SAR Evaluation Report

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

FOR

PDA PHONE

MODEL: KAIS100, KAIS110, KAIS120

FCC ID: NM8KS

REPORT NUMBER: 07U10984-7

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Prepared for

HIGH TECH COMPUTER CORP.
NO.23 XINGHUA ROAD
TAOYUAN 330, TAIWAN

Prepared by

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issued date	Revisions	Revised By
--	May 15, 2007	Initial issue	Sunny Shih

CERTIFICATE OF COMPLIANCE (SAR EVALUATION)

DATES OF TEST: April 30, May 1, 3, 7, 8, 9, 10 and 14, 2007

APPLICANT: ADDRESS:	High Tech Computer Corp. No.23 Xinghua Road, Taoyuan 330, Taiwan
FCC ID: MODEL:	NM8KS KAIS100, KAIS110, KAIS120
DEVICE CATEGORY: EXPOSURE CATEGORY:	Portable Device General Population/Uncontrolled Exposure

PDA Phone with three radio modules GSM/WCDMA, WLAN and Bluetooth.

Note: This device contains 900/1800 MHz functions that are not operational in U.S. territories.

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: 0.607 Body-worn: 1.470	Head: 0.637 Body-worn: 1.450
FCC 24E	1850.20 - 1909.8	Head: 0.880 Body-worn: 0.848	Head: 0.802 Body-worn: 0.714
FCC 15.247	2412 - 2462	Head: 0.064 Body-worn: 0.159	N/A

This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for General Population/Uncontrolled Exposure limits specified in ANSI/IEEE Std. C95.1-1992 and had been tested in accordance with the measurement procedures specified in FCC OET 65 Supplement C (Edition 01-01).

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:	Tested By:
Hsin-Fu Shih	Ninous Davoudi
Hsin Fu Shih Engineering Supervisor Compliance Certification Services	Ninous Davoudi EMC Engineer Compliance Certification Services

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1 DEVICE UNDER TEST (DUT) DESCRIPTION

PDA Phone with three radio modules GSM/WCDMA, WLAN and Bluetooth. Note: This device contains 900/1800 MHz functions that are not operational in U.S. territories.	
Mobile phone capabilities:	Class A
GPRS Multi-slot class:	Class 10
Body-worn accessories:	• Holster with belt-clip - Newtech International Co., Ltd, Style No HTC-423 • Headset - Merry Electronics Co., Ltd, Model No. EMC220
Duty cycle:	GPRS/EGPRS: 1 slot: 12.5% 2 slots: 25% WCDMA & WCDMA + HSDPA: 100%
Battery:	• Samsung Li-Ion Polymer Battery, Model KAIS160 3.7Vdc, 1350mAh • DynaPack Li-Ion Polymer Battery, Model KAIS160 3.7Vdc, 1350mAh

2 FACILITIES AND ACCREDITATION

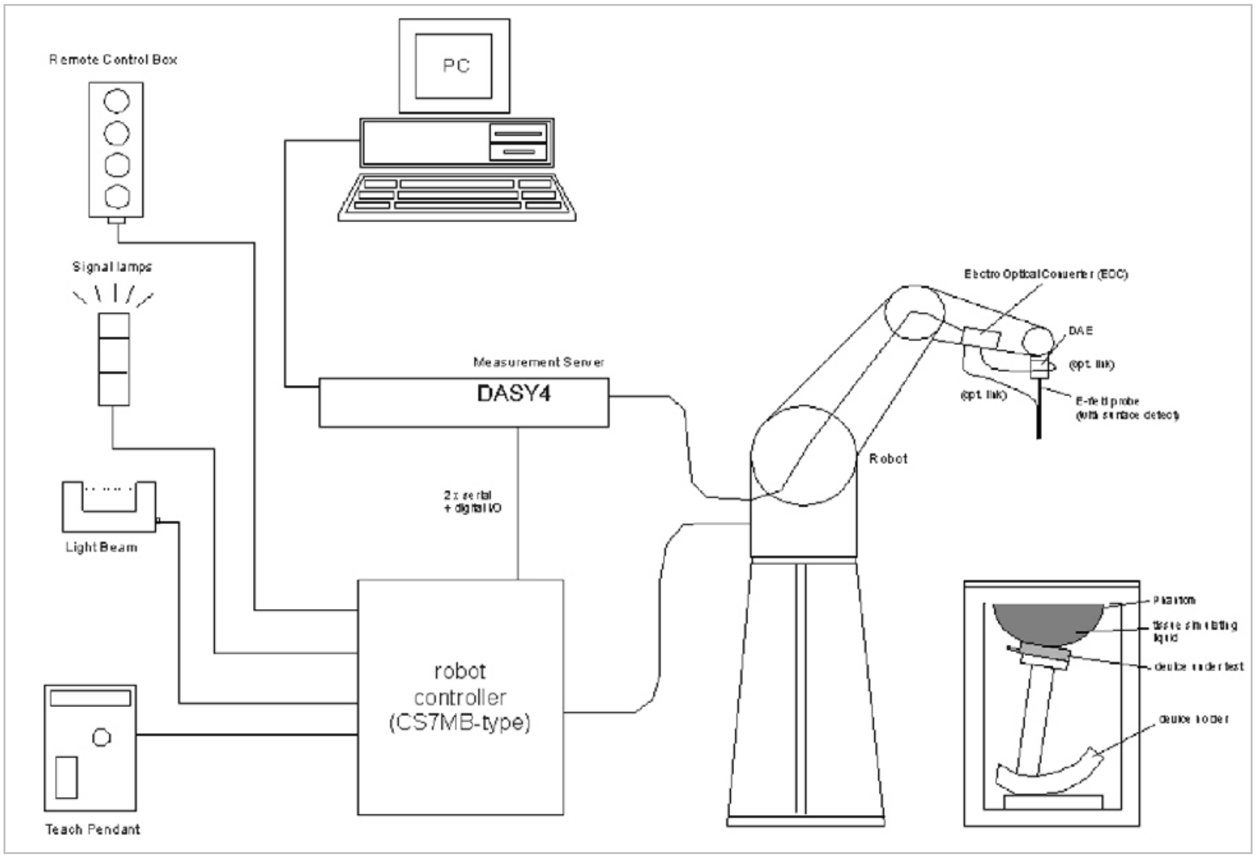
The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, CA 94538 USA. The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

NVLAP 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.

No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

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 SIMULATING 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.

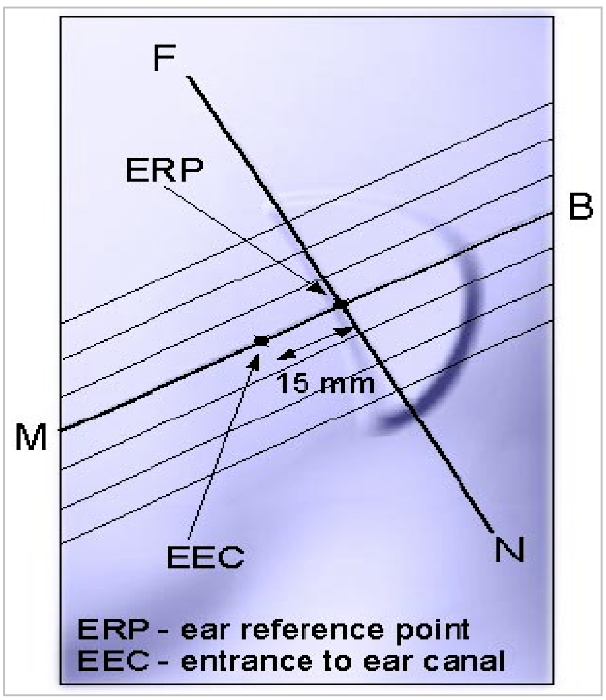
Ingredients (% by weight)	Frequency (MHz)									
	450		835		915		1900		2450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (NaCl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	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

