SAR Evaluation Report

IN ACCORDANCE WITH THE REQUIREMENTS OF
FCC OET BULLETIN 65 SUPPLEMENT C

FOR

SMARTPHONE

MODEL: EXCA100

FCC ID: NM8EXCA

REPORT NUMBER: 06I10345-3C

ISSUE DATE: JULY 12, 2006

Prepared for

HIGH TECH COMPUTER CORP.
23 HSIN HUA RD., TAOYUAN 330, TAIWAN

Prepared by

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LAB CODE:200065-0

Revision History

Rev.	Issued date	Revisions	Revised By
--	June 22, 2006	Initial issue	HS
B	June 27, 2006	Correction of model number	ND
C	July 12, 2006	Adding the results for EUT with Jog Bar along with liquid and performance check results	ND

CERTIFICATE OF COMPLIANCE (SAR EVALUATION)

DATES OF TEST: June 13, 14, 15, 16, and July 10, 2006

APPLICANT: ADDRESS:	High Tech Computer Corp. 23 Hsin Hua Rd., Taoyuan 330, Taiwan
FCC ID: MODEL:	NM8EXCA EXCA100 (without jog bar) & EXCA100 (with jog bar)
DEVICE CATEGORY: EXPOSURE CATEGORY:	Portable Device General Population/Uncontrolled Exposure

Smartphone EXCA100 (without jog bar) and EXCA100 (with jog bar) is a quad band phone which includes WLAN and Bluetooth.

This device can operate in 900 and 1800MHz bands which are not used in US. This report is applicable only to 850MHz, 1900MHz, and 2.4 GHz band.

Test Sample is a:	Production unit

Rule Parts	Frequency Range [MHz]	The Highest SAR Values [1g_mW/g]	The Highest Multi-band SAR Values [1g_mW/g]
FCC 22H	824.2-848.8	Head: 0.952 Body: 1.470	Head: 1.09 Body: 1.49
FCC 24E	1850.2-1909.8	Head: 1.34 Body: 1.030	Head: 1.26 Body: 0.952
15C	2412-2462	Body: 0.066	Body: 1.49

Testing has been carried out in accordance with:

47CFR §2.1093 - Radiofrequency Radiation Exposure Evaluation: Portable Devices

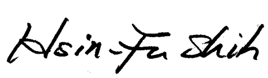
FCC OET Bulletin 65 (Edition 97-01), Supplement C (Edition 01-01) - Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields

RSS-102 - Evaluation Procedure for Mobile and Portable Radio Transmitters with Respect to Health Canada's Safety Code 6 for Exposure of Humans to Radio Frequency Fields

IEEE 1528_2003 - IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:



Hsin Fu Shih
Senior Engineer
Compliance Certification Services

Tested By:

Ninous Davoudi
EMC Engineer
Compliance Certification Services

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1 EQUIPMENT UNDER TEST (EUT) DESCRIPTION

Smartphone EXCA100 (without jog bar) and EXCA100 (with jog bar) is a quad band phone which includes WLAN and Bluetooth. This device can operate in 900 and 1800MHz bands which are not used in US. This report is applicable only to 850MHz, 1900MHz, and 2.4 GHz band.	
Mobile Phone capabilities:	Class B
GPRS Multi-slot Class:	Class 10 (2up, 3 down) for both GPRS and EGPRS
Normal Operation:	Hold to ear or Worn on Body
Duty Cycle:	GSM: 12.5% GPRS & EGPRS: 25% WiFi & BT: 100%
Body worn Accessory:	NewTech Holster with belt clip, model HTC-296
Antenna(s):	GSM: HTC Shorting Monopole, model D00031388 WLAN: HTC Shorting Monopole, model 36H00417-00M Bluetooth: HTC PIFA, model D00031818
Power supply:	Standard battery by Celxpert Energy Co., Ltd., model EXCA160, 960 mAh

2 FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

LAB CODE:200065-0

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ccsemc.com.

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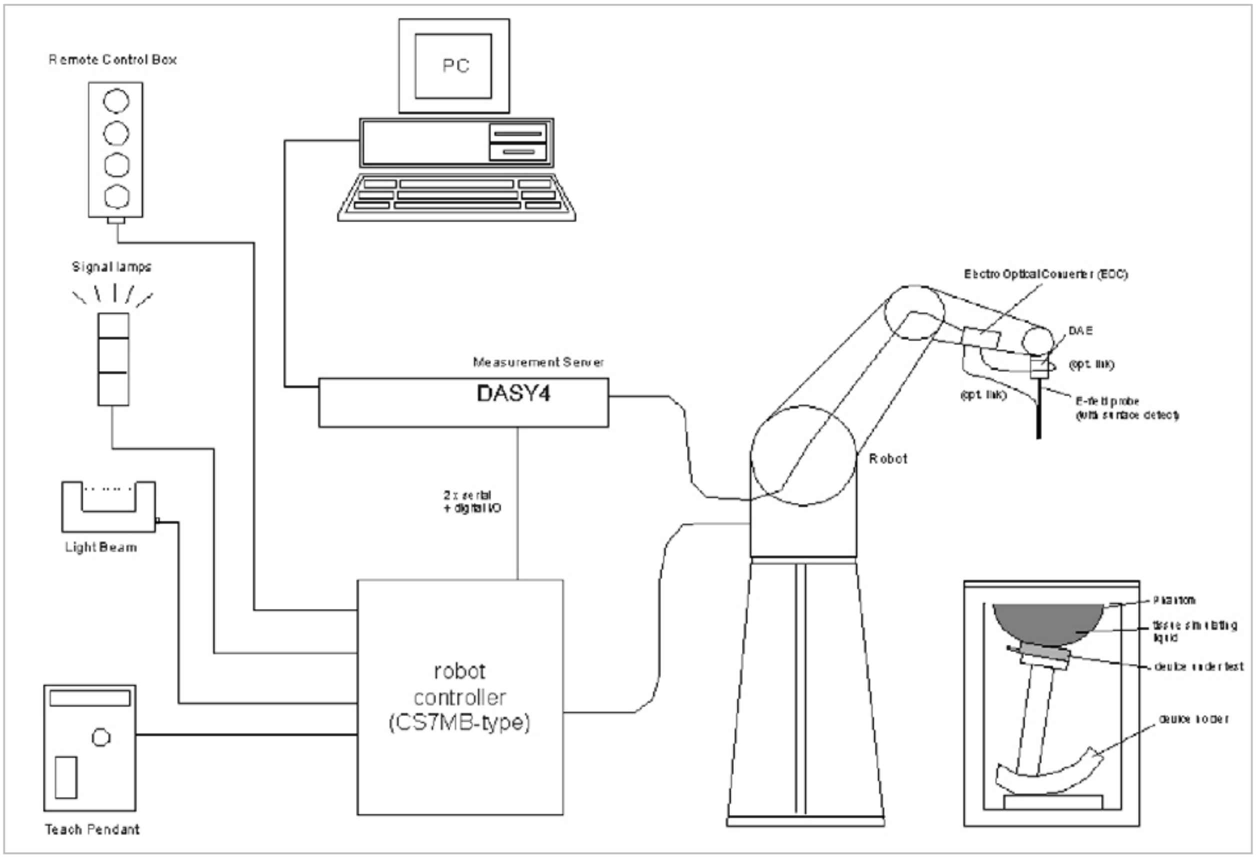
3 SYSTEM DESCRIPTION



The DASY4 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Stäubli RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A dosimetric 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.
- 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 controls with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing to validate the proper functioning of the system.

3.1 COMPOSITION OF INGREDIENTS FOR TISSUE SIMULATIG LIQUIDS

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.

