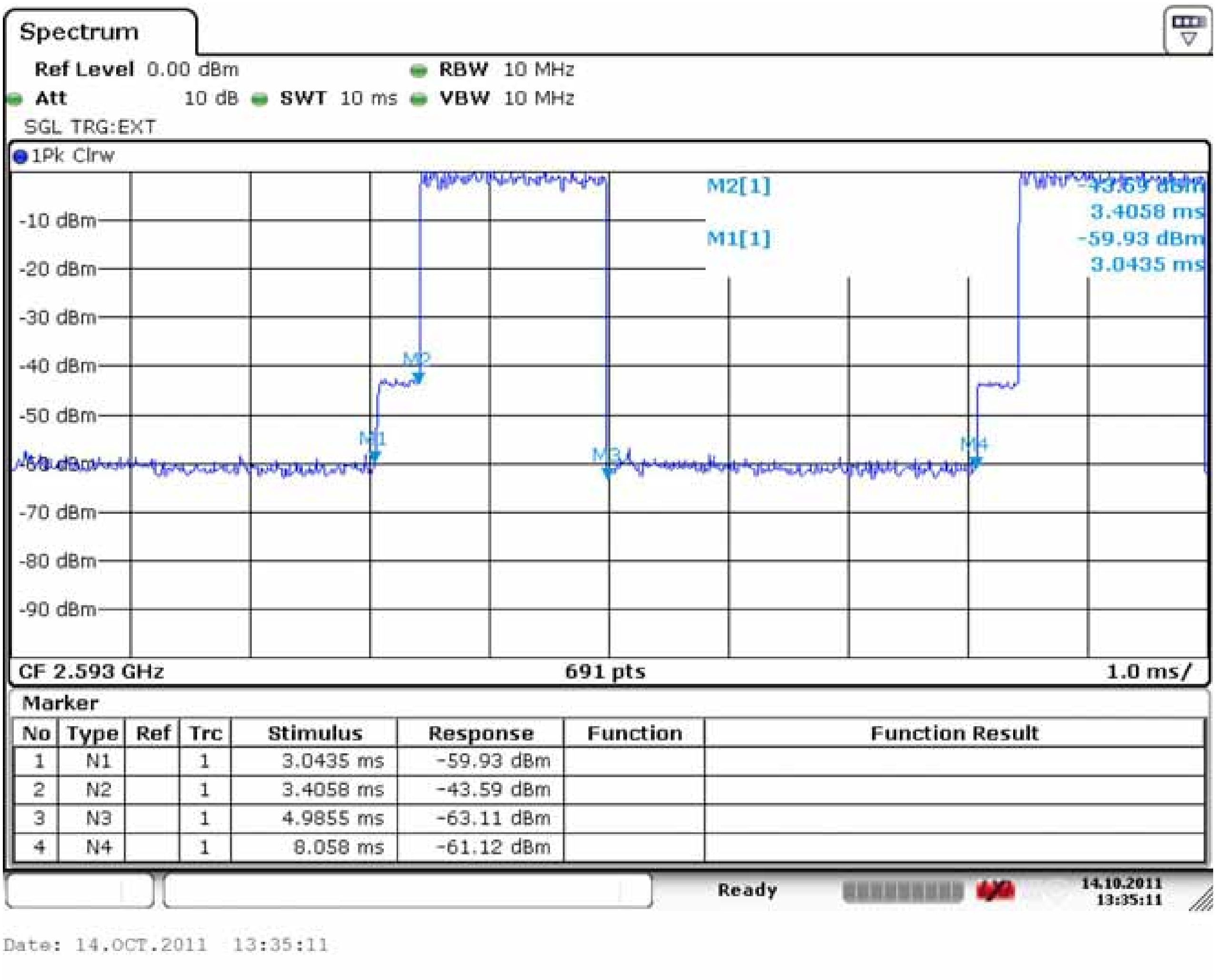
Duty Cycle = 15 symbols UL time / (frame length x 100%)
= 1.58 / (5 x 100%)
= **31.6** %

Duty Factor = 15 * 102.86us / 5000us
= **30.86** %

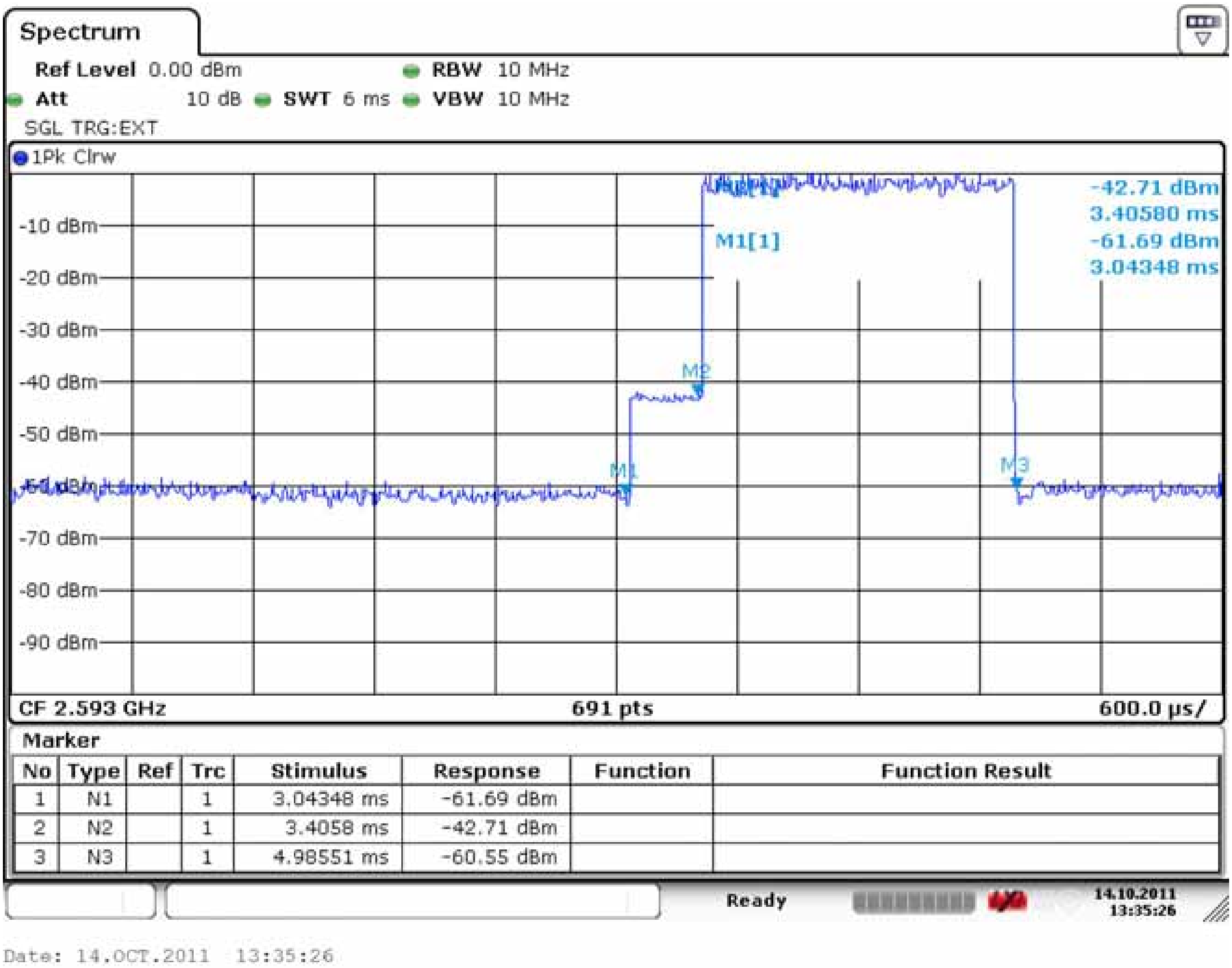
CF (Crest Factor) = 5000 us/15*102.857 us
= **3.24**

-**Test Condition**

Channel	Modulation	Bandwidth	Zone Type
Middle	16QAM 1/2	5 MHz	PUSC



<Plot 1>



<Plot 2>

-<u>Duty Cycle Calculation</u>

Bust length (Plot 1) = Mark 4 – Mark 1 = 8.058 ms – 3.044 ms = 5 ms
15 symbols UL time (Plot 2) = Mark 3 – Mark 2 = 4.986 ms – 3.406 ms = 1.58 ms

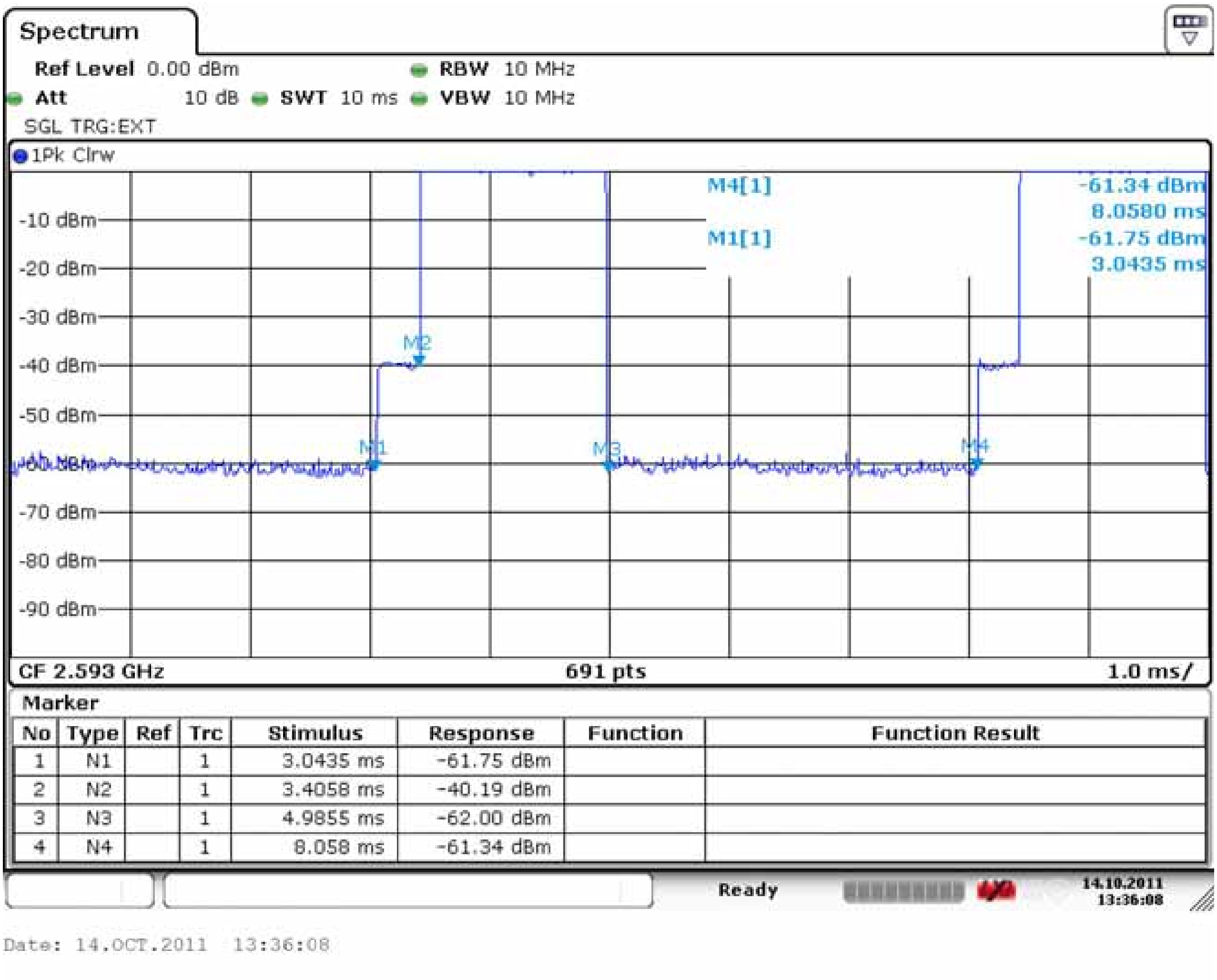
Duty Cycle = 15 symbols UL time / (frame length x 100%)
= 1.58 / (5 x 100%)
= **31.6** %

Duty Factor = 15 * 102.86us / 5000us
= **30.86** %

CF (Crest Factor) = 5000 us/15*102.857 us
= **3.24**

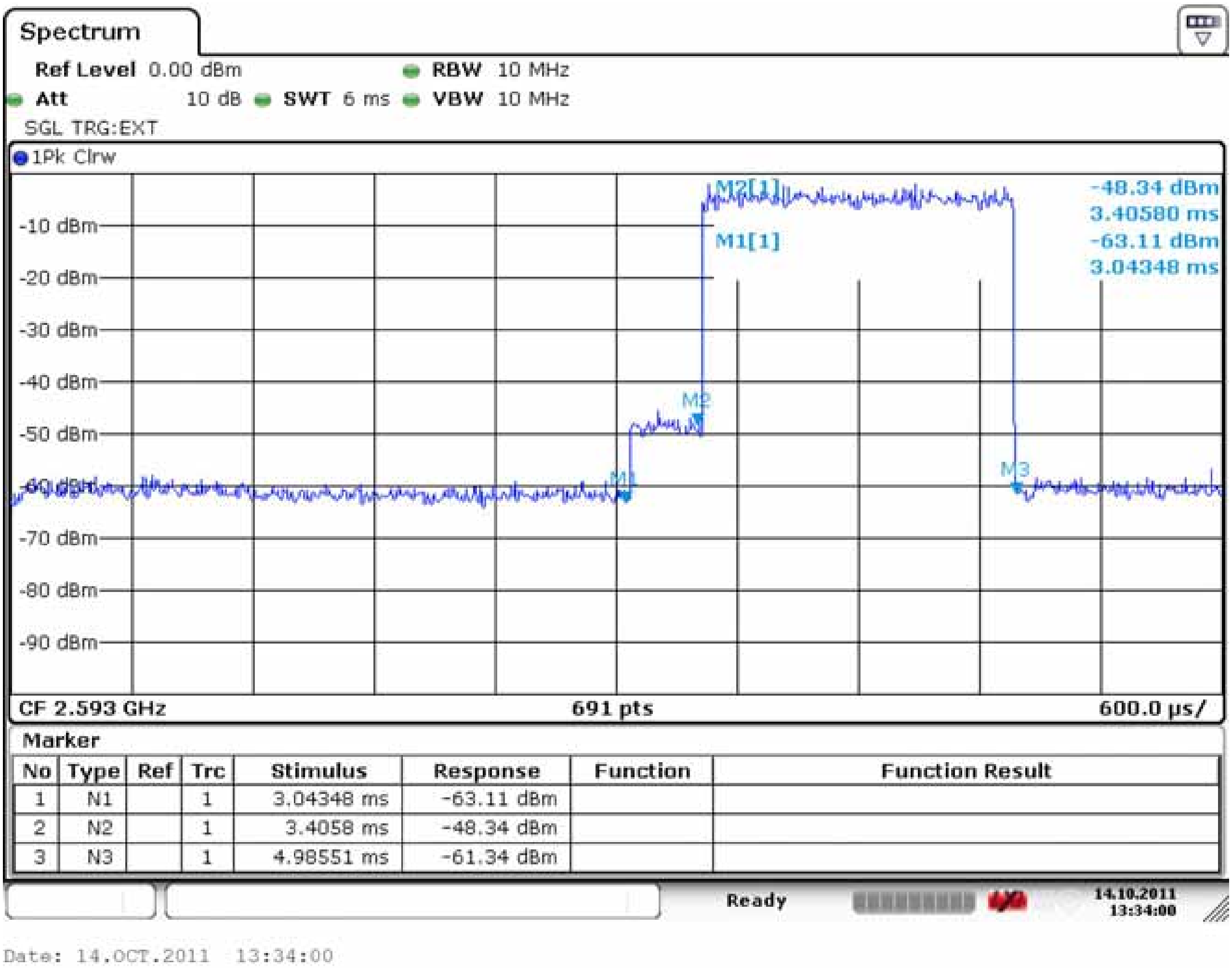
-Test Condition

Channel	Modulation	Bandwidth	Zone Type
Middle	16QAM 3/4	5 MHz	PUSC



No	Type	Ref	Trc	Stimulus	Response	Function	Function Result
1	N1		1	3.0435 ms	-61.75 dBm		
2	N2		1	3.4058 ms	-40.19 dBm		
3	N3		1	4.9855 ms	-62.00 dBm		
4	N4		1	8.058 ms	-61.34 dBm		

<Plot 1>



<Plot 2>

-**Duty Cycle Calculation**

Bust length (Plot 1) = Mark 4 – Mark 1 = 8.058 ms – 3.044 ms = 5 ms
15 symbols UL time (Plot 2) = Mark 3 – Mark 2 = 4.986 ms – 3.406 ms = 1.58 ms

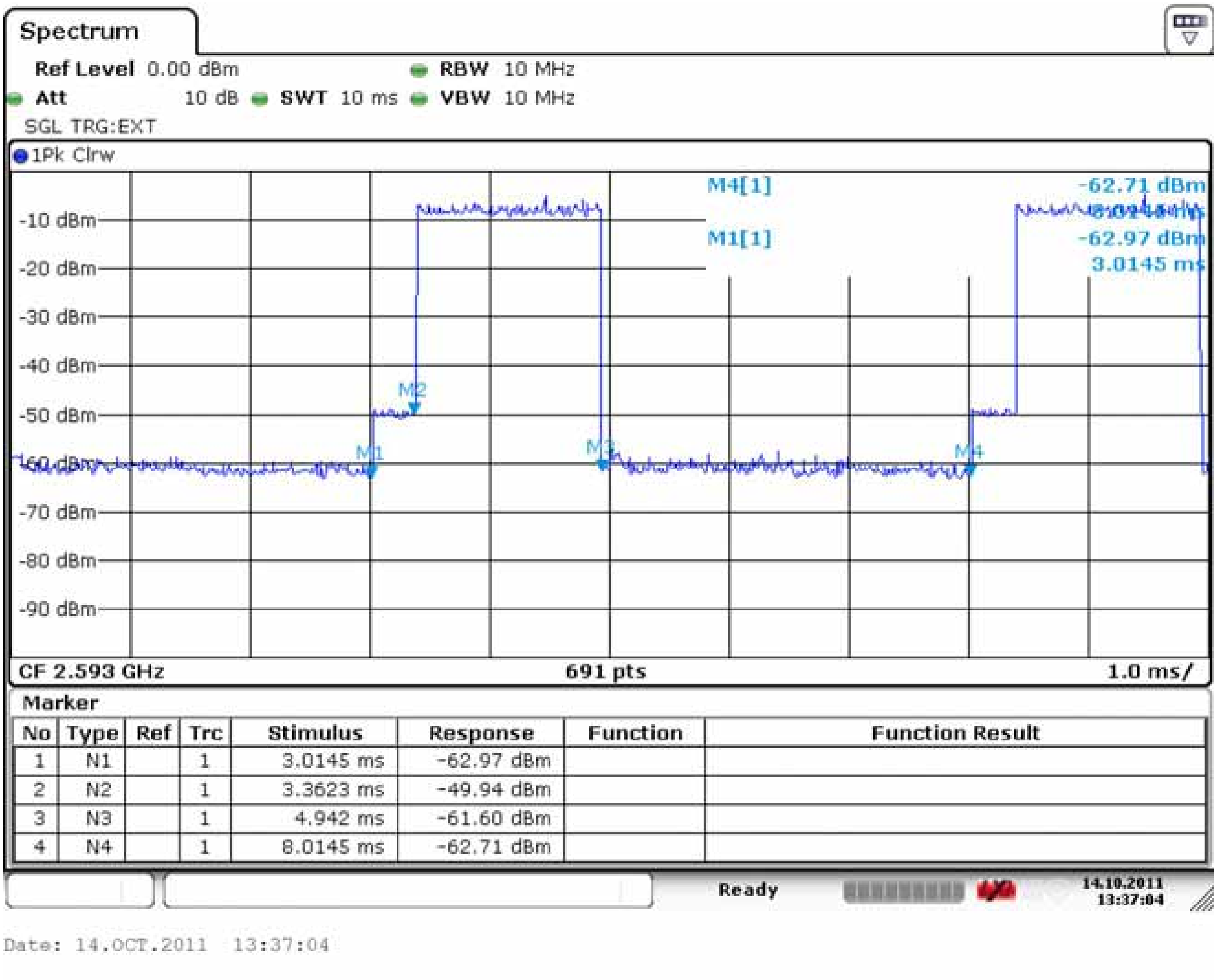
Duty Cycle = 15 symbols UL time / (frame length x 100%)
= 1.58 / (5 x 100%)
= **31.6** %

Duty Factor = 15 * 102.86us / 5000us
= **30.86** %

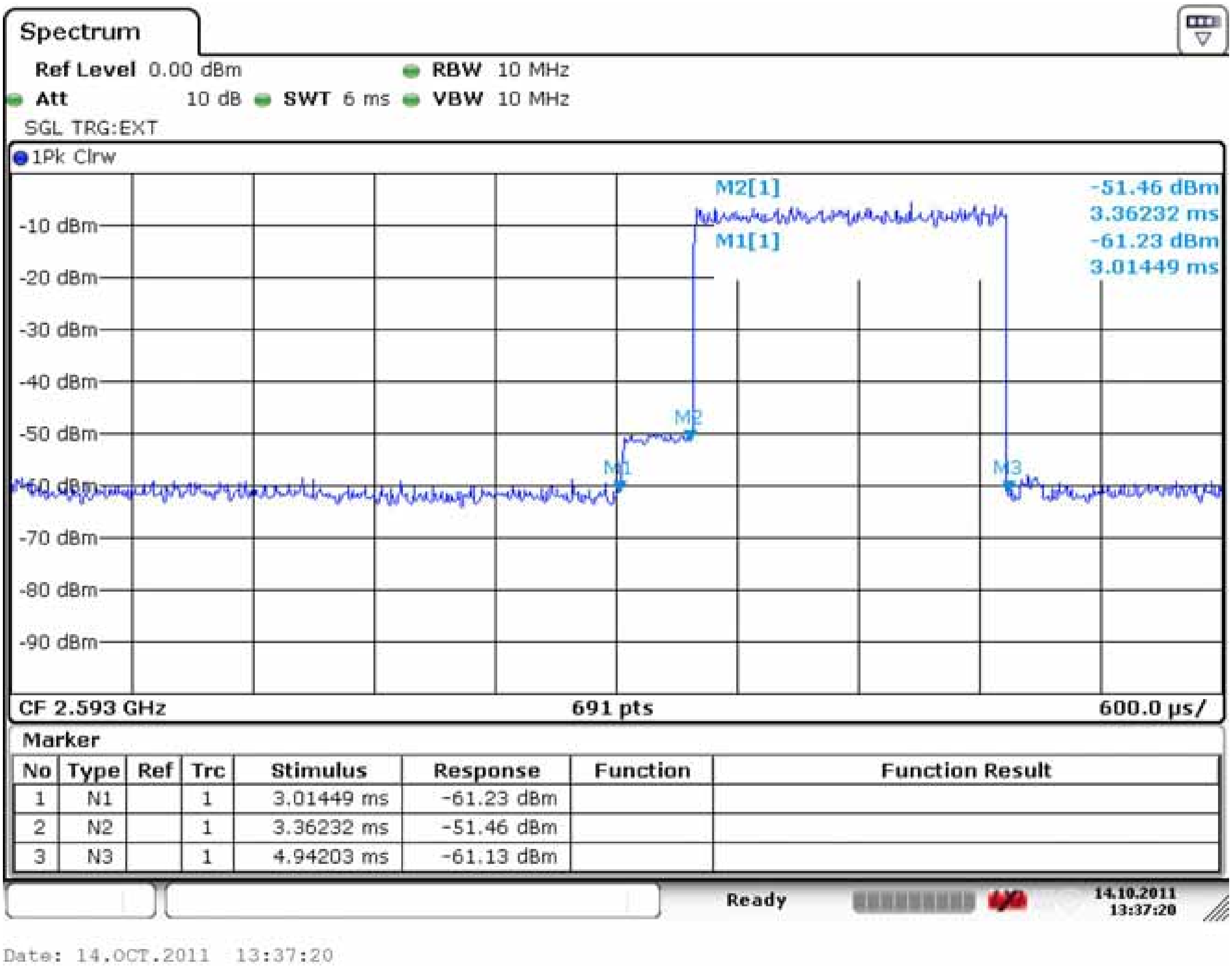
CF (Crest Factor) = 5000 us/15*102.857 us
= **3.24**

-Test Condition

Channel	Modulation	Bandwidth	Zone Type
Middle	QPSK 1/2	10 MHz	PUSC



<Plot 1>



<Plot 2>

-Duty Cycle Calculation

Bust length (Plot 1) = Mark 4 – Mark 1 = 8.016 ms – 3.016 ms = 5 ms
15 symbols UL time (Plot 2) = Mark 3 – Mark 2 = 4.942 ms – 3.362 ms = 1.58 ms

