TEST REPORT

1. Applicant

Name : SystemBase Co., Ltd.
Address : 16F Daerung Post Tower-1, 212-8, Guro-dong Seoul Korea

2. Products

EUT Type : Bluetooth USB Adapter
Model Name : TALUS
Manufacturer : SystemBase Co., Ltd.

3. Test Standard : FCC 47 CFR § 2.1093

4. Test Method : OET Bulletin 65, Supplement C(July 2001)

5. Test Result : Positive

6. Date of Application : July 15th, 2009

7. Date of Issue : August 10th, 2009

Tested by

Jong-Gon Ban
Telecommunication Center
Engineer

Approved by

Jeong-Min Kim
Telecommunication Center
Manager

The test results contained apply only to the test sample(s) supplied by the applicant, and this test report shall not be reproduced in full or in part without approval of the KTL in advance.

Korea Testing Laboratory

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1. EQUIPMENT UNDER TEST

1.1 General Information

Type of equipment	Bluetooth USB Adapter
Device Category	Portable Device
Model Name	TALUS
FCC ID	PROTALUS
Test Device	Production Unit
Applicant & Address	16F Daerung Post Tower-1, 212-8, Guro-dong Seoul, Korea
Contact Person	S.Y.Kim/ Assistant Manager
Rule & Test standard	FCC 47 CFR § 2.1093/ OET Bulletin 65, Supplement C(July 2001)
FCC Clasification	PUT- Part15 Unlicensed PCS portable Tx worn on body
RF exposure Category	General Population/ Uncontrolled
Maximum 1g SAR	**0.224 W/kg**

1.2 Description of Device :

Operation Modes	Bluetooth 2.0 + EDR
Max Conducted RF power	BDR : 14.16 dBm / EDR : 6.75 dBm SAR measurements were performed only in BDR Mode according to 60/f.
Tx Frequency Range	2402 MHz ~ 2480 MHz
Bluetooth Power Class	1
Duty Cycle	1:1
Antenna Type	Three External type Antennas (Long/Mid/Short size)
Antenna infomation	R-AN2400-1901RS : 19.7 cm/ + 5 dBi R-AN2400-5801RS : 13.7 cm/ + 2 dBi AN2400-3306RS : 3.0 cm/ + 1 dBi

2. INTRODUCTION

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

The safety limits used for the environmental evaluation measurements are based on the criteria published by American National Standards Institude (ANSI) for localized specific absorption rate (SAR) in IEEE/ANSI C95.1-1992 Standard for safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz. (c) 1992 by the Institute of Electical and Electronics Engineers, Inc., New York, New York 10017.[2] The measurement procedure described in IEEE/ANSI C95.3-1992 Recommended Practice for the Measurement of Potentially Hazardous Electromgnetic Fields – RF and Microwave[3] is used for guidance in measureing 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 Radiofrequency Electromagnetic Fields "NCRP Report No. 86 (c) NCRP, 1986, Bethesda, MD 20814.[4] SAR is a measure of the rate of energy absorption due to exaposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards.

2.1 SAR Definition

Specific Absortion Rate (SAR) is defined as the time derivative (rate) of the incremental energy (*dU*) absorbed by (dissipated in) an incremental mass (*dm*) contained in a volume element (*dV*) of a given density(*p*). It is also defined as the rate of RF energy absortion per unit mass at a point in an absorbing body. (see Figure.1)

$$SAR = \frac{d}{dt}\left(\frac{dU}{dm}\right) = \frac{d}{dt}\left(\frac{dU}{pdv}\right)$$

Figure 1. SAR Mathematical Equation

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

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

Where :

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

p = 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 or energy absortion were found to be the wavelength of the incident field in realtions 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 reflectinf surfaces, and whether conductive contact is made by the organism with a ground plane.[4]

3. DESCRIPTION OF SAR MEASREMENT SYSTEM

3.1 SAR Measurement System

These measurements are performed using the DASY4 automated dosimetric assessment system. It is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland and consists of high precision robotics system (Staubli), robot controller, measurement server, Measurement computer, near-field probe, probe alignment sensor, and the SAM 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 Fig.2).