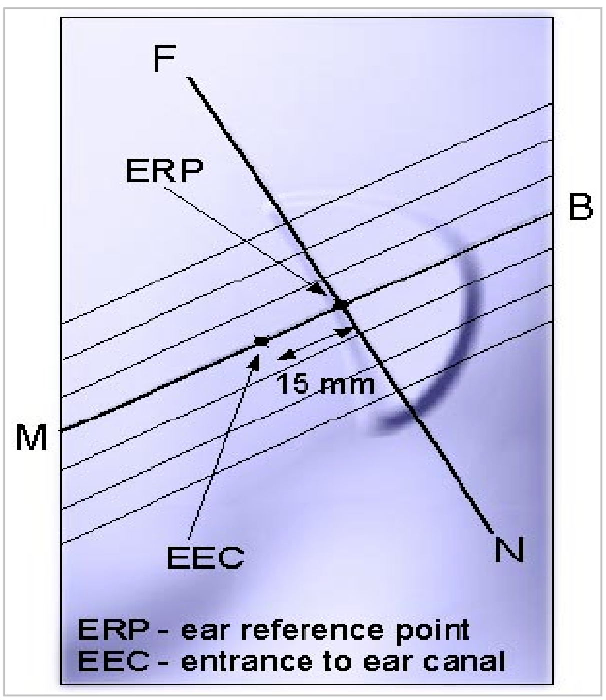
Ingredients (% by weight)	Frequency (MHz)									
	450		835		915		1900		2450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (NaCl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	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
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.1	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
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7
Dielectric Constant	43.42	58.0	42.54	56.1	42.0	56.8	39.9	54.0	39.8	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

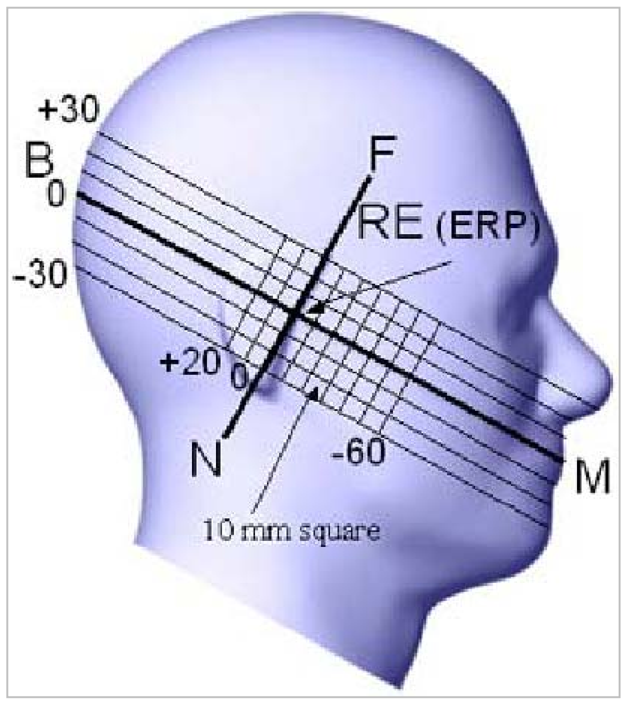
Salt: 99+% Pure Sodium Chloride
Sugar: 98+% Pure Sucrose
Water: De-ionized, 16 MΩ+ resistivity
HEC: Hydroxyethyl Cellulose
DGBE: 99+% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]
Triton X-100 (ultra pure): Polyethylene glycol mono [4-(1,1, 3, 3-tetramethylbutyl)phenyl]ether

4 TEST POSITIONS FOR DEVICES OPERATING NEXT TO A PERSON'S EAR

This category includes most wireless handsets with fixed, retractable or internal antennas located toward the top half of the device, with or without a foldout, sliding or similar keypad cover. The handset should have its earpiece located within the upper ¼ of the device, either along the centerline or off-centered, as perceived by its users. This type of handset should be positioned in a normal operating position with the "test device reference point" located along the "vertical centerline" on the front of the device aligned to the "ear reference point". The "test device reference point" should be located at the same level as the center of the earpiece region. The "vertical centerline" should bisect the front surface of the handset at its top and bottom edges. A "ear reference point" is located on the outer surface of the head phantom on each ear spacer. It is located 1.5 cm above the center of the ear canal entrance in the "phantom reference plane" defined by the three lines joining the center of each "ear reference point" (left and right) and the tip of the mouth.

A handset should be initially positioned with the earpiece region pressed against the ear spacer of a head phantom. For the SCC-34/SC-2 head phantom, the device should be positioned parallel to the "N-F" line defined along the base of the ear spacer that contains the "ear reference point". For interim head phantoms, the device should be positioned parallel to the cheek for maximum RF energy coupling. The "test device reference point" is aligned to the "ear reference point" on the head phantom and the "vertical centerline" is aligned to the "phantom reference plane". This is called the "initial ear position". While maintaining these three alignments, the body of the handset is gradually adjusted to each of the following positions for evaluating SAR:





4.1 CHEEK/TOUCH POSITION

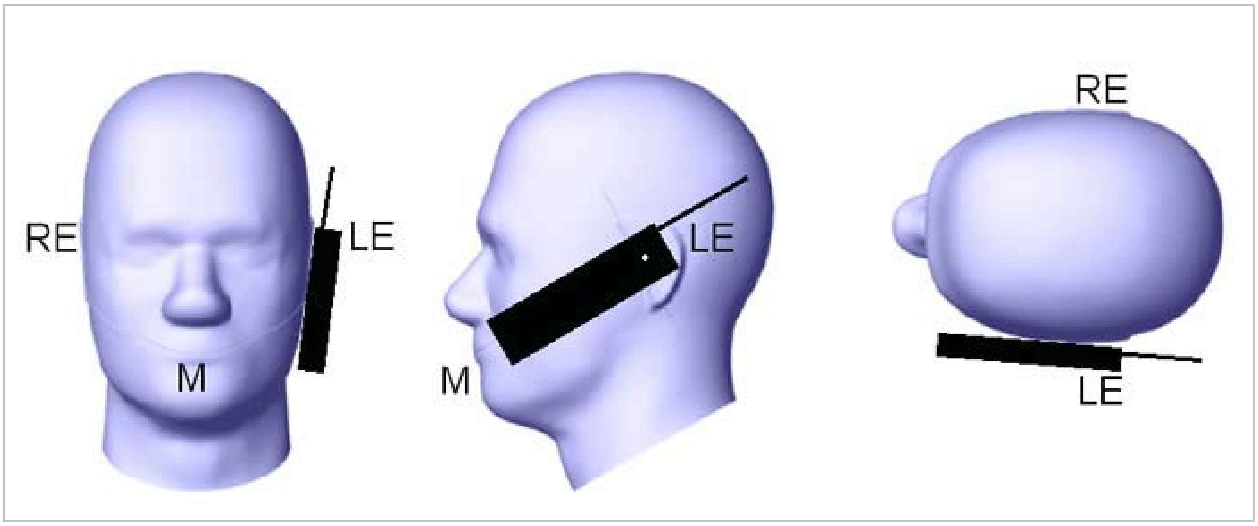
The device is brought toward the mouth of the head phantom by pivoting against the “ear reference point” or along the “N-F” line for the SCC-34/SC-2 head phantom.

This test position is established:

i. When any point on the display, keypad or mouthpiece portions of the handset is in contact with the phantom.
ii. (or) When any portion of a foldout, sliding or similar keypad cover opened to its intended self-adjusting normal use position is in contact with the cheek or mouth of the phantom.

For existing head phantoms – when the handset loses contact with the phantom at the pivoting point, rotation should continue until the device touches the cheek of the phantom or breaks its last contact from the ear spacer.

Cheek / Touch Position



4.2 EAR/TILT POSITION

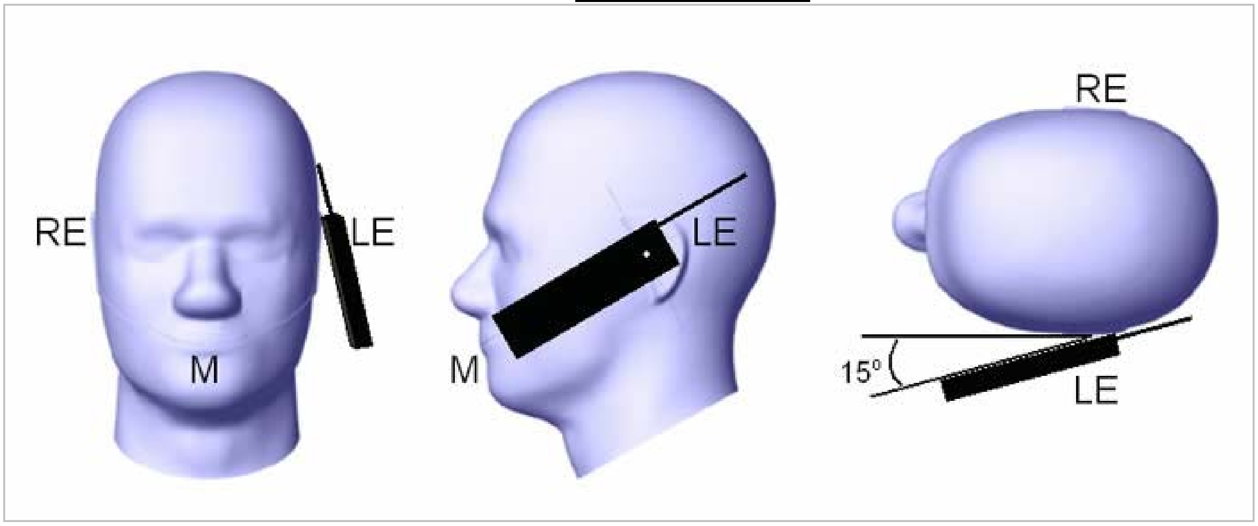
With the handset aligned in the "Cheek/Touch Position":

i. If the earpiece of the handset is not in full contact with the phantom's ear spacer (in the "Cheek/Touch position") and the peak SAR location for the "Cheek/Touch" position is located at the ear spacer region or corresponds to the earpiece region of the handset, the device should be returned to the "initial ear position" by rotating it away from the mouth until the earpiece is in full contact with the ear spacer.