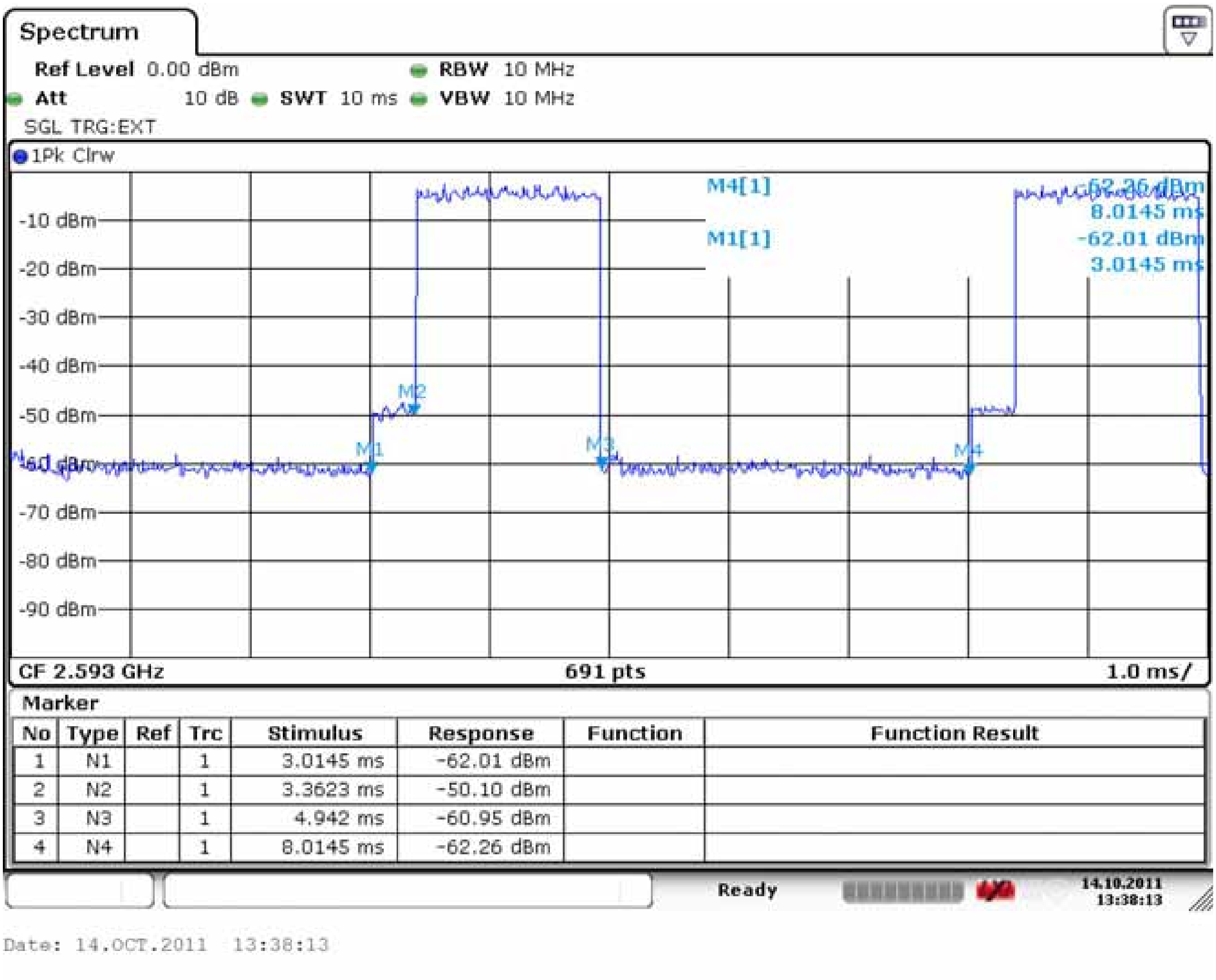
Duty Cycle = 15 symbols UL time / (frame length x 100%)
= 1.58 / (5 x 100%)
= **31.6** %

Duty Factor = 15 * 102.86us / 5000us
= **30.86** %

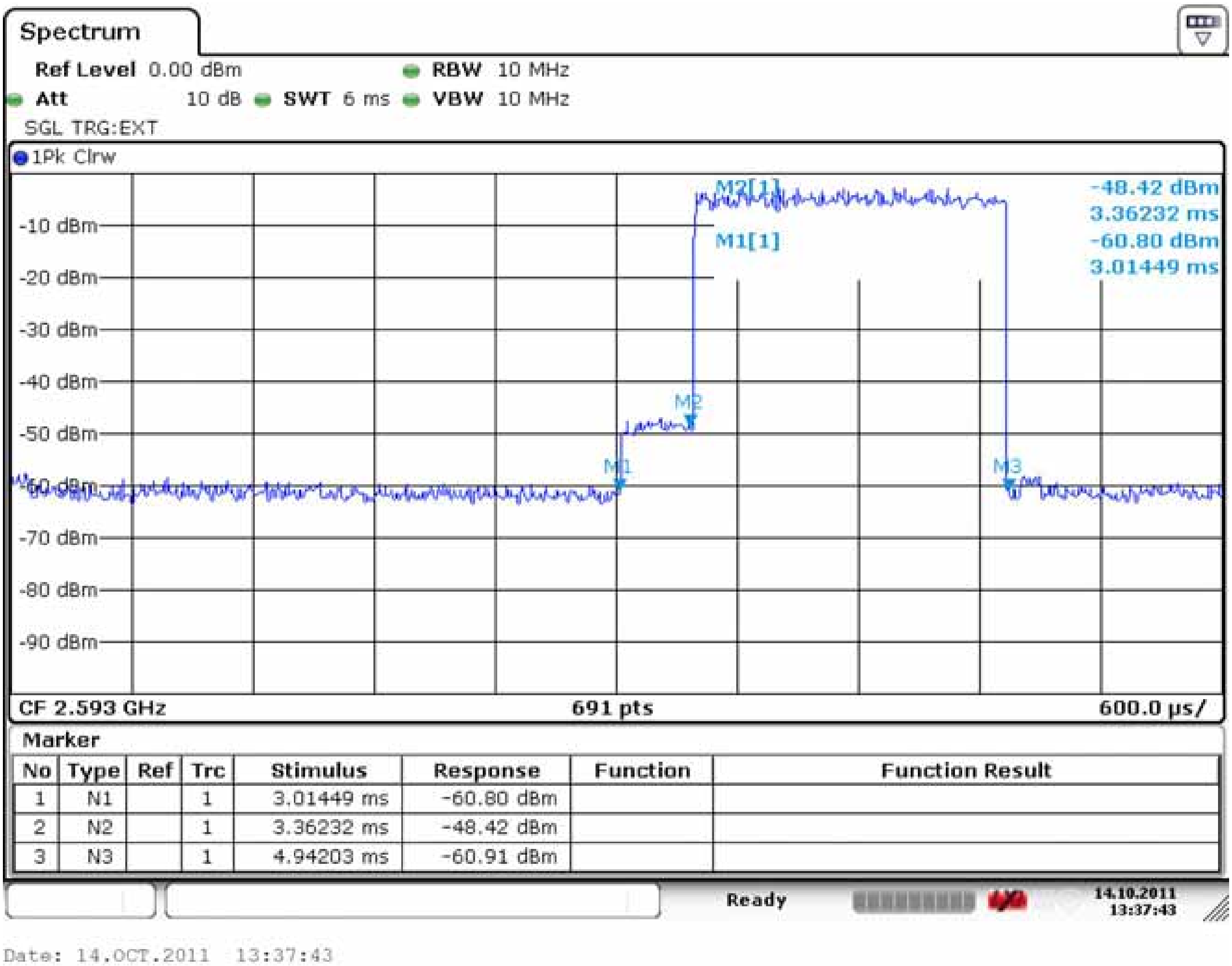
CF (Crest Factor) = 5000 us/15*102.857 us
= **3.24**

-Test Condition

Channel	Modulation	Bandwidth	Zone Type
Middle	QPSK 3/4	10 MHz	PUSC



<Plot 1>



<Plot 2>

-<u>Duty Cycle Calculation</u>

Bust length (Plot 1) = Mark 4 – Mark 1 = 8.015 ms – 3.015 ms = 5 ms
15 symbols UL time (Plot 2) = Mark 3 – Mark 2 = 4.942 ms – 3.362 ms = 1.58 ms

Duty Cycle = 15 symbols UL time / (frame length x 100%)
= 1.58 / (5 x 100%)
= **31.6** %

Duty Factor = 15 * 102.86us / 5000us

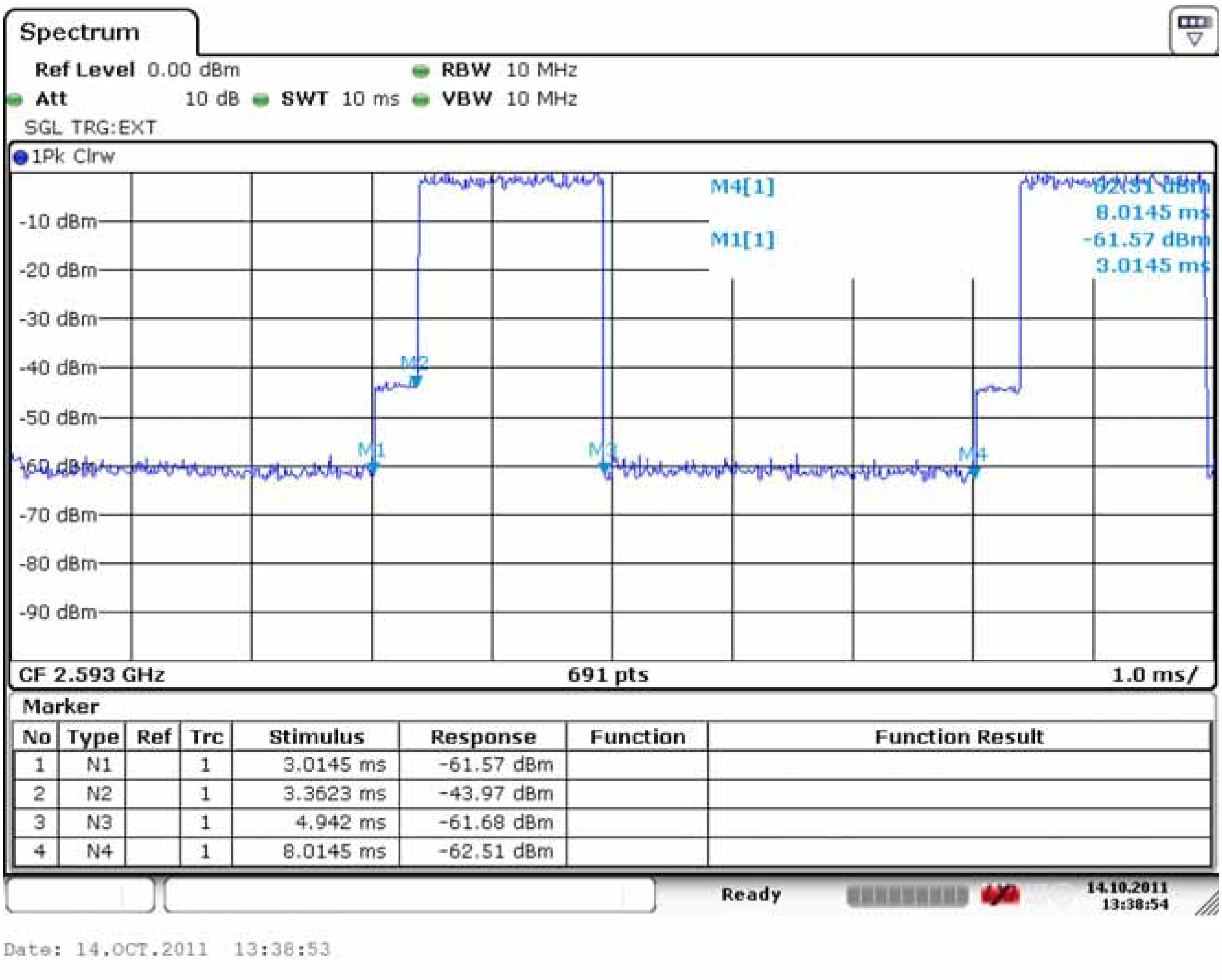
= **30.86** %

CF (Crest Factor) = 5000 us/15*102.857 us

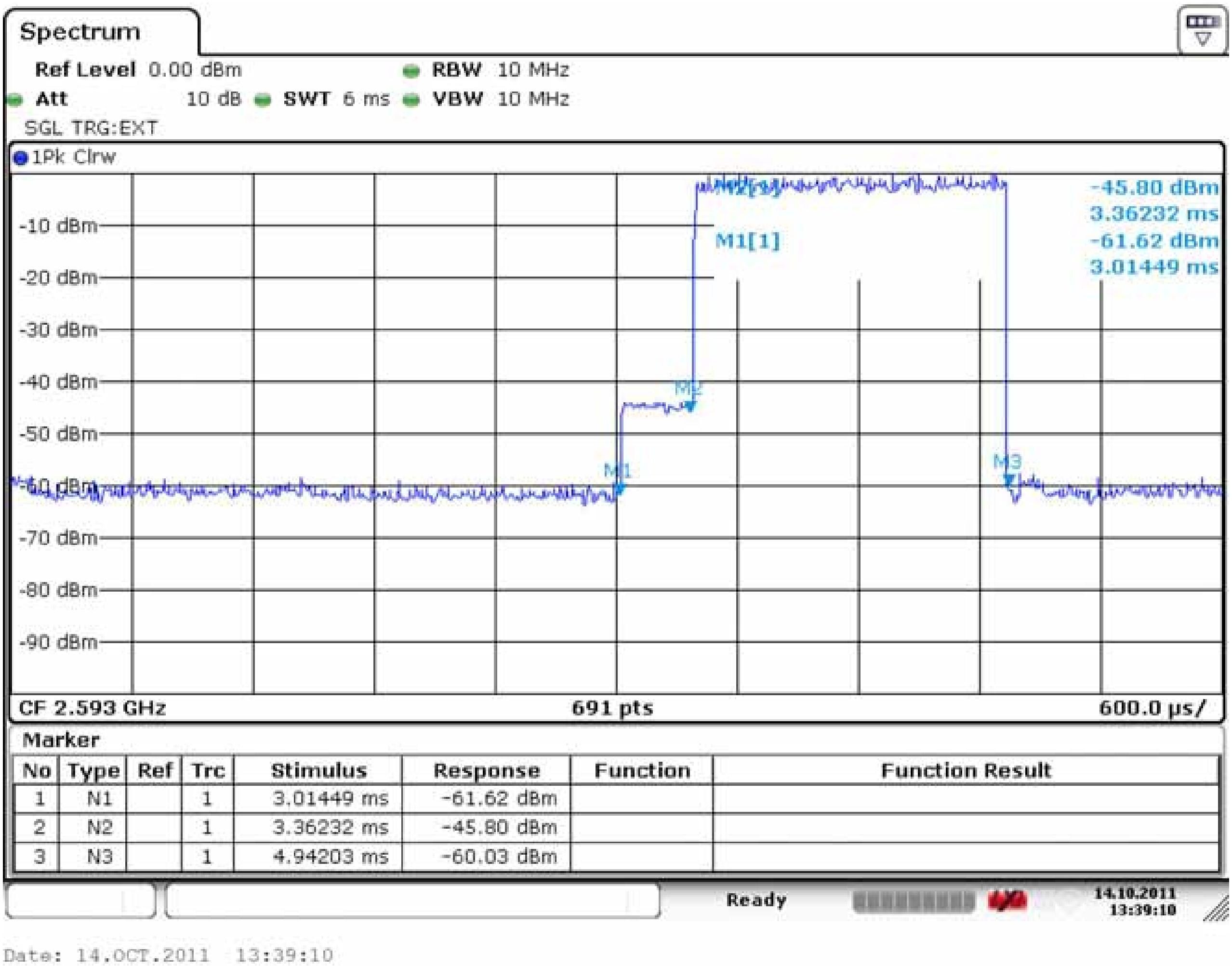
= **3.24**

-**Test Condition**

Channel	Modulation	Bandwidth	Zone Type
Middle	16QAM 1/2	10 MHz	PUSC



<Plot 1>



<Plot 2>

-**<u>Duty Cycle Calculation</u>**

Bust length (Plot 1) = Mark 4 – Mark 1 = 8.015 ms – 3.015 ms = 5 ms
15 symbols UL time (Plot 2) = Mark 3 – Mark 2 = 4.942 ms – 3.362 ms = 1.58 ms

Duty Cycle = 15 symbols UL time / (frame length x 100%)
= 1.58 / (5 x 100%)
= **31.6** %

Duty Factor = 15 * 102.86us / 5000us

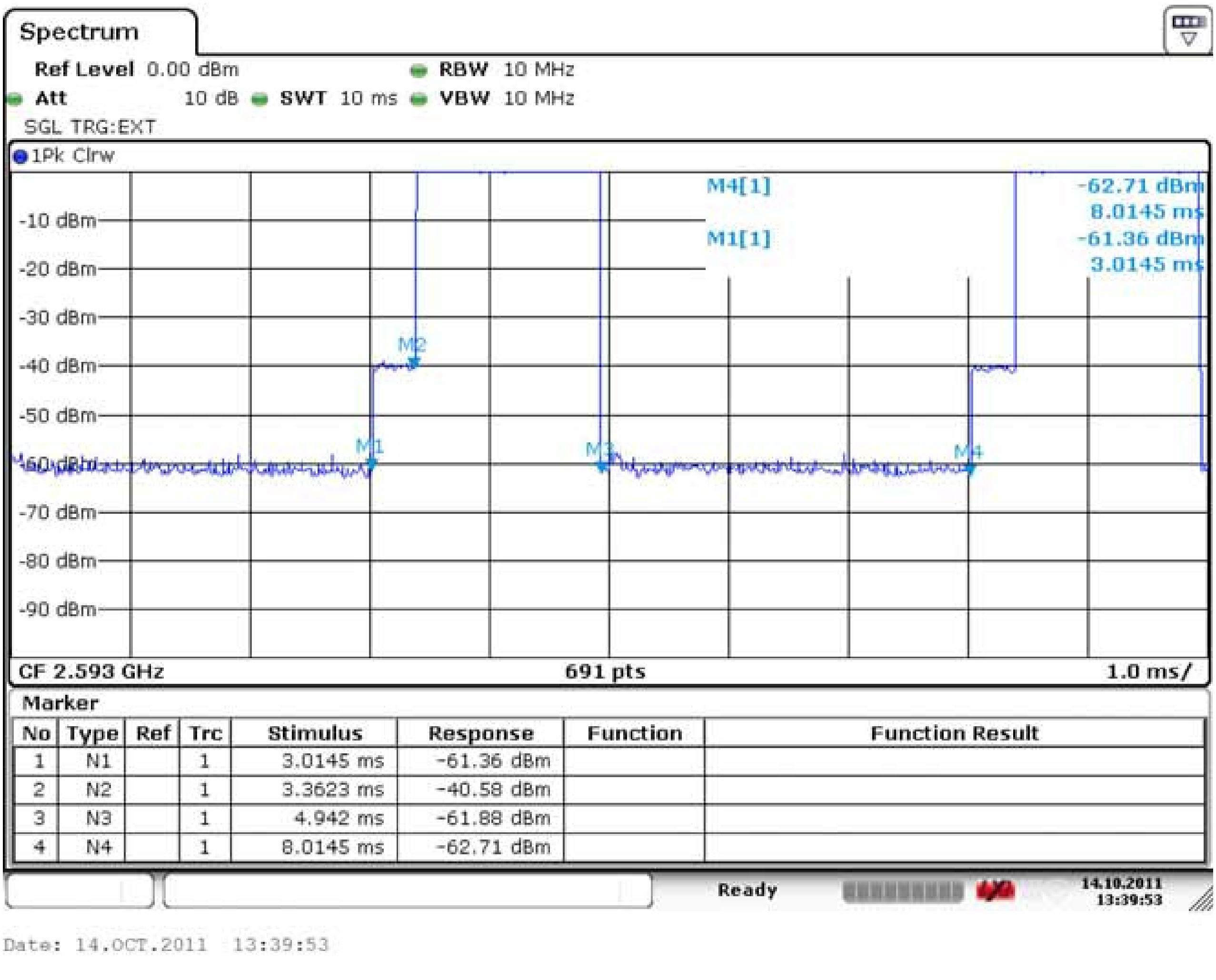
= **30.86** %

CF (Crest Factor) = 5000 us/15*102.857 us

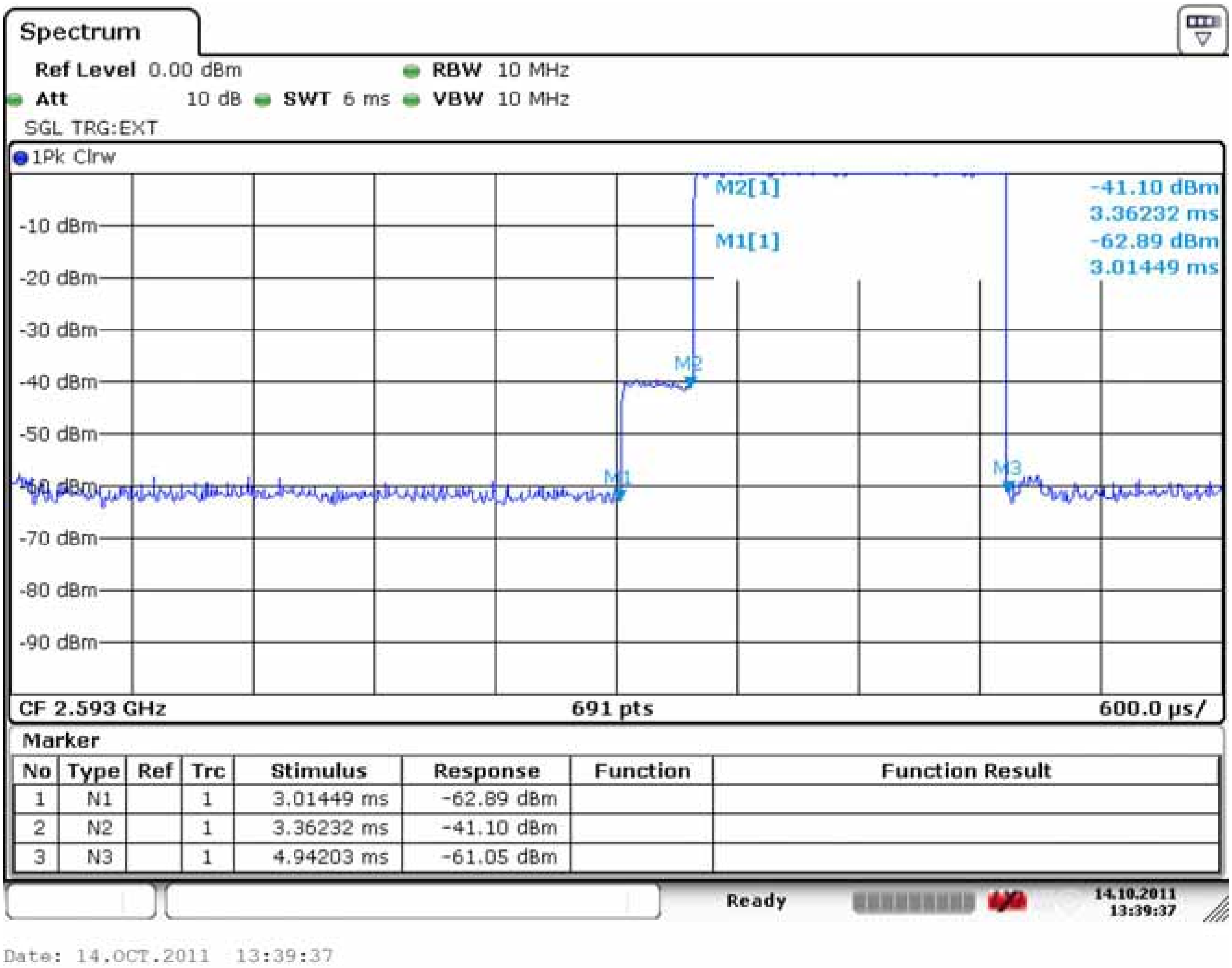
= **3.24**

-Test Condition

Channel	Modulation	Bandwidth	Zone Type
Middle	16QAM 3/4	10 MHz	PUSC



<Plot 1>



<Plot 2>

-**Duty Cycle Calculation**

Bust length (Plot 1) = Mark 4 – Mark 1 = 8.015 ms – 3.015 ms = 5 ms
15 symbols UL time (Plot 2) = Mark 3 – Mark 2 = 4.942 ms – 3.362 ms = 1.58 ms