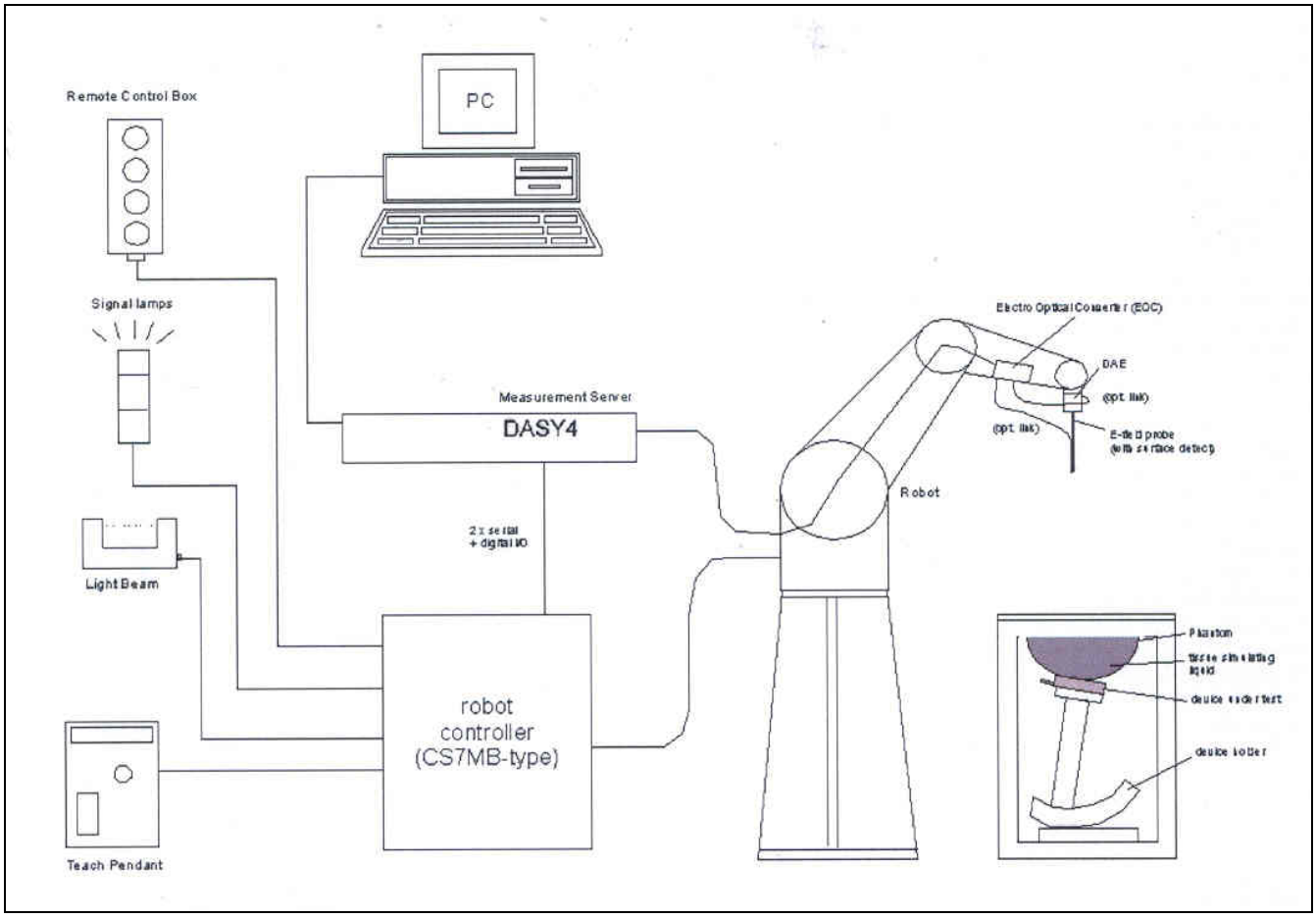

Figure 2. SAR Measurement System

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 [5].

3.2 E-Field Probe Type and Performance

The SAR measurements were conducted with the dosimetric probe ET3DV6, (see Fifure.4) designed in the classical triangular configuration [5] and optimised for dosimetric evaluation. The probe has been is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical mortifier 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 approace and looks for the maximum using a 2nd order fitting. The approach is stopped at reaching the maximum.

Figure 3. Probe and DAE

Probe Specifications

Construction	Symmetrical design with triangular core Built-in optical fiber for surface detection System Built-in shielding against static charges
Calibration	In air from 10 MHz to 2.5 GHz In brain and muscle simulating tissue at Frequencies of 450 MHz, 900 MHz and 1.8 GHz (accuracy. 8%)
Frequency	10 MHz to > 6 GHz; Linearity: . 0.2 dB (30 MHz to 3 GHz)
Directivity	. 0.2 dB in brain tissue (rotation around probe axis) . 0.4 dB in brain tissue (rotation normal probe axis)
Dynamic Range Linearity	5 uW/g to > 100 mW/g; 0.2 dB
Surface Detection	0.2 mm repeatability in air and clear liquids Over diffuse reflecting surfaces.
Dimensions	Overall length: 330 mm Tip length: 16 mm Body diameter: 12 mm Tip diameter: 6.8 mm Distance from probe tip to dipole centers: 2.7 mm
Application	General dissymmetry up to 3 GHz Compliance tests of mobile phones Fast automatic scanning in arbitrary phantoms