ii. (otherwise) The handset should be moved (translated) away from the cheek perpendicular to the line passes through both "ear reference points" (note: one of these ear reference points may not physically exist on a split head model) for approximate 2-3 cm. While it is in this position, the device handset is tilted away from the mouth with respect to the "test device reference point" until the inside angle between the vertical centerline on the front surface of the phone and the horizontal line passing through the ear reference point isby 15°. After the tilt, it is then moved (translated) back toward the head perpendicular to the line passes through both "ear reference points" until the device touches the phantom or the ear spacer. If the antenna touches the head first, the positioning process should be repeated with a tilt angle less than 15° so that the device and its antenna would touch the phantom simultaneously. This test position may require a device holder or positioner to achieve the translation and tilting with acceptable positioning repeatability.

If a device is also designed to transmit with its keypad cover closed for operating in the head position, such positions should also be considered in the SAR evaluation. The device should be tested on the left and right side of the head phantom in the "Cheek/Touch" and "Ear/Tilt" positions. When applicable, each configuration should be tested with the antenna in its fully extended and fully retracted positions. These test configurations should be tested at the high, middle and low frequency channels of each operating mode; for example, AMPS, CDMA, and TDMA. If the SAR measured at the middle channel for each test configuration (left, right, Cheek/Touch, Tile/Ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s). If the transmission band of the test device is less than 10 MHz, testing at the high and low frequency channels is optional.

Ear/Tilt 15° Position



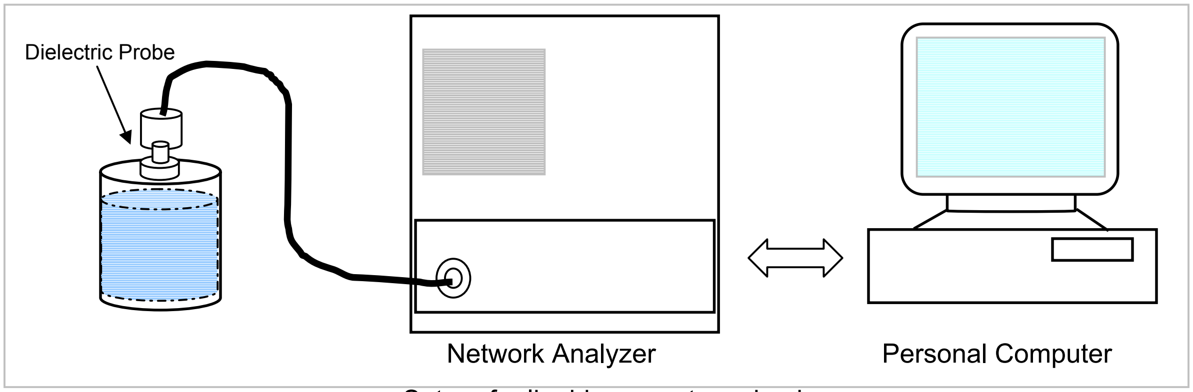
4.3 TEST POSITIONS FOR BODY-WORN AND OTHER SIMILAR CONFIGURATIONS

Without the belt-clips or holsters

Body-worn accessories may not always be supplied or available as options for some devices that are intended to be authorized for body-worn use. A separation distance of 1.5 cm between the back of the device and a flat phantom is recommended for testing body-worn SAR compliance under such circumstances. Other separation distances may be used, but they should not exceed 2.5 cm. In these cases, the device may use body-worn accessories that provide a separation distance greater than that tested for the device provided however that the accessory contains no metallic components.

5 SIMULATING LIQUID PARAMETERS CHECK

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine of the dielectric parameters are within the tolerances of the specified target values. The relative permittivity and conductivity of the tissue material should be within ± 5% of the values given in the table below.



Set-up for liquid parameters check

Reference Values of Tissue Dielectric Parameters for Head and Body Phantom (for 150 – 3000 MHz and 5800 MHz)

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in IEEE Standard 1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations and extrapolated according to the head parameters specified in IEEE Standard 1528.

Target Frequency (MHz)	Head		Body	
	ε_r	σ (S/m)	ε_r	σ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800 – 2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5800	35.3	5.27	48.2	6.00

(ε_r = relative permittivity, σ = conductivity and ρ = 1000 kg/m^3)

5.1 SIMULATING LIQUID PARAMETER CHECK RESULT

Simulating Liquid Dielectric Parameters Check Result @ Head 835 MHz

Room Ambient Temperature = 23°C; Relative humidity = 40% Measured by: Ninous Davoudi

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
835	22	15	e'	40.5219	Relative Permittivity (ϵ_r):	40.5219	41.5	-2.36	± 5
			e"	18.7061	Conductivity (σ):	0.86894	0.90	-3.45	± 5

Liquid Check
Ambient temperature: 23.0 deg. C; Liquid temperature: 23.0 deg C
June 13, 2006 08:57 AM

Frequency	e'	e"
800000000.	40.9510	18.8040
805000000.	40.8797	18.8103
810000000.	40.8043	18.7963
815000000.	40.7333	18.7549
820000000.	40.7076	18.7602
825000000.	40.6188	18.7245
830000000.	40.5797	18.7127
835000000.	40.5219	18.7061
840000000.	40.4430	18.6952
845000000.	40.3888	18.6571
850000000.	40.3407	18.6384
855000000.	40.2798	18.6440
860000000.	40.2092	18.6117
865000000.	40.1611	18.5837
870000000.	40.1003	18.5798
875000000.	40.0311	18.5786
880000000.	39.9881	18.5601
885000000.	39.9261	18.5771
890000000.	39.8598	18.5756
895000000.	39.8192	18.5571
900000000.	39.7559	18.5256

The conductivity (σ) can be given as:

$$\sigma = \omega\varepsilon_0 e'' = 2\pi f \varepsilon_0 e''$$

where $f = target\ f * 10^6$

$\varepsilon_0 = 8.854 * 10^{-12}$

Simulating Liquid Dielectric Parameters Check Result @ Head 835 MHz

Room Ambient Temperature = 23°C; Relative humidity = 40% Measured by: Ninous Davoudi

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
835	22	15	e'	40.49	Relative Permittivity (ε_r):	40.4900	41.5	-2.43	± 5
			e"	18.7044	Conductivity (σ):	0.86886	0.90	-3.46	± 5

Liquid Check
Ambient temperature: 23.0 deg. C; Liquid temperature: 22.0 deg C
June 15, 2006 11:20 AM

Frequency	e'	e"
800000000.	40.9233	18.8222
805000000.	40.8522	18.8284
810000000.	40.8023	18.8290
815000000.	40.7476	18.7884
820000000.	40.6842	18.7718
825000000.	40.6406	18.7661
830000000.	40.5681	18.7473
835000000.	40.4900	18.7044
840000000.	40.4342	18.7392
845000000.	40.3871	18.6886
850000000.	40.2939	18.6925
855000000.	40.2687	18.6778
860000000.	40.1887	18.6480
865000000.	40.1460	18.6386
870000000.	40.0655	18.5997
875000000.	40.0151	18.5931
880000000.	39.9563	18.5891
885000000.	39.8945	18.6061
890000000.	39.8401	18.6110
895000000.	39.8009	18.5623
900000000.	39.7560	18.5600

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

where $f = \text{target } f * 10^6$

$\varepsilon_0 = 8.854 * 10^{-12}$

Simulating Liquid Dielectric Parameters Check Result @ Head 835 MHz

Room Ambient Temperature = 23°C; Relative humidity = 50% Measured by: Ninous Davoudi

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
835	22	15	e'	40.0328	Relative Permittivity (ε_r):	40.0328	41.5	-3.54	± 5
			e"	18.4423	Conductivity (σ):	0.85668	0.90	-4.81	± 5

Liquid Check
Ambient temperature: 23.0 deg. C; Liquid temperature: 22.0 deg C
July 10, 2006 01:33 PM