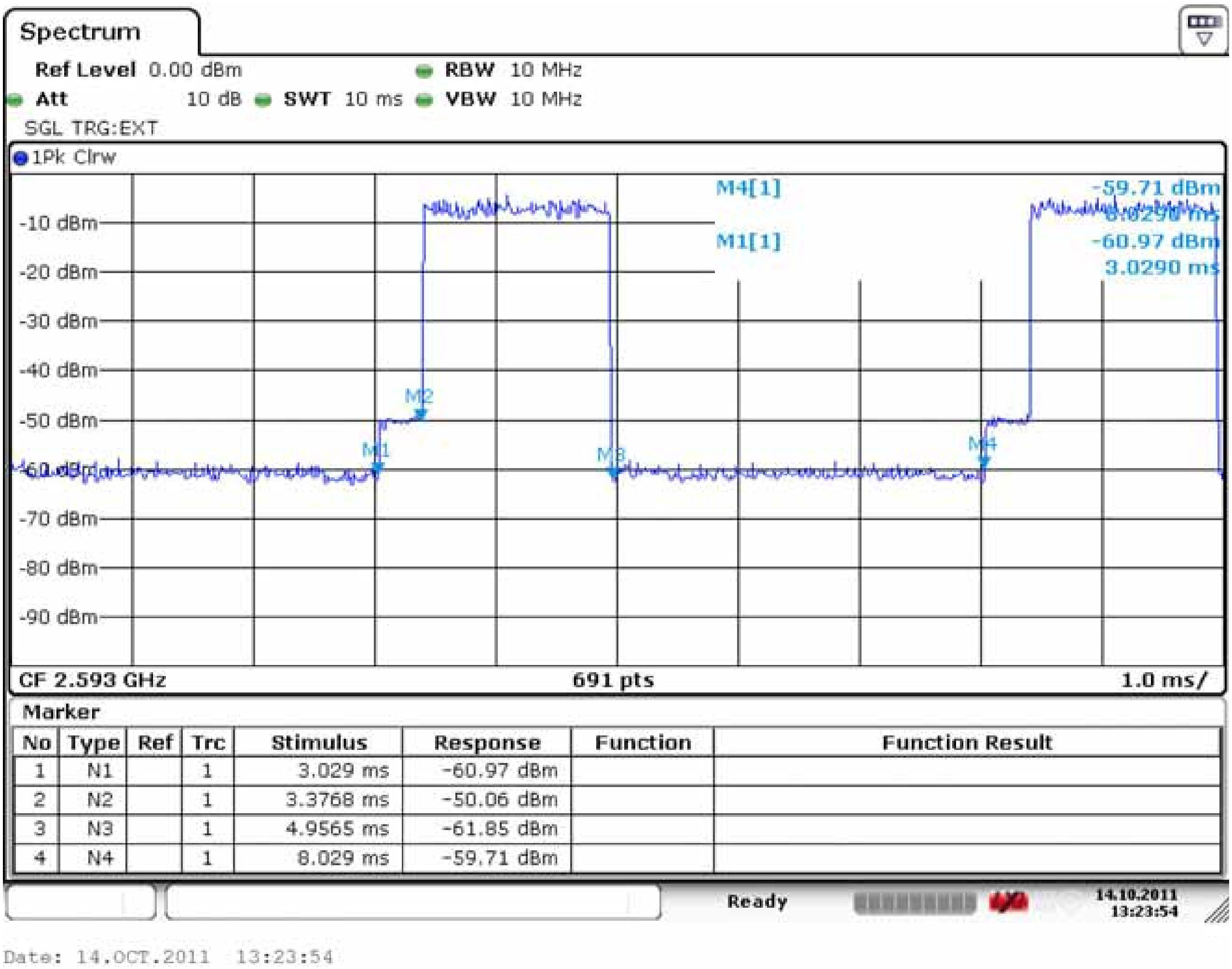
Duty Cycle = 15 symbols UL time / (frame length x 100%)
= 1.58 / (5 x 100%)
= **31.6** %

Duty Factor = 15 * 102.86us / 5000us
= **30.86** %

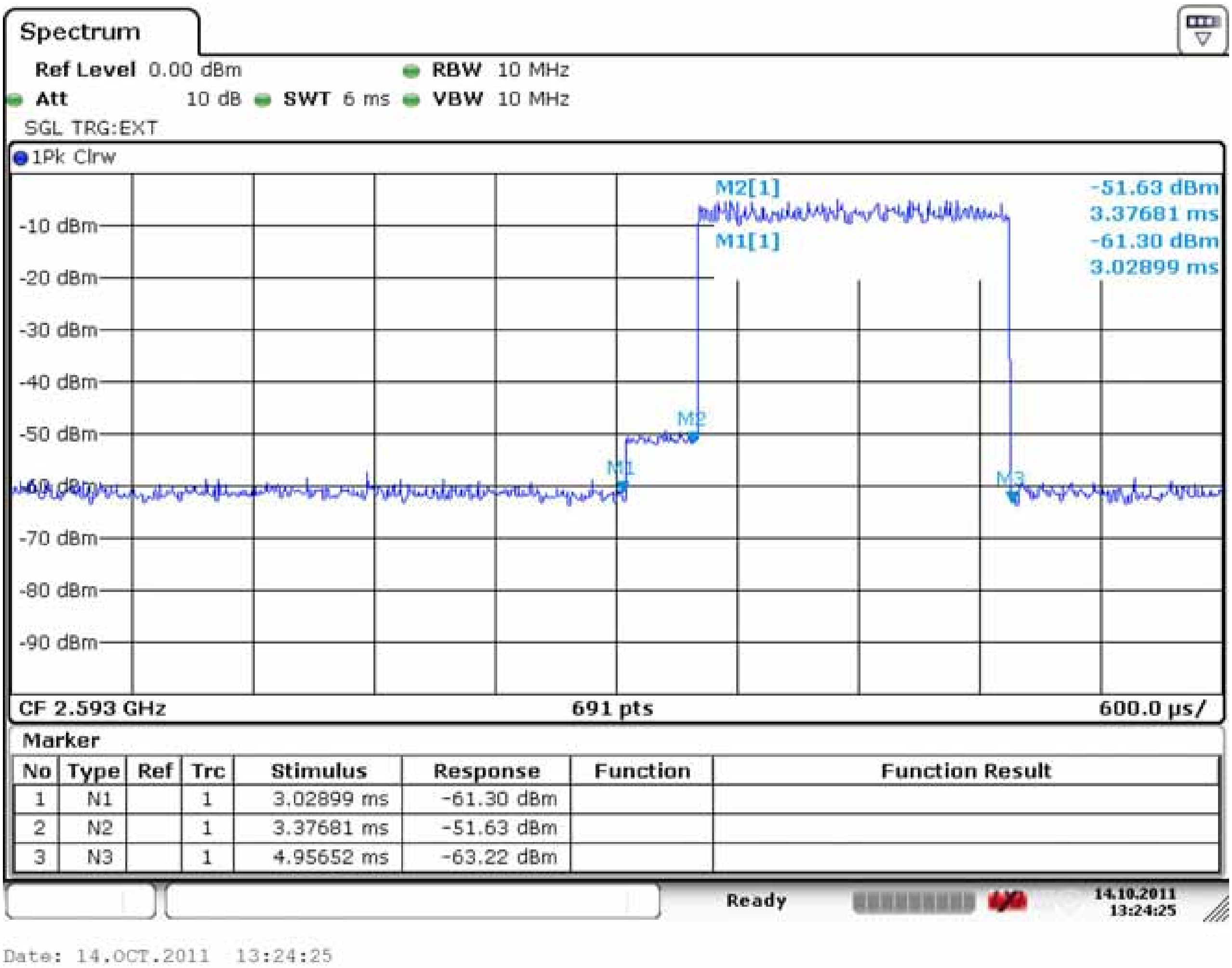
CF (Crest Factor) = 5000 us/15*102.857 us
= **3.24**

-Test Condition

Channel	Modulation	Bandwidth	Zone Type
Middle	QPSK 1/2	5 MHz	AMC



<Plot 1>



<Plot 2>

-Duty Cycle Calculation

Bust length (Plot 1) = Mark 4 – Mark 1 = 8.029 ms – 3.029 ms = 5 ms
15 symbols UL time (Plot 2) = Mark 3 – Mark 2 = 4.957 ms – 3.377 ms = 1.58 ms

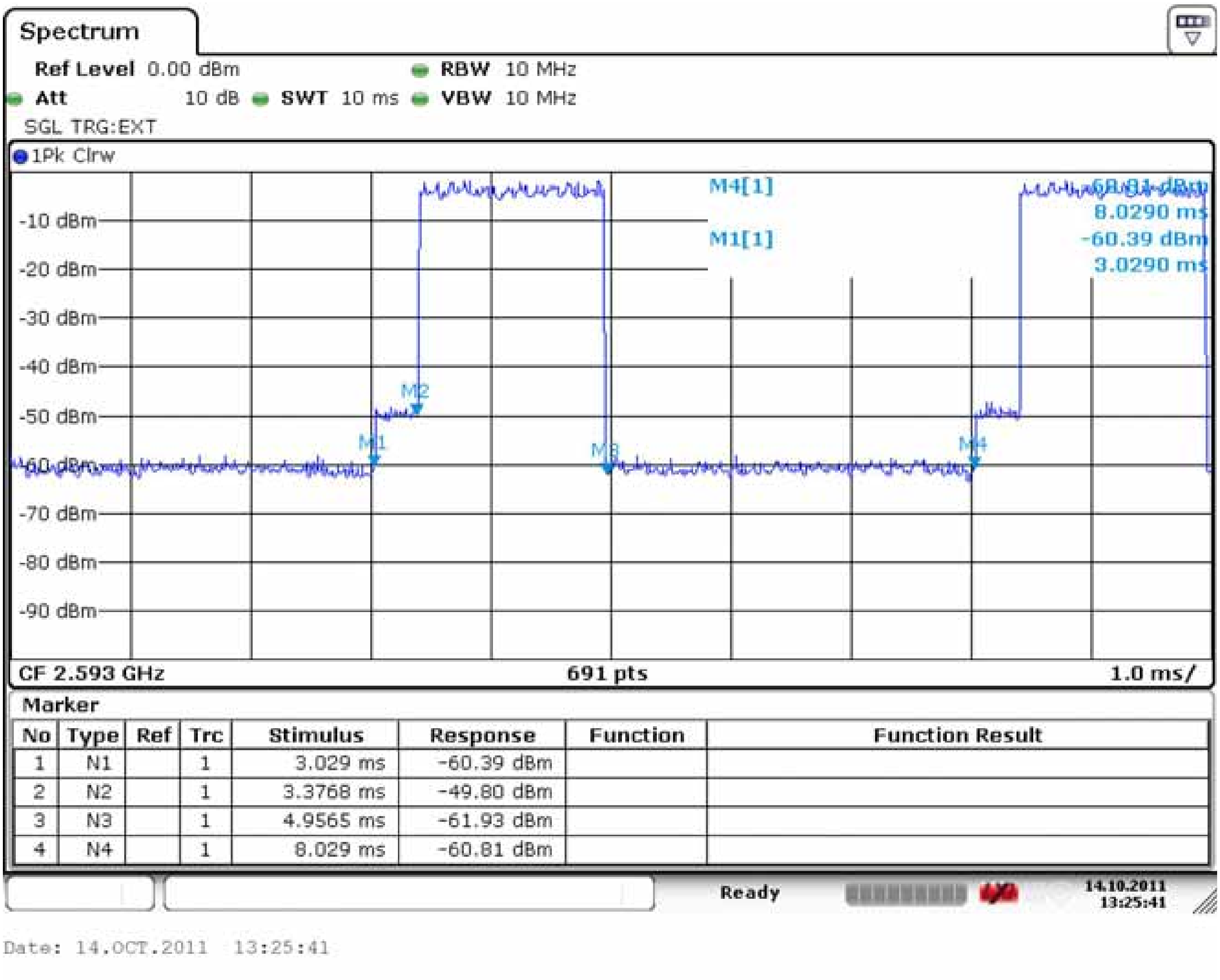
Duty Cycle = 15 symbols UL time / (frame length x 100%)
= 1.58 / (5 x 100%)
= **31.6** %

Duty Factor = 15 * 102.86us / 5000us
= **30.86** %

CF (Crest Factor) = 5000 us/15*102.857 us
= **3.24**

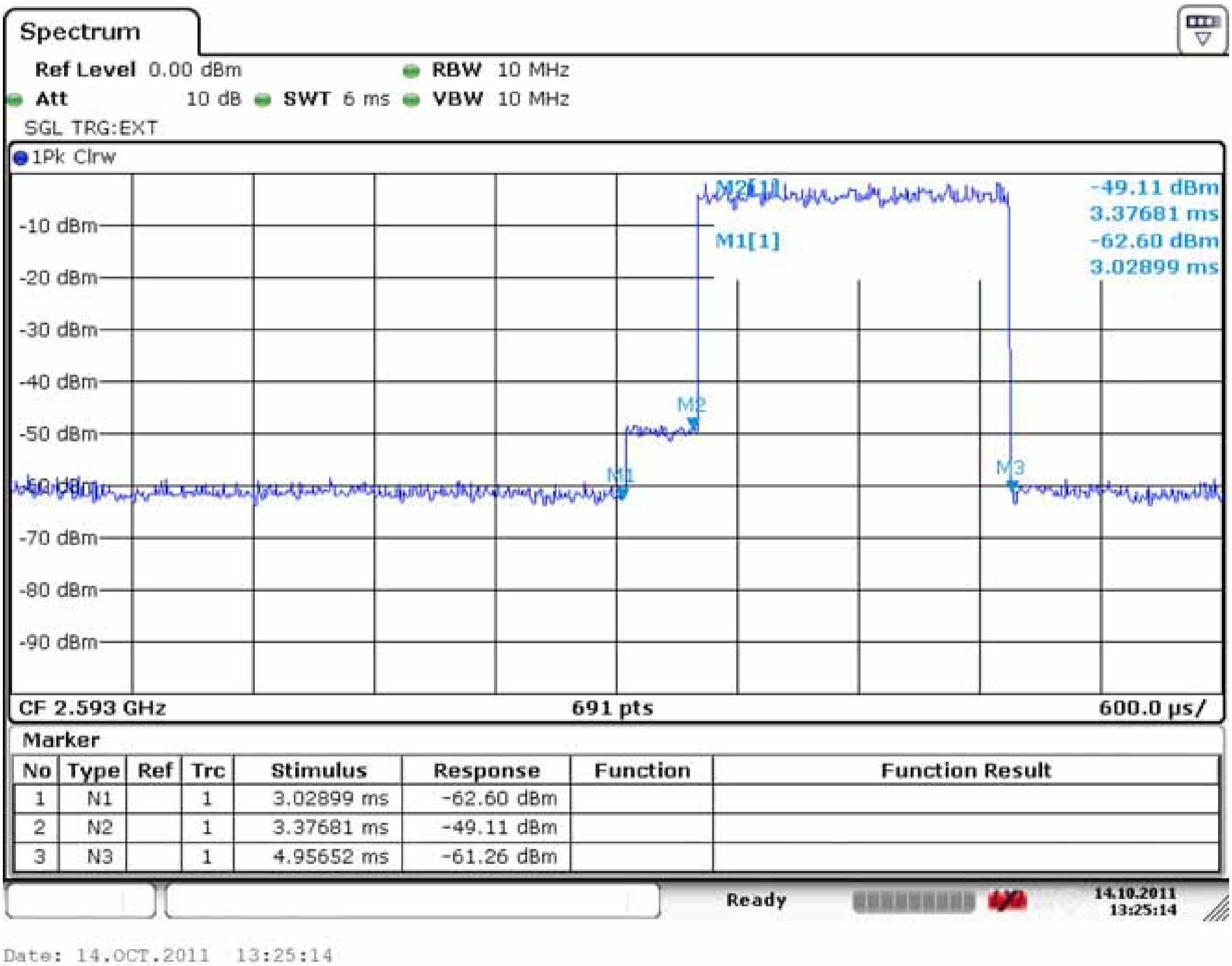
-Test Condition

Channel	Modulation	Bandwidth	Zone Type
Middle	QPSK 3/4	5 MHz	AMC



No	Type	Ref	Trc	Stimulus	Response	Function	Function Result
1	N1		1	3.029 ms	-60.39 dBm		
2	N2		1	3.3768 ms	-49.80 dBm		
3	N3		1	4.9565 ms	-61.93 dBm		
4	N4		1	8.029 ms	-60.81 dBm		

<Plot 1>



<Plot 2>

-Duty Cycle Calculation

Bust length (Plot 1) = Mark 4 – Mark 1 = 8.029 ms – 3.029 ms = 5 ms
15 symbols UL time (Plot 2) = Mark 3 – Mark 2 = 4.957 ms – 3.377 ms = 1.58 ms

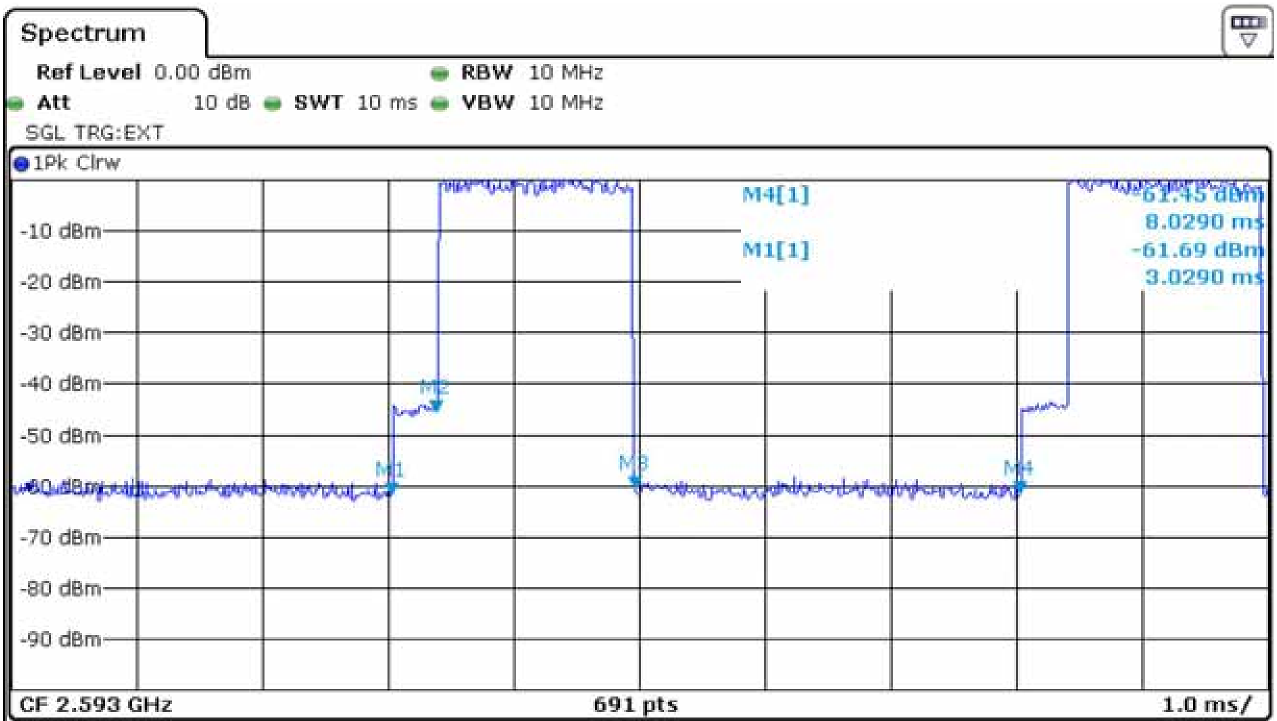
Duty Cycle = 15 symbols UL time / (frame length x 100%)
= 1.58 / (5 x 100%)
= **31.6** %

Duty Factor = 15 * 102.86us / 5000us
= **30.86** %

CF (Crest Factor) = 5000 us/15*102.857 us
= **3.24**

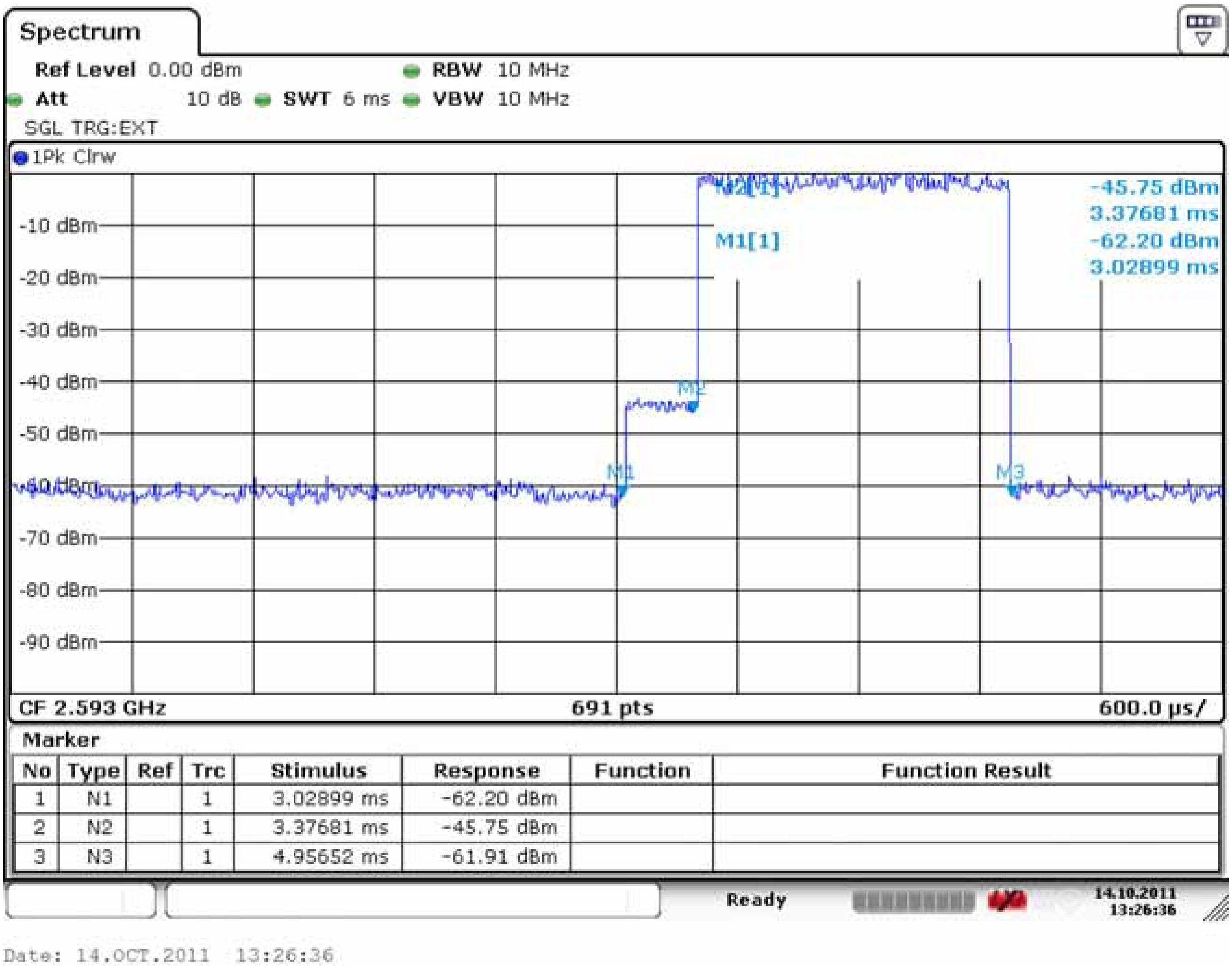
-**Test Condition**

Channel	Modulation	Bandwidth	Zone Type
Middle	16QAM 1/2	5 MHz	AMC



No	Type	Ref	Trc	Stimulus	Response	Function	Function Result
1	N1		1	3.029 ms	-61.69 dBm		
2	N2		1	3.3768 ms	-45.35 dBm		
3	N3		1	4.9565 ms	-60.57 dBm		
4	N4		1	8.029 ms	-61.45 dBm		

<Plot 1>



<Plot 2>

-<u>Duty Cycle Calculation</u>

Bust length (Plot 1) = Mark 4 – Mark 1 = 8.029 ms – 3.029 ms = 5 ms
15 symbols UL time (Plot 2) = Mark 3 – Mark 2 = 4.957 ms – 3.377 ms = 1.58 ms

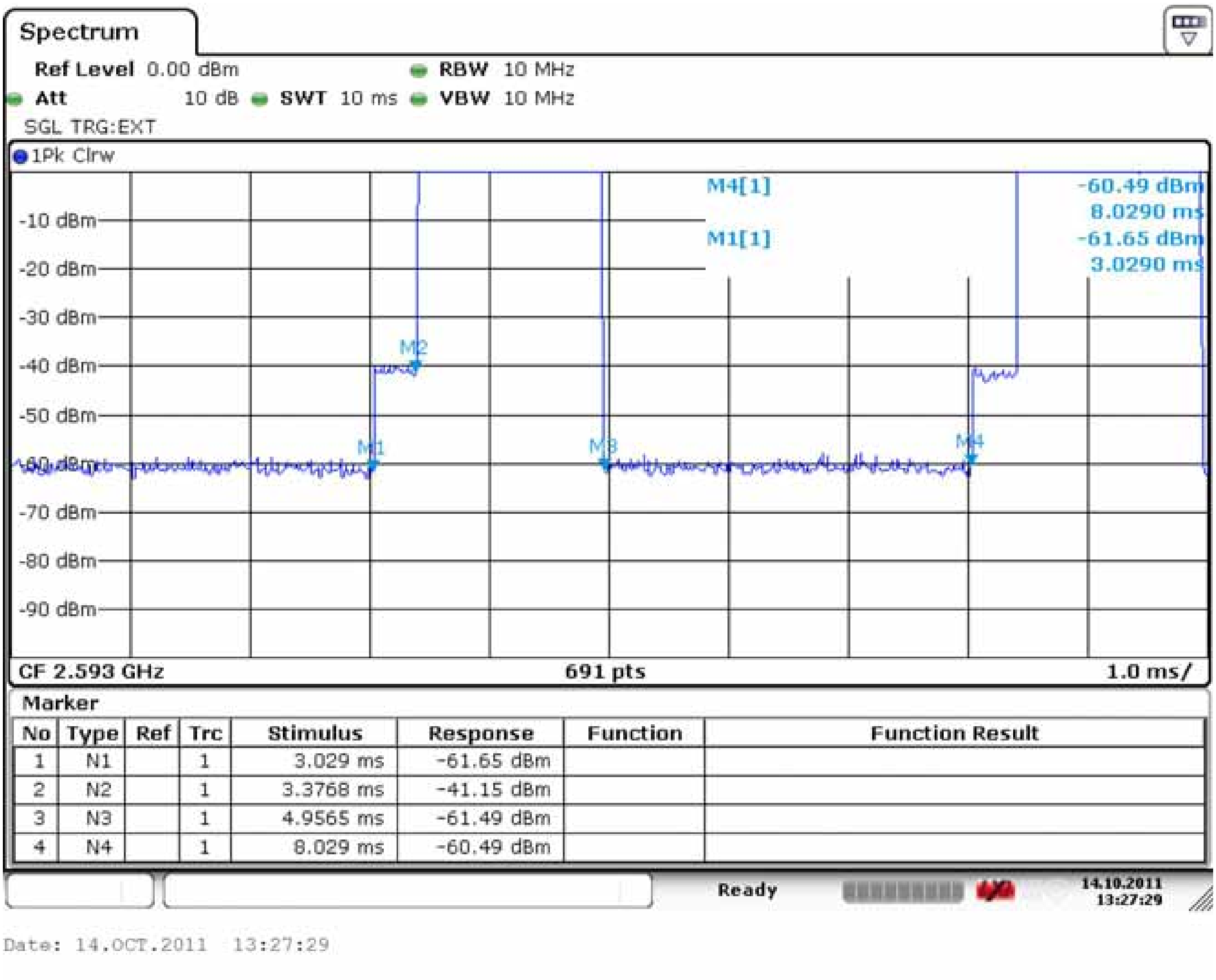
Duty Cycle = 15 symbols UL time / (frame length x 100%)
= 1.58 / (5 x 100%)
= **31.6** %