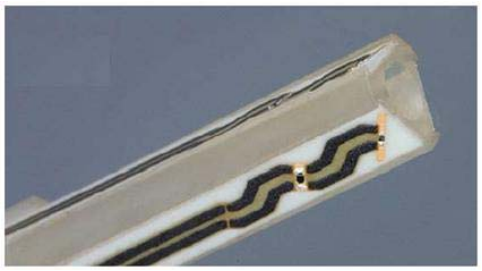

Figure 4. ET3DV6 E-Field Probe

3.3 Probe Calibration Process

Dosimetric Assessment Procedure

Each probe is calibrated according to a dosimetric assessment procedure described [6] with an accuracy better than +/- 10%. The spherical isotropy was evaluated with the procedure described in [7] and found to be better than +/- 0.25dB. The sensitivity parameters (NornX, NornY, NornZ), 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)

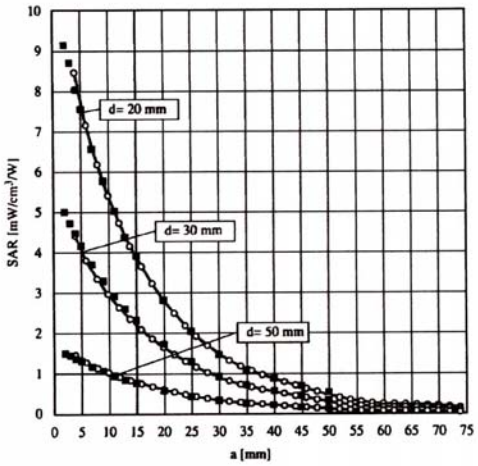

Figure B.1. E-Field and Temperature measurements at 900MHz[5]

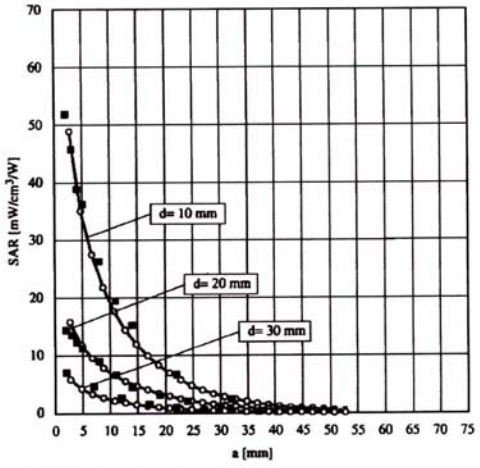

Figure B.2. E -field and temperature measurements at 1.8GHz[5]

3.4 Data Acquisition Electronics

The data acquisition electronics (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. The input impedance of the DAE4 box is 200 Mohm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.Transmission to the PC-card is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock.
The mechanical probe-mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection.

3.5 Phantom Properties

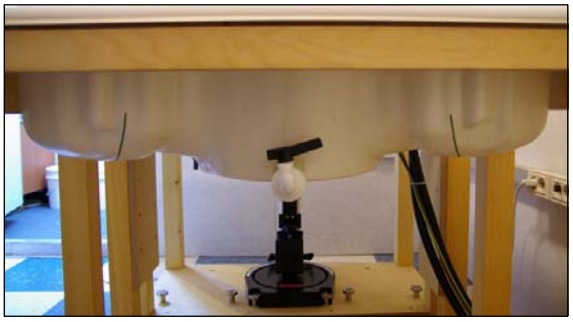

Figure 5. SAM twin phantom

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 [9][10]. 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.

Phantom Properties	Requirement for specific EUT	Measured
Depth of Phantom	> 150 mm	200 mm
Width of flat section	> 10 cm (Twice EUT Width)	20 cm
Length of flat section	> 26 cm (Twice EUT Length)	30 cm
Thickness of flat section	2 mm ± 0.2 mm	2.08 ~ 2.20 mm

Table 1. Flat Section Properties of SAM Twin Phantom

3.6 Device Holder for DASY4

In combination with the SAM Phantom V4.0, 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 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 [10]. To produce the Worst-case condition (the hand absorbs antenna output power), the hand is omitted during the tests.

Figure 4. Device Holder

3.7 Brain & Muscle Simulating Mixture Characteristic

The brain and muscle mixtures consist of a viscous gel using hydroxethylcellulose (HEC) gelling agent and saline solution (see Table 2). Preservation with 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 [11].

Ingredients	2450MHz Brain	2450MHz Muscle
Water	55.0%	68.64%
Sugar	-	-
Salt	-	-
DGBE	45.0%	31.37%
Bacteriacide	-	-
HEC	-	-

Table 2 : Composition of Tissue Equivalent Matter

4. System Verification

4.1 Tissue Verification

The dielectric parameters of the brain and muscle simulating liquid were measured prior to SAR assessment using the HP85070D dielectric probe kit and Agilent 8753D Network Analyzer. The actual dielectric parameters are shown in the following table.