Frequency	e'	e"
800000000.	40.4661	18.5639
805000000.	40.4020	18.5491
810000000.	40.3562	18.5192
815000000.	40.3125	18.4944
820000000.	40.2561	18.4786
825000000.	40.1780	18.4373
830000000.	40.0858	18.4371
835000000.	40.0328	18.4423
840000000.	39.9922	18.4131
845000000.	39.9402	18.3770
850000000.	39.8489	18.3829
855000000.	39.8039	18.3661
860000000.	39.7717	18.3562
865000000.	39.6775	18.3029
870000000.	39.6121	18.3129
875000000.	39.5528	18.3413
880000000.	39.5186	18.3127
885000000.	39.4481	18.2947
890000000.	39.3773	18.3067
895000000.	39.3725	18.2706
900000000.	39.2988	18.2838

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

where $f = \text{target } f * 10^6$

$\varepsilon_0 = 8.854 * 10^{-12}$

Simulating Liquid Dielectric Parameters Check Result @ Head 1900 MHz

Room Ambient Temperature = 23°C; Relative humidity = 45% Measured by: Ninous Davoudi

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
1900	22	15	e'	39.6866	Relative Permittivity (ε_r):	39.6866	40.0	-0.78	± 5
			e"	13.4191	Conductivity (σ):	1.41839	1.40	1.31	± 5

Liquid Check
Ambient temperature: 23.0 deg. C; Liquid temperature: 22.0 deg C
June 14, 2006 08:58 AM

Frequency	e'	e"
1710000000.	40.5010	12.9362
1720000000.	40.4471	12.9595
1730000000.	40.4021	12.9901
1740000000.	40.3513	13.0087
1750000000.	40.3121	13.0390
1760000000.	40.2594	13.0652
1770000000.	40.2105	13.1107
1780000000.	40.1654	13.1295
1790000000.	40.1249	13.1639
1800000000.	40.0792	13.1924
1810000000.	40.0245	13.1992
1820000000.	39.9973	13.2287
1830000000.	39.9432	13.2325
1840000000.	39.8955	13.2689
1850000000.	39.8677	13.2868
1860000000.	39.8327	13.3154
1870000000.	39.7825	13.3416
1880000000.	39.7467	13.3648
1890000000.	39.7062	13.3882
1900000000.	39.6866	13.4191
1910000000.	39.6395	13.4469

The conductivity (σ) can be given as:

$$\sigma = \omega\varepsilon_0 \, e'' = 2\,\pi\, f\, \varepsilon_0\, e''$$

where $f = \text{target } f * 10^6$

$\varepsilon_0 = 8.854 * 10^{-12}$

Simulating Liquid Dielectric Parameters Check Result @ Head 1900 MHz

Room Ambient Temperature = 23°C; Relative humidity = 45% Measured by: Ninous Davoudi

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
1900	22	15	e'	40.1971	Relative Permittivity (ε_r):	40.1971	40.0	0.49	± 5
			e"	13.4687	Conductivity (σ):	1.42363	1.40	1.69	± 5

Liquid Check
Ambient temperature: 23.0 deg. C; Liquid temperature: 22.0 deg C
June 15, 2006 08:48 AM

Frequency	e'	e"
1710000000.	40.9917	12.9721
1720000000.	40.9442	13.0080
1730000000.	40.9143	13.0396
1740000000.	40.8355	13.0602
1750000000.	40.7927	13.0966
1760000000.	40.7417	13.1070
1770000000.	40.6889	13.1528
1780000000.	40.6542	13.1752
1790000000.	40.6129	13.2048
1800000000.	40.5707	13.2258
1810000000.	40.5301	13.2276
1820000000.	40.4882	13.2548
1830000000.	40.4516	13.2787
1840000000.	40.3939	13.3009
1850000000.	40.3687	13.3149
1860000000.	40.3243	13.3442
1870000000.	40.2940	13.3796
1880000000.	40.2662	13.4073
1890000000.	40.2197	13.4322
1900000000.	40.1971	13.4687
1910000000.	40.1478	13.4718

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

where $f = \text{target } f * 10^{6}$

$\varepsilon_0 = 8.854 * 10^{-12}$

Simulating Liquid Dielectric Parameters Check Result @ Head 1900 MHz

Room Ambient Temperature = 23°C; Relative humidity = 50% Measured by: Ninous Davoudi

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
1900	22	15	e'	39.3431	Relative Permittivity (ε_r):	39.3431	40.0	-1.64	± 5
			e"	13.2021	Conductivity (σ):	1.39545	1.40	-0.32	± 5

Liquid Check
Ambient temperature: 23.0 deg. C; Liquid temperature: 22.0 deg C
July 10, 2006 09:24 AM

Frequency	e'	e"
1710000000.	40.1097	12.6977
1720000000.	40.0670	12.7293
1730000000.	40.0257	12.7662
1740000000.	39.9872	12.8107
1750000000.	39.9371	12.8435
1760000000.	39.8846	12.8595
1770000000.	39.8601	12.8741
1780000000.	39.8136	12.8807
1790000000.	39.7690	12.9137
1800000000.	39.7308	12.9398
1810000000.	39.6807	12.9642
1820000000.	39.6462	12.9972
1830000000.	39.5949	13.0496
1840000000.	39.5480	13.0874
1850000000.	39.4941	13.1116
1860000000.	39.4711	13.1257
1870000000.	39.4414	13.1321
1880000000.	39.4154	13.1570
1890000000.	39.3831	13.1890
1900000000.	39.3431	13.2021
1910000000.	39.2782	13.2255

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

where $f = \text{target } f * 10^6$

$\varepsilon_0 = 8.854 * 10^{-12}$

Simulating Liquid Dielectric Parameter Check Result @ Head 2450 MHz

Room Ambient Temperature = 23°C; Relative humidity = 50% Measured by: Ninous Davoudi

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
2450	22	15	e'	40.0443	Relative Permittivity (ε_r):	40.0443	39.2	2.15	± 5
			e"	13.5957	Conductivity (σ):	1.85305	1.80	2.95	± 5

Liquid Check
Ambient temperature: 23.0 deg. C; Liquid temperature: 22.0 deg C
June 16, 2006 09:32 AM

Frequency	e'	e''
2400000000.	40.2403	13.4613
2410000000.	40.1962	13.4684
2420000000.	40.1631	13.5034
2430000000.	40.1216	13.5146
2440000000.	40.0725	13.5585
2450000000.	40.0443	13.5957
2460000000.	40.0049	13.6288
2470000000.	39.9705	13.6664
2480000000.	39.9301	13.7152
2490000000.	39.9000	13.7553
2500000000.	39.8803	13.7835

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

where $f = \text{target } f * 10^6$

$\varepsilon_0 = 8.854 * 10^{-12}$

Simulating Liquid Dielectric Parameters Check Result @ Muscle 835 MHz

Room Ambient Temperature = 23°C; Relative humidity = 45% Measured by: Ninous Davoudi

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
835	22	15	e'	53.7899	Relative Permittivity (ε_r):	53.7899	55.2	-2.55	± 5
			e"	20.9595	Conductivity (σ):	0.97361	0.97	0.37	± 5

Liquid Check
Ambient temperature: 23.0 deg. C; Liquid temperature: 22.0 deg C
June 15, 2006 12:21 PM

Frequency	e'	e"
800000000.	54.1116	21.0460
805000000.	54.0705	21.0476
810000000.	54.0201	21.0357
815000000.	53.9771	21.0100
820000000.	53.9665	20.9786
825000000.	53.8811	20.9687
830000000.	53.7992	20.9800
835000000.	53.7899	20.9595
840000000.	53.7126	20.9310
845000000.	53.6750	20.8884
850000000.	53.6105	20.8887
855000000.	53.5533	20.8757
860000000.	53.4959	20.8307
865000000.	53.4654	20.7975
870000000.	53.3818	20.7632
875000000.	53.3415	20.7557
880000000.	53.3205	20.7409
885000000.	53.2542	20.7435
890000000.	53.2201	20.7444
895000000.	53.1874	20.6924
900000000.	53.1441	20.6918

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

where $f = \text{target } f * 10^6$

$\varepsilon_0 = 8.854 * 10^{-12}$

Simulating Liquid Dielectric Parameters Check Result @ Muscle 835 MHz

Room Ambient Temperature = 23°C; Relative humidity = 50% Measured by: Ninous Davoudi

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
835	22	15	e'	53.5382	Relative Permittivity (ε_r):	53.5382	55.2	-3.01	± 5
			e"	20.6001	Conductivity (σ):	0.95692	0.97	-1.35	± 5