Duty Factor = 15 * 102.86us / 5000us
= **30.86** %

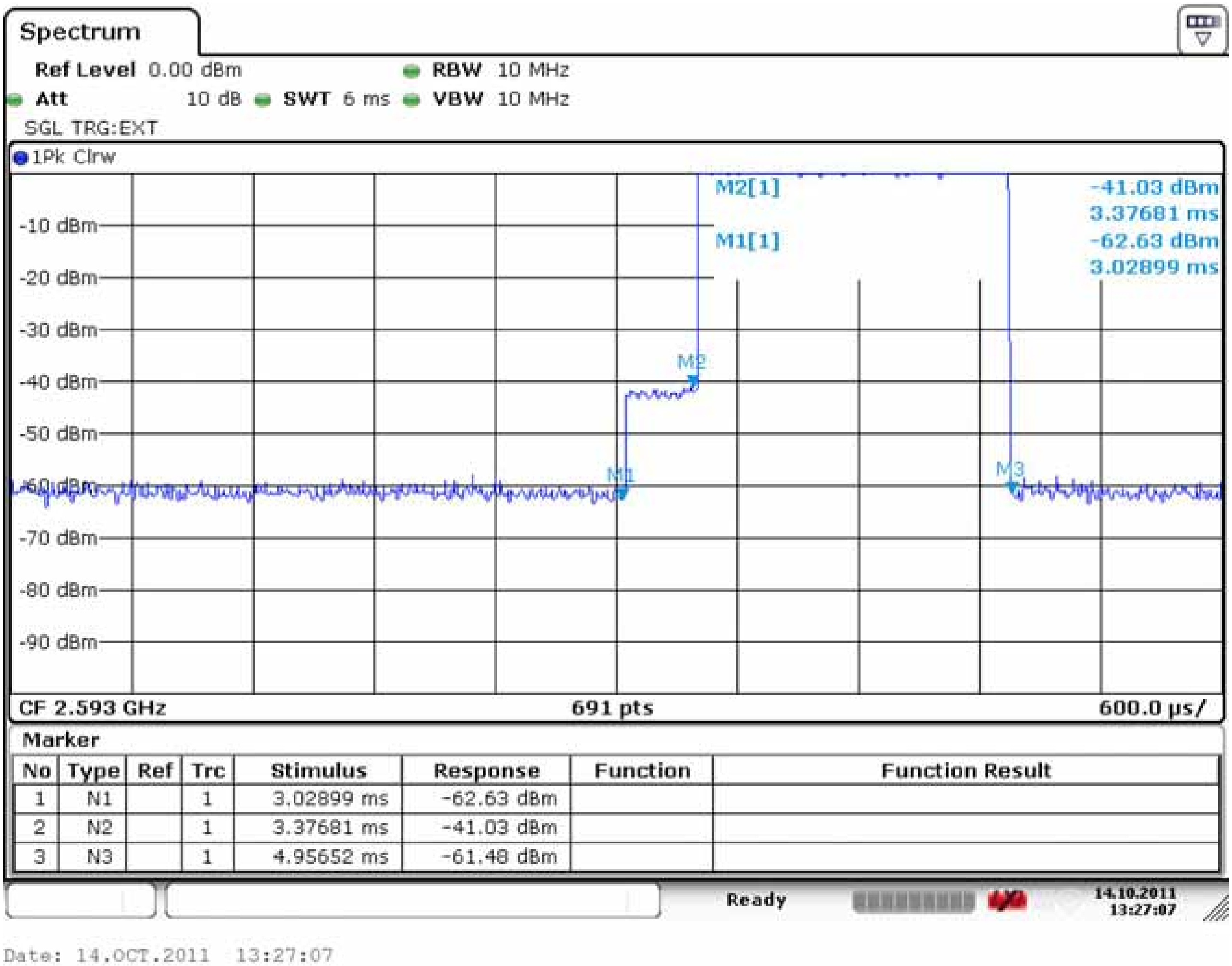
CF (Crest Factor) = 5000 us/15*102.857 us
= **3.24**

-**Test Condition**

Channel	Modulation	Bandwidth	Zone Type
Middle	16QAM 3/4	5 MHz	AMC



<Plot 1>



<Plot 2>

-Duty Cycle Calculation

Bust length (Plot 1) = Mark 4 – Mark 1 = 8.029 ms – 3.029 ms = 5 ms
15 symbols UL time (Plot 2) = Mark 3 – Mark 2 = 4.957 ms – 3.377 ms = 1.58 ms

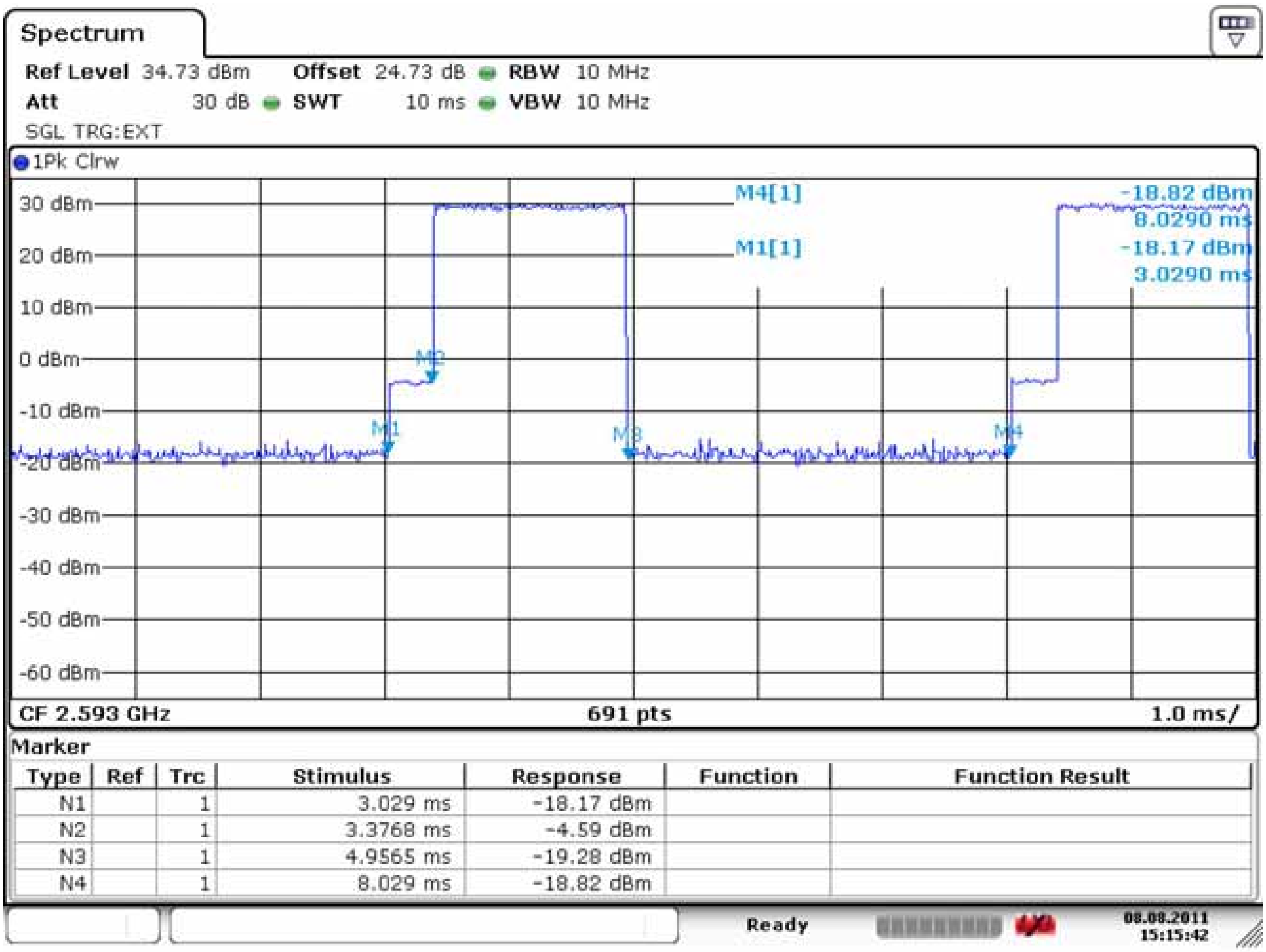
Duty Cycle = 15 symbols UL time / (frame length x 100%)
= 1.58 / (5 x 100%)
= **31.6** %

Duty Factor = 15 * 102.86us / 5000us
= **30.86** %

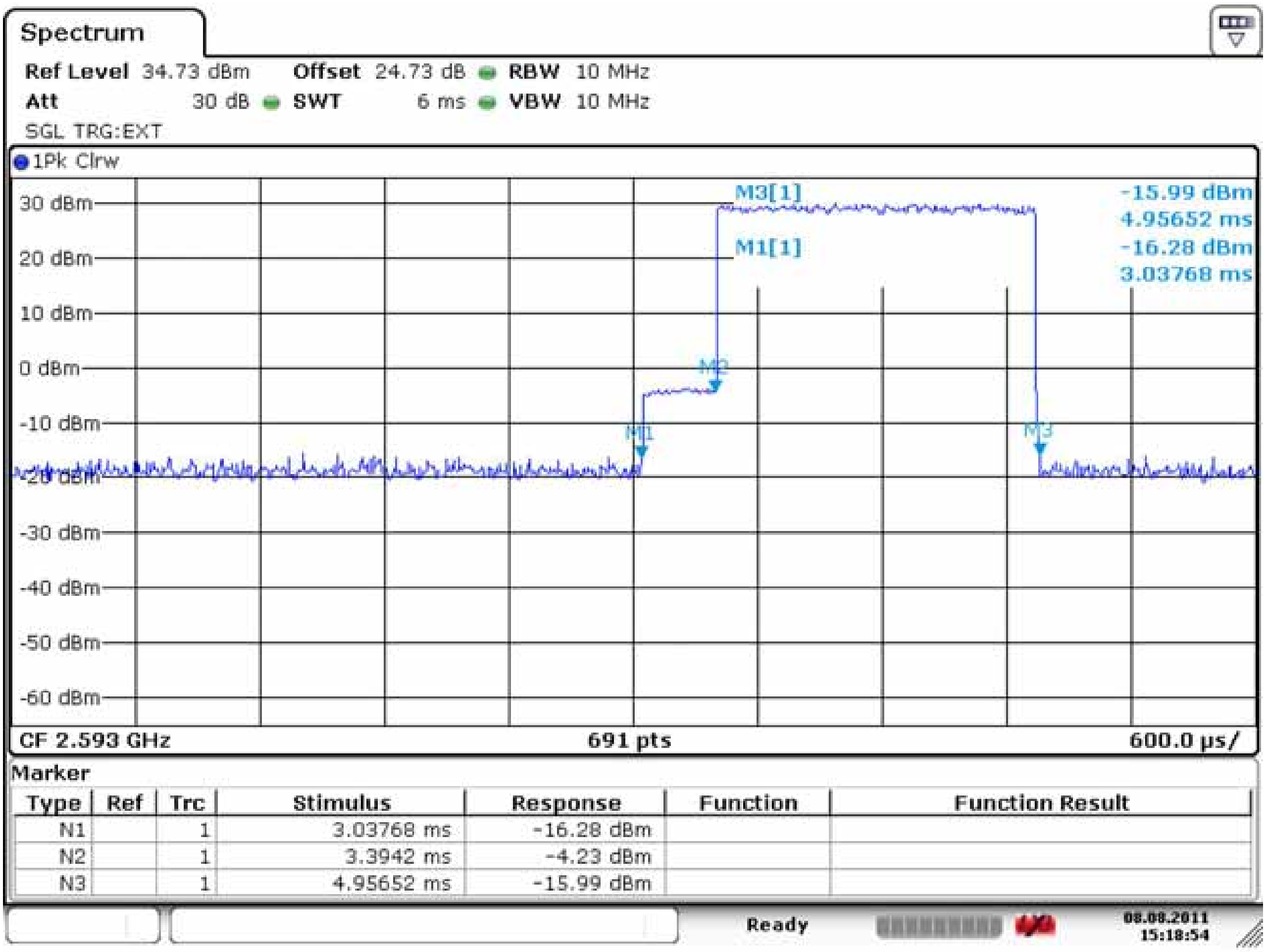
CF (Crest Factor) = 5000 us/15*102.857 us
= **3.24**

-Test Condition

Channel	Modulation	Bandwidth	Zone Type
Middle	QPSK 1/2	10 MHz	AMC



<Plot 1>



<Plot 2>

-<u>Duty Cycle Calculation</u>

Bust length (Plot 1) = Mark 4 – Mark 1 = 8.029 ms – 3.029 ms = 5 ms
15 symbols UL time (Plot 2) = Mark 3 – Mark 2 = 4.957 ms – 3.394 ms = 1.56 ms

Duty Cycle = 15 symbols UL time / (frame length x 100%)
= 1.56 / (5 x 100%)
= **31.2** %

Duty Factor = 15 * 102.86us / 5000us

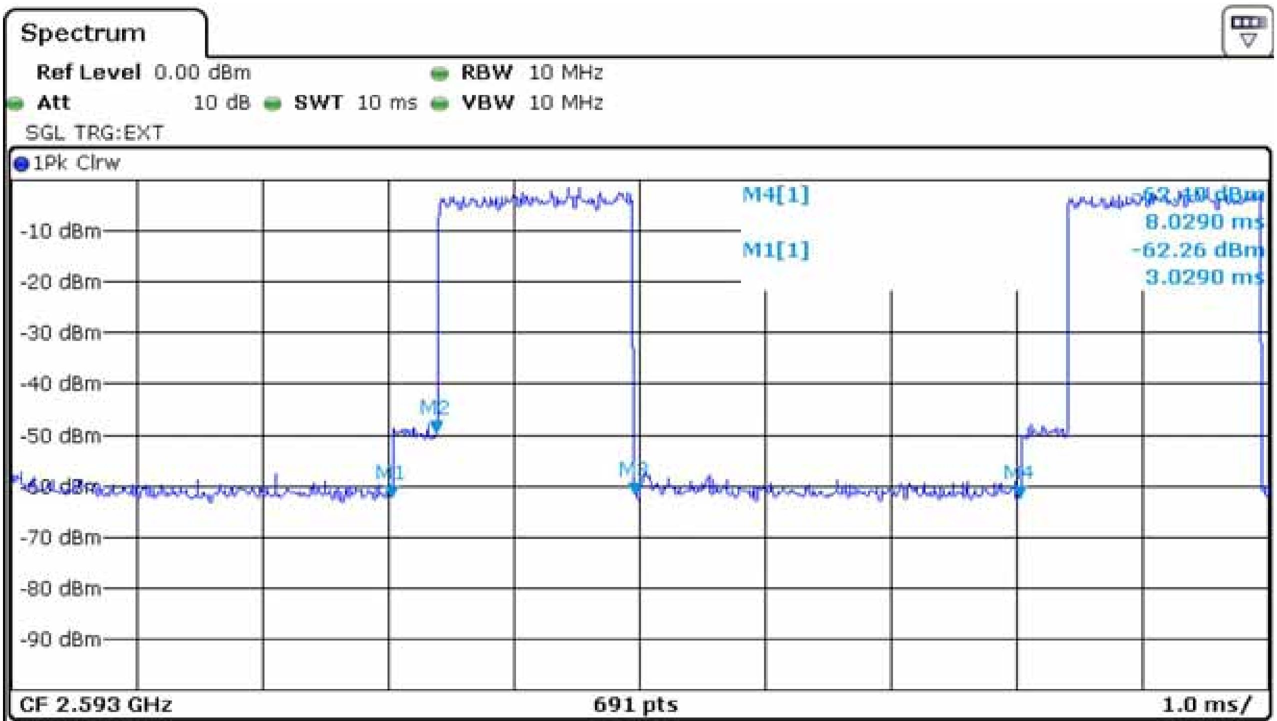
= **30.86** %

CF (Crest Factor) = 5000 us/15*102.857 us

= **3.24**

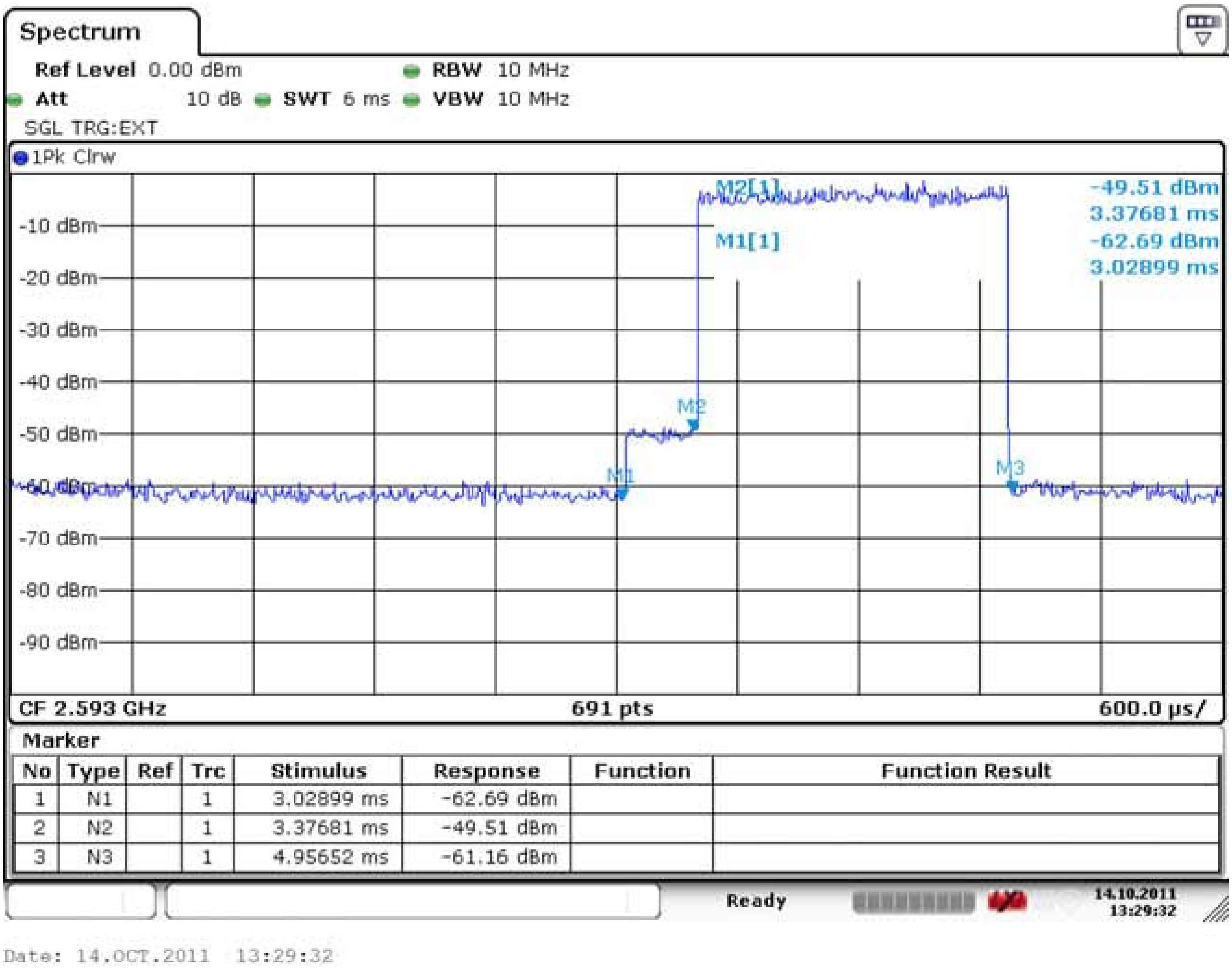
-**Test Condition**

Channel	Modulation	Bandwidth	Zone Type
Middle	QPSK 3/4	10 MHz	AMC



No	Type	Ref	Trc	Stimulus	Response	Function	Function Result
1	N1		1	3.029 ms	-62.26 dBm		
2	N2		1	3.3768 ms	-49.53 dBm		
3	N3		1	4.9565 ms	-61.66 dBm		
4	N4		1	8.029 ms	-62.40 dBm		

<Plot 1>



<Plot 2>

-Duty Cycle Calculation

Bust length (Plot 1) = Mark 4 – Mark 1 = 8.029 ms – 3.029 ms = 5 ms
15 symbols UL time (Plot 2) = Mark 3 – Mark 2 = 4.957 ms – 3.377 ms = 1.58 ms

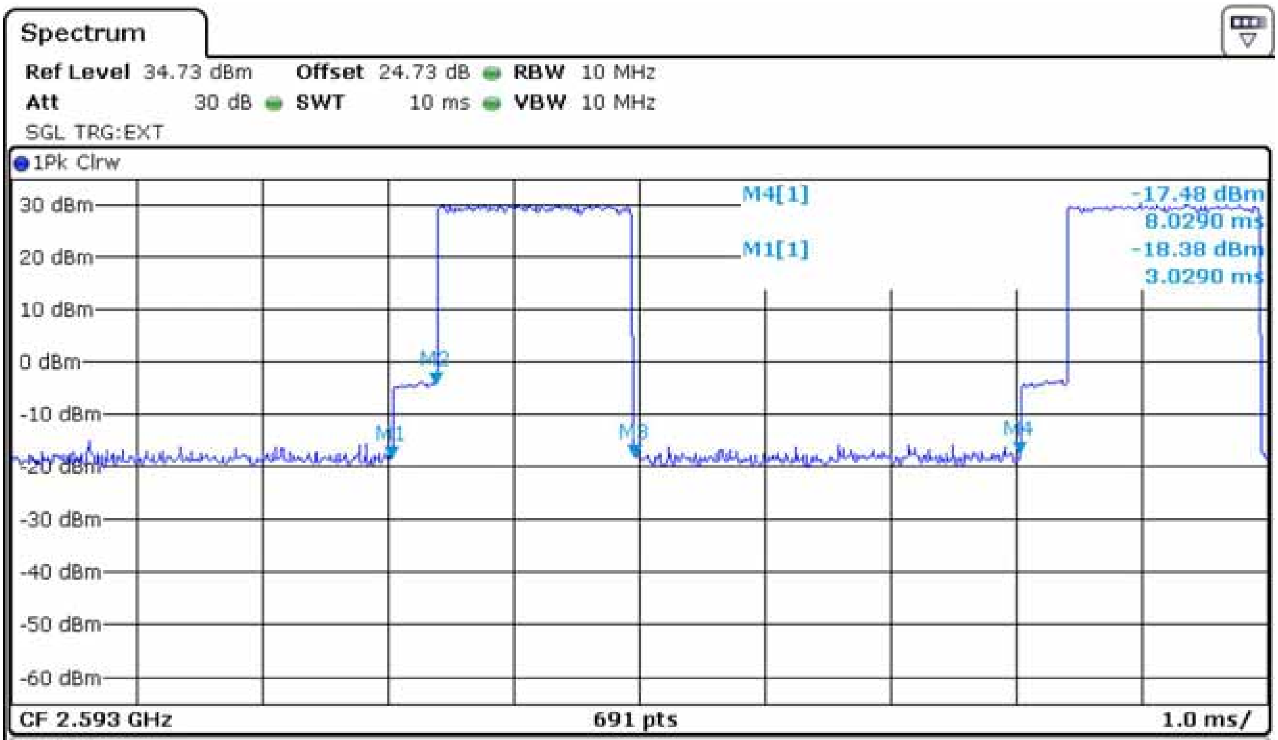
Duty Cycle = 15 symbols UL time / (frame length x 100%)
= 1.58 / (5 x 100%)
= **31.6** %