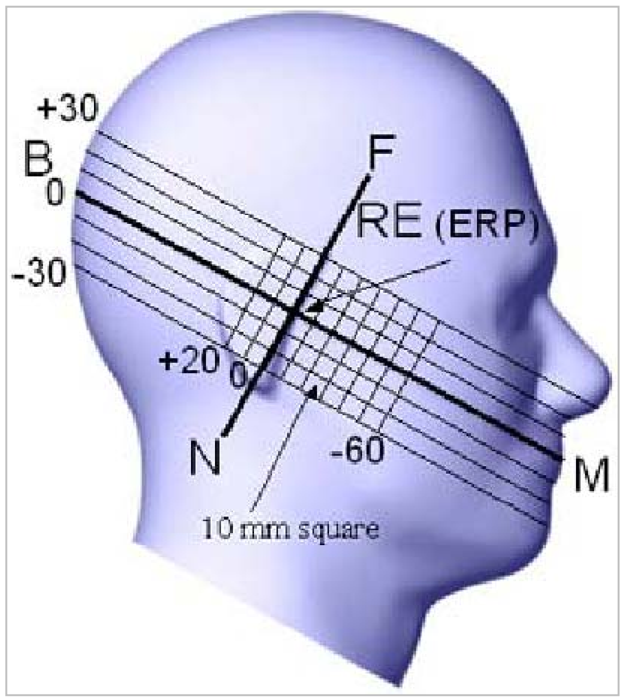
Salt: 99+% Pure Sodium Chloride Sugar: 98+% Pure Sucrose
Water: De-ionized, 16 MΩ+ resistivity HEC: Hydroxyethyl Cellulose
DGBE: 99+% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]
Triton X-100 (ultra pure): Polyethylene glycol mono [4-(1,1, 3, 3-tetramethylbutyl)phenyl]ether

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

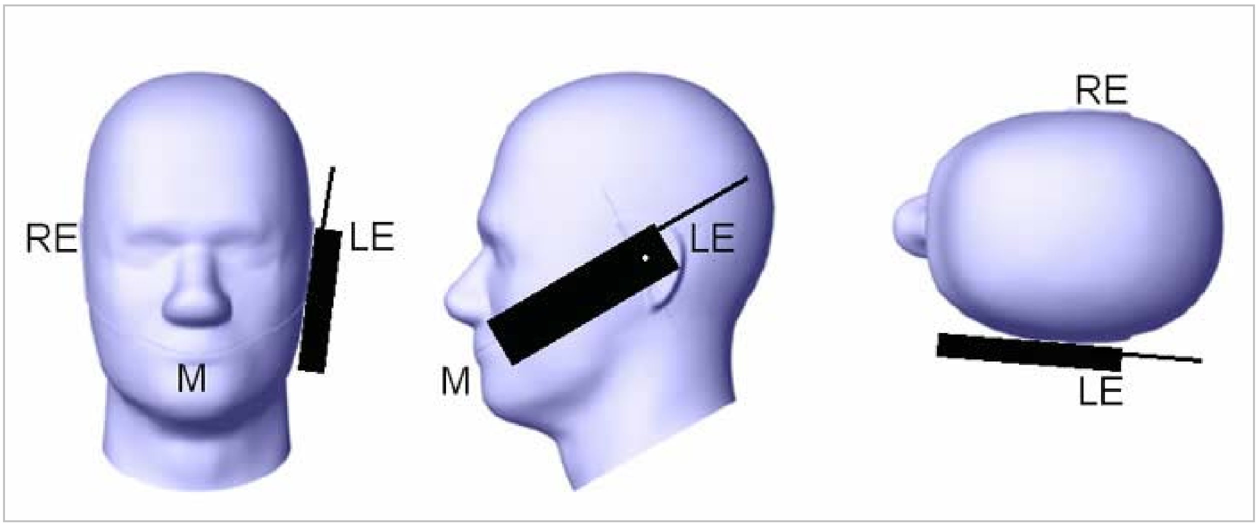
The device is brought toward the mouth of the head phantom by pivoting against the “ear reference point” or along the “N-F” line for the SCC-34/SC-2 head phantom.

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

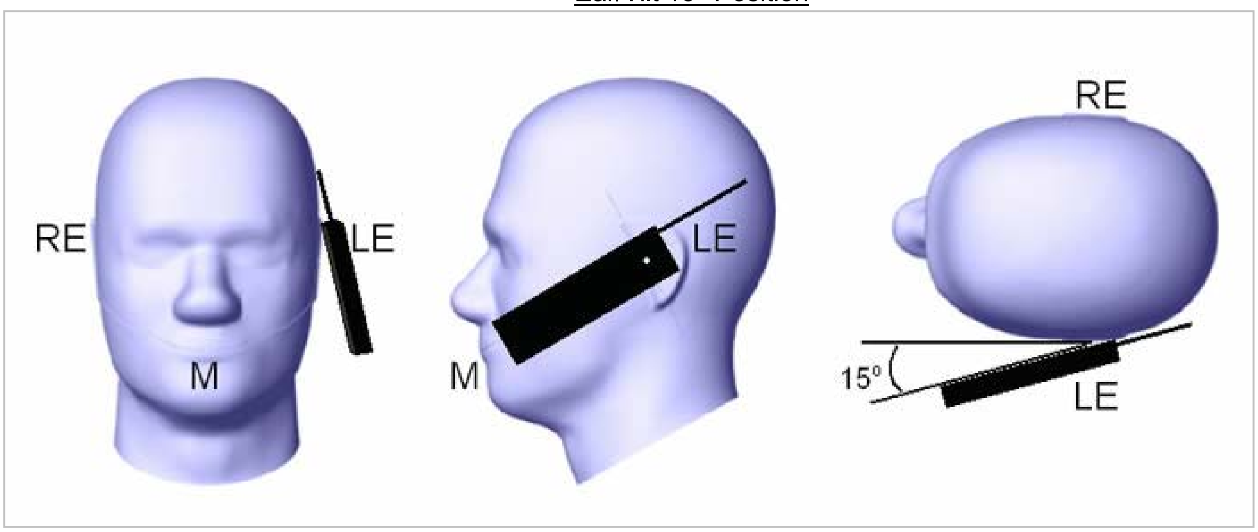
With the handset aligned in the “Cheek/Touch Position”:

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 is by 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, Tilt/Ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s). 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



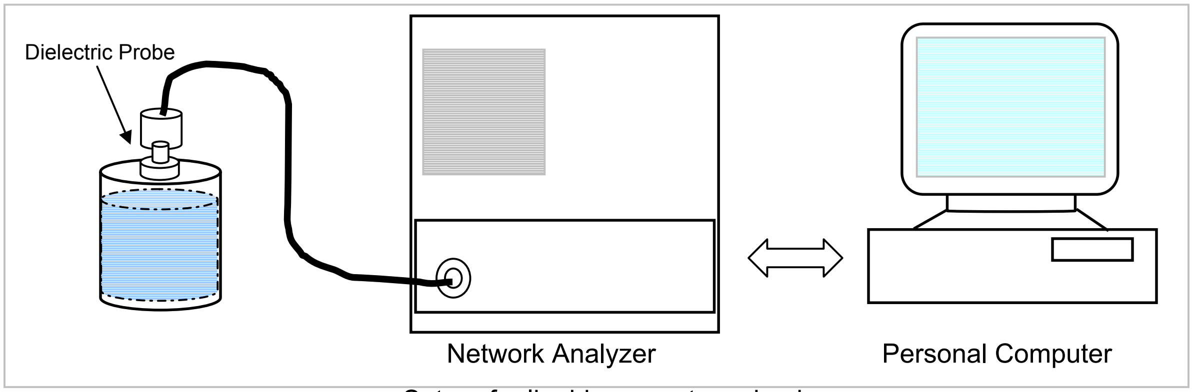
4.3 TEST POSITIONS FOR BODY-WORN AND OTHER SIMILAR CONFIGURATIONS

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 = 22°C; Relative humidity = 50% Measured by: Ninous Davoudi

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
835	21	15	e'	40.2753	Relative Permittivity (ε_r):	40.2753	41.5	-2.95	± 5
			e"	18.6061	Conductivity (σ):	0.86429	0.90	-3.97	± 5