Liquid Check
Ambient temperature: 23.0 deg. C; Liquid temperature: 22.0 deg C
July 10, 2006 02:58 PM

Frequency	e'	e"
800000000.	53.8702	20.7785
805000000.	53.8128	20.7654
810000000.	53.7761	20.7283
815000000.	53.7552	20.6859
820000000.	53.7255	20.6637
825000000.	53.6267	20.6165
830000000.	53.5434	20.6086
835000000.	53.5382	20.6001
840000000.	53.4871	20.5537
845000000.	53.4282	20.5432
850000000.	53.3635	20.5134
855000000.	53.2973	20.5061
860000000.	53.2830	20.4905
865000000.	53.2143	20.4418
870000000.	53.1490	20.4563
875000000.	53.1058	20.4414
880000000.	53.0924	20.4469
885000000.	53.0346	20.4166
890000000.	52.9847	20.4046
895000000.	52.9904	20.3714
900000000.	52.9349	20.3671

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

where $f = target\ f * 10^6$

$\varepsilon_0 = 8.854 * 10^{-12}$

Simulating Liquid Dielectric Parameters Check Result @ Muscle 1900 MHz

Room Ambient Temperature = 23°C; Relative humidity = 45% Measured by: Ninous Davoudi

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
1900	22	15	e'	51.6567	Relative Permittivity (ε_r):	51.6567	53.3	-3.08	± 5
			e''	13.8115	Conductivity (σ):	1.45987	1.52	-3.96	± 5

Liquid Check
Ambient temperature: 23.0 deg. C; Liquid temperature: 22.0 deg C
June 15, 2006 09:14 AM

Frequency	e'	e''
1710000000.	52.3580	13.1571
1720000000.	52.3144	13.1742
1730000000.	52.2748	13.2205
1740000000.	52.2202	13.2325
1750000000.	52.1899	13.3110
1760000000.	52.1217	13.3492
1770000000.	52.0684	13.4112
1780000000.	52.0306	13.4463
1790000000.	51.9994	13.4655
1800000000.	51.9778	13.4980
1810000000.	51.9522	13.4984
1820000000.	51.9159	13.5009
1830000000.	51.8875	13.5148
1840000000.	51.8721	13.5459
1850000000.	51.8255	13.6042
1860000000.	51.7564	13.6506
1870000000.	51.7011	13.6818
1880000000.	51.6843	13.7184
1890000000.	51.6540	13.7496
1900000000.	51.6567	13.8115
1910000000.	51.6332	13.8262

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

where $f = target\ f * 10^6$

$\varepsilon_0 = 8.854 * 10^{-12}$

Simulating Liquid Dielectric Parameters Check Result @ Muscle 1900 MHz

Room Ambient Temperature = 23°C; Relative humidity = 50% Measured by: Ninous Davoudi

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
1900	22	15	e'	52.5266	Relative Permittivity (ε_r):	52.5266	53.3	-1.45	± 5
			e"	13.8506	Conductivity (σ):	1.46400	1.52	-3.68	± 5

Liquid Check
Ambient temperature: 23.0 deg. C; Liquid temperature: 22.0 deg C
July 10, 2006 09:46 AM

Frequency	e'	e"
1710000000.	53.1626	13.1763
1720000000.	53.1255	13.2158
1730000000.	53.0862	13.2501
1740000000.	53.0600	13.3061
1750000000.	53.0188	13.3458
1760000000.	52.9882	13.3696
1770000000.	52.9564	13.3981
1780000000.	52.9148	13.4170
1790000000.	52.8920	13.4597
1800000000.	52.8441	13.4918
1810000000.	52.8093	13.5199
1820000000.	52.7661	13.5774
1830000000.	52.7232	13.6203
1840000000.	52.6899	13.6553
1850000000.	52.6488	13.7116
1860000000.	52.6318	13.7360
1870000000.	52.5923	13.7412
1880000000.	52.5805	13.7791
1890000000.	52.5555	13.8004
1900000000.	52.5266	13.8506
1910000000.	52.4753	13.8821

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

where $f = target\ f * 10^6$

$\varepsilon_0 = 8.854 * 10^{-12}$

Simulating Liquid Dielectric Parameter Check Result @ Muscle 2450 MHz

Room Ambient Temperature = 23°C; Relative humidity = 50% Measured by: Ninous Davoudi

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
2450	22	15	e'	52.3195	Relative Permittivity (ε_r):	52.3195	52.7	-0.72	± 5
			e"	15.0061	Conductivity (σ):	2.04528	1.95	4.89	± 5

Liquid Check
Ambient temperature: 23.0 deg. C; Liquid temperature: 22.0 deg C
June 16, 2006 09:20 AM

Frequency	e'	e"
2400000000.	52.5039	14.8198
2410000000.	52.4557	14.8440
2420000000.	52.4304	14.8971
2430000000.	52.3910	14.9078
2440000000.	52.3584	14.9794
2450000000.	52.3195	15.0061
2460000000.	52.2797	15.0695
2470000000.	52.2429	15.0952
2480000000.	52.2103	15.1585
2490000000.	52.1793	15.2129
2500000000.	52.1584	15.2472

The conductivity (σ) can be given as:

$$\sigma = \omega\varepsilon_0 e'' = 2\pi f \varepsilon_0 e''$$

where f = target $f * 10^6$
$\varepsilon_0 = 8.854 * 10^{-12}$

6 SYSTEM PERFORMANCE CHECK

The system performance check is performed prior to any usage of the system in order to guarantee reproducible results. The system performance check verifies that the system operates within its specifications of ±10%.

System Performance Check Measurement Conditions

- The measurements were performed in the flat section of the SAM twin phantom filled with Head simulating liquid of the following parameters.
- The DASY4 system with an Isotropic E-Field Probe EX3DV3-SN: 3531 was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10 mm (above 1 GHz) and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 15 mm was aligned with the dipole.
  For 5 GHz band - The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
- Special 5 x 5 x 7 fine cube was chosen for cube integration(dx=dy=7.5mm; dz=5mm).
  For 5 GHz band - Special 8x8x8 fine cube was chosen for cube integration(dx=dy=4.3mm; dz=3mm)
- Distance between probe sensors and phantom surface was set to 4 mm.
  For 5 GHz band - Distance between probe sensors and phantom surface was set to 2.0mm
- The dipole input power (forward power) was 250 mW±3%.
- The results are normalized to 1 W input power.

Reference SAR Values for body-tissue

IEEE Standard 1528-2003 Recommended Reference Value.

Frequency (MHz)	Distance (mm)	1g SAR [W/kg]	10g SAR [W/kg]
300	15	3.0	2.0
450	15	4.9	3.3
835	15	9.5	6.2
900	15	10.8	6.9
1450	10	29.0	16.0
1800	10	38.1	19.8
1900	10	39.7	20.5
2000	10	41.1	21.1
2450	10	52.4	24.0
3000	10	63.8	25.7

Note: All SAR values normalized to 1 W forward power.

6.1 SYSTEM PERFORMANCE CHECK RESULTS

System Validation Dipole: D835V2 SN:4d002

Date: June 13, 2006

Room Ambient Temperature = 23°C; Relative humidity = 40% Measured by: Ninous Davoudi

Head Simulating Liquid			SAR (mW/g)		Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
835	22	15	1g	2.32	9.28	9.5	-2.32	± 10
			10g	1.52	6.08	6.2	-1.94	± 10

Date: June 15, 2006

Room Ambient Temperature = 23°C; Relative humidity = 40% Measured by: Ninous Davoudi

Head Simulating Liquid			SAR (mW/g)		Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
835	22	15	1g	2.31	9.24	9.5	-2.74	± 10
			10g	1.52	6.08	6.2	-1.94	± 10

Date: July 10, 2006

Room Ambient Temperature = 23°C; Relative humidity = 50% Measured by: Ninous Davoudi

Head Simulating Liquid			SAR (mW/g)		Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
835	22	15	1g	2.28	9.12	9.5	-4.00	± 10
			10g	1.50	6	6.2	-3.23	± 10

System Validation Dipole: D1900V2 SN:5d043

Date: June 14, 2006

Room Ambient Temperature = 23°C; Relative humidity = 45% Measured by: Ninous Davoudi

Head Simulating Liquid			SAR (mW/g)		Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
1900	22	15	1g	9.52	38.08	39.7	-4.08	± 10
			10g	4.95	19.8	20.5	-3.41	± 10

Date: June 15, 2006

Room Ambient Temperature = 23°C; Relative humidity = 45% Measured by: Ninous Davoudi

Head Simulating Liquid			SAR (mW/g)		Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
1900	22	15	1g	9.55	38.2	39.7	-3.78	± 10
			10g	4.97	19.88	20.5	-3.02	± 10

Date: July 10, 2006

Room Ambient Temperature = 23°C; Relative humidity = 50% Measured by: Ninous Davoudi

Head Simulating Liquid			SAR (mW/g)		Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
1900	22	15	1g	9.36	37.44	39.7	-5.69	± 10
			10g	4.87	19.48	20.5	-4.98	± 10

System Validation Dipole: D2450V2 SN: 706

Date: June 16, 2006

Room Ambient Temperature = 23°C; Relative humidity = 50% Measured by: Ninous Davoudi

Head Simulating Liquid			SAR (mW/g)		Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
2450	22	15	1g	12.70	50.8	52.4	-3.05	± 10
			10g	5.82	23.28	24.0	-3.00	± 10

7 SAR MEASURMENT PROCEDURE

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 flat section of the flat phantom is measured at a distance of 4 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. Based on this data, the area of the maximum absorption is determined by Spline interpolation. The first Area Scan covers the entire dimension of the EUT to ensure that the hotspot was correctly identified.