Duty Factor = 15 * 102.86us / 5000us
= **30.86** %

CF (Crest Factor) = 5000 us/15*102.857 us
= **3.24**

-Test Condition

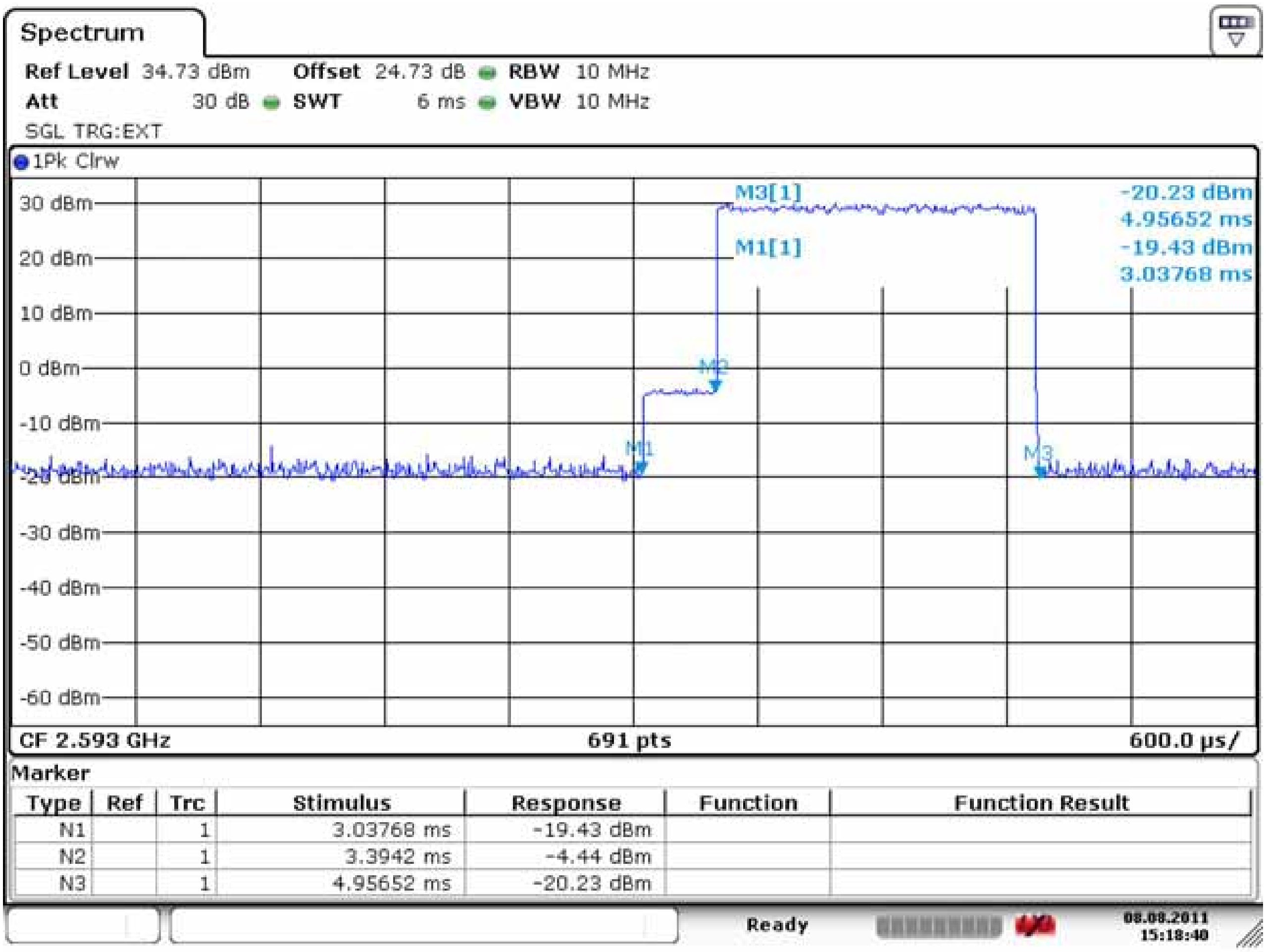
Channel	Modulation	Bandwidth	Zone Type
Middle	16QAM 1/2	10 MHz	AMC



Marker

Type	Ref	Trc	Stimulus	Response	Function	Function Result
N1		1	3.029 ms	-18.38 dBm		
N2		1	3.3768 ms	-4.39 dBm		
N3		1	4.9565 ms	-18.02 dBm		
N4		1	8.029 ms	-17.48 dBm		

<Plot 1>



<Plot 2>

-<u>Duty Cycle Calculation</u>

Bust length (Plot 1) = Mark 4 – Mark 1 = 8.029 ms – 3.029 ms = 5 ms
15 symbols UL time (Plot 2) = Mark 3 – Mark 2 = 4.957 ms – 3.394 ms = 1.56 ms

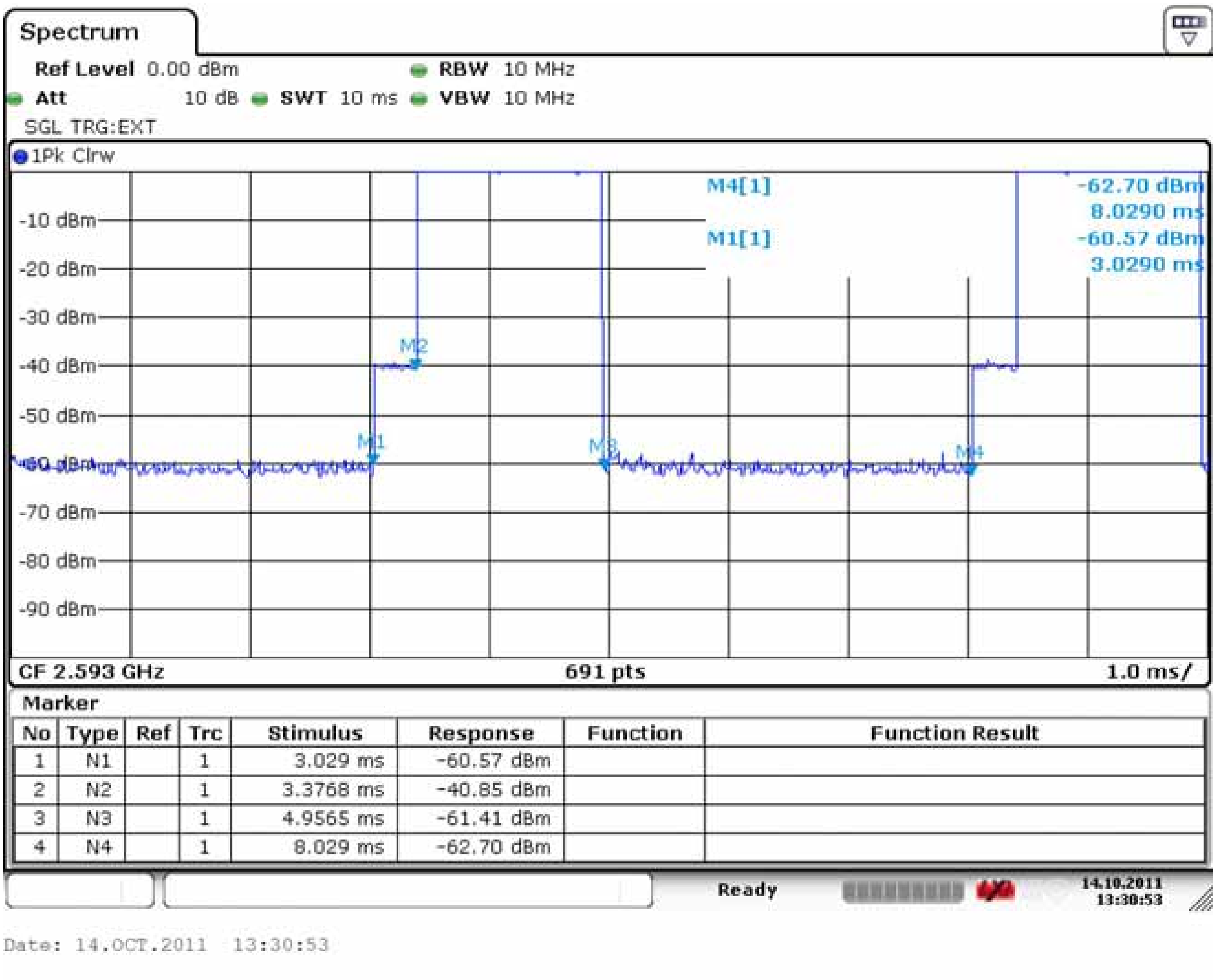
Duty Cycle = 15 symbols UL time / (frame length x 100%)
= 1.56 / (5 x 100%)
= **31.2** %

Duty Factor = 15 * 102.86us / 5000us
= **30.86** %

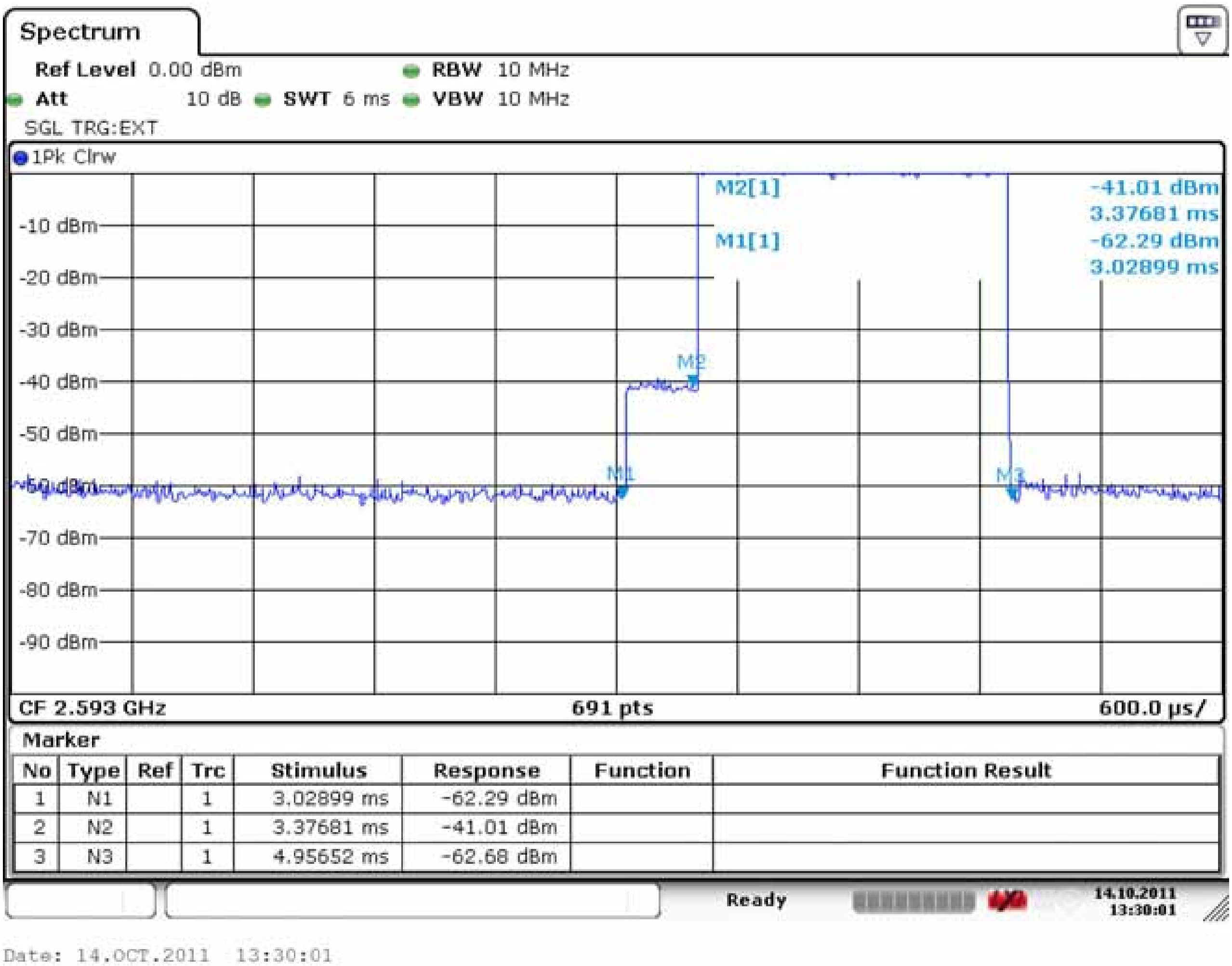
CF (Crest Factor) = 5000 us/15*102.857 us
= **3.24**

-Test Condition

Channel	Modulation	Bandwidth	Zone Type
Middle	16QAM 3/4	10 MHz	AMC



<Plot 1>



<Plot 2>

-<u>Duty Cycle Calculation</u>

Bust length (Plot 1) = Mark 4 – Mark 1 = 8.029 ms – 3.029 ms = 5 ms
15 symbols UL time (Plot 2) = Mark 3 – Mark 2 = 4.957 ms – 3.377 ms = 1.58 ms

Duty Cycle = 15 symbols UL time / (frame length x 100%)
= 1.58 / (5 x 100%)
= **31.6** %

Duty Factor = 15 * 102.86us / 5000us
= **30.86** %

CF (Crest Factor) = 5000 us/15*102.857 us
= **3.24**

1.18 WiMax System Description

The SWU-3400AN is 2.5 GHz WiMAX transceiver in a USB dongle configuration using GCT chipset which supports 1 TX and 2RX antenna for this device. Only one antenna is used for both transmitting and receiving while the other antenna is strictly used for RX diversity. Its uplink is capable of both 10 MHz and 5 MHz bandwidths.

The following test vector was used for each modulation and bandwidth.

Mode	Test Vector file name	Mode	Test Vector file name
AMC 5MHz QPSK1/2	5MHZ_UL_QPSK12	AMC 10MHz QPSK1/2	10MHZ_ULAMC_QPSK12
AMC 5MHz QPSK3/4	5MHZ _UL_QPSK34	AMC 10MHz QPSK3/4	10MHZ _ULAMC_QPSK34
AMC 5MHz 16QAM1/2	5MHZ _UL_16QAM12	AMC 10MHz 16QAM1/2	10MHZ _ULAMC_16QAM12
AMC 5MHz 16QAM3/4	5MHZ _UL_16QAM34	AMC 10MHz 16QAM3/4	10MHZ _ULAMC_16QAM34
PUSC 5MHz QPSK1/2	5MHZ _UL_QPSK12	PUSC 10MHz QPSK1/2	10MHZ _UL_QPSK12
PUSC 5MHz QPSK3/4	5MHZ _UL_QPSK34	PUSC 10MHz QPSK3/4	10MHZ _UL_QPSK34
PUSC 5MHz 16QAM1/2	5MHZ _UL_16QAM12	PUSC 10MHz 16QAM1/2	10MHZ _UL_16QAM12
PUSC 5MHz 16QAM3/4	5MHZ _UL_16QAM34	PUSC 10MHz 16QAM3/4	10MHZ _UL_16QAM34

The up-link sub-frame is triggered by an Allocation Start Time contained in the information of UL-MAP. This information specifies the starting times of the Uplink and Downlink frames. In any UL sub-frame, the duty factor ranging and bandwidth information is used to ensure optimal system operation. In normal transmission, the device will transmit control signaling at the first 3 uplink symbols and then use the rest of the uplink symbols for data traffic bursts in the uplink sub-frame. Since the first 3 symbols are also used for ranging detection purposes and are shared among other devices, its transmitting power is much smaller than the data burst symbol power. During the SAR testing, the first 3 symbols are also kept in reduced power level and the data traffic bursts are always running at the maximum output power level. In the real usage, the data burst power will be adjusted according to the signal strength of the communication. In this way, by using the test mode arrangement we are transmitting at a worst case RF level.

PUSC Zone Type:

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

AMC Zone Type:

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

The Vector Signal Generator (VSG) produces a downlink burst every 5 milliseconds which simulates the transmission of a BS operating under normal mode. This downlink burst instructs the MS to transmit for 15 symbols in the UL data zone. This UL transmission is repeated every 5 milliseconds. The transmitting power of the MS is set to maximum power. The VSG and MS use same frequency. The VSG level is much less than the MS Tx power (Approximately 80dB less than the MS power) and so does not affect the SAR readings. Since both the VSG (Base station simulator) and MS are working in TDD mode, co-operation under same frequency is not an issue.

The Vector Signal Generator (VSG) is loaded with a BS (Base Station) downlink signal which contains the 29:18 information. The mobile station synchronizes to the signal from the VSG in frequency and time and then demodulates two maps contained in the VSG DL frame. The first map, called the DL map, specifies the number of DL symbols (29). The second map, called the UL map, specifies the number of UL symbols (18). The UL map also tells the MS to transmit a burst which occupies all data symbols and all sub-channels. No control channel transmissions are requested by the VSG. Measurements were taken in this configuration with the MS transmitting using the 29:18 ratio, but since there was no energy in the control symbols, the effective power is only across 15 symbols.

As mentioned above the DL: UL frame is specified in the DL and UL maps respectively. There is no ranging present when there is data traffic. The other types of control traffic are HARQ ACK/NACK, CQICH (CINR reporting) and bandwidth (BW) requests. BW requests are piggy-backed onto the data symbols when traffic is present. Since the BW requests are shared across the Control Symbols (traffic versus non-traffic modes), the control traffic that is relevant to the SAR calculation is CQICH and HARQ ACK/NACK. The maximum power for this control traffic is 32.35 mW (5/35 of 226.46 mW) for 10 MHz and 68.16 mW (5/17 of 231.74 mW) for 5 MHz.

In the test mode in PUSC or AMC with all data sub-channels (All 48 sub-channels for AMC and 35 Sub-channels for PUSC) occupied with data. During normal operation the MS will transmit on all sub-channels when maximum UL throughput is required. It is possible for the MS to will transmit fewer sub-channels.

For the signal from the Vector Signal Generator VSG, it looks identical to the signal that would come from a BS in the field. The intent is to make the think it is in EUT a real network. The transmission from the EUT under test conditions is exactly the same as in the field in normal operation. The only difference is that normally in the field there will be information in some of the control symbols, whereas SAR tests were performed with not having the information in the some control symbols. So it is necessary to calculate a scaling factor that takes into consideration this fact.

You will see a calculation, scaling factor from the measurements (the measurements were taken under a channel configuration of 29:18, without control symbols) to a network configuration using 29:18. This is also calculated for 10 MHz and 5 MHz bandwidth channels.

- 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/AMC) 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.

1.19 WiMax Error Correction Scaling Factors

Zone Type	Modulation	Frequency [MHz]	BW [MHz]	Max. Rated Power [mW]	CS+TS Slots	CS Slots	Measured AVR RF Output Power		SAR Scaling Factor
							dBm	mW	
PUSC	QPSK	Low	5	234.42	17	5	22.93	196.34	1.26
		Mid	5	234.42	17	5	22.82	191.43	1.30
		High	5	234.42	17	5	23.20	208.93	1.19
	16QAM	Low	5	234.42	17	5	23.07	202.77	1.22
		Mid	5	234.42	17	5	22.91	195.43	1.27
		High	5	234.42	17	5	23.13	205.59	1.21
AMC	QPSK	Low	5	234.42	17	5	23.60	229.09	1.08
		Mid	5	234.42	17	5	23.65	231.74	1.07
		High	5	234.42	17	5	23.24	210.86	1.18
	16QAM	Low	5	234.42	17	5	23.61	229.61	1.08
		Mid	5	234.42	17	5	23.43	220.29	1.13
		High	5	234.42	17	5	23.41	219.28	1.13
PUSC	QPSK	Low	10	234.42	35	5	23.00	199.53	1.21
		Mid	10	234.42	35	5	23.16	207.01	1.16
		High	10	234.42	35	5	23.06	202.30	1.19
	16QAM	Low	10	234.42	35	5	22.97	198.15	1.22
		Mid	10	234.42	35	5	23.12	205.12	1.18
		High	10	234.42	35	5	23.04	201.37	1.20
AMC	QPSK	Low	10	234.42	35	5	23.47	222.33	1.08
		Mid	10	234.42	35	5	23.54	225.94	1.07
		High	10	234.42	35	5	23.29	213.30	1.13
	16QAM	Low	10	234.42	35	5	23.55	226.46	1.06
		Mid	10	234.42	35	5	23.50	223.87	1.08
		High	10	234.42	35	5	23.45	221.31	1.09

The maximum rated power for WiMax is 234.42mW. Control channels occupy 5 slots for operations in the 5MHz and 10MHz bandwidths. For the 10MHz bandwidth, there are 35 total slots. For the 5MHz bandwidth, there are 17 total slots. This device transmits 15 traffic symbols and 3 control symbols for all modulation and bandwidths.

Error correction scaling Factor were calculated based on the following equation.

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

Given:

P_{max}: Maximum Rated Power (mW)

P: Measured Maximum Output Power (mW)

The following is a sample calculation of SAR Scaling factors:

Using Low channel 5MHz QPSK in PUSC the measured average power was 196.34mW. The maximum rated power is 234.42mW.

[(234.42*5/17)*3 + 234.42*15] / [196.34*15] = 1.26

Using High channel 10MHz 16QAM in AMC the measured average power was 221.31mW. The maximum rated power is 234.42mW

[(234.42*5/35)*3 + 234.42*15] / [221.31*15] = 1.09

1.20 WiMax Conducted Power Measurement

-PAPR (Peak to Average Ratio)

The power data indicated below is RMS average over the burst-on of DL: UL ration 29:18 (except 3 control symbols) period by means of triggering and gating function.
Please see the measured actual conducted output power Table.

Zone Type	Modulation	Coding Rate	Frequency (MHz)	Peak Power (dBm)	Average Power (dBm)	PAPR (Peak to Average)
PUSC	QPSK (BW 5MHz)	1/2	2506	30.15	22.93	7.22
			2593	30.05	22.82	7.23
			2685	30.39	23.20	7.19
	16QAM (BW 5MHz)	1/2	2506	30.46	23.07	7.39
			2593	30.34	22.91	7.43
			2685	30.54	23.13	7.41
	QPSK (BW 10MHz)	1/2	2506	30.40	23.00	7.40
			2593	30.50	23.16	7.34
			2685	30.47	23.06	7.41
	16QAM (BW 10MHz)	1/2	2506	30.36	22.97	7.39
			2593	30.52	23.12	7.40
			2685	30.46	23.04	7.42
AMC	QPSK (BW 5MHz)	1/2	2506	30.91	23.60	7.31
			2593	30.94	23.65	7.29
			2685	30.59	23.24	7.35
	16QAM (BW 5MHz)	1/2	2506	31.03	23.61	7.42
			2593	30.82	23.43	7.39
			2685	30.82	23.41	7.41
	QPSK (BW 10MHz)	1/2	2506	31.39	23.47	7.92
			2593	31.47	23.54	7.93
			2685	31.25	23.29	7.96
	16QAM (BW 10MHz)	1/2	2506	31.31	23.55	7.76
			2593	31.26	23.50	7.76
			2685	31.24	23.45	7.79

Note: Spectrum Analyzer with Channel Power function and Gate on 5 MHz Bandwidth: RBW=50 kHz; VBW = 500 kHz; sweep time = 500 ms , 10 MHz Bandwidth : RBW=100 kHz; VBW = 1 MHz; sweep time = 500 ms with peak and average detection.

- **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 10mW 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 - 10 %. This type of measurement error is dependent on the signal characteristics, the results demonstrate that there is no SAR underestimation.

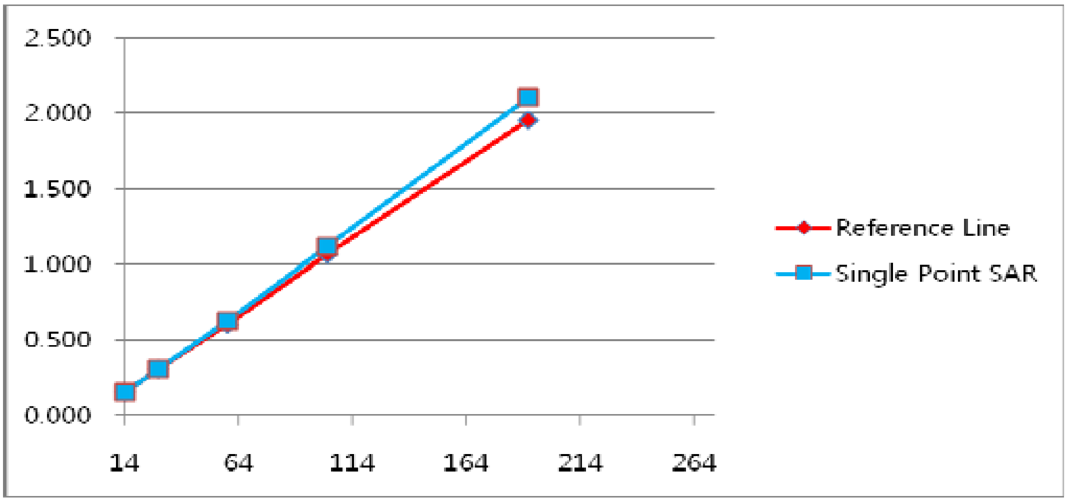
- **Linearity response check procedures**

For each modulation, and BW tested for SAR, the probe was moved to an arbitrary location with the EUT touching the flat phantom in order to be able to achieve SAR values over the range of linearity measurements. Then the point SAR readings from the DASY software were measured using the multi-meter function and recorded with increasing approximately 10 mW, in 3 dB steps, until the maximum power level is reached. In order to achieve the appropriate SAR levels for linearity for this USB dongle, the EUT was positioned at 0.0 cm from the flat phantom. For each channel, modulation, and BW tested for SAR per April 2010 TCB Workshop guidance, 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 increasing approximately 10 mW, in 3 dB steps, until the maximum power level is reached according to the FCC Publication KDB 615223 publication guidance for testing WIMAX for SAR.