Freq. [MHz]	Liquid	Date	Liquid Temp [°C]	parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
2450	Head	August 10th 2009	22.2	εr	39.2	39.3	+0.3	± 5
				σ	1.80	1.82	+1.1	± 5
	Body	August 10th 2009	22.5	εr	52.7	52.5	-0.4	± 5
				σ	1.95	1.97	+1.0	± 5

Table 3 : Measured Simulating Liquid Dielectric Values

The humidity and dielectric/ambient temperatures are recorded during the assessment of the tissue material dielectric parameters. The difference between the ambient temperature of the liquid during the dielectric measurement and the temperature during tests was less than |2|°C.

4.2 System Validation

Figure 5. Validation setup

Prior to the SAR assessment, the system validation kit was used to verify that the DASY4 was operating within its specifications. The validation dipoles are highly symmetric and matched at the centre frequency for the specified liquid and distance to the phantom. The accurate distance between the liquid surface and the dipole centre is achieved with a distance holder that snaps onto the dipole.
System validation is performed by feeding a known power level into a reference dipole, set at a know distance from the phantom. The measured SAR is compared to the theoretically derived level.

The reference SAR values are derived using a reference dipole and flat phantom suitable. The forward power into the reference dipole for each SAR validation was adjusted to 250 mW.

These reference SAR values are obtained from the IEEE Std 1528 and are normalized to 1 W. The measured 1g(10g) SAR should be within 10 % of the expected target reference values shown in table 4 below.

System Validation Kit	Date	Tissue	Liquid Temp.(˚C)	Ambient Temp.(˚C)	Targeted SAR_{1g} (mW/g)	Measured SAR 1 g (mW/g)	Deviation (%)
2450V2 S/N:746	August 10th ,2009	2450MHz Brain	22.3	22.0	52.4	53.2	+1.5

Table 4 : Deviation from Reference Validation Values

During the SAR measurement process the liquid depth was maintained to a level of a least 15 tolerance of ± 0.2cm.
The following photo shows the depth of the liquid depth of the liquid maintained during the testing.

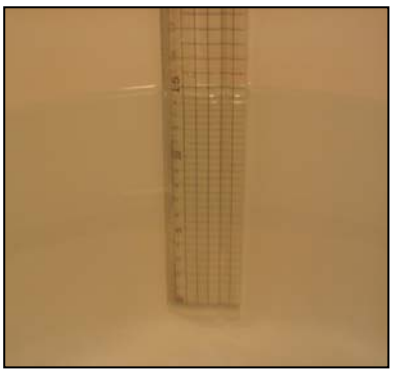

Figure 6. Liquid Depth

5. SAR MEASUREMENT PROCEDURE USING DASY4

The SAR evaluation was performed with the SPEAG DASY4 system. A summary of the procedure follows ;

a) A measurement of the SAR value at a fixed location is used as a reference value for assessing the power drop of the EUT. The SAR at this point is measured at the start of the test and then again at the end of the test.

b) The SAR distribution at the exposed side of the phantom is measured at a distance of 3.9 mm from the inner surface of the shell. The area covers the entire dimension of the EUT and the horizontal grid spacing is 15 mm x 15 mm(or 20mm x 20mm). The actual Area Scan has dimensions surrounding the test device. Based on this data, the area of the maximum absorption is determined by Spline interpolation.

c) Around this point, a volume is assessed by measuring 5 x 5 x 7 (7 x 7 x 7) points. On the basis of this data set, the spatial peak SAR value is evaluated with the following procedure ;

(i) The data at the surface are extrapolated, since the centre 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 is based on a least square algorithm[13]. A polynomial of the fourth order is calculated through the points in z-axes. This polynomial is then used to evaluate the points between the surface and the probe tip.

(ii) The maximum interpolated value is searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g and 10 g) are 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-direction)[13][14]. The volume is integrated with the trapezoidal-algorithm. One thousand points (10 x 10 x 10) are interpolated to calculate the averages.

(iii) All neighbouring volumes are evaluated until no neighbouring volume with a higher average value is found.

(iv) The SAR value at the same location as in Step (a) is again measured (If the value changed by more than 5%, the evaluation is repeatd.)

6. MEASUREMENT UNCERTAINTY

The uncertainty analysis is based on the template listed in the IEEE Std 1528-2003 for both EUT SAR tests and Validation uncertainty. The measurement uncertainty of a specific device is evaluated independently and the total uncertainty for both evaluations (95 % confidence level) must be less than 25 %.