For 5 GHz band - The SAR distribution at the exposed flat section of the flat phantom is measured at a distance of 2.0 mm from the inner surface of the shell. The area covers the entire dimension of the EUT and the horizontal grid spacing is 10 mm x 10 mm. Based on this data, the area of the maximum absorption is determined by Spline interpolation. The first Area Scan covers the entire dimension of the EUT to ensure that the hotspot was correctly identified.

c) Around this point, a volume of X=Y= 30 and Z=21 mm is assessed by measuring 5 x 5 x 7 mm points. On the basis of this data set, the spatial peak SAR value is evaluated with the following procedure:

For 5 GHz band - Around this point, a volume of X=Y=Z=30 mm is assessed by measuring 8 x 8 x 8 mm 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 1.2 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.3 mm. The extrapolation is based on a least square algorithm. 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). 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 to evaluate the actual power drift.

7.1 DASY4 SAR MEASURMENT PROCEDURE

Step 1: Power Reference Measurement

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 2.1 mm. This distance cannot be smaller than the Distance of sensor calibration points to probe tip as defined in the probe properties (for example, 1.2 mm for an EX3DV3 probe type).

Step 2: Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY4 software can find the maximum locations even in relatively coarse grids. When an Area Scan has measured all reachable points, it computes the field maximal found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE Standard 1528, EN 50361 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan). If only one Zoom Scan follows the Area Scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of Zoom Scans has to be increased accordingly.

Step 3: Zoom Scan

Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The Zoom Scan measures 5 x 5 x 7 points within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the Zoom Scan evaluates the averaged SAR for 1 g and 10 g and displays these values next to the job’s label.
For 5 GHz band – Same as above except the Zoom Scan measures 8 x 8 x 8 points.

Step 4: Power drift measurement

The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

Step 5: Z-Scan

The Z Scan measures points along a vertical straight line. The line runs along the Z-axis of a one-dimensional grid. In order to get a reasonable extrapolation, the extrapolated distance should not be larger than the step size in Z-direction.

7.2 DASY4 MULTIBAND SAR MEASURMENT PROCEDURE

Step 1: Power Reference Measurement

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 2.1 mm. This distance cannot be smaller than the Distance of sensor calibration points to probe tip as defined in the probe properties (for example, 1.2 mm for an EX3DV3 probe type).

Step 2: Volume Scan Job

Volume Scans are used to assess peak SAR and averaged SAR measurement in largely extended 3-deimensional volumes within any phantom. This measurement does not need any previous area scan. The grid can be anchored to a user specific point or to the current probe location. The steps in horizontal and vertical directions are 15mm.

Step 3: Power drift measurement

The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

Step 5: Z-Scan

The Z Scan measures points along a vertical straight line. The line runs along the Z-axis of a one-dimensional grid. In order to get a reasonable extrapolation, the extrapolated distance should not be larger than the step size in Z-direction.

Step 5: Multiband Data Extractions

After SAR measurements in each liquid, SEMCAD tool is used to evaluate the combined SAR from different bands.

8 PROCEDURE USED TO ESTABLISH TEST SIGNAL

The following procedures had been used to prepare the EUT for the SAR test.
The following setting is used to prepare the EUT in GSM850/1900MHz bands for the SAR test.

Agilent 8960 series 10 E5515C, Wireless Communication Test Set is used to control the EUT and measure the output power.

The following setting was used to establish the signal.

System Config:	GSM/GPRS Lap App D	
	E6701D	D.03.32
Call Parms:	BCH ➔	Cell Band: GSM850/PCS
	TCH ➔	Traffic Band: GSM850/PCS
		Traffic Channel: 128/190/251 or 512/661/810
	PDTCH ➔	Traffic Band: GSM850/PCS
		Traffic Channel: 128/190/251 512/661/810
		Coding Scheme: CS-4
		MultiSlot Config: 2up, 3 down (for GPRS/EGPRS)
Control:	Active Cell ➔	GSM/GPRS/EGPRS

GSM850, GSM

Channel	Frequency (MHz)	Power (dBm)
128	824.2	32.61
190	836.6	32.52
251	848.8	32.41

GSM1900, GSM

Channel	Frequency (MHz)	Power (dBm)
512	1850.2	29.54
661	1880.0	29.51
810	1909.8	29.72

GSM850, GPRS

Channel	Frequency (MHz)	Power (dBm)
128	824.2	32.51
190	836.6	32.40
251	848.8	32.37

GSM1900, GPRS

Channel	Frequency (MHz)	Power (dBm)
512	1850.2	29.20
661	1880.0	29.23
810	1909.8	29.40

GSM850, EGPRS

Channel	Frequency (MHz)	Power (dBm)
128	824.2	26.64
190	836.6	26.92
251	848.8	27.17

GSM1900, EGPRS

Channel	Frequency (MHz)	Power (dBm)
512	1850.2	26.26
661	1880.0	25.86
810	1909.8	25.53

The client provided a special driver and program, WLANUtility, which enable a user to control the frequency and output power of the module.

The cable assembly insertion loss of 21.55dB (including 20.55 dB attenuator and 1dB cable connectors) was entered as an offset in the power meter to allow for direct reading of power.

802.11b mode

Channel	Frequency (MHz)	Power (dBm)
Low	2412	13.50
Middle	2437	12.55
High	2462	11.30

802.11g mode

Channel	Frequency (MHz)	Power (dBm)
Low	2412	12.25
Middle	2437	11.29
High	2462	11.15

The client provided a special driver and program, BTTest, which enable a user to control the frequency and output power of the module.

The cable assembly insertion loss of 21.55dB (including 20.55 dB attenuator and 1dB cable connectors) was entered as an offset in the power meter to allow for direct reading of power.

Bluetooth conducted power

Channel	Frequency (MHz)	Power (dBm)
Low	2402	2.70
Middle	2441	2.00
High	2480	1.50

9 SAR MEASURMENT RESULTS

9.1 GSM850-WITHOUT JOG BAR

9.1.1 LEFT HAND SIDE

Photos are confidential, please see a seperate file	Photos are confidential, please see a seperate file
Touch Position	Tilt (15°) Position

GSM850-GSM mode

Test Position	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
Touch	128	824.2	0.805	-0.017	0.808
	190	836.6	0.842	0.000	0.842
	251	848.8	0.661	0.000	0.661
Tilt (15°)	128	824.2			
	190	836.6	0.649	-0.041	0.655
	251	848.8			

Notes:

1) The exact method of extrapolation is Measured SAR x 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.
3) The battery was fully charged in accordance with manufacture's instructions prior to SAR measurements.

9.1.2 RIGHT HAND SIDE

Photos are confidential, please see a seperate file	Photos are confidential, please see a seperate file
Touch Position	Tilt (15°) Position

GSM850-GSM mode

Test Position	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
Touch	128	824.2	0.894	0.000	0.894
	190	836.6	0.952	0.000	**0.952**
	251	848.8	0.719	0.000	0.719
Tilt (15°)	128 190 251	824.2 836.6 848.8	0.592	0.000	0.592

Notes:

1) The exact method of extrapolation is Measured SAR x 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.
3) The battery was fully charged in accordance with manufacture's instructions prior to SAR measurements.