Linearity Response Check

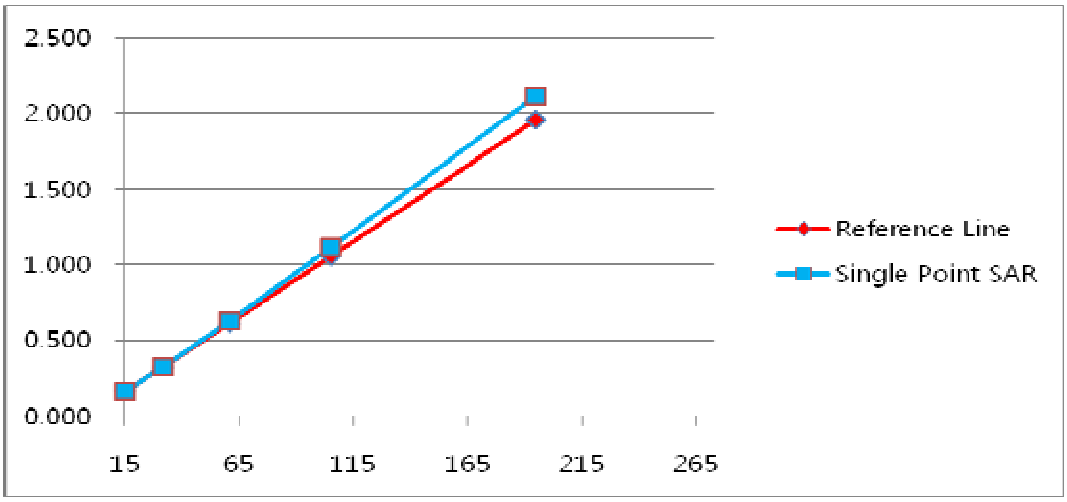
PUSC_5M_QPSK1/2_Mid

Power (mW)	14.825	29.854	59.020	103.992	191.426
Single Point SAR (W/kg)	0.151	0.308	0.625	1.119	2.100
Reference Line (W/kg)	0.151	0.305	0.602	1.061	1.954
Deviation	0.000	0.003	0.023	0.058	0.146
Percent Deviation(%)	0.000	1.091	3.763	5.437	7.493



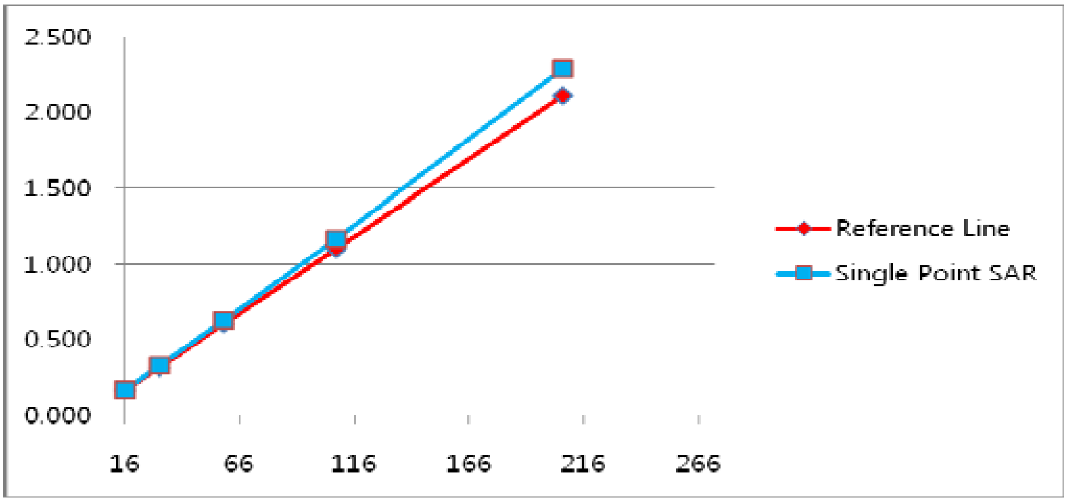
PUSC_5M_16QAM1/2_Mid

Power (mW)	15.776	32.137	61.387	105.682	195.434
Single Point SAR (W/kg)	0.158	0.325	0.624	1.113	2.110
Reference Line (W/kg)	0.158	0.322	0.615	1.058	1.957
Deviation	0.000	0.003	0.009	0.055	0.153
Percent Deviation(%)	0.000	0.977	1.497	5.157	7.802



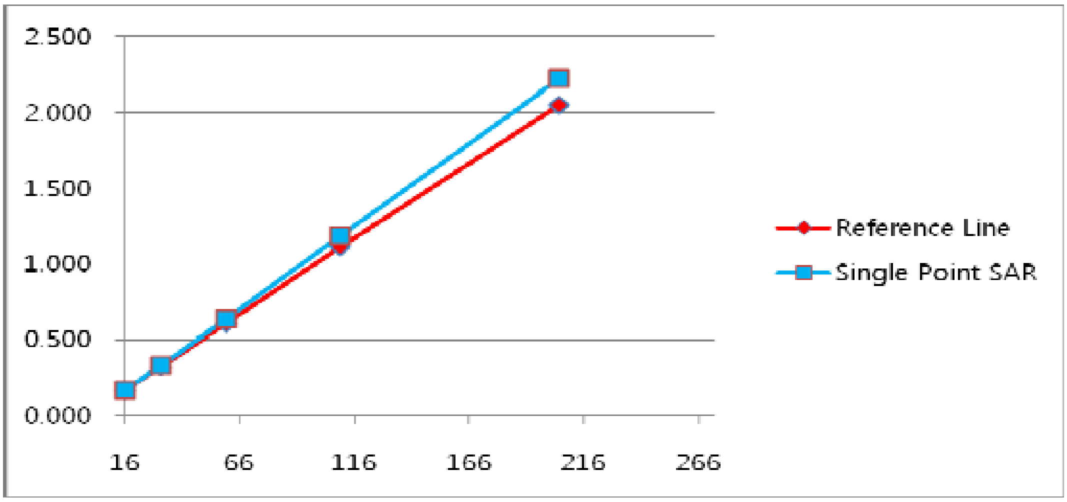
PUSC_10M_QPSK1/2_Mid

Power (mW)	16.200	31.261	59.156	108.143	207.014
Single Point SAR (W/kg)	0.165	0.327	0.630	1.170	2.287
Reference Line (W/kg)	0.165	0.318	0.603	1.101	2.108
Deviation	0.000	0.009	0.027	0.069	0.179
Percent Deviation(%)	0.000	2.702	4.561	6.223	8.467



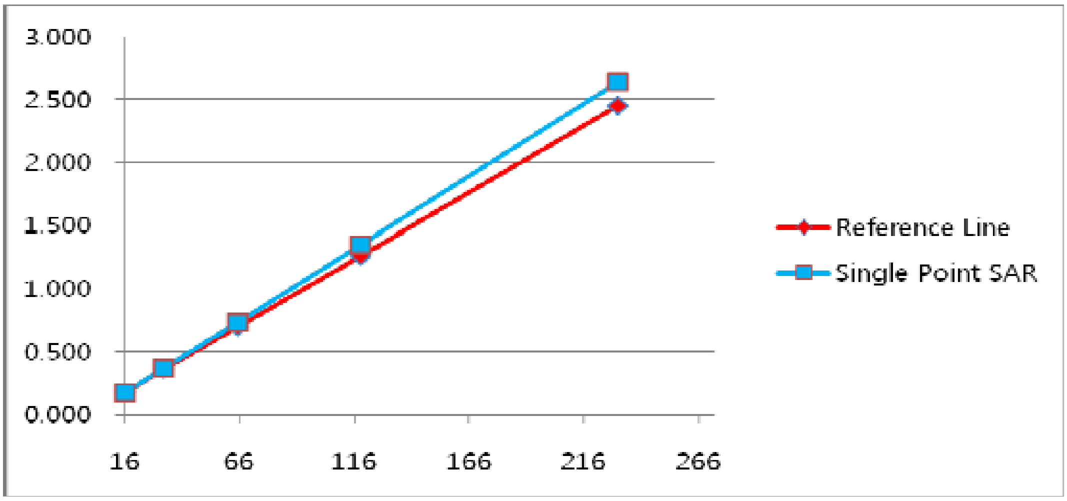
PUSC_10M_16QAM1/2_Mid

Power (mW)	16.430	32.137	60.256	110.810	205.116
Single Point SAR (W/kg)	0.164	0.330	0.631	1.184	2.225
Reference Line (W/kg)	0.164	0.321	0.601	1.106	2.047
Deviation	0.000	0.009	0.030	0.078	0.178
Percent Deviation(%)	0.000	2.874	4.911	7.045	8.674



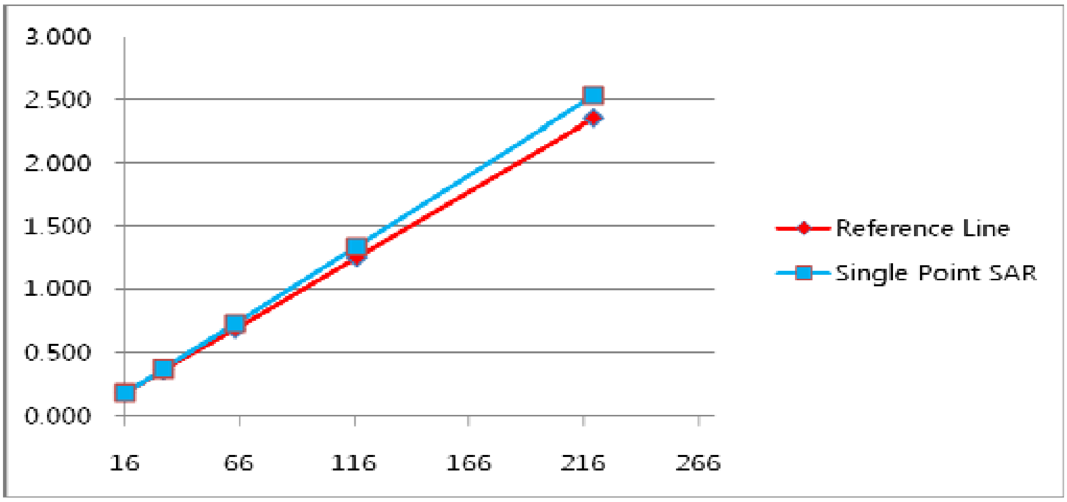
AMC_5M_QPSK1/2_Mid

Power (mW)	16.800	33.940	65.900	119.200	231.739
Single Point SAR (W/kg)	0.178	0.373	0.738	1.349	2.641
Reference Line (W/kg)	0.178	0.360	0.698	1.263	2.455
Deviation	0.000	0.013	0.040	0.086	0.186
Percent Deviation(%)	0.000	3.726	5.696	6.813	7.562



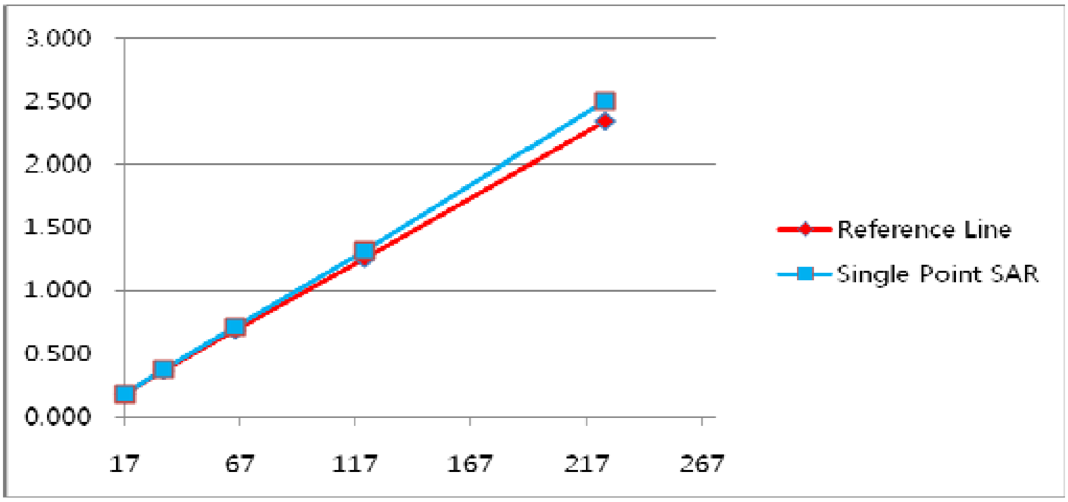
AMC_5M_16QAM1/2_Mid

Power (mW)	16.770	33.820	64.200	117.400	220.293
Single Point SAR (W/kg)	0.179	0.369	0.725	1.339	2.530
Reference Line (W/kg)	0.179	0.361	0.685	1.253	2.351
Deviation	0.000	0.008	0.040	0.086	0.179
Percent Deviation(%)	0.000	2.219	5.799	6.854	7.597



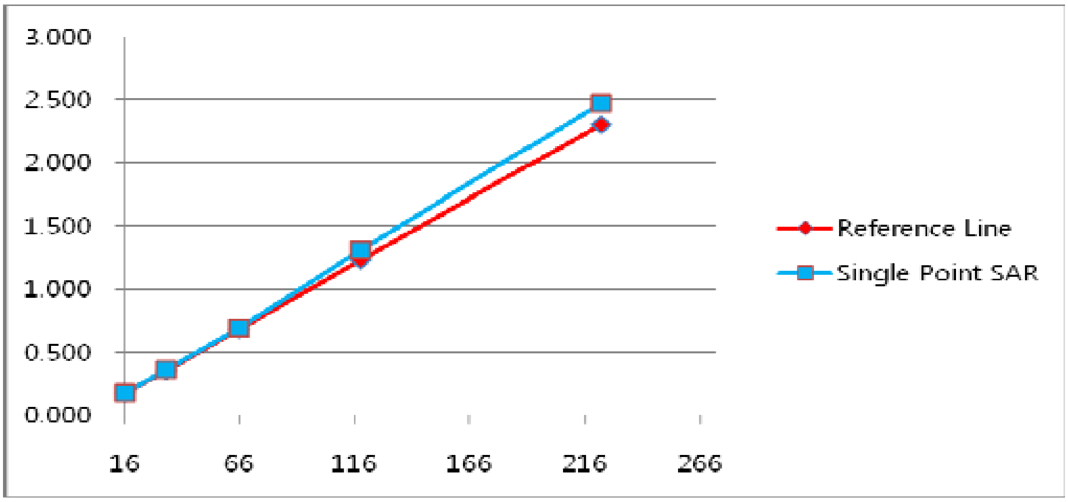
AMC_10M_QPSK1/2_Mid

Power (mW)	17.140	34.806	65.681	121.339	225.944
Single Point SAR (W/kg)	0.177	0.369	0.708	1.317	2.500
Reference Line (W/kg)	0.177	0.359	0.678	1.253	2.333
Deviation	0.000	0.010	0.030	0.064	0.167
Percent Deviation(%)	0.000	2.686	4.381	5.102	7.144



AMC_10M_16QAM1/2_Mid

Power (mW)	16.711	34.497	66.069	119.950	223.872
Single Point SAR (W/kg)	0.172	0.361	0.694	1.314	2.470
Reference Line (W/kg)	0.172	0.355	0.680	1.235	2.304
Deviation	0.000	0.006	0.014	0.079	0.166
Percent Deviation(%)	0.000	1.672	2.054	6.431	7.194



2. Instruments List

Maunfacturer	Device	Type	Serial Number	Due date of Calibration
Stäubli	Robot	RX90BL	F03/5W05A1/A/01	N/A
Schmid& Partner Engineering AG	Dosimetric E-Field Probe	EX3DV4	3791	June 21, 2012
Schmid& Partner Engineering AG	2600 MHz System Validation Dipole	D2600V2	1038	June 08, 2013
Schmid& Partner Engineering AG	Data acquisition Electronics	DAE3	567	January 27, 2012
Schmid& Partner Engineering AG	Software	DASY 4 V4.7	-	N/A
Schmid& Partner Engineering AG	Phantom	SAM Phantom V4.0	TP-1299 TP-1300	N/A
Agilent	Network Analyzer	E5070B	MY42100282	March 31, 2012
Agilent	Dielectric Probe Kit	85070D	2184	N/A
Agilent	Power Meter	E4419B	GB43311126	July 04, 2012
Agilent	Power Sensor	E9300H	MY41495307	September 29, 2012
			MY41495308	September 29, 2012
Agilent	Signal Generator	E4421B	MY43350132	July 04, 2012
Empower RF Systems	Power Amplifier	2001-BBS3Q7ECK	1032 D/C 0336	April 01, 2012
Agilent	Dual Directional Coupler	777D	50128	July 10, 2012
		778D	50454	July 06, 2012
Microlab	LP Filter	LA-15N LA-30N	N/A	October 01, 2012
R&S	Vector Signal Generator	SMJ100A	100882	July 20, 2012

3.Summary of Results

Test mode and configuration

Test Mode	Modulation & Coding	Zone Type	BW (Bandwidth)	Test Channel
Horizontal Up	QPSK 1/2 , 16QAM 1/2	PUSC & AMC	5 & 10MHz	Middle(Ch)
Horizontal Down	QPSK 1/2 , 16QAM 1/2	PUSC & AMC	5 & 10MHz	Middle(Ch)
Horizontal Up 90°	QPSK 1/2 , 16QAM 1/2	PUSC & AMC	5 & 10MHz	Middle(Ch)
Horizontal Down 90°	QPSK 1/2 , 16QAM 1/2	PUSC & AMC	5 & 10MHz	Middle(Ch)
Vertical Front	QPSK 1/2 , 16QAM 1/2	PUSC & AMC	5 & 10MHz	Middle(Ch)
Vertical Back	QPSK 1/2 , 16QAM 1/2	PUSC & AMC	5 & 10MHz	Middle(Ch)

Notes:

1. The test data reported are the worst-case SAR value with the 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 results are reported.
3. Liquid Tissue Depth is at least 15.0 cm
4. Tissue parameters are listed on the SAR plots.
5. Temperature of Liquid is 22 ± 2° C.
6. Power supplied through host device.
7. Test configuration is described in the setup photo.
8. Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration 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).
9. SAR Test configurations for WiMAX per FCC KDB publication 615223 and April/October 2010 FCC/TCB Workshop Notes:
   a. This device support two coding rates(1/2 and 3/4) that are rated to the same maximum output power. Since the higher rates were not more than 0.25 dB from the lowest coding rate, only the lowest coding rate(1/2) was tested.
   b. 16QAM was required to be tested when output power for 16QAM was more than 0.25 dB higher than QPSK and the QPSK SAR was more than 0.8 W/kg.
   c. This device supports PUSC and AMC Zone type.
   d. WiMAX SAR was scaled according to FCC WiMAX requirements. The device was configured to operate with 15 traffic symbols active and the 3 control maximum tune up power for both the maximum output power for 15 traffic symbols and 3 control symbols. The SAR plots reflect measured SAR values.
   e. Crest Factor used for the SAR system for WiMAX signal for 5 MHz and 10 MHz BW was 3.24
   f. The scaled SAR was used to determine test reduction scenarios.

SAR test data Summary

- Measurement Results (5 MHz_PUSC_QPSK 1/2 & 16 QAM 1/2)

Frequency (MHz)	Calculated		Device Test Position	Separation Distance	Modulation	Scale Factors	Conducted Power		1g SAR(W/kg)	
	Duty Cycle (%)	Crest Factor					Begin Power	End Power	Measured	Scaled
2506	30.9	3.24	Horizontal Up	5 mm	QPSK	1.21	23.00	22.81	0.679	0.822
2593	30.9	3.24	Horizontal Up	5 mm	QPSK	1.16	23.16	23.03	0.772	0.896
2685	30.9	3.24	Horizontal Up	5 mm	QPSK	1.19	23.06	22.91	0.607	0.722
2506	30.9	3.24	Horizontal Up	5 mm	16 QAM	1.22	22.97	23.10	0.669	0.816
2593	30.9	3.24	Horizontal Up	5 mm	16 QAM	1.18	23.12	23.26	0.647	0.763
2685	30.9	3.24	Horizontal Up	5 mm	16 QAM	1.20	23.04	23.20	0.594	0.713
2506	30.9	3.24	Horizontal Down	5 mm	QPSK	1.21	23.00	23.04	0.728	0.881
2593	30.9	3.24	Horizontal Down	5 mm	QPSK	1.16	23.16	23.22	0.868	1.007
2685	30.9	3.24	Horizontal Down	5 mm	QPSK	1.19	23.06	23.09	0.766	0.912
2506	30.9	3.24	Horizontal Down	5 mm	16 QAM	1.22	22.97	22.83	0.827	1.009
2593	30.9	3.24	Horizontal Down	5 mm	16 QAM	1.18	23.12	23.09	**0.986**	**1.163**
2685	30.9	3.24	Horizontal Down	5 mm	16 QAM	1.20	23.04	23.12	0.881	1.057
2593	30.9	3.24	Horizontal Up 90°	5 mm	QPSK	1.16	23.12	23.00	0.192	0.223
2593	30.9	3.24	Horizontal Down 90°	5 mm	QPSK	1.16	23.12	23.02	0.049	0.057
2593	30.9	3.24	Vertical Front	5 mm	QPSK	1.16	23.12	22.97	0.336	0.390
2593	30.9	3.24	Vertical Back	5 mm	QPSK	1.16	23.12	23.08	0.272	0.316
ANSI/ IEEE C95.1 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						**Body 1.6 W/kg (mW/g)** Averaged over 1 gram				

Note : Refer to the notes on page 62

- Measurement Results (10 MHz_PUSC_QPSK 1/2 & 16 QAM 1/2)

Frequency (MHz)	Calculated		Device Test Position	Separation Distance	Modulation	Scale Factors	Conducted Power		1g SAR(W/kg)	
	Duty Cycle (%)	Crest Factor					Begin Power	End Power	Measured	Scaled
2506	30.9	3.24	Horizontal Up	5 mm	QPSK	1.08	23.60	23.74	0.813	0.878
2593	30.9	3.24	Horizontal Up	5 mm	QPSK	1.07	23.65	23.79	0.872	0.933
2685	30.9	3.24	Horizontal Up	5 mm	QPSK	1.18	23.24	23.41	0.529	0.624
2506	30.9	3.24	Horizontal Up	5 mm	16 QAM	1.08	23.61	23.74	0.624	0.674
2593	30.9	3.24	Horizontal Up	5 mm	16 QAM	1.13	23.43	23.45	0.808	0.913
2685	30.9	3.24	Horizontal Up	5 mm	16 QAM	1.13	23.41	23.34	0.537	0.607
2506	30.9	3.24	Horizontal Down	5 mm	QPSK	1.08	23.60	23.59	0.733	0.792
2593	30.9	3.24	Horizontal Down	5 mm	QPSK	1.07	23.65	23.56	0.837	0.896
2685	30.9	3.24	Horizontal Down	5 mm	QPSK	1.18	23.24	23.09	0.907	1.070
2506	30.9	3.24	Horizontal Down	5 mm	16 QAM	1.08	23.61	23.48	0.927	1.001
2593	30.9	3.24	Horizontal Down	5 mm	16 QAM	1.13	23.43	23.45	**1.140**	**1.288**
2685	30.9	3.24	Horizontal Down	5 mm	16 QAM	1.13	23.41	23.41	0.889	1.005
2593	30.9	3.24	Horizontal Up 90°	5 mm	QPSK	1.07	23.65	23.58	0.214	0.229
2593	30.9	3.24	Horizontal Down 90°	5 mm	QPSK	1.07	23.65	23.56	0.044	0.047
2593	30.9	3.24	Vertical Front	5 mm	QPSK	1.07	23.65	23.74	0.381	0.408
2593	30.9	3.24	Vertical Back	5 mm	QPSK	1.07	23.65	23.60	0.304	0.325
ANSI/ IEEE C95.1 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						**Body 1.6 W/kg (mW/g)** Averaged over 1 gram				

Note : Refer to the notes on page 62

- Measurement Results (5 MHz_AMC_QPSK 1/2 & 16 QAM 1/2)

Frequency (MHz)	Calculated Duty Cycle (%)	Calculated Crest Factor	Device Test Position	Separation Distance	Modulation	Scale Factors	Conducted Power Begin Power	Conducted Power End Power	1g SAR(W/kg) Measured	1g SAR(W/kg) Scaled
2506	30.9	3.24	Horizontal Up	5 mm	QPSK	1.08	23.47	23.47	0.862	0.931
2593	30.9	3.24	Horizontal Up	5 mm	QPSK	1.07	23.54	23.44	0.900	0.963
2685	30.9	3.24	Horizontal Up	5 mm	QPSK	1.13	23.29	23.36	0.818	0.924
2506	30.9	3.24	Horizontal Up	5 mm	16 QAM	1.06	23.55	23.64	0.777	0.824
2593	30.9	3.24	Horizontal Up	5 mm	16 QAM	1.08	23.50	23.49	0.883	0.954
2685	30.9	3.24	Horizontal Up	5 mm	16 QAM	1.09	23.45	23.59	0.693	0.755
2506	30.9	3.24	Horizontal Down	5 mm	QPSK	1.08	23.47	23.31	0.829	0.895
2593	30.9	3.24	Horizontal Down	5 mm	QPSK	1.07	23.54	23.48	1.040	1.113
2685	30.9	3.24	Horizontal Down	5 mm	QPSK	1.13	23.29	23.47	1.050	1.187
2506	30.9	3.24	Horizontal Down	5 mm	16 QAM	1.06	23.55	23.57	0.934	0.990
2593	30.9	3.24	Horizontal Down	5 mm	16 QAM	1.08	23.50	23.64	**1.120**	**1.210**
2685	30.9	3.24	Horizontal Down	5 mm	16 QAM	1.09	23.45	23.46	1.050	1.145
2593	30.9	3.24	Horizontal Up 90°	5 mm	QPSK	1.07	23.54	23.61	0.187	0.200
2593	30.9	3.24	Horizontal Down 90°	5 mm	QPSK	1.07	23.54	23.48	0.042	0.045
2593	30.9	3.24	Vertical Front	5 mm	QPSK	1.07	23.54	23.49	0.393	0.421
2593	30.9	3.24	Vertical Back	5 mm	QPSK	1.07	23.54	23.69	0.308	0.330
ANSI/ IEEE C95.1 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						**Body 1.6 W/kg (mW/g)** Averaged over 1 gram				