Liquid Check
Ambient temperature: 22.0 deg. C; Liquid temperature: 21.0 deg C
April 30, 2007 09:03 AM

Frequency	e'	e"
800000000.	40.3620	18.5370
805000000.	40.3364	18.5449
810000000.	40.3567	18.5618
815000000.	40.3624	18.5822
820000000.	40.3401	18.6150
825000000.	40.3440	18.6245
830000000.	40.2884	18.6446
835000000.	40.2753	18.6061
840000000.	40.2002	18.6056
845000000.	40.1333	18.5927
850000000.	40.1030	18.5598
855000000.	39.9978	18.4763
860000000.	39.9328	18.4236
865000000.	39.7986	18.4110
870000000.	39.7066	18.3269
875000000.	39.6220	18.3019
880000000.	39.5215	18.2521
885000000.	39.4076	18.2564
890000000.	39.3382	18.2387
895000000.	39.3089	18.2198
900000000.	39.1960	18.2494

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 = 22°C; Relative humidity = 50% Measured by: Ninous Davoudi

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
835	21	15	e'	40.1657	Relative Permittivity (ε_r):	40.1657	41.5	-3.22	± 5
			e"	18.6254	Conductivity (σ):	0.86519	0.90	-3.87	± 5

Liquid Check

Ambient temperature: 22.0 deg. C; Liquid temperature: 21.0 deg C

May 01, 2007 08:40 AM

Frequency	e'	e"
800000000.	40.4790	18.8199
805000000.	40.4654	18.7905
810000000.	40.4342	18.7339
815000000.	40.3894	18.7241
820000000.	40.3751	18.7063
825000000.	40.3113	18.6597
830000000.	40.2440	18.6356
835000000.	40.1657	18.6254
840000000.	40.0675	18.6521
845000000.	39.9890	18.6321
850000000.	39.9021	18.6149
855000000.	39.7948	18.5936
860000000.	39.7061	18.5982
865000000.	39.5982	18.6388
870000000.	39.5325	18.6072
875000000.	39.4501	18.6208
880000000.	39.3807	18.6410
885000000.	39.3334	18.6650
890000000.	39.2752	18.6820
895000000.	39.2833	18.6507
900000000.	39.2473	18.6713

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 = 22°C; Relative humidity = 50% Measured by: Jonathan King

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
835	21	15	e'	40.6625	Relative Permittivity (ε_r):	40.6625	41.5	-2.02	± 5
			e"	18.7618	Conductivity (σ):	0.87153	0.90	-3.16	± 5

Liquid Check
Ambient temperature: 22 deg. C; Liquid temperature: 21 deg C
May 02, 2007 08:02 PM

Frequency	e'	e"
800000000.	41.1046	18.8933
805000000.	41.0729	18.8882
810000000.	40.9684	18.8490
815000000.	40.8906	18.8247
820000000.	40.8395	18.8361
825000000.	40.7885	18.8052
830000000.	40.7192	18.8008
835000000.	40.6625	18.7618
840000000.	40.5663	18.7654
845000000.	40.5398	18.7914
850000000.	40.4709	18.7362
855000000.	40.3797	18.7085
860000000.	40.3219	18.7230
865000000.	40.2734	18.6943
870000000.	40.2080	18.7112
875000000.	40.1399	18.6786
880000000.	40.0832	18.6833
885000000.	40.0340	18.6760
890000000.	39.9673	18.6739
895000000.	39.9249	18.6156
900000000.	39.8807	18.6174

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 = 21°C; Relative humidity = 45% Measured by: Jonathan King

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
835	21	15	e'	42.9276	Relative Permittivity (ε_r):	42.9276	41.5	3.44	± 5
			e"	19.3430	Conductivity (σ):	0.89852	0.90	-0.16	± 5

Liquid Check
Ambient temperature: 22 deg. C; Liquid temperature: 21 deg C
May 09, 2007 07:02 PM

Frequency	e'	e"
800000000.	43.3324	19.4398
805000000.	43.2837	19.4086
810000000.	43.2216	19.4032
815000000.	43.1597	19.4141
820000000.	43.1301	19.3837
825000000.	43.0526	19.3514
830000000.	42.9707	19.3739
835000000.	42.9276	19.3430
840000000.	42.8756	19.3150
845000000.	42.7943	19.3274
850000000.	42.7126	19.2984
855000000.	42.6776	19.3183
860000000.	42.6019	19.2677
865000000.	42.5140	19.2419
870000000.	42.4339	19.2041
875000000.	42.3930	19.2263
880000000.	42.3474	19.2296
885000000.	42.2481	19.2189
890000000.	42.2108	19.2100
895000000.	42.1714	19.1919
900000000.	42.1090	19.1611

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 = 22°C; Relative humidity = 50% Measured by: Ninous Davoudi

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
1900	21	15	e'	40.4552	Relative Permittivity (ε_r):	40.4552	40.0	1.14	± 5
			e"	13.8363	Conductivity (σ):	1.46249	1.40	4.46	± 5

Liquid Check
Ambient temperature: 22.0 deg. C; Liquid temperature: 21.0 deg C
May 07, 2007 09:51 AM

Frequency	e'	e"
1710000000.	41.0199	13.4969
1720000000.	41.0109	13.5619
1730000000.	41.0338	13.6042
1740000000.	41.1200	13.6138
1750000000.	41.1824	13.5834
1760000000.	41.1826	13.5530
1770000000.	41.1641	13.5217
1780000000.	41.0557	13.5246
1790000000.	40.9102	13.5452
1800000000.	40.7541	13.5949
1810000000.	40.6150	13.6686
1820000000.	40.5324	13.7506
1830000000.	40.4664	13.8560
1840000000.	40.4839	13.8965
1850000000.	40.5424	13.9226
1860000000.	40.6420	13.8972
1870000000.	40.7071	13.8837
1880000000.	40.6944	13.8624
1890000000.	40.5970	13.8450
1900000000.	40.4552	13.8363
1910000000.	40.2768	13.8798

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 = 22°C; Relative humidity = 50% Measured by: Ninous Davoudi

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
1900	21	15	e'	41.0336	Relative Permittivity (ε_r):	41.0336	40.0	2.58	± 5
			e''	13.7939	Conductivity (σ):	1.45801	1.40	4.14	± 5

Liquid Check
Ambient temperature: 22.0 deg. C; Liquid temperature: 21.0 deg C
May 08, 2007 07:59 AM

Frequency	e'	e''
1710000000.	41.6068	13.4088
1720000000.	41.6126	13.4590
1730000000.	41.6515	13.4886
1740000000.	41.7247	13.4899
1750000000.	41.7761	13.4754
1760000000.	41.7728	13.4630
1770000000.	41.7385	13.4699
1780000000.	41.6284	13.4686
1790000000.	41.4789	13.4962
1800000000.	41.3408	13.5484
1810000000.	41.1966	13.6022
1820000000.	41.1340	13.6695
1830000000.	41.0812	13.7493
1840000000.	41.1222	13.7902
1850000000.	41.1595	13.8329
1860000000.	41.2549	13.8216
1870000000.	41.2754	13.8217
1880000000.	41.2546	13.7997
1890000000.	41.1540	13.7944
1900000000.	41.0336	13.7939
1910000000.	40.8665	13.8347

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 = 22°C; Relative humidity =45% Measured by: Jonathan King

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
2450	21	15	e'	38.1245	Relative Permittivity (ε_r):	38.1245	39.2	-2.74	± 5
			e"	13.3246	Conductivity (σ):	1.81610	1.80	0.89	± 5

Liquid Check
Ambient temperature: 22 deg. C; Liquid temperature: 21 deg C
May 10, 2007 05:53 PM