9.1.3 BODY POSITION WITH HOLSTER WITH BELT CLIP

Photos are confidential, please see a seperate file	Photos are confidential, please see a seperate file
Face up	Face down

GSM850-GPRS mode					
Test Position	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
EUT Face up	128	824.2	0.914	-0.202	0.958
	190	836.6	0.871	-0.207	0.914
	251	848.8	0.606	0.000	0.606
GSM850-GPRS mode					
Test Position	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
EUT Face down	128	824.2	1.470	0.000	**1.470**
	190	836.6	1.300	-0.077	1.323
	251	848.8	0.885	0.000	0.885
GSM850-EGPRS mode					
Test Position	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
EUT Face down	128	824.2			
	190	836.6	0.414	-0.046	0.418
	251	848.8			

Notes:

1) The exact method of extrapolation is Measured SAR x 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.
3) The battery was fully charged in accordance with manufacture's instructions prior to SAR measurements.

9.2 GSM1900-WITHOUT JOG BAR

9.2.1 LEFT HAND SIDE

Photos are confidential, please see a seperate file	Photos are confidential, please see a seperate file
Touch Position	Tilt (15°) Position

GSM1900-GSM mode

Test Position	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
Touch	512	1850.2	0.634	0.000	0.634
	661	1880.0	0.891	0.000	0.891
	810	1909.8	1.070	0.000	1.070
Tilt (15°)	512	1850.2	0.758	-0.051	0.767
	661	1880.0	1.070	-0.044	1.081
	810	1909.8	1.340	0.000	**1.340**

Notes:

1) The exact method of extrapolation is Measured SAR x 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.
3) The battery was fully charged in accordance with manufacture's instructions prior to SAR measurements.

9.2.2 RIGHT HAND SIDE

Photos are confidential, please see a seperate file	Photos are confidential, please see a seperate file
Touch Position	Tilt (15°) Position

GSM1900-GSM mode					
Test Position	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
Touch	512 661 810	1850.2 1880.0 1909.8	0.740	0.000	0.740
Tilt (15°)	512 661 810	1850.2 1880.0 1909.8	0.643 0.925 1.160	-0.066 -0.056 -0.112	0.653 0.937 1.190

Notes:

1) The exact method of extrapolation is Measured SAR x 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.
3) The battery was fully charged in accordance with manufacture's instructions prior to SAR measurements.

9.2.3 BODY POSITION WITH HOLSTER HTC-296

Photos are confidential, please see a seperate file	Photos are confidential, please see a seperate file
Face up	Face down

GSM1900-GPRS mode					
Test Position	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
EUT Face up	512 661 810	1850.2 1880.0 1909.8	0.291	-0.020	0.292

GSM1900-GPRS mode					
Test Position	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
EUT Face down	512	1850.2	0.732	-0.138	0.756
	661	1880.0	0.821	-0.128	0.846
	810	1909.8	1.030	0.000	**1.030**

GSM1900-EGPRS mode					
Test Position	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
EUT Face down	512 661 810	1850.2 1880.0 1909.8	0.368	-0.096	0.376

Notes:

1) The exact method of extrapolation is Measured SAR x 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.
3) The battery was fully charged in accordance with manufacture's instructions prior to SAR measurements.

9.3 GSM850MHZ-WITH JOG BAR

Spot check tests are performed on the EUT with Jog Bar based on the worst cases from the EUT model without Jog Bar.

9.3.1 RIGHT HAND SIDE

Photos are confidential, please see a seperate file	Photos are confidential, please see a seperate file
Touch Position	Tilt (15°) Position

GSM850

Test Position	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
Touch	128 190 251	824.2 836.6 848.8	0.938	0.000	**0.938**
Tilt (15°)	128 190 251	824.2 836.6 848.8			

Notes:

1) The exact method of extrapolation is Measured SAR x 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.
3) Please see attachments for the detailed measurement data and plots showing the maximum SAR location of the EUT.
4) The battery was fully charged in accordance with manufacture's instructions prior to SAR measurements.

9.3.2 BODY POSITION WITH HOLSTER

Photos are confidential, please see a seperate file	Photos are confidential, please see a seperate file
Body position-Face up	Body position-Face down

GSM850

Test Position	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1] SAR 1g (mW/g)
GPRS Face up	128 190 251	824.2 836.6 848.8			

GSM850

Test Position	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1] SAR 1g (mW/g)
GPRS Face down	128 190 251	824.2 836.6 848.8	1.450	-0.101	**1.484**

GSM850

Test Position	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1] SAR 1g (mW/g)
EGPRS Face down	128 190 251	824.2 836.6 848.8			

Notes:

1) The exact method of extrapolation is Measured SAR x 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.
3) Please see attachments for the detailed measurement data and plots showing the maximum SAR location of the EUT.
4) The battery was fully charged in accordance with manufacture's instructions prior to SAR measurements.

9.4 GSM1900MHZ-WITH JOG BAR

Spot check tests are performed on the EUT with Jog Bar based on the worst cases from the EUT model without Jog Bar.

9.4.1 LEFT HAND SIDE

Photos are confidential, please see a seperate file	Photos are confidential, please see a seperate file
Touch Position	Tilt (15°) Position

GSM1900

Test Position	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
Touch	512	1850.2			
	661	1880.0			
	810	1909.8			
Tilt (15°)	512	1850.2			
	661	1880.0			
	810	1909.8	1.320	0.000	**1.320**

Notes:

1) The exact method of extrapolation is Measured SAR x 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.
3) Please see attachments for the detailed measurement data and plots showing the maximum SAR location of the EUT.
4) The battery was fully charged in accordance with manufacture's instructions prior to SAR measurements.

9.4.2 BODY position WITH Holster HTC-296

Photos are confidential, please see a seperate file	Photos are confidential, please see a seperate file
Body position-Face up	Body position-Face down

GSM1900					
Test Position	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
GPRS Face up	512 661 810	1850.2 1880.0 1909.8			
GSM1900					
Test Position	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
GPRS Face down	512 661 810	1850.2 1880.0 1909.8	1.040	0.000	**1.040**
GSM1900					
Test Position	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
EGPRS Face down	512 661 810	1850.2 1880.0 1909.8			

Notes:
1) The exact method of extrapolation is Measured SAR x 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.
3) Please see attachments for the detailed measurement data and plots showing the maximum SAR location of the EUT.
4) The battery was fully charged in accordance with manufacture's instructions prior to SAR measurements.

9.5 WLAN

9.5.1 BODY POSITION WITH Holster HTC-296

Photos are confidential, please see a seperate file	Photos are confidential, please see a seperate file
Face up	Face down

802.11b (1Mbps)-EUT Face Up				
Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
1	2412	0.065	-0.074	**0.066**
6	2437	0.048	-0.153	0.050
11	2462	0.028	0.000	0.028
802.11g (6 Mbps)-EUT Face Up				
Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
1	2412			
6	2437	0.019	-0.109	0.020
11	2462			
802.11b (1Mbps)-EUT Face Dwon				
Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
1	2412			
6	2437	0.024	-0.148	0.025
11	2462			

Notes:

1) The exact method of extrapolation is Measured SAR x 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.
3) The battery was fully charged in accordance with manufacture’s instructions prior to SAR measurements.

9.6 BLUETOOTH

9.6.1 BODY POSITION WITH HOLSTER

Photos are confidential, please see a seperate file	Photos are confidential, please see a seperate file
Face down	Worst Case (For Reference Only)

Bluetooth-Face Down				
Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
0 39 78	2402 2441 2480	0.0001	0.000	0.0001
Bluetooth-Worst case (For Reference Only)				
Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
0 39 78	2402 2441 2480	0.0061	-0.025	0.0061

Notes:

1) The exact method of extrapolation is Measured SAR x 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.
3) The battery was fully charged in accordance with manufacture's instructions prior to SAR measurements.

9.7 MULTIBAND SAR EVALUATION RESULTS

9.7.1 WORST CASE CONFIUGURATIONS

The following SAR results are from the previous zoom scans in order to determine the worst case:

Wireless Modules	Simulating liquid	Test Position	Ch	f (MHz)	Zoom Scan SAR 1g (mW/g)
GSM850	Head	Right hand side-Touch	190	836.6	0.952
	Body	Body Position	128	824.2	1.47
GSM1900	Head	Left hand side-Tilt	810	1909.8	1.34
	Body	Body Position	810	1909.8	1.03
WLAN	Body	Body Position	1	2412	0.066
Bluetooth	Body	Body Position	39	2441	0.0001

The following SAR values are evaluated in the same frequency & position in two different liquids using Dasy4 Multi-Band method in order to use SEMCAD tool to evaluate the combined SAR.