Note : Refer to the notes on page 62

- **Measurement Results (10 MHz_AMC_QPSK 1/2 & 16 QAM 1/2)**

Frequency (MHz)	Calculated		Device Test Position	Separation Distance	Modulation	Scale Factors	Conducted Power		1g SAR(W/kg)	
	Duty Cycle (%)	Crest Factor					Begin Power	End Power	Measured	Scaled
2506	30.9	3.24	Horizontal Up	5 mm	QPSK	1.16	23.47	23.47	0.862	1.000
2593	30.9	3.24	Horizontal Up	5 mm	QPSK	1.14	23.54	23.44	0.900	1.026
2685	30.9	3.24	Horizontal Up	5 mm	QPSK	1.21	23.29	23.36	0.818	0.990
2506	30.9	3.24	Horizontal Up	5 mm	16 QAM	1.14	23.55	23.64	0.777	0.886
2593	30.9	3.24	Horizontal Up	5 mm	16 QAM	1.15	23.50	23.49	0.883	1.015
2685	30.9	3.24	Horizontal Up	5 mm	16 QAM	1.17	23.45	23.59	0.693	0.811
2506	30.9	3.24	Horizontal Down	5 mm	QPSK	1.16	23.47	23.31	0.829	0.962
2593	30.9	3.24	Horizontal Down	5 mm	QPSK	1.14	23.54	23.48	1.040	1.186
2685	30.9	3.24	Horizontal Down	5 mm	QPSK	1.21	23.29	23.47	1.050	1.271
2506	30.9	3.24	Horizontal Down	5 mm	16 QAM	1.14	23.55	23.57	0.934	1.065
2593	30.9	3.24	Horizontal Down	5 mm	16 QAM	1.15	23.50	23.64	**1.120**	**1.288**
2685	30.9	3.24	Horizontal Down	5 mm	16 QAM	1.17	23.45	23.46	1.050	1.229
2593	30.9	3.24	Horizontal Up 90°	5 mm	QPSK	1.14	23.54	23.61	0.187	0.213
2593	30.9	3.24	Horizontal Down 90°	5 mm	QPSK	1.14	23.54	23.48	0.042	0.048
2593	30.9	3.24	Vertical Front	5 mm	QPSK	1.14	23.54	23.49	0.393	0.448
2593	30.9	3.24	Vertical Back	5 mm	QPSK	1.14	23.54	23.69	0.308	0.351
ANSI/ IEEE C95.1 2005 – Safety Limit **Spatial Peak** **Uncontrolled Exposure/ General Population**						**Body** **1.6 W/kg (mW/g)** Averaged over 1 gram				

Note : Refer to the notes on page 62

Appendix

List

Appendix A	DASY4 Report (Plots of the SAR Measurements)	- 2600 MHz Validation Test - WiMax 2600 Test
Appendix B	Uncertainty Analysis	
Appendix C	Calibration Certificate	- PROBE - DAE - DIPOLE

Appendix A

Test Plot - DASY4 Report

2600 MHz Validation Test_Body

Date: 2011-11-08

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: Validation 2600 MHz_1108.da4

Input Power : 100 mW

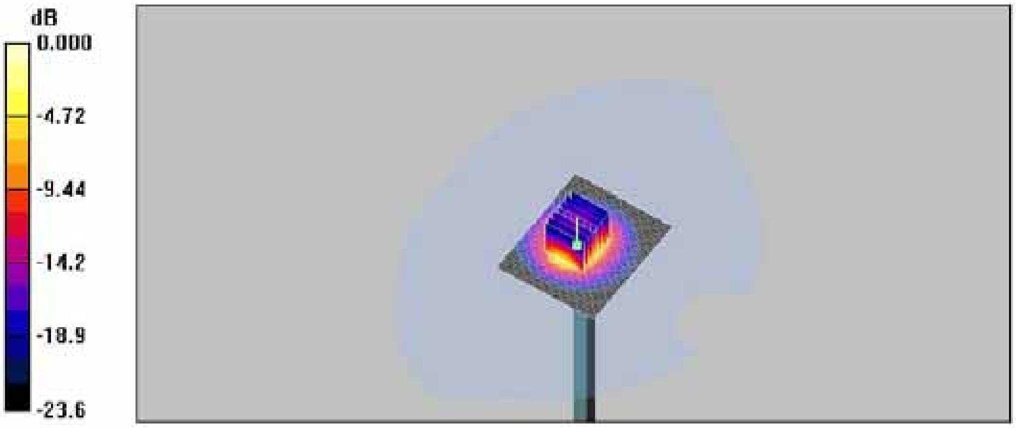
DUT: Dipole 2600 MHz D2600V2; Type: D2600V2; Serial: D2600V2 - SN:1038
Program Name: Validation 2600 MHz

Communication System: CW; Frequency: 2600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2600 MHz; $\sigma = 2.19$ mho/m; $\varepsilon_r = 52.8$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3791; ConvF(6.32, 6.32, 6.32); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2011-01-27
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

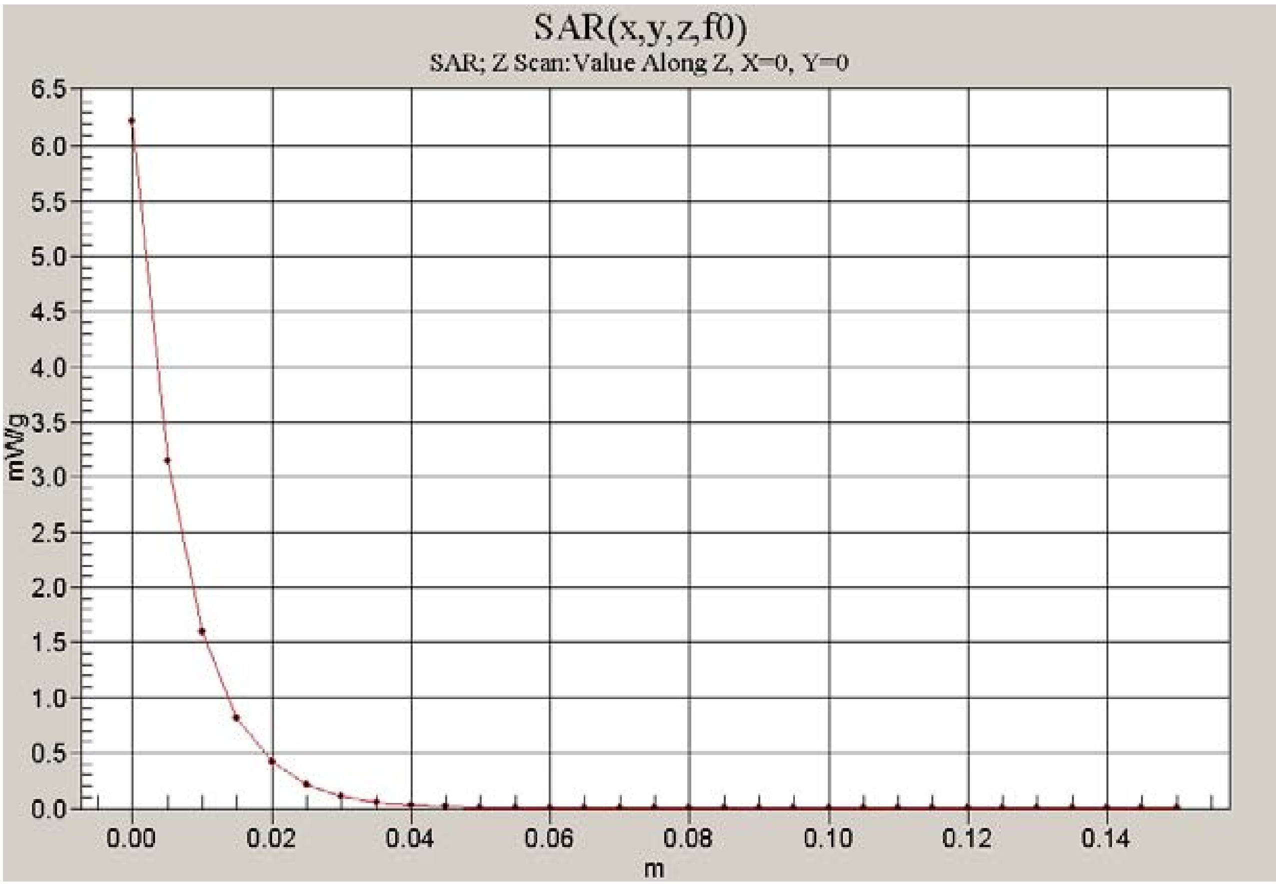
Validation 2600 MHz/Area Scan (51x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 6.64 mW/g

Validation 2600 MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 48.2 V/m; Power Drift = -0.031 dB
Peak SAR (extrapolated) = 12.2 W/kg
SAR(1 g) = 5.63 mW/g; SAR(10 g) = 2.47 mW/g
Maximum value of SAR (measured) = 6.44 mW/g



0 dB = 6.44mW/g

Z Scan


SAR(x,y,z,f0)
SAR; Z Scan:Value Along Z, X=0, Y=0
mW/g
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
m

2600 MHz Validation Test_Body

Date: 2011-11-09

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: Validation 2600 MHz_1109.da4

Input Power : 100 mW

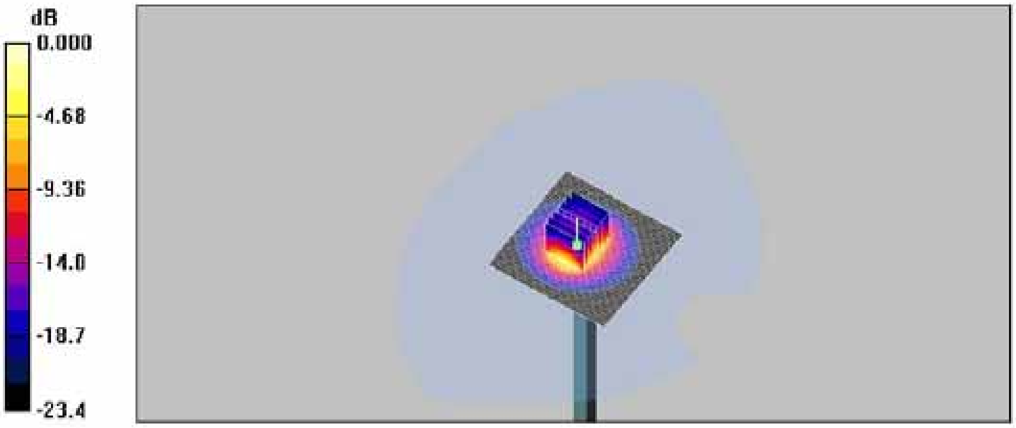
DUT: Dipole 2600 MHz D2600V2; Type: D2600V2; Serial: D2600V2 - SN:1038
Program Name: Validation 2600 MHz

Communication System: CW; Frequency: 2600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2600 MHz; σ = 2.18 mho/m; ε_r = 52.7; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3791; ConvF(6.32, 6.32, 6.32); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2011-01-27
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

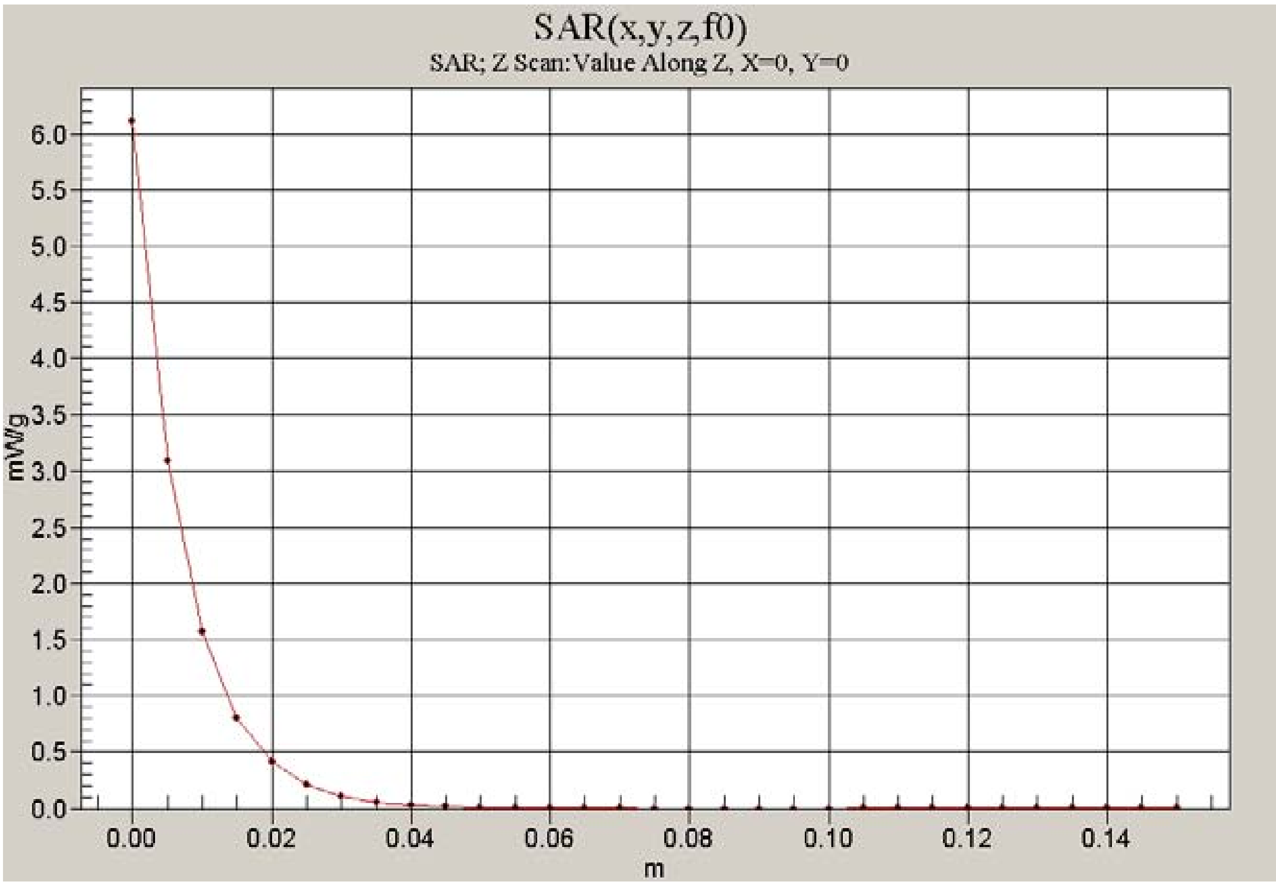
Validation 2600 MHz/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 6.58 mW/g

Validation 2600 MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 48.1 V/m; Power Drift = -0.025 dB
Peak SAR (extrapolated) = 12.3 W/kg
SAR(1 g) = 5.6 mW/g; SAR(10 g) = 2.45 mW/g
Maximum value of SAR (measured) = 6.48 mW/g



0 dB = 6.48mW/g

Z Scan


SAR(x,y,z,f0)
SAR; Z Scan:Value Along Z, X=0, Y=0
mW/g
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
m

2600 MHz Test_Body_PUSC_5 MHz

Date: 2011-11-08

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: Wimax_Horizontal-Up_PUSC_5MHz.da4

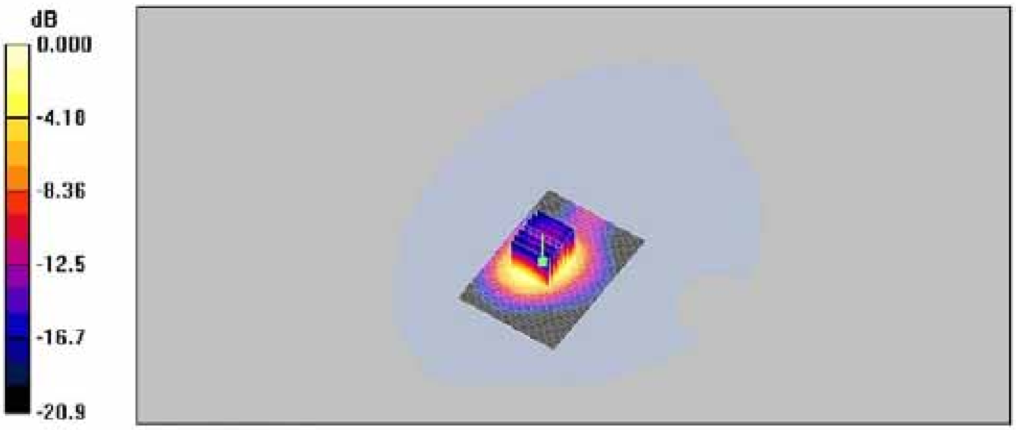
DUT: SWU-3400AN; Type: USB Dongle; Serial: KRSD0630UU3400AN-00097
Program Name: Wimax_Body

Communication System: Wimax; Frequency: 2506 MHz;Duty Cycle: 1:3.24
Medium parameters used: f = 2506 MHz; σ = 2.06 mho/m; ε_r = 53.1; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3791; ConvF(6.32, 6.32, 6.32); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2011-01-27
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body_Horizontal Up_PUSC_5MHz_QPSK1/2_Low_5mm/Area Scan (51x71x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.880 mW/g

Body_Horizontal Up_PUSC_5MHz_QPSK1/2_Low_5mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.18 V/m; Power Drift = 0.175 dB
Peak SAR (extrapolated) = 1.30 W/kg
SAR(1 g) = 0.727 mW/g; SAR(10 g) = 0.380 mW/g
Maximum value of SAR (measured) = 0.811 mW/g



0 dB = 0.811mW/g

Date: 2011-11-08

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: Wimax_Horizontal-Up_PUSC_5MHz&10MHz.da4

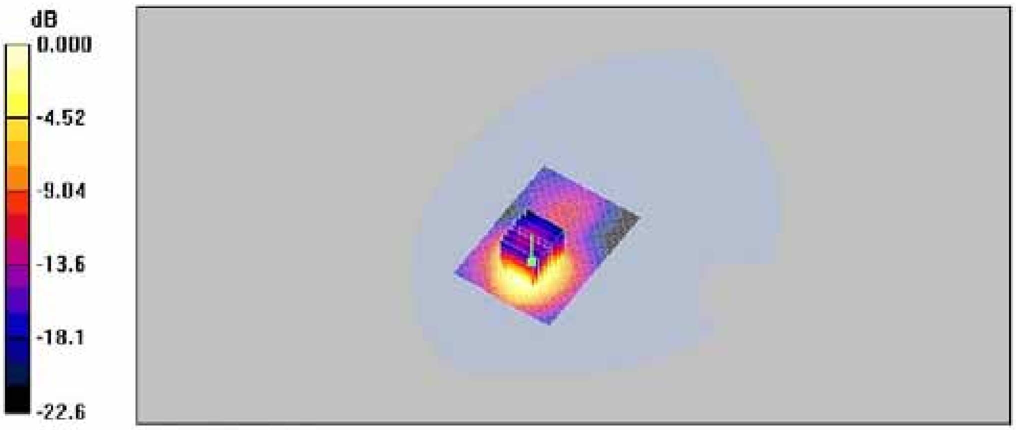
DUT: SWU-3400AN; Type: USB Dongle; Serial: KRSD0630UU3400AN-00097
Program Name: Wimax_Body

Communication System: Wimax; Frequency: 2593 MHz;Duty Cycle: 1:3.24
Medium parameters used: f = 2593 MHz; σ = 2.19 mho/m; ε_r = 52.8; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3791; ConvF(6.32, 6.32, 6.32); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2011-01-27
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body_Horizontal Up_PUSC_5MHz_QPSK1/2_Mid_5mm/Area Scan (51x71x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.993 mW/g

Body_Horizontal Up_PUSC_5MHz_QPSK1/2_Mid_5mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.63 V/m; Power Drift = 0.074 dB
Peak SAR (extrapolated) = 1.32 W/kg
SAR(1 g) = 0.734 mW/g; SAR(10 g) = 0.386 mW/g
Maximum value of SAR (measured) = 0.801 mW/g



0 dB = 0.801mW/g

Date: 2011-11-08

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: Wimax_Horizontal-Up_PUSC_5MHz.da4

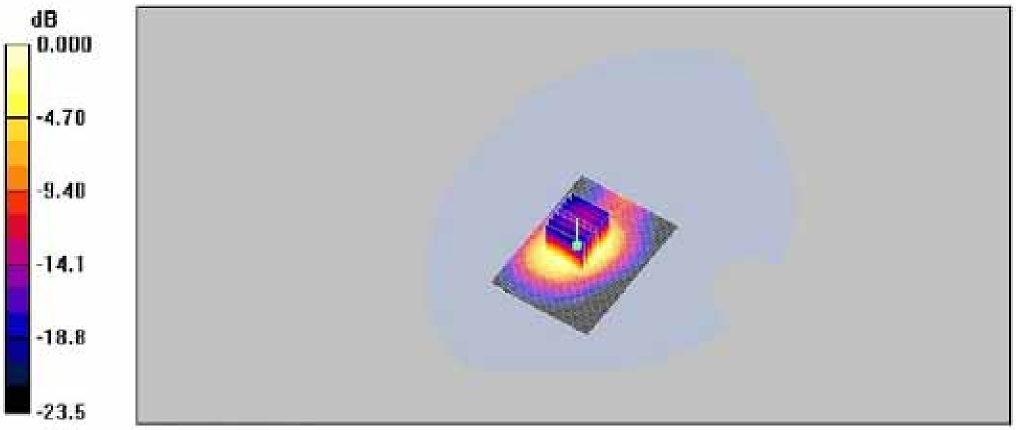
DUT: SWU-3400AN; Type: USB Dongle; Serial: KRSD0630UU3400AN-00097
Program Name: Wimax_Body

Communication System: Wimax; Frequency: 2685 MHz;Duty Cycle: 1:3.24
Medium parameters used: f = 2685 MHz; σ = 2.28 mho/m; ε_r = 52.4; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3791; ConvF(6.32, 6.32, 6.32); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2011-01-27
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body_Horizontal Up_PUSC_5MHz_QPSK1/2_High_5mm/Area Scan (51x71x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.719 mW/g

Body_Horizontal Up_PUSC_5MHz_QPSK1/2_High_5mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.13 V/m; Power Drift = 0.147 dB
Peak SAR (extrapolated) = 1.09 W/kg
SAR(1 g) = 0.593 mW/g; SAR(10 g) = 0.305 mW/g
Maximum value of SAR (measured) = 0.651 mW/g



0 dB = 0.651mW/g

Date: 2011-11-08

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: Wimax_Horizontal-Up_PUSC_5MHz.da4

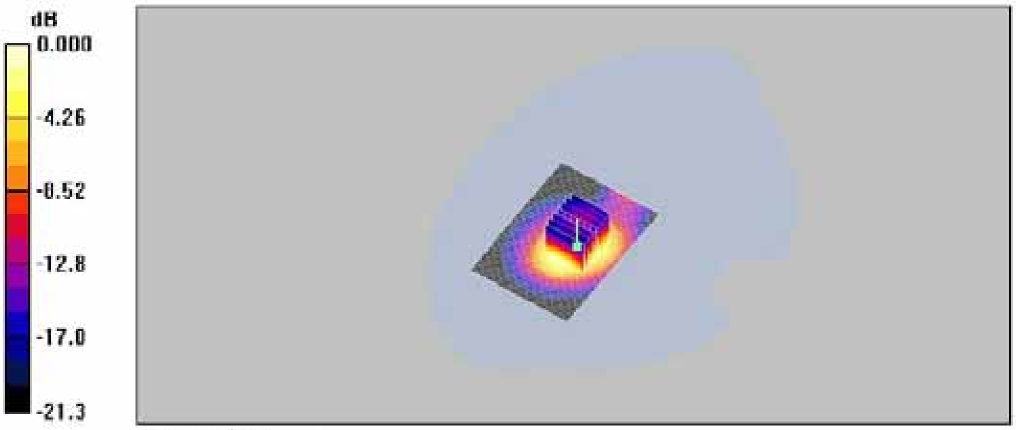
DUT: SWU-3400AN; Type: USB Dongle; Serial: KRSD0630UU3400AN-00097
Program Name: Wimax_Body

Communication System: Wimax; Frequency: 2506 MHz;Duty Cycle: 1:3.24
Medium parameters used: f = 2506 MHz; σ = 2.06 mho/m; ε_r = 53.1; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3791; ConvF(6.32, 6.32, 6.32); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2011-01-27
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body_Horizontal Up_PUSC_5MHz_16QAM1/2_Low_5mm/Area Scan (51x71x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.845 mW/g

Body_Horizontal Up_PUSC_5MHz_16QAM1/2_Low_5mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.04 V/m; Power Drift = -0.180 dB
Peak SAR (extrapolated) = 1.22 W/kg
SAR(1 g) = 0.684 mW/g; SAR(10 g) = 0.362 mW/g
Maximum value of SAR (measured) = 0.753 mW/g



0 dB = 0.753mW/g

Date: 2011-11-08

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: Wimax_Horizontal-Up_PUSC_5MHz.da4