Frequency	e'	e"
2400000000.	38.3522	13.1847
2405000000.	38.3163	13.1909
2410000000.	38.2937	13.2165
2415000000.	38.2701	13.2239
2420000000.	38.2452	13.2461
2425000000.	38.2260	13.2582
2430000000.	38.2179	13.2668
2435000000.	38.1949	13.2905
2440000000.	38.1854	13.3003
2445000000.	38.1580	13.3112
2450000000.	38.1245	13.3246
2455000000.	38.0901	13.3497
2460000000.	38.0799	13.3576
2465000000.	38.0510	13.3756
2470000000.	38.0364	13.3710
2475000000.	38.0105	13.3921
2480000000.	37.9822	13.4099
2485000000.	37.9790	13.4314
2490000000.	37.9540	13.4493
2495000000.	37.9165	13.4587
2500000000.	37.9031	13.4671

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 @ Head 2450 MHz

Room Ambient Temperature = 22°C; Relative humidity =45% Measured by: Jonathan King

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
2450	21	15	e'	39.1044	Relative Permittivity (ε_r):	39.1044	39.2	-0.24	± 5
			e"	13.3123	Conductivity (σ):	1.81442	1.80	0.80	± 5

Liquid Check
Ambient temperature: 22 deg. C; Liquid temperature: 21 deg C
May 14, 2007 07:25 PM

Frequency	e'	e"
2400000000.	39.2998	13.1383
2405000000.	39.2777	13.1453
2410000000.	39.2601	13.1708
2415000000.	39.2329	13.1878
2420000000.	39.2049	13.2167
2425000000.	39.1936	13.2288
2430000000.	39.1809	13.2589
2435000000.	39.1511	13.2617
2440000000.	39.1382	13.2809
2445000000.	39.1287	13.2973
2450000000.	39.1044	13.3123
2455000000.	39.0796	13.3363
2460000000.	39.0630	13.3533
2465000000.	39.0418	13.3744
2470000000.	39.0129	13.3798
2475000000.	38.9958	13.3919
2480000000.	38.9700	13.4004
2485000000.	38.9545	13.4141
2490000000.	38.9301	13.4300
2495000000.	38.9179	13.4437
2500000000.	38.9035	13.4483

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 = 22°C; Relative humidity = 50% Measured by: Ninous Davoudi

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
835	21	15	e'	53.9646	Relative Permittivity (ε_r):	53.9646	55.2	-2.24	± 5
			e"	20.7746	Conductivity (σ):	0.96502	0.97	-0.51	± 5

Liquid Check
Ambient temperature: 22.0 deg. C; Liquid temperature: 21.0 deg C
April 30, 2007 08:54 AM

Frequency	e'	e"
800000000.	53.9819	20.7734
805000000.	53.9883	20.7826
810000000.	54.0066	20.7759
815000000.	53.9906	20.7811
820000000.	53.9963	20.8284
825000000.	53.9965	20.8270
830000000.	53.9822	20.8140
835000000.	53.9646	20.7746
840000000.	53.9029	20.7625
845000000.	53.8675	20.7301
850000000.	53.8128	20.6725
855000000.	53.7471	20.6413
860000000.	53.6554	20.5664
865000000.	53.5451	20.5532
870000000.	53.4595	20.4885
875000000.	53.4100	20.4323
880000000.	53.2875	20.4044
885000000.	53.1933	20.4191
890000000.	53.1224	20.4356
895000000.	53.0841	20.3979
900000000.	52.9945	20.4272

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 = 22°C; Relative humidity = 40% Measured by: Ninous Davoudi

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
835	21	15	e'	52.5009	Relative Permittivity (ε_r):	52.5009	55.2	-4.89	± 5
			e"	20.4580	Conductivity (σ):	0.95032	0.97	-2.03	± 5

Liquid Check
Ambient temperature: 22.0 deg. C; Liquid temperature: 21.0 deg C
May 01, 2007 08:04 AM

Frequency	e'	e"
800000000.	52.8005	20.7637
805000000.	52.7685	20.7118
810000000.	52.7469	20.6400
815000000.	52.6912	20.5806
820000000.	52.6482	20.5395
825000000.	52.6145	20.5066
830000000.	52.5569	20.4659
835000000.	52.5009	20.4580
840000000.	52.3909	20.4477
845000000.	52.3346	20.4621
850000000.	52.2630	20.4604
855000000.	52.1539	20.4403
860000000.	52.0661	20.4452
865000000.	52.0062	20.4934
870000000.	51.9176	20.4882
875000000.	51.8626	20.5133
880000000.	51.8122	20.5471
885000000.	51.7721	20.5770
890000000.	51.7296	20.5971
895000000.	51.7301	20.5906
900000000.	51.6875	20.5639

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 = 22°C; Relative humidity = 40% Measured by: Jonathan King

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
835	21	15	e'	54.839	Relative Permittivity (ε_r):	54.8390	55.2	-0.65	± 5
			e"	21.0810	Conductivity (σ):	0.97926	0.97	0.95	± 5

Liquid Check
Ambient temperature: 22 deg. C; Liquid temperature: 21 deg C
May 02, 2007 07:45 PM

Frequency	e'	e"
800000000.	55.2260	21.2316
805000000.	55.1758	21.2204
810000000.	55.1226	21.1821
815000000.	55.0443	21.1647
820000000.	54.9749	21.1220
825000000.	54.9714	21.1337
830000000.	54.8729	21.0969
835000000.	54.8390	21.0810
840000000.	54.7662	21.0467
845000000.	54.7486	21.0689
850000000.	54.6970	21.0272
855000000.	54.6297	20.9703
860000000.	54.5626	20.9680
865000000.	54.5530	20.9438
870000000.	54.4635	20.9613
875000000.	54.4097	20.9010
880000000.	54.3542	20.9164
885000000.	54.3073	20.8967
890000000.	54.2686	20.8951
895000000.	54.2383	20.8587
900000000.	54.2049	20.8395

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 = 22°C; Relative humidity = 35% Measured by: Jonathan King

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
835	21	15	e'	54.6445	Relative Permittivity (ε_r):	54.6445	55.2	-1.01	± 5
			e"	20.8548	Conductivity (σ):	0.96875	0.97	-0.13	± 5

Liquid Check
Ambient temperature: 22 deg. C; Liquid temperature: 21 deg C
May 03, 2007 04:22 PM

Frequency	e'	e"
800000000.	54.9635	21.0403
805000000.	54.9309	21.0132
810000000.	54.8923	20.9829
815000000.	54.8361	20.9479
820000000.	54.7917	20.9425
825000000.	54.7438	20.8940
830000000.	54.6825	20.9119
835000000.	54.6445	20.8548
840000000.	54.5988	20.8341
845000000.	54.5421	20.8397
850000000.	54.5056	20.8377
855000000.	54.4651	20.7938
860000000.	54.3913	20.7737
865000000.	54.3447	20.7652
870000000.	54.3047	20.7435
875000000.	54.2543	20.7475
880000000.	54.1905	20.7141
885000000.	54.1422	20.7175
890000000.	54.1039	20.7171
895000000.	54.0867	20.6873
900000000.	54.0455	20.6881

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 835 MHz

Room Ambient Temperature = 22°C; Relative humidity = 45% Measured by: Jonathan King

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
835	21	15	e'	55.0636	Relative Permittivity (ε_r):	55.0636	55.2	-0.25	± 5
			e"	21.0305	Conductivity (σ):	0.97691	0.97	0.71	± 5

Liquid Check
Ambient temperature: 22 deg. C; Liquid temperature: 21 deg C
May 08, 2007 10:20 PM

Frequency	e'	e"
800000000.	55.4283	21.1589
805000000.	55.3761	21.1140
810000000.	55.3525	21.0986
815000000.	55.2964	21.0839
820000000.	55.2617	21.0784
825000000.	55.1931	21.0239
830000000.	55.1208	21.0161
835000000.	55.0636	21.0305
840000000.	55.0716	21.0093
845000000.	54.9911	20.9557
850000000.	54.9526	20.9523
855000000.	54.8983	20.9333
860000000.	54.8451	20.9141
865000000.	54.7950	20.8724
870000000.	54.7194	20.8732
875000000.	54.6801	20.8816
880000000.	54.6329	20.8397
885000000.	54.5772	20.8546
890000000.	54.5518	20.8364
895000000.	54.5073	20.7943
900000000.	54.4780	20.7885