a	b	c	d	e= f(d,k)	f	g	h=cxf/e	i=cxg/e	k
Uncertainty Component	Sec.	Tol. (%)	Prob. Dist.	Div.	Ci (1 g)	Ci (10 g)	1 g Ui (± %)	10 g Ui (± %)	vi
Measurement System									
Probe Calibration (k=1)	E.2.1	5.9	N	1	1	1	5.9	5.9	∞
Axial Isotropy	E.2.2	4.7	R	√ 3	0.7	0.7	1.9	1.9	∞
Hemispherical Isotropy	E.2.2	9.6	R	√ 3	0.7	0.7	3.9	3.9	∞
Boundary Effect	E.2.3	1.0	R	√ 3	1	1	0.6	0.6	∞
Linearity	E.2.4	4.7	R	√ 3	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1.0	R	√ 3	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	0.3	N	1	1	1	0.3	0.3	∞
Response Time	E.2.7	0.8	R	√ 3	1	1	0.5	0.5	∞
Integration Time	E.2.8	2.6	R	√ 3	1	1	1.5	1.5	∞
RF Ambient Noise	E.6.1	3.0	R	√ 3	1	1	1.7	1.7	∞
RF Ambient Refections	E.6.1	3.0	R	√ 3	1	1	1.7	1.7	∞
Probe Positioner	E.6.2	0.4	R	√ 3	1	1	0.2	0.2	∞
Probe Positioning with respect to Phantom Shell	E.6.3	2.9	R	√ 3	1	1	1.7	1.7	∞
Algorithms for Max. SAR Evaluation	E.5	1.0	R	√ 3	1	1	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	E.4.2	2.9	N	1	1	1	2.9	2.9	145
Device Holder Uncertainty	E.4.1	3.6	N	1	1	1	3.6	3.6	5
Output Power Variation — SAR Drift Measurement	6.6.2	5.0	R	√ 3	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									
Phantom Uncertainty (shape and thickness tolerances)	E.3.1	4.0	R	√ 3	1	1	2.3	2.3	∞
Liquid Conductivity — Deviation from target values	E.3.2	5.0	R	√ 3	0.64	0.43	1.8	1.2	∞
Liquid Conductivity — Measurement uncertainty	E.3.3	2.5	N	1	0.64	0.43	1.6	1.1	∞
Liquid Permititivity — Deviation from target values	E.3.2	5.0	R	√ 3	0.6	0.49	1.7	1.4	∞
Liquid Pemiittivity — Measurement uncertainty	E.3.3	2.5	N	1	0.6	0.49	1.5	1.2	∞
Cornbined standard Uncertainty			RSS				± 10.9	± 10.7	387
Expanded Uncertainty (95% CONFIDENCE LEVEL)			K=2				± 21.9	± 21.4	

Table 5. EUT SAR Test - Uncertainty Budget for DASY4 Version V4.6 Build 19

Estimated total measurement uncertainity for the DASY4 measurement system was ± 10.9 %.
The extended uncertainity (K=2) was assessed to be ± 21.9 % based on 95 % confidence level.
The uncertainity is not added to the measurement result.

7. Description of Test Position

SAR measurements were performed in the “cheek” and “tilted” positions on left and right sides of the phantom. Both were measured in the head section of the SAM Twin Phantom . For the “Belt ” position , it was measured in the flat section of the SAM Twin Phantom .

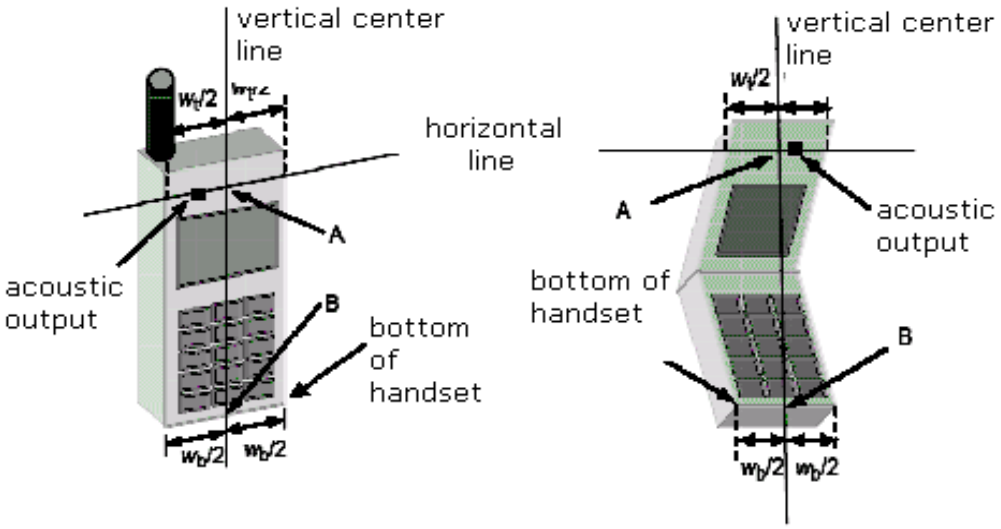

Figure 7. Handset vertical and horizontal reference line

7.1 Cheek Position

The device was positioned with the vertical center line of the body of the device and the horizontal line crossing the center (see Figure 7) of the ear piece in a plane parallel to the sagittal plane of the phantom(see Figure 8). While maintaining the device in this plane, it was aligned the vertical center line with the reference plane containing the three ear and mouth reference points(M, RE and LE) and aligned the center of the ear piece with the line RE-LE. Then device was translated towards the phantom with the ear piece aligned with the line LE-RE until it touched the ear. While maintaining the device in the reference plane and maintaining the device contact with the ear, the bottom of the device was moved until any point on the front side is in contact with the cheek of the phantom.(see Figure 9)