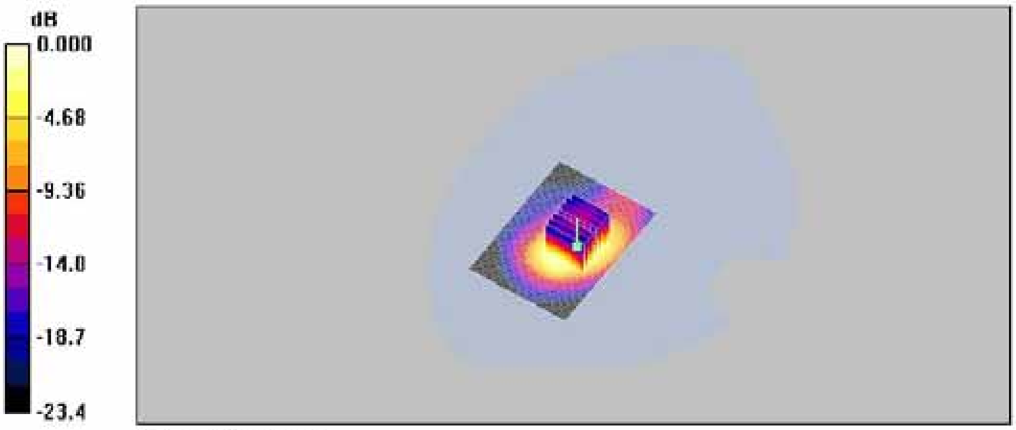
DUT: SWU-3400AN; Type: USB Dongle; Serial: KRSD0630UU3400AN-00097
Program Name: Wimax_Body

Communication System: Wimax; Frequency: 2593 MHz;Duty Cycle: 1:3.24
Medium parameters used: f = 2593 MHz; $\sigma = 2.19$ mho/m; $\varepsilon_r = 52.8$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3791; ConvF(6.32, 6.32, 6.32); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2011-01-27
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body_Horizontal Up_PUSC_5MHz_16QAM1/2_Mid_5mm/Area Scan (51x71x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.752 mW/g

Body_Horizontal Up_PUSC_5MHz_16QAM1/2_Mid_5mm/Zoom Scan (7x7x7)/Cube
0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.62 V/m; Power Drift = 0.112 dB
Peak SAR (extrapolated) = 1.13 W/kg
SAR(1 g) = 0.618 mW/g; SAR(10 g) = 0.320 mW/g
Maximum value of SAR (measured) = 0.676 mW/g



0 dB = 0.676mW/g

Date: 2011-11-08

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: Wimax_Horizontal-Up_PUSC_5MHz.da4

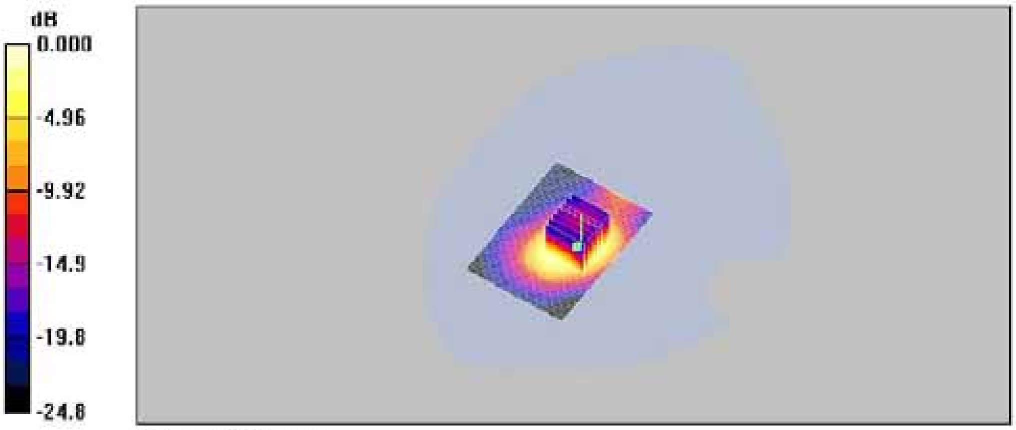
DUT: SWU-3400AN; Type: USB Dongle; Serial: KRSD0630UU3400AN-00097
Program Name: Wimax_Body

Communication System: Wimax; Frequency: 2685 MHz;Duty Cycle: 1:3.24
Medium parameters used: f = 2685 MHz; σ = 2.28 mho/m; ε_r = 52.4; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3791; ConvF(6.32, 6.32, 6.32); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2011-01-27
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body_Horizontal Up_PUSC_5MHz_16QAM1/2_High_5mm/Area Scan (51x71x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.712 mW/g

Body_Horizontal Up_PUSC_5MHz_16QAM1/2_High_5mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.00 V/m; Power Drift = 0.143 dB
Peak SAR (extrapolated) = 1.06 W/kg
SAR(1 g) = 0.575 mW/g; SAR(10 g) = 0.295 mW/g
Maximum value of SAR (measured) = 0.624 mW/g



0 dB = 0.624mW/g

Date: 2011-11-08

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: Wimax_Horizontal-Down_PUSC_5MHz.da4

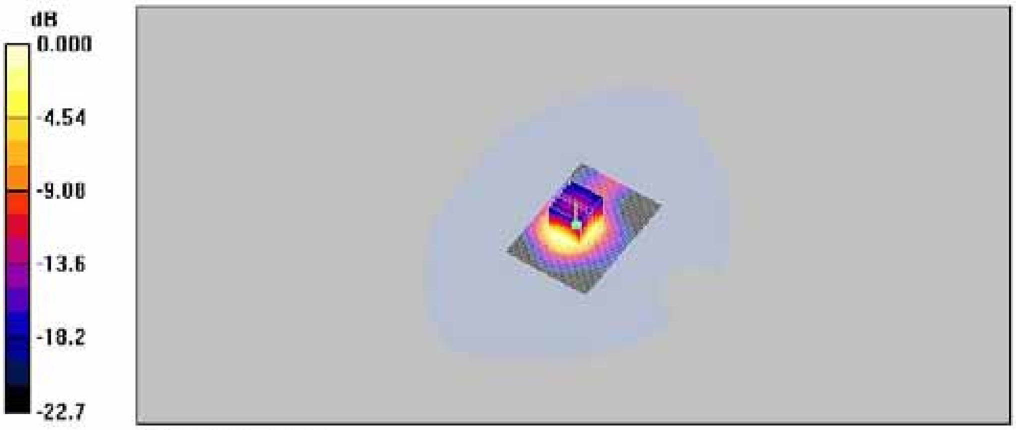
DUT: SWU-3400AN; Type: USB Dongle; Serial: KRSD0630UU3400AN-00097
Program Name: Wimax_Body

Communication System: Wimax; Frequency: 2506 MHz;Duty Cycle: 1:3.24
Medium parameters used: f = 2506 MHz; σ = 2.06 mho/m; ε_r = 53.1; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3791; ConvF(6.32, 6.32, 6.32); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2011-01-27
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body_Horizontal Down_PUSC_5MHz_QPSK1/2_Low_5mm/Area Scan (51x71x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.961 mW/g

Body_Horizontal Down_PUSC_5MHz_QPSK1/2_Low_5mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 17.2 V/m; Power Drift = 0.075 dB
Peak SAR (extrapolated) = 1.43 W/kg
SAR(1 g) = 0.803 mW/g; SAR(10 g) = 0.418 mW/g
Maximum value of SAR (measured) = 0.893 mW/g



0 dB = 0.893mW/g

Date: 2011-11-08

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: Wimax_Horizontal-Down_PUSC_5MHz.da4

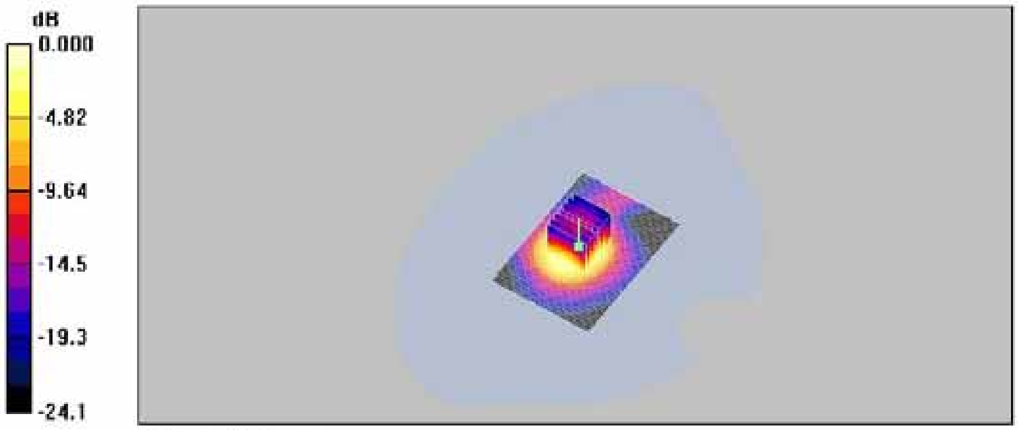
DUT: SWU-3400AN; Type: USB Dongle; Serial: KRSD0630UU3400AN-00097
Program Name: Wimax_Body

Communication System: Wimax; Frequency: 2593 MHz;Duty Cycle: 1:3.24
Medium parameters used: f = 2593 MHz; σ = 2.19 mho/m; ε_r = 52.8; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3791; ConvF(6.32, 6.32, 6.32); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2011-01-27
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body_Horizontal Down_PUSC_5MHz_QPSK1/2_Mid_5mm/Area Scan (51x71x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.12 mW/g

Body_Horizontal Down_PUSC_5MHz_QPSK1/2_Mid_5mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 19.0 V/m; Power Drift = 0.061 dB
Peak SAR (extrapolated) = 1.56 W/kg
SAR(1 g) = 0.865 mW/g; SAR(10 g) = 0.442 mW/g
Maximum value of SAR (measured) = 0.960 mW/g



0 dB = 0.960mW/g

Date: 2011-11-08

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: Wimax_Horizontal-Down_PUSC_5MHz.da4

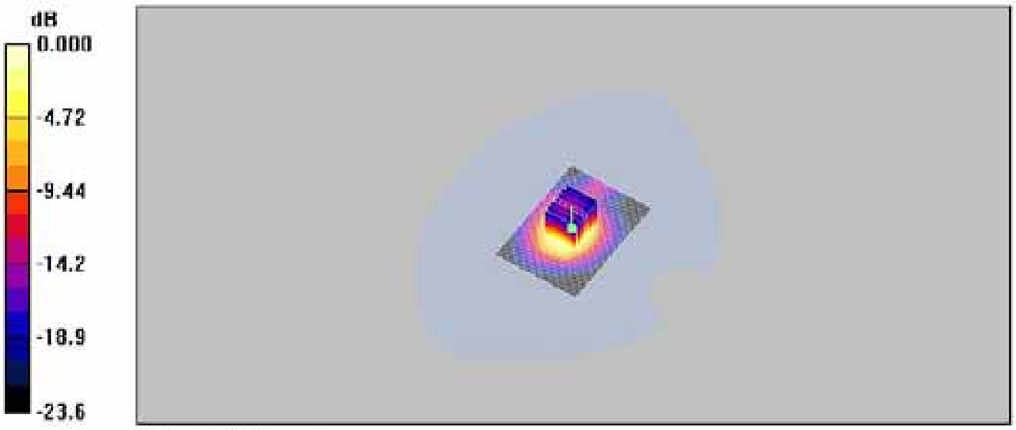
DUT: SWU-3400AN; Type: USB Dongle; Serial: KRSD0630UU3400AN-00097
Program Name: Wimax_Body

Communication System: Wimax; Frequency: 2685 MHz;Duty Cycle: 1:3.24
Medium parameters used: f = 2685 MHz; σ = 2.28 mho/m; ε_r = 52.4; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3791; ConvF(6.32, 6.32, 6.32); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2011-01-27
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

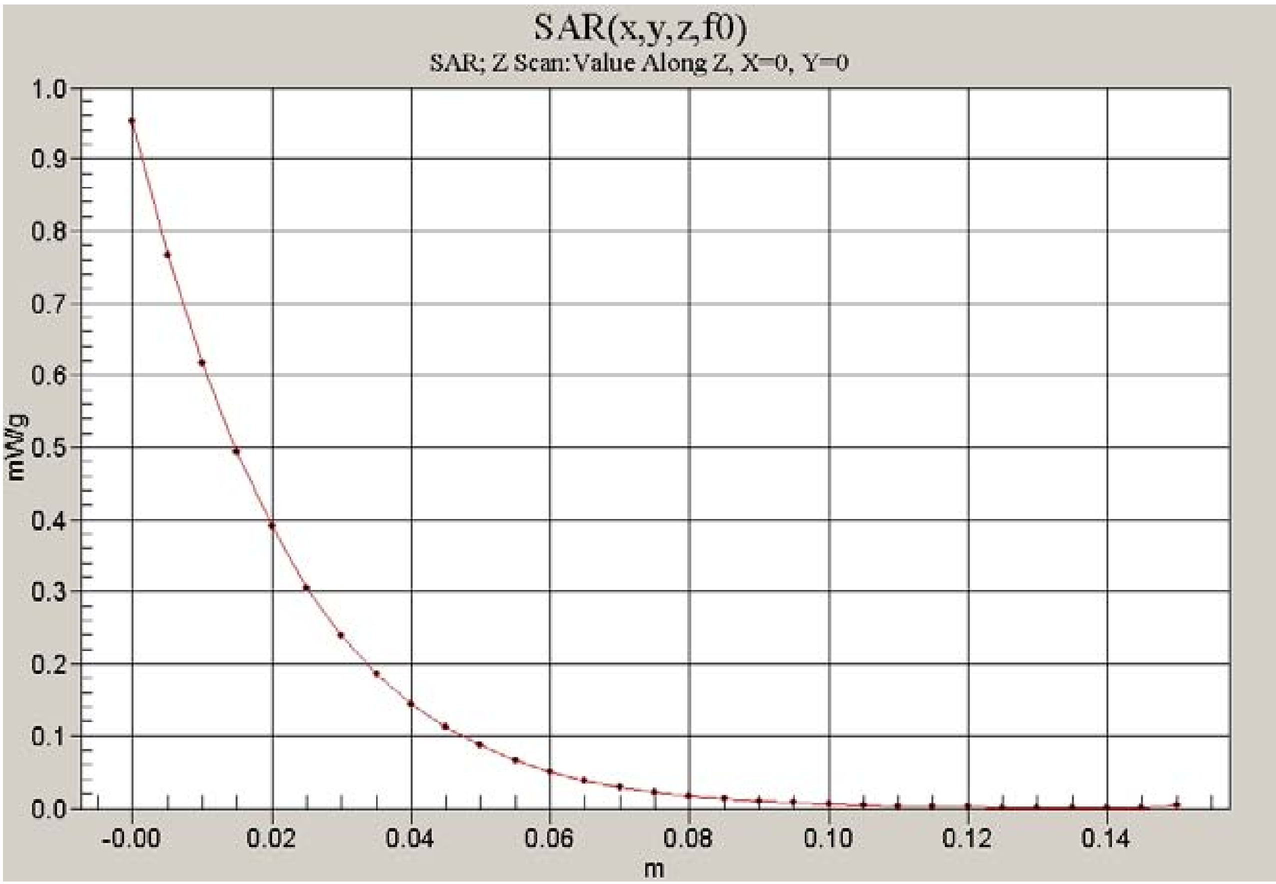
Body_Horizontal Down_PUSC_5MHz_QPSK1/2_High_5mm/Area Scan (51x71x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.17 mW/g

Body_Horizontal Down_PUSC_5MHz_QPSK1/2_High_5mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 19.1 V/m; Power Drift = 0.180 dB
Peak SAR (extrapolated) = 1.65 W/kg
SAR(1 g) = 0.886 mW/g; SAR(10 g) = 0.444 mW/g
Maximum value of SAR (measured) = 0.971 mW/g



0 dB = 0.971mW/g

Z Scan


SAR(x,y,z,f0)
SAR; Z Scan:Value Along Z, X=0, Y=0
mW/g
m
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
-0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14

Date: 2011-11-08

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: Wimax_Horizontal-Down_PUSC_5MHz.da4

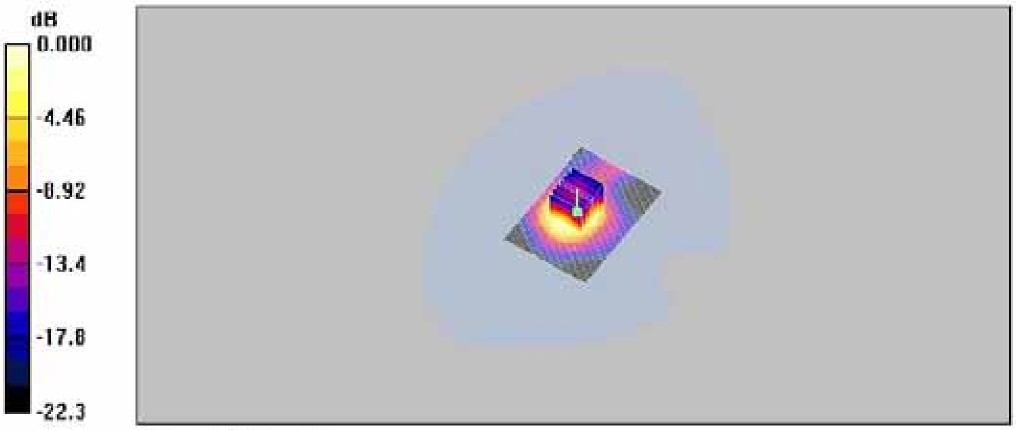
DUT: SWU-3400AN; Type: USB Dongle; Serial: KRSD0630UU3400AN-00097
Program Name: Wimax_Body

Communication System: Wimax; Frequency: 2506 MHz;Duty Cycle: 1:3.24
Medium parameters used: f = 2506 MHz; $\sigma = 2.06$ mho/m; $\varepsilon_r = 53.1$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3791; ConvF(6.32, 6.32, 6.32); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2011-01-27
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body_Horizontal Down_PUSC_5MHz_16QAM1/2_Low_5mm/Area Scan (51x71x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.803 mW/g

Body_Horizontal Down_PUSC_5MHz_16QAM1/2_Low_5mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 16.2 V/m; Power Drift = -0.063 dB
Peak SAR (extrapolated) = 1.20 W/kg
SAR(1 g) = 0.670 mW/g; SAR(10 g) = 0.348 mW/g
Maximum value of SAR (measured) = 0.735 mW/g



0 dB = 0.735mW/g

Date: 2011-11-08

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: Wimax_Horizontal-Down_PUSC_5MHz.da4

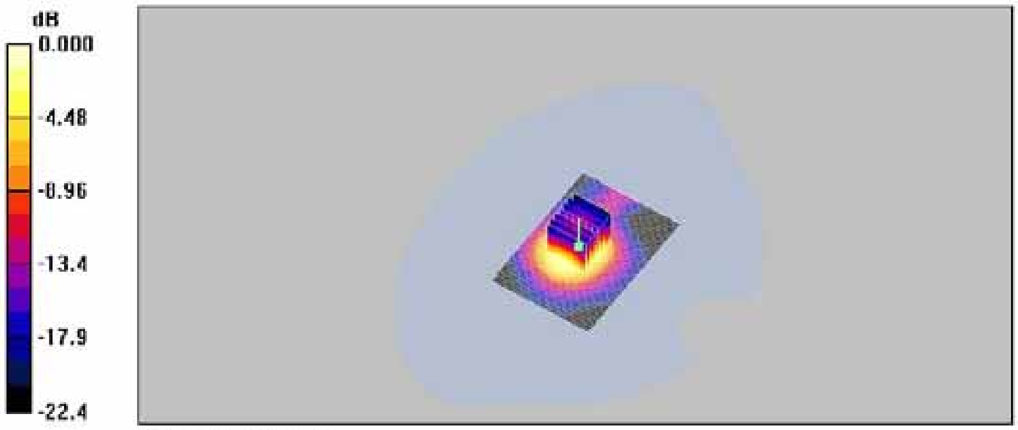
DUT: SWU-3400AN; Type: USB Dongle; Serial: KRSD0630UU3400AN-00097
Program Name: Wimax_Body

Communication System: Wimax; Frequency: 2593 MHz;Duty Cycle: 1:3.24
Medium parameters used: f = 2593 MHz; $\sigma = 2.19$ mho/m; $\varepsilon_r = 52.8$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3791; ConvF(6.32, 6.32, 6.32); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2011-01-27
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body_Horizontal Down_PUSC_5MHz_16QAM1/2_Mid_5mm/Area Scan (51x71x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.02 mW/g

Body_Horizontal Down_PUSC_5MHz_16QAM1/2_Mid_5mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 18.5 V/m; Power Drift = 0.083 dB
Peak SAR (extrapolated) = 1.46 W/kg
SAR(1 g) = 0.803 mW/g; SAR(10 g) = 0.411 mW/g
Maximum value of SAR (measured) = 0.890 mW/g



0 dB = 0.890mW/g

Date: 2011-11-08

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: Wimax_Horizontal-Down_PUSC_5MHz.da4

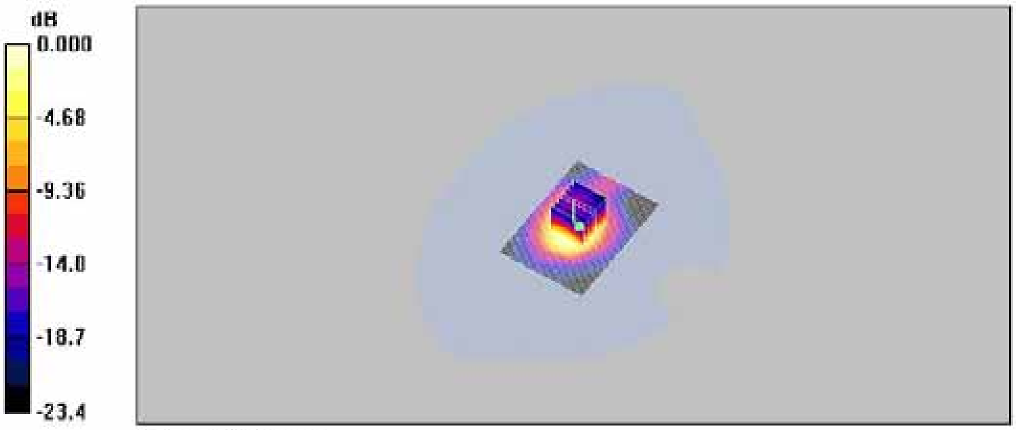
DUT: SWU-3400AN; Type: USB Dongle; Serial: KRSD0630UU3400AN-00097
Program Name: Wimax_Body

Communication System: Wimax; Frequency: 2685 MHz;Duty Cycle: 1:3.24
Medium parameters used: f = 2685 MHz; $\sigma = 2.28$ mho/m; $\varepsilon_r = 52.4$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3791; ConvF(6.32, 6.32, 6.32); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2011-01-27
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body_Horizontal Down_PUSC_5MHz_16QAM1/2_High_5mm/Area Scan (51x71x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.21 mW/g

Body_Horizontal Down_PUSC_5MHz_16QAM1/2_High_5mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 20.3 V/m; Power Drift = -0.023 dB
Peak SAR (extrapolated) = 1.54 W/kg
SAR(1 g) = 0.824 mW/g; SAR(10 g) = 0.418 mW/g
Maximum value of SAR (measured) = 0.909 mW/g



0 dB = 0.909mW/g

Date: 2011-11-08

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: Wimax_Horizontal Up 90_PUSC.da4

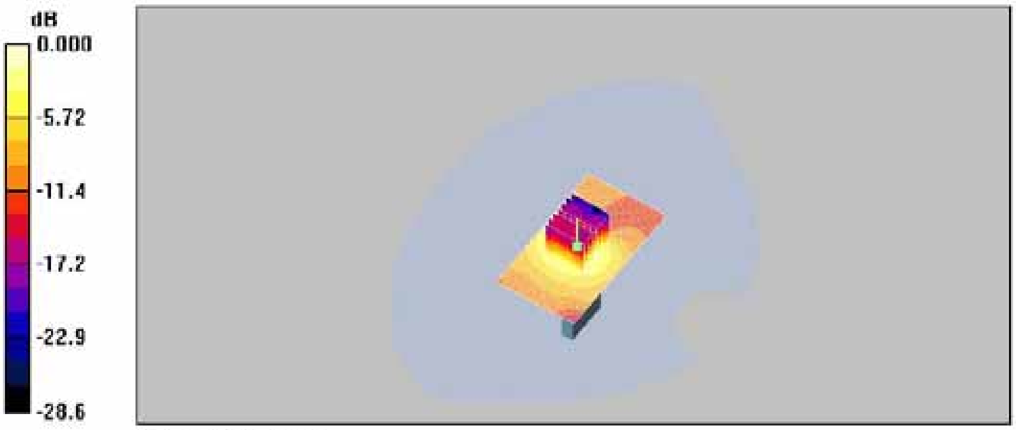
DUT: SWU-3400AN; Type: USB Dongle_90; Serial: KRSD0630UU3400AN-00097
Program Name: Wimax_Body

Communication System: Wimax; Frequency: 2593 MHz;Duty Cycle: 1:3.24
Medium parameters used: f = 2593 MHz; σ = 2.19 mho/m; ε_r = 52.8; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3791; ConvF(6.32, 6.32, 6.32); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2011-01-27
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body_Horizontal Up 90_PUSC_5MHz_QPSK1/2_Mid_5mm/Area Scan (41x71x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.214 mW/g

Body_Horizontal Up 90_PUSC_5MHz_QPSK1/2_Mid_5mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.61 V/m; Power Drift = 0.073 dB
Peak SAR (extrapolated) = 0.387 W/kg
SAR(1 g) = 0.187 mW/g; SAR(10 g) = 0.089 mW/g
Maximum value of SAR (measured) = 0.213 mW/g



0 dB = 0.213mW/g