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 = 22°C; Relative humidity = 45% Measured by: Jonathan King

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
835	21	15	e'	54.2306	Relative Permittivity (ε_r):	54.2306	55.2	-1.76	± 5
			e"	20.8091	Conductivity (σ):	0.96663	0.97	-0.35	± 5

Liquid Check
Room Ambient temperature: 22 deg. C; Liquid temperature: 21 deg C
May 09, 2007 09:30 PM

Frequency	e'	e"
800000000.	54.5573	20.9229
805000000.	54.5266	20.8972
810000000.	54.4885	20.8799
815000000.	54.4230	20.8614
820000000.	54.3784	20.8357
825000000.	54.3263	20.8018
830000000.	54.2753	20.8287
835000000.	54.2306	20.8091
840000000.	54.1930	20.7762
845000000.	54.1406	20.7599
850000000.	54.0892	20.7434
855000000.	54.0614	20.7292
860000000.	53.9954	20.6971
865000000.	53.9492	20.6579
870000000.	53.9088	20.6596
875000000.	53.8494	20.6367
880000000.	53.8088	20.6599
885000000.	53.7514	20.6367
890000000.	53.6803	20.6296
895000000.	53.6775	20.6066
900000000.	53.6111	20.5929

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 1900 MHz

Room Ambient Temperature = 22°C; Relative humidity = 50% Measured by: Ninous Davoudi

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
1900	21	15	e'	53.5824	Relative Permittivity (ε_r):	53.5824	53.3	0.53	± 5
			e"	14.2629	Conductivity (σ):	1.50758	1.52	-0.82	± 5

Liquid Check
Ambient temperature: 22.0 deg. C; Liquid temperature: 21.0 deg C
May 07, 2007 09:38 AM

Frequency	e'	e"
1710000000.	54.0606	13.7363
1720000000.	54.0744	13.7940
1730000000.	54.1328	13.8359
1740000000.	54.2246	13.8446
1750000000.	54.2810	13.8230
1760000000.	54.2825	13.7962
1770000000.	54.2432	13.7973
1780000000.	54.1164	13.8274
1790000000.	53.9663	13.8533
1800000000.	53.8130	13.9312
1810000000.	53.6998	13.9932
1820000000.	53.6219	14.0837
1830000000.	53.6105	14.1964
1840000000.	53.6409	14.2421
1850000000.	53.7388	14.2703
1860000000.	53.8331	14.2601
1870000000.	53.8829	14.2639
1880000000.	53.8540	14.2405
1890000000.	53.7322	14.2343
1900000000.	53.5824	14.2629
1910000000.	53.4152	14.3019

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 1900 MHz

Room Ambient Temperature = 22°C; Relative humidity = 50% Measured by: Ninous Davoudi

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
1900	21	15	e'	53.5116	Relative Permittivity (ε_r):	53.5116	53.3	0.40	± 5
			e"	14.3325	Conductivity (σ):	1.51494	1.52	-0.33	± 5

Liquid Check
Ambient temperature: 22.0 deg. C; Liquid temperature: 21.0 deg C
May 08, 2007 07:47 AM

Frequency	e'	e"
1710000000.	54.0680	13.7228
1720000000.	54.0747	13.7679
1730000000.	54.1285	13.7913
1740000000.	54.2039	13.8030
1750000000.	54.2579	13.8133
1760000000.	54.2292	13.8201
1770000000.	54.1756	13.8599
1780000000.	54.0478	13.8799
1790000000.	53.8905	13.9307
1800000000.	53.7741	13.9873
1810000000.	53.6557	14.0431
1820000000.	53.6073	14.1003
1830000000.	53.6090	14.1536
1840000000.	53.6653	14.2201
1850000000.	53.7461	14.2784
1860000000.	53.7795	14.2982
1870000000.	53.7738	14.3055
1880000000.	53.7431	14.2917
1890000000.	53.6251	14.3009
1900000000.	53.5116	14.3325
1910000000.	53.3410	14.3712

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 @ Muscle 2450 MHz

Room Ambient Temperature = 22°C; Relative humidity = 45% Measured by: Jonathan King

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
2450	21	15	e'	51.325	Relative Permittivity (ε_r):	51.3250	52.7	-2.61	± 5
			e"	14.6534	Conductivity (σ):	1.99721	1.95	2.42	± 5

Liquid Check
Ambient temperature: 22 deg. C; Liquid temperature: 21 deg C
May 10, 2007 08:47 PM

Frequency	e'	e"
2400000000.	51.4987	14.4323
2405000000.	51.4795	14.4496
2410000000.	51.4596	14.4901
2415000000.	51.4456	14.5050
2420000000.	51.4275	14.5252
2425000000.	51.4078	14.5437
2430000000.	51.3971	14.5662
2435000000.	51.3783	14.5879
2440000000.	51.3724	14.6046
2445000000.	51.3479	14.6300
2450000000.	51.3250	14.6534
2455000000.	51.2900	14.6698
2460000000.	51.2666	14.6682
2465000000.	51.2413	14.7066
2470000000.	51.2292	14.7135
2475000000.	51.2188	14.7335
2480000000.	51.1967	14.7497
2485000000.	51.1795	14.7636
2490000000.	51.1637	14.7872
2495000000.	51.1316	14.8241
2500000000.	51.1135	14.8247

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 = 22°C; Relative humidity = 45% Measured by: Ninous Davoudi

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
2450	21	15	e'	52.241	Relative Permittivity (ε_r):	52.2410	52.7	-0.87	± 5
			e''	14.7742	Conductivity (σ):	2.01367	1.95	3.27	± 5

Liquid Check
Ambient temperature: 22.0 deg. C; Liquid temperature: 21.0 deg C
May 14, 2007 02:01 PM

Frequency	e'	e''
2400000000.	51.7437	14.3146
2405000000.	51.7042	14.4121
2410000000.	51.7068	14.4951
2415000000.	51.7146	14.5907
2420000000.	51.7576	14.6541
2425000000.	51.8323	14.7121
2430000000.	51.9220	14.7663
2435000000.	52.0189	14.7925
2440000000.	52.1255	14.7986
2445000000.	52.1890	14.7792
2450000000.	52.2410	14.7742
2455000000.	52.2909	14.7523
2460000000.	52.2935	14.6995
2465000000.	52.2879	14.6344
2470000000.	52.2169	14.5779
2475000000.	52.1665	14.5254
2480000000.	52.0868	14.5002
2485000000.	51.9878	14.4776
2490000000.	51.8784	14.4730
2495000000.	51.7585	14.4979
2500000000.	51.6276	14.5488

The conductivity (σ) can be given as:

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

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

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 Body 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

In the table below, the numerical reference SAR values of a SPEAG validation dipoles placed below the flat phantom filled with body-tissue simulating liquid are given. The reference SAR values were calculated using the finite-difference time-domain method and the geometry parameters.