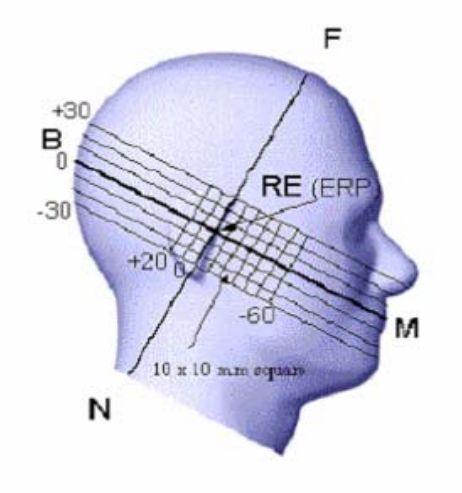

Figure 8. Side view of SAM phantom

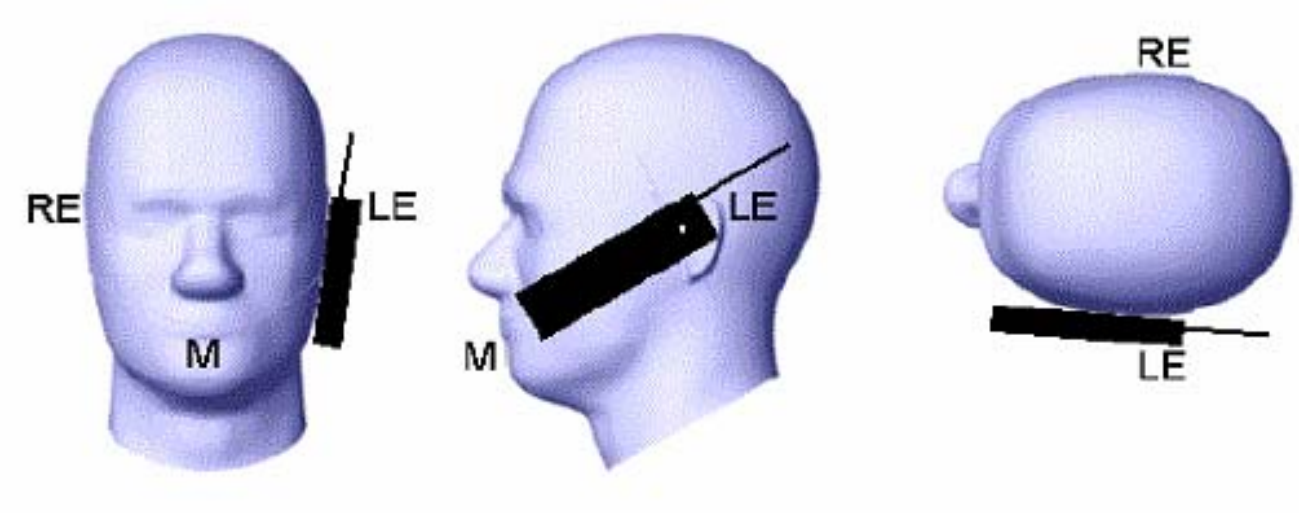

Figure 9. Cheek/Touch Position

2)

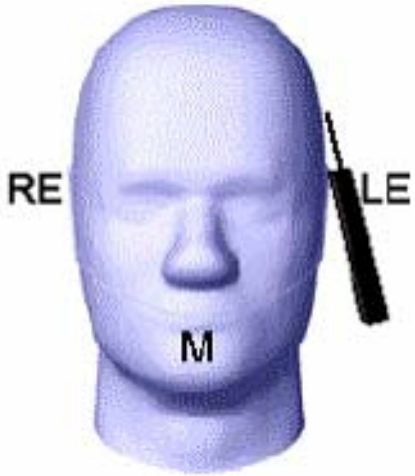

Figure 10. Ear /Tilt Position

Figure 11. Belt Position set up without holster

7.2 Tilt Position

The device was positioned in the "Cheek" position. While maintaining the device in the reference plane described above cheek position and pivoting against the ear, device was moved outward away from the mouth by an angle of 15 degrees. (see Figure 10)

7.3 Body Holster/Belt-Clip Position

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.
Accessories for Body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do 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 the device with each accessory. If multiple accessories 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. Test position spacing was documented.

