SAR Evaluation Report

in accordance with the requirements of
FCC Report and Order: ET Docket 93-62, and OET Bulletin 65 Supplement C

for

Dual Band Tri Mode PCS/AMPS/CDMA Cellular Phone

MODEL: VT-7U

FCC ID: GKRVT-7U

October 20, 2004

REPORT NO: 04I2845-2

Prepared for

Compal Electronics Inc
No. 581, Jui-Kuang Rd.
Neihu, Taipei, 114,
Taiwan, R.O.C.

Prepared by

COMPLIANCE CERTIFICATION SERVICES
561F MONTEREY ROAD,
MORGAN HILL, CA 95037, USA
TEL: (408) 463-0885

CERTIFICATE OF COMPLIANCE (SAR EVALUATION)

DATES OF TEST: October 18-20, 2004

APPLICANT:	Compal Electronics Inc. No. 581, Jui-Kuang Rd Neihu, Taipei, 114, Taiwan R.O.C.
FCC ID:	GKRVT-7U
MODEL:	VT-7U
DEVICE CATEGORY:	Portable Device
EXPOSURE CATEGORY:	General Population/Uncontrolled Explosure

Dual Band Tri Mode PCS/AMPS/CDMA Cellular Phone

Test Sample is a:	Production unit
Modulation type:	AMPS/CDMA

FCC Rule Parts	Frequency Range [MHz]	The Highest SAR Values [1g_mW/g]		Max. Power Output [dBm]
22H (AMPS)	824.04 – 848.97	Head:	0.907	26.65
		Body:	0.348	
22H (CDMA Cell)	824.76 – 848.25	Head:	0.460	24.20
		Body:	0.265	
24E (CDMA PCS)	1851.25 – 1908.75	Head:	1.090	23.65
		Body:	0.184	

This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for General Population/Uncontrolled Explosure 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).

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Released For CCS By:

Hsin-Fu Shih (Sunny Shih)
COMPLIANCE CERTIFICATION SERVICES

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