Dipole Type	Distance (mm)	Frequency (MHz)	SAR (1g) [W/kg]	SAR (10g) [W/kg]	SAR (peak) [W/kg]
D450V2	15	450	5.01	3.36	7.22
D835V2	15	835	9.71	6.38	14.1
D900V2	15	900	11.1	7.17	16.3
D1450V2	10	1450	29.6	16.6	49.8
D1800V2	10	1800	38.5	20.3	67.5
D1900V2	10	1900	39.8	20.8	69.6
D2000V2	10	2000	40.9	21.2	71.5
D2450V2	10	2450	51.2	23.7	97.6

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

6.1 SYSTEM PERFORMANCE CHECK RESULTS

System Validation Dipole: D835V2 SN:4d002

Date: April 30, 2007

Room Ambient Temperature = 22°C; Relative humidity = 50% Measured by: Ninous Davoudi

Body Simulating Liquid			SAR (mW/g)		Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
835	21	15	1g	2.42	9.68	9.71	-0.31	± 10
			10g	1.6	6.4	6.38	0.31	± 10

Date: May 1, 2007

Room Ambient Temperature = 22°C; Relative humidity = 40% Measured by: Ninous Davoudi

Body Simulating Liquid			SAR (mW/g)		Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
835	21	15	1g	2.40	9.6	9.71	-1.13	± 10
			10g	1.58	6.32	6.38	-0.94	± 10

Date: May 2, 2007

Room Ambient Temperature = 22°C; Relative humidity = 40% Measured by: Jonathan King

Body Simulating Liquid			SAR (mW/g)		Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
835	21	15	1g	2.33	9.32	9.71	-4.02	± 10
			10g	1.54	6.16	6.38	-3.45	± 10

Date: May 3, 2007

Room Ambient Temperature = 22°C; Relative humidity = 35% Measured by: Jonathan King

Body Simulating Liquid			SAR (mW/g)		Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
835	21	15	1g	2.41	9.64	9.71	-0.72	± 10
			10g	1.59	6.36	6.38	-0.31	± 10

Date: May 8, 2007

Room Ambient Temperature = 22°C; Relative humidity = 45% Measured by: Jonathan King

Body Simulating Liquid			SAR (mW/g)		Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
835	21	15	1g	2.44	9.76	9.71	0.51	± 10
			10g	1.61	6.44	6.38	0.94	± 10

Date: May 9, 2007

Ambient Temperature = 22°C; Relative humidity = 45% Measured by: Jonathan King

Body Simulating Liquid			SAR (mW/g)		Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
835	21	15	1g	2.39	9.56	9.71	-1.54	± 10
			10g	1.58	6.32	6.38	-0.94	± 10

System Validation Dipole: D1900V2 SN:5d043

Date: May 7, 2007

Room Ambient Temperature = 22°C; Relative humidity = 50% Measured by: Ninous Davoudi

Body Simulating Liquid			SAR (mW/g)		Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
1900	21	15	1g	9.94	39.76	39.8	-0.10	± 10
			10g	5.26	21.04	20.8	1.15	± 10

Date: May 8, 2007

Room Ambient Temperature = 22°C; Relative humidity = 50% Measured by: Ninous Davoudi

Body Simulating Liquid			SAR (mW/g)		Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
1900	21	15	1g	10.20	40.8	39.8	2.51	± 10
			10g	5.41	21.64	20.8	4.04	± 10

System Validation Dipole: D2450V2 SN: 706

Date: May 10, 2007

Ambient Temperature = 22°C; Relative humidity = 45% Measured by: Jonathan King

Body Simulating Liquid			SAR (mW/g)		Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
2450	21	15	1g	13.80	55.2	51.2	7.81	± 10
			10g	6.42	25.68	23.7	8.35	± 10

Date: May 14, 2007

Room Ambient Temperature = 22°C; Relative humidity = 45% Measured by: Ninous Davoudi

Body Simulating Liquid			SAR (mW/g)		Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
2450	21	15	1g	13.80	55.2	51.2	7.81	± 10
			10g	6.29	25.16	23.7	6.16	± 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=24 and Z=20 mm is assessed by measuring 7 x 7 x 9 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 7 x 7 x 9 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 configure the CMU200 to establish the link for SAR testing.

Service selection →	Test Mode A – Auto Slot Config. → off
Main Service →	Packet Data
Network Support →	GSM+GPRS
Slot Config →	33 dBm for GSM850 and 30 dBm for GSM1900 27 dBm for GPRS850 and 26 dBm for GPRS1900

Conducted power:

GSM850

Channel	Frequency (MHz)	GSM	GPRS	
		Power (dBm)	1 slot Power (dBm)	2 slots Power (dBm)
128	824.2	33.1	33.1	33.0
192	837.0	33.4	33.4	33.4
251	848.8	33.4	33.4	33.4

GSM850

Channel	Frequency (MHz)		EGPRS	
			1 slot Power (dBm)	2 slots Power (dBm)
128	824.2		27.1	27.1
192	837.0		27.4	27.4
251	848.8		27.5	27.5

GSM1900

Channel	Frequency (MHz)	GSM	GPRS	
		Power (dBm)	1 slot Power (dBm)	2 slots Power (dBm)
512	1850.2	29.8	29.8	29.8
661	1880.0	29.7	29.7	29.7
810	1909.8	29.7	29.7	29.7

GSM1900

Channel	Frequency (MHz)		EGPRS	
			1 slot Power (dBm)	2 slots Power (dBm)
512	1850.2		25.8	25.8
661	1880.0		25.7	25.7
810	1909.8		25.7	25.7

WCDMA + HSDPA Procedure

This procedure assumes the Agilent 8960 Test Set has the following applications installed and with valid license.

WCDMA

- Call Setup > Shift & Preset
- Cell Parameters: PS Domain Information > Present
    - ATT (IMSI Attach) Flag State > Set
- Security Parameter - System Operations > None
- Channel Type: RMC: 12.2k

- Paging Service: RB Test Mode
- Channel (UARFCN) Parms:

	PCS band	Cell band
DL Channel:	9662 / 9800 / 9938 /	4357 / 4407 / 4458
UL Channel:	9262 / 9400 / 9538 /	4132 / 4182 / 4233

- DL DTCH Data: All Ones
- RLC Reestablish: Off
- Call Limit State: Off
- Call Drop Timer: Off
- SRB Config.: 13.6k DCCH
- UE Target Power: 25 dBm
- UL CL Power Ctrl Parameters
    - UL CL Power Ctrl Mode: All Up Bits

RF Output Power Measurement Results – for RMC Channel Type

Channel Type: 12.2K RMC

Cell Band

Channel	Frequency (MHz)	Ch Power (dBm)
4132	826.4	23.1
4182	836.4	22.7
4233	846.6	22.6

PCS Band

Channel	Frequency (MHz)	Ch Power (dBm)
9262	1852.4	22.7
9400	1880.0	22.8
9538	1907.6	22.7

WCDMA + HSDPA

- Uplink Parameter:
  - PRACH Bc / Bd control: Manual
  - Manual PRACH Bc: 9
  - Manual PRACH: Bd: 15
- Channel Type: 12.2k + HSDPA
- HSDPA Parameters:
  - HSDPA RB Test Mode Setup
    - HS–DSCH Configuration Type: FRC
    - FRC Type: <Selected H-set according to the UE category>

HS-DSCH category	Corresponding requirement
Category 1	H-Set 1
Category 2	H-Set 1
Category 3	H-Set 2
Category 4	H-Set 2
Category 5	H-Set 3
Category 6	H-Set 3
Category 7	H-Set 6 (Rel-6)
Category 8	H-Set 6 (Rel-6)
Category 10	H-Set 4
Category 11	H-Set 5

    - CN Domain: CS Domain
    - Uplink 64k DTCH for HSDPA Loopback State: On
    - HS-DSCH Data Pattern: All Ones
    - RLC Header on HS-DSCH: Present
  - HSDPA Uplink Parameters
    - DelatACK: 5
    - DeltaNACK: 5
    - DeltaCQI: 2

RF Output Power Measurement Results - for 12.2k RMC HSDPA Channel Type

12.2k RMC + HSDPA

Cell Band

Channel	Frequency (MHz)	Ch Power (dBm)
4132	826.4	23.0
4182	836.4	22.5
4233	846.6	22.4

PCS Band

Channel	Frequency (MHz)	Ch Power (dBm)
9262	1852.4	22.5
9400	1880.0	22.5
9538	1907.6	22.5

9 CELL BAND SAR MEASURMENT RESULTS

Test results are for model KAIS120 with battery manufactured by Samsung unless it is mentioned.

9.1 NORMAL POSITION

9.1.1 LEFT HAND SIDE

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	0.186	-0.004	0.186
Tilt (15°)	128 190 251	824.2 836.6 848.8	0.191	0.000	0.191

WCDMA

Test Position	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
Touch	4132 4182 4233	826.4 836.4 846.6	0.179	-0.059	0.181
Tilt (15°)	4132 4182 4233	826.4 836.4 846.6	0.184	0.000	0.184

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.

9.1.2 RIGHT HAND SIDE

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	0.243	0.000	0.243
Tilt (15°)	128 190 251	824.2 836.6 848.8	0.211	-0.042	0.213
WCDMA					
Test Position	**Channel**	**f (MHz)**	**Measured SAR 1g (mW/g)**	**Power Drift (dB)**	**Extrapolated[1)] SAR 1g (mW/g)**
Touch	4132 4182 4233	826.4 836.4 846.6	0.217	0.007	0.217
Tilt (15°)	4132 4182 4233	826.4 836.4 846.6	0.198	-0.059	0.201

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.

9.2 SIDE OPEN POSITION

9.2.1 LEFT HAND SIDE

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	824.2			
	190	836.6	0.213	0.000	0.213
	251	848.8			
Tilt (15°)	128	824.2			
	190	836.6	0.295	-0.040	0.298
	251	848.8			
Tilt (15°) GPRS 2 slots	190	836.6	0.562	-0.083	0.573
	190 [5)]	836.6	0.515	-0.157	0.534
	190 [6)]	836.6	0.556	-0.067	0.565
	190 [7)]	**836.6**	**0.591**	**-0.116**	**0.607**

WCDMA

Test Position	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
Touch	4132	826.4			
	4182	836.4	0.191	0.000	0.191
	4233	846.6			
Tilt (15°)	4132	826.4			
	4182	836.4	0.261	-0.016	0.262
	4233	846.6			

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.
5) Model KAIS 110.
6) Model KAIS 100.
7) Model KAIS 120 with DynaPack Battery.
8) EGPRS mode is skipped since power levels are significantly lower.

9.2.2 RIGHT HAND SIDE

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	0.143	-0.077	0.146
Tilt (15°)	128 190 251	824.2 836.6 848.8	0.161	0.000	0.161

WCDMA

Test Position	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
Touch	4132 4182 4233	826.4 836.4 846.6	0.121	0.000	0.121
Tilt (15°)	4132 4182 4233	826.4 836.4 846.6	0.140	0.000	0.140

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 BODY POSITION WITH HOLSTER

LCD Up	LCD Down

GPRS850 - 2 slots					
Test Position	**Channel**	**f (MHz)**	**Measured SAR 1g (mW/g)**	**Power Drift (dB)**	**Extrapolated[1] SAR 1g (mW/g)**
LCD Up	128 190 251	824.2 836.6 848.8	0.689	0.000	0.689
LCD Down	128 190 251 **190[5]** 190[6] 190[7]	824.2 836.6 848.8 **836.6** 836.6 836.6	1.370 1.460 1.450 **1.470** 1.450 1.440	0.000 0.000 0.000 **0.000** 0.000 0.000	1.370 1.460 1.450 **1.470** 1.450 1.440
WCDMA					
Test Position	**Channel**	**f (MHz)**	**Measured SAR 1g (mW/g)**	**Power Drift (dB)**	**Extrapolated[1] SAR 1g (mW/g)**
LCD Down	4132 4182 4233	826.4 836.4 846.6	0.701	0.000	0.701
WCDMA + HSDPA					
Test Position	**Channel**	**f (MHz)**	**Measured SAR 1g (mW/g)**	**Power Drift (dB)**	**Extrapolated[1] SAR 1g (mW/g)**
LCD Down	4132 4182 4233	826.4 836.4 846.6	0.672	0.000	0.672

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.
5) Model KAIS 100.
6) Model KAIS 110.
7) Model KAIS 100 with Dynapack battery.
8) EGPRS mode is skipped since power levels are significantly lower.

10 PCS BAND SAR MEASURMENT RESULTS

Test results are for model KAIS120 with battery manufactured by Samsung unless it is mentioned.

10.1 NORMAL POSITION

10.1.1 LEFT HAND SIDE

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	512 661 810	1850.2 1880.0 1909.8	0.282	0.000	0.282
Tilt (15°)	512 661 810	1850.2 1880.0 1909.8	0.391	0.000	0.391

WCDMA

Test Position	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
Touch	9262 9400 9538	1852.40 1880.00 1907.60	0.334	0.000	0.334
Tilt (15°)	9262 9400 9538	1852.40 1880.00 1907.60	0.465	0.000	0.465

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.

10.1.2 RIGHT HAND SIDE

10.1.2.1 GSM1900

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	0.320	0.000	0.320
	810	1909.8			
Tilt (15°)	512	1850.2			
	661	1880.0	0.437	-0.054	0.442
	810	1909.8			
Tilt (15°) GPRS 2 slots	512	1850.2	0.797	-0.064	0.809
	661	**1880.0**	**0.866**	**-0.069**	**0.880**
	810	1909.8	0.765	-0.191	0.799
	661 [5]	1880.0	0.650	-0.128	0.669
	661 [6]	1880.0	0.790	-0.133	0.815
	661 [7]	1880.0	0.783	-0.069	0.796

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.
5) Model KAIS 110.
6) Model KAIS 100.
7) Model KAIS 120 with DynaPack Battery.
8) EGPRS mode is skipped since power levels are significantly lower.

10.1.2.2 WCDMA

Touch Position	Tilt (15°) Position

WCDMA					
Test Position	**Channel**	**f (MHz)**	**Measured SAR 1g (mW/g)**	**Power Drift (dB)**	**Extrapolated[1] SAR 1g (mW/g)**
Touch	9262 9400 9538	1852.40 1880.00 1907.60	0.340	0.000	0.340
Tilt (15°)	9262 9400 9538	1852.40 1880.00 1907.60	0.516	0.000	0.516
	9400 [5)]	1880.00	0.469	-0.018	0.471
	9400 [6)]	1880.00	0.534	0.000	0.534
	9400 [7)]	1880.00	0.484	0.000	0.484

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.
5) Model KAIS 110.
6) Model KAIS 100.
7) Model KAIS 100 with DynaPack Battery.

10.2 SIDE OPEN POSITION

10.2.1 LEFT HAND SIDE

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	512 661 810	1850.2 1880.0 1909.8	0.306	-0.193	0.320
Tilt (15°)	512 661 810	1850.2 1880.0 1909.8	0.389	-0.032	0.392
WCDMA					
Test Position	**Channel**	**f (MHz)**	**Measured SAR 1g (mW/g)**	**Power Drift (dB)**	**Extrapolated[1] SAR 1g (mW/g)**
Touch	9262 9400 9538	1852.40 1880.00 1907.60	0.358	0.000	0.358
Tilt (15°)	9262 9400 9538	1852.40 1880.00 1907.60	0.474	-0.198	0.496

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.

10.2.2 RIGHT HAND SIDE

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	512 661 810	1850.2 1880.0 1909.8	0.196	0.000	0.196
Tilt (15°)	512 661 810	1850.2 1880.0 1909.8	0.322	0.000	0.322
WCDMA					
Test Position	**Channel**	**f (MHz)**	**Measured SAR 1g (mW/g)**	**Power Drift (dB)**	**Extrapolated[1)] SAR 1g (mW/g)**
Touch	9262 9400 9538	1852.40 1880.00 1907.60	0.259	0.000	0.259
Tilt (15°)	9262 9400 9538	1852.40 1880.00 1907.60	0.429	0.000	0.429

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.