Transmitters that are designed to operate in front of a person's face, as in push-to-talk configurations, are test for SAR compliance with the front of the device positioned to face the flat phantom in brain fluid. For devices that are carried next to the body such as a shoulder, waist or chest-worn transmitters, SAR compliance is tested with the accessories, 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. Worst-case positioning is then documented and used to perform Body SAR testing.

8. FCC 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 (Hand / Feet / Ankle / Wrist)	4.00	20.00

Table. 8 Safety Limits for Partial Body Exposure

NOTE 1 : **Whole-Body SAR** is averaged over the entire body, **partial-body SAR** is averaged over any 1gram of tissue defined as a tissue volume in the shape of a cube. **SAR for hands, wrists, feet and ankles** is averaged over any 10 grams of tissue defined as a tissue volume in the shape of cube

NOTE 2 : At frequencies above 6.0 GHz, SAR limits are not applicable and MPE limits for power density should be applied at 5 cm or more from the transmitting device.

NOTE 3 : The time averaging criteria for field strength and power density do not apply to general population SAR limit of 47 CFR § 2.1093.

10. SAR MEASUREMENT RESULTS

1) Body SAR Measurement with R-AN2400-1901RS Antenna (19.7 cm/ + 5 dBi)

Frequency		Mode	Antenna to Phantom Separation Distance	USB connector Orientation	Antenna	Power (dBm)		SAR 1g (W/Kg)
MHz	CH					Begin	End	
2441	39	Bluetooth 2.0 BDR	0.5 cm	Horizontal-Up	Horizontal	13.51	13.50	0.186
2441	39		0.5 cm		Vertical	13.51	13.50	0.029
2441	39	Bluetooth 2.0 BDR	0.5 cm	Horizontal-Down	Horizontal	13.51	13.49	0.215
2441	39		0.5 cm		Vertical	13.51	13.50	0.033
2441	39	Bluetooth 2.0 BDR	0.7 cm	Vertical-Front	Horizontal	13.51	13.50	0.115
2441	39		0.7 cm		Vertical	13.51	13.49	0.040
2441	39	Bluetooth 2.0 BDR	0.7 cm	Vertical-Back	Horizontal	13.51	13.50	0.109
2441	39		0.7 cm		Vertical	13.51	13.50	0.039
2441	39	Bluetooth 2.0 BDR	0.5 cm	Dongle Tip	Horizontal	13.51	13.49	0.002
2441	39		0.5 cm		Vertical	13.51	13.49	0.181
2402	0	Bluetooth 2.0 BDR	0.5 cm	Horizontal-Down	Horizontal	14.15	14.14	**0.224**
2480	78		0.5 cm		Horizontal	12.59	12.57	0.156

NOTES:
1. The test data reported are the worst-case SAR value with the position set in a typical configuration
2. All modes of operation were investigated and the worst-case are reported.
3. In case of Vertical-Front and Vertical-Back the USB dongle was attached to the phantom directly but the separation distance between phantom and Antenna is 0.7 cm
4. Depth of simulating tissue is 15.0 cm ±0.2 cm
5. Tissue parameters and temperatures are listed on the SAR plot.
6. Power supply : Power supplied through host device (HP & LENOVO)
7. Test signal call mode : Test-mode (CSR tool)
8. USB extension cable length : 30 cm
9. SAR Configuration : Body (SAR measurement procedures for USB dongle transmitters given in KDB 447498)
10. The EUT was fixed by using a Styrofoam to avoid perturbation due to the device holder clamps.

2)Body SAR Measurement with R-AN2400-5801RS Antenna (13.7 cm/ + 2 dBi)

Frequency		Mode	Antenna to Phantom Separation Distance	USB connector Orientation	Antenna	Power (dBm)		SAR 1g (W/Kg)
MHz	CH					Begin	End	
2441	39	Bluetooth 2.0 BDR	0.5 cm	Horizontal-Up	Horizontal	13.51	13.49	0.129
2441	39		0.5 cm		Vertical	13.51	13.50	0.007
2441	39	Bluetooth 2.0 BDR	0.5 cm	Horizontal-Down	Horizontal	13.51	13.50	0.161
2441	39		0.5 cm		Vertical	13.51	13.49	0.020
2441	39	Bluetooth 2.0 BDR	0.7 cm	Vertical-Front	Horizontal	13.50	13.49	0.127
2441	39		0.7 cm		Vertical	13.51	13.49	0.019
2441	39	Bluetooth 2.0 BDR	0.7 cm	Vertical-Back	Horizontal	13.51	13.49	0.091
2441	39		0.7 cm		Vertical	13.51	13.49	0.017
2441	39	Bluetooth 2.0 BDR	0.5 cm	Dongle Tip	Horizontal	13.51	13.50	0.002
2441	39		0.5 cm		Vertical	13.51	13.50	0.205

NOTES:
1. The test data reported are the worst-case SAR value with the position set in a typical configuration
2. All modes of operation were investigated and the worst-case are reported.
3. In case of Vertical-Front and Vertical-Back the USB dongle was attached to the phantom directly but the separation distance between phantom and Antenna is 0.7 cm
4. Depth of simulating tissue is 15.0 cm ±0.2 cm
5. Tissue parameters and temperatures are listed on the SAR plot.
6. Power supply : Power supplied through host device (HP & LENOVO)
7. Test signal call mode : Test-mode (CSR tool)
8. USB extension cable length : 30 cm
9. SAR Configuration : Body (SAR measurement procedures for USB dongle transmitters given in KDB 447498)
10. The EUT was fixed by using a Styrofoam to avoid perturbation due to the device holder clamps.