9.7.2 RIGHT HAND SIDE-TOUCH POSITION (WORST CASE CONFIGURATION)

Photos are confidential, please see a seperate file

Touch Position

Wireless Module	Test Position	f (MHz)	Volume scan 1g SAR (mW/kg)
GSM850[2)]	Right Hand Side-Touch	836.6	0.954
WLAN[2)]	Right Hand Side-Touch	2412	0.235
		Combined 1g SAR Value:	**1.090**

Notes:

1) The exact method of extrapolation is Measured SAR x 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.
2) SAR is evaluated in the same frequency & position in two different liquids using Dasy4 Multi-Band method in order to use SEMCAD tool to evaluate the combined SAR.
3) The battery was fully charged in accordance with manufacture's instructions prior to SAR measurements.
4) Bluetooth SAR evaluation is skipped on this position because the Bluetooth antenna is outside the phantom.

9.7.3 LEFT HAND SIDE-TILT POSITION (WORST CASE CONFIGURATION)

Photos are confidential, please see a seperate file

Tilt (15°) Position

Wireless Module	Test Position	f (MHz)	Volume scan 1g SAR (mW/kg)
GSM1900[2)]	Left Hand side-Tilt	1909.8	1.230
WLAN[2)]	Left Hand side-Tilt	2412	0.257
		Combined 1g SAR Value:	**1.260**

Notes:

1) The exact method of extrapolation is Measured SAR x 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.
2) SAR is evaluated in the same frequency & position in two different liquids using Dasy4 Multi-Band method in order to use SEMCAD tool to evaluate the combined SAR.
3) The battery was fully charged in accordance with manufacture's instructions prior to SAR measurements.
4) Bluetooth SAR evaluation is skipped on this position because the Bluetooth antenna is outside the phantom.

9.7.4 BODY POSITION WITH HOLSTER (WORST CASE CONFIGURATION)

Photos are confidential, please see a seperate file

Body position-Face up

Wireless Module	Test Positions	f (MHz)	Volume scan 1g SAR (mW/kg)
GSM850[2)]	Body Position	824.2	1.460
WLAN[2)]	Body Position	2412	0.070
		Combined 1g SAR Value:	**1.490**
Wireless Module	Test Positions	f (MHz)	Volume scan 1g SAR (mW/kg)
GSM1900[2)]	Body Position	1909.8	0.943
WLAN[2)]	Body Position	2412	0.070
		Combined 1g SAR Value:	**0.952**

Notes:

1) The exact method of extrapolation is Measured SAR x 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.
2) SAR is evaluated in the same frequency & position in two different liquids using Dasy4 Multi-Band method in order to use SEMCAD tool to evaluate the combined SAR.
3) The battery was fully charged in accordance with manufacture's instructions prior to SAR measurements.
4) The combined SAR does not include the value of the Bluetooth since the SAR is below the system noise floor.

10 MEASURMENT UNCERTAINTY

10.1 MEASURMENT UNCERTAINTY FOR 300 MHz – 3000 MHz

Uncertainty component	Tol. (±%)	Probe Dist.	Div.	Ci (1g)	Ci (10g)	Std. Unc.(±%)	
						Ui (1g)	Ui(10g)
Measurement System							
Probe Calibration	4.80	N	1	1	1	4.80	4.80
Axial Isotropy	4.70	R	1.732	0.707	0.707	1.92	1.92
Hemispherical Isotropy	9.60	R	1.732	0.707	0.707	3.92	3.92
Boundary Effects	1.00	R	1.732	1	1	0.58	0.58
Linearity	4.70	R	1.732	1	1	2.71	2.71
System Detection Limits	1.00	R	1.732	1	1	0.58	0.58
Readout Electronics	1.00	N	1	1	1	1.00	1.00
Response Time	0.80	R	1.732	1	1	0.46	0.46
Integration Time	2.60	R	1.732	1	1	1.50	1.50
RF Ambient Conditions - Noise	1.59	R	1.732	1	1	0.92	0.92
RF Ambient Conditions - Reflections	0.00	R	1.732	1	1	0.00	0.00
Probe Positioner Mechnical Tolerance	0.40	R	1.732	1	1	0.23	0.23
Probe Positioning With Respect to Phantom Shell	2.90	R	1.732	1	1	1.67	1.67
Extrapolation, interpolation, and integration algorithms for max. SAR evaluation	3.90	R	1.732	1	1	2.25	2.25
Test sample Related							
Test Sample Positioning	1.10	N	1	1	1	1.10	1.10
Device Holder Uncertainty	3.60	N	1	1	1	3.60	3.60
Power and SAR Drift Measurement	5.00	R	1.732	1	1	2.89	2.89
Phantom and Tissue Parameters							
Phantom Uncertainty	4.00	R	1.732	1	1	2.31	2.31
Liquid Conductivity - Target	5.00	R	1.732	0.64	0.43	1.85	1.24
Liquid Conductivity - Meas.	8.60	N	1	0.64	0.43	5.50	3.70
Liquid Permittivity - Target	5.00	R	1.732	0.6	0.49	1.73	1.41
Liquid Permittivity - Meas.	3.30	N	1	0.6	0.49	1.98	1.62
Combined Standard Uncertainty	RSS					11.44	10.49
Expanded Uncertainty (95% Confidence Interval)	K=2					22.87	20.98

Notesfor table
1. Tol. - tolerance in influence quaitity
2. N - Nomal
3. R - Rectangular
4. Div. - Divisor used to obtain standard uncertainty
5. Ci - is te sensitivity coefficient

11 EQUIPMENT LIST AND CALIBRATION

Name of Equipment	Manufacturer	Type/Model	Serial Number	Cal. Due date
Robot - Six Axes	Stäubli	RX90BL	N/A	N/A
Robot Remote Control	Stäubli	CS7MB	3403-91535	N/A
DASY4 Measurement Server	SPEAG	SEUMS001BA	1041	N/A
Probe Alignment Unit	SPEAG	LB (V2)	261	N/A
S-Parameter Network Analyzer	Agilent	8753ES-6	US39173569	2/9/07
Electronic Probe kit	Hewlett Packard	85070C	N/A	N/A
E-Field Probe	SPEAG	EX3DV4	3552	5/30/07
Thermometer	ERTCO	639-1S	1718	1/11/07
SAM Phantom (SAM1)	SPEAG	TP-1185	QD000P40CA	N/A
SAM Phantom (SAM2)	SPEAG	TP-1015	N/A	N/A
Data Acquisition Electronics	SPEAG	DAE4	558	1/20/07
System Validation Dipole	SPEAG	D835V2	4d002	1/23/08
System Validation Dipole	SPEAG	D1900V2	5d043	1/29/08
System Validation Dipole	SPEAG	D2450V2	706	4/27/08
Signal Generator	R&S	SMP 04	DE34210	6/8/06
Power Meter	Giga-tronics	8651A	8651404	12/27/06
Power Sensor	Giga-tronics	80701A	1834588	12/27/07
Amplifier	Mini-Circuits	ZVE-8G	0360	N/A
Amplifier	Mini-Circuits	ZHL-42W	D072701-5	N/A
Radio Communication Tester	Rohde & Schwarz	CMU 200	838114/032	3/21/07
Simulating Liquid	CCS	H835	N/A	Within 24 hrs of first test
Simulating Liquid	CCS	H1900	N/A	Within 24 hrs of first test
Simulating Liquid	CCS	H2450	N/A	Within 24 hrs of first test
Simulating Liquid	CCS	M835	N/A	Within 24 hrs of first test
Simulating Liquid	CCS	M1900	N/A	Within 24 hrs of first test
Simulating Liquid	CCS	M2450	N/A	Within 24 hrs of first test

12 PHOTOS

Smart Phone-without Jog Bar

Photos are confidential, please see a seperate file

Smart Phone-with Jog Bar

Photos are confidential, please see a seperate file

Holster

Photos are confidential, please see a seperate file

Face down

Photos are confidential, please see a seperate file

Face up

Battery and Wireless Modules' Location

Photos are confidential, please see a seperate file

13 ATTACHMENTS

No.	Contents	No. Of Pages
1	System Performance Check Plots	14
2-1	SAR Test Plots-GSM850	19
2-2	SAR Test Plots-GSM1900	19
2-3	SAR Test Plots-WLAN and Bluetooth	9
2-4	SAR Test Plots-Multi-Band	8
3	Certificate of E-Field Probe - EXDV4SN3552	10
4	Certificate of System Validation Dipole - D835V2 SN:4d002	9
5	Certificate of System Validation Dipole - D1900V2 SN:5d043	9
6	Certificate of System Validation Dipole - D2450 SN:706	9

End of Report