10.3 BODY POSITION WITH HOLSTER

LCD Up	LCD Down

GPRS1900 - 2 slots					
Test Position	**Channel**	**f (MHz)**	**Measured SAR 1g (mW/g)**	**Power Drift (dB)**	**Extrapolated[1)] SAR 1g (mW/g)**
LCD Up	512 661 810	1850.2 1880.0 1909.8	0.377	0.000	0.377
LCD Down	512	1850.2	0.680	0.000	0.680
	661	1880.0	0.789	0.000	0.789
	810	1909.8	0.788	0.000	0.788
	661 [5)]	1880.0	0.705	0.000	0.705
	661 [6)]	1880.0	0.655	0.000	0.655
	661 [7)]	**1880.0**	**0.848**	**0.000**	**0.848**

WCDMA					
Test Position	**Channel**	**f (MHz)**	**Measured SAR 1g (mW/g)**	**Power Drift (dB)**	**Extrapolated[1)] SAR 1g (mW/g)**
LCD Down	9262 9400 9538	1852.40 1880.00 1907.60	0.544	-0.175	0.566

WCDMA + HSDPA					
Test Position	**Channel**	**f (MHz)**	**Measured SAR 1g (mW/g)**	**Power Drift (dB)**	**Extrapolated[1)] SAR 1g (mW/g)**
LCD Down	9262 9400 9538	1852.40 1880.00 1907.60	0.422	-0.194	0.441

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.
5) Model KAIS 100.
6) Model KAIS 110.
7) Model KAIS 120 with DynaPack Battery.
8) EGPRS mode is skipped since power levels are significantly lower.

11 2.4GHZ BAND SAR MEASURMENT RESULTS

Test results are for model KAIS120 with battery manufactured by Samsung unless it is mentioned.

11.1 NORMAL POSITION

11.1.1 LEFT HAND SIDE

Touch Position	Tilt (15°) Position

b mode

Test Position	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
Touch	1	2412			
	6	2437	0.042	-0.048	0.042
	11	2462			
Tilt (15°)	1	2412			
	6	2437	0.027	0.000	0.027
	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) 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.
5) 802.11g mode was skipped due to significantly lower output power.

11.1.2 RIGHT HAND SIDE

Touch Position	Tilt (15°) Position

b mode

Test Position	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1] SAR 1g (mW/g)
Touch	1	2412			
	6	2437	0.061	-0.148	0.063
	11	2462			
	6 [5]	**2437**	**0.064**	**0.000**	**0.064**
	6 [6]	2437	0.051	-0.165	0.053
	6 [7]	2437	0.047	-0.162	0.049
Tilt (15°)	1	2412			
	6	2437	0.017	-0.139	0.018
	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) 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.
5) Model KAIS 100.
6) Model KAIS 110.
7) Model KAIS 100 with DynaPack Battery.
8) EGPRS mode is skipped since power levels are significantly lower.
9) G mode was skipped due to significantly lower output power.

11.2 SIDE OPEN POSITION

11.2.1 LEFT HAND SIDE

Touch Position	Tilt (15°) Position

b mode					
Test Position	**Channel**	**f (MHz)**	**Measured SAR 1g (mW/g)**	**Power Drift (dB)**	**Extrapolated[1)] SAR 1g (mW/g)**
Touch	1	2412			
	6	2437	0.044	-0.105	0.045
	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) 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.
5) G mode was skipped due to significantly lower output power.
6) Tilt position was skipped since SAR values are too low.

11.2.2 RIGHT HAND SIDE

Touch Position	Tilt (15°) Position

b mode

Test Position	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
Touch	1 6 11	2412 2437 2462	0.037	0.000	0.037

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.
5) G mode was skipped due to significantly lower output power
6) Tilt position was skipped since SAR values are too low.

11.3 BODY POSITION WITH HOLSTER

LCD Up	LCD Down

b mode

Test Position	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
LCD Up	1 6 11	2412 2437 2462	0.020	0.000	0.020
LCD Down	1 6 11	2412 2437 2462	0.090	-0.093	0.092
	6 [5)]	2437	0.152	-0.070	0.154
	6 [6)]	2437	0.113	-0.072	0.115
	6 [7)]	2437	**0.157**	**-0.060**	**0.159**

g mode

Test Position	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
LCD Down	1 6 11	2412 2437 2462	0.065	0.000	0.065

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.
5) Model KAIS 100.
6) Model KAIS 110.
7) Model KAIS 100 with DynaPack Battery.

12 MULTI-BAND SAR MEASURMENT RESULTS

12.1 WORST CASE CONFIUGURATIONS

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

Frequency band	Test Positions	Model name	f (MHz)	Zoom Scan SAR 1g (mW/g)
GSM850 (Part 22 Cell band)	Left Hand Side: Side Open - Tilt	KAIS 120 [1)]	836.6	**0.607**
	Body-worn: LCD face down	KAIS 100 [2)]	836.6	**1.470**
GSM1900 (Part 24 PCS band)	Right Hand Side: Normal - Tilt	KAIS 120 [2)]	1880.0	**0.880**
	Body-worn: LCD face down	KAIS 120 [1)]	1880.0	**0.848**

1) with DynaPack Battery

2) with Samsung Battery

12.2 MULTI-BAND SAR RESULTS - CELL BAND

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.

Head

Wireless Transmitter	Test Position	f (MHz)	Volume scan 1g SAR (mW/kg)
GSM850	Left Hand Side: Side Open - Tilt	836.6	0.624
WLAN [1)]	Left Hand Side: Side Open - Tilt	2437.0	0.031
Bluetooth	Left Hand Side: Side Open - Tilt	2402.0	0.001
		Combined 1g SAR Value:	**0.637**

Body

Wireless Transmitter	Test Position	f (MHz)	Volume scan 1g SAR (mW/kg)
GSM850	Body-worn: LCD face down	836.6	1.430
WLAN [1)]	Body-worn: LCD face down	2437.0	0.159
Bluetooth	Body-worn: LCD face down	2402.0	0.007
		Combined 1g SAR Value:	**1.450**

1) WLAN operates in b mode since this mode has higher power

12.3 MULTI-BAND SAR RESULTS - PCS BAND

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.

Head

Wireless Transmitter	Test Position	f (MHz)	Volume scan 1g SAR (mW/kg)
GSM1900	Right Hand Side: Normal - Tilt	1880	0.781
WLAN [1)]	Right Hand Side: Normal - Tilt	2437	0.021
Bluetooth	Right Hand Side: Normal - Tilt	2402	0.0004
		Combined 1g SAR Value:	**0.802**

Body

Wireless Transmitter	Test Position	f (MHz)	Volume scan 1g SAR (mW/kg)
GSM1900	Body-worn: LCD face down	1880	0.700
WLAN [1)]	Body-worn: LCD face down	2437	0.159
Bluetooth	Body-worn: LCD face down	2402	0.007
		Combined 1g SAR Value:	**0.714**

1) WLAN operates in b mode since this mode has higher power

13 MEASURMENT UNCERTAINTY

13.1 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

14 EQUIPMENT LIST AND CALIBRATION

Name of Equipment	Manufacturer	Type/Model	Serial Number	Cal. Due date MM	DD	Year
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		
SAM Phantom (SAM1)	SPEAG	TP-1185	QD000P40CA	N/A		
SAM Phantom (SAM2)	SPEAG	TP-1015	N/A	N/A		
Electronic Probe kit	HP	85070C	N/A	N/A		
S-Parameter Network Analyzer	Agilent	8753ES-6	US39173569	2	14	2008
E-Field Probe	SPEAG	EX3DV4	3552	5	30	2007
Thermometer	ERTCO	639-1S	1718	11	7	2007
Data Acquisition Electronics	SPEAG	DAE3 V1	427	11	16	2007
System Validation Dipole	SPEAG	D835V2	4d002	1	23	2008
System Validation Dipole	SPEAG	D1900V2	5d043	1	29	2008
System Validation Dipole	SPEAG	D2450V2	706	4	27	2008
Signal Generator	R&S	SMP 04	DE34210	10	9	2007
Power Meter	Giga-tronics	8651A	8651404	4	3	2008
Power Sensor	Giga-tronics	80701A	1834588	4	17	2008
Amplifier	Mini-Circuits	ZHL-42W	D072701-5	N/A		
Radio Communication Tester	R &S	CMU 201	106291	4	16	1008
Radio Communication Tester	Agilent	E5515C	GB46160222	6	29	2007
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		

15 PHOTOS

KAIS 100 or KAIS110 - Normal

KAIS 100 or KAIS110 Side Open

KAIS 120 - Normal

KAIS 120 – Side Open

KAIS 120

Holster with belt-clip

Batteries

Headset

16 ATTACHMENTS

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END OF REPORT