3)Body SAR Measurement with AN2400-3306RS Antenna(3.0 cm/ + 1 dBi)

Frequency		Mode	Antenna to Phantom Separation Distance	USB connector Orientation	Antenna	Power (dBm)		SAR 1g (W/Kg)
MHz	CH					Begin	End	
2441	39	Bluetooth 2.0 BDR	0.5 cm	Horizontal-Up	Fixed	13.51	13.50	0.200
2441	39	Bluetooth 2.0 BDR	0.5 cm	Horizontal-Down	Fixed	13.52	13.50	0.211
2441	39	Bluetooth 2.0 BDR	0.7 cm	Vertical-Front	Fixed	13.51	13.50	0.171
2441	39	Bluetooth 2.0 BDR	0.7 cm	Vertical-Back	Fixed	13.51	13.50	0.168
2441	39	Bluetooth 2.0 BDR	0.5 cm	Dongle Tip	Fixed	13.50	13.49	0.006

NOTES:
1. The test data reported are the worst-case SAR value with the position set in a typical configuration
2. All modes of operation were investigated and the worst-case are reported.
3. In case of Vertical-Front and Vertical-Back the USB dongle was attached to the phantom directly but the separation distance between phantom and Antenna is 0.7 cm
4. Depth of simulating tissue is 15.0 cm ±0.2 cm
5. Tissue parameters and temperatures are listed on the SAR plot.
6. Power supply : Power supplied through host device (HP & LENOVO)
7. Test signal call mode : Test-mode (CSR tool)
8. USB extension cable length : 30 cm
9. SAR Configuration : Body (SAR measurement procedures for USB dongle transmitters given in KDB 447498)
10. The EUT was fixed by using a Styrofoam to avoid perturbation due to the device holder clamps.

11. CONCLUSION

The SAR evaluation indicates that TALUS complies with the RF radiation exposure limits of the FCC.
These measurements were taken to simulate the RF effects of RF exposure under worst-case conditions.
Precise laboratory measures were taken to assure repeatability of the tests. The results and statements relate only to the item(s) tested.

12. EQUIPMENT LIST AND CALIBRATION DETAILS

Equipment Type	Manufacturer	Model Number	Serial Number	Calibration Due
Robot - Six Axes	Staubli	RX60	N/A	N/A
Robot Remote Control	SPEAG	CS7MB	F03/5U96A1 /C/01	N/A
SAM Twin Phantom	SPEAG	TP1276	QD000P40CA	N/A
Flat Phantom V4.4	SPEAG	QD000P44BA, BB	1001, higher	N/A
Data Acquisition Electronics	SPEAG	DAE4	559	2010.04.30
Probe E-Field	SPEAG	ET3DV6	3020	2010.07.22
Antenna Dipole 835 MHz	SPEAG	D835V2	481	2010.05.24
Antenna Dipole 900 MHz	SPEAG	D900V2	194	2009.11.19
Antenna Dipole 1800 MHz	SPEAG	D1800V2	2d066	2010.05.23
Antenna Dipole 1900 MHz	SPEAG	D1900V2	5d038	2009.11.20
Antenna Dipole 1950 MHz	SPEAG	D1950V2	1027	2010.03.14
Antenna Dipole 2450 MHz	SPEAG	D2450V2	746	2011.04.27
High power RF Amplifier	EMPOWER	2057-BBS3Q5KCK	1002D/C0321	2009.10.13
Universal Radio Communication Tester	R&S	CMU200	110019	2009.08.29
Signal Generator	Agilent	E8257D	MY44320379	2010.01.02
RF Power Meter Dual	HP	E4419A	GB37170495	2010.04.27
RF Power Sensor 0.01 - 18 GHz	HP	8481A	US37299851	2010.01.12
RF Power Sensor 0.01 - 18 GHz	HP	8481A	3318A92872	2010.01.12
S-Parameter Network Analyzer	Agilent	8753D	3410A07251	2009.04.04
Dual Directional Coupler	HP	778D	1144AO4576	2009.10.13
Directional Coupler	Agilent	773D	MY28390213	2009.10.13
Bluetooth Test Set	Anritsu	MT8852B	6K00006994	2010.03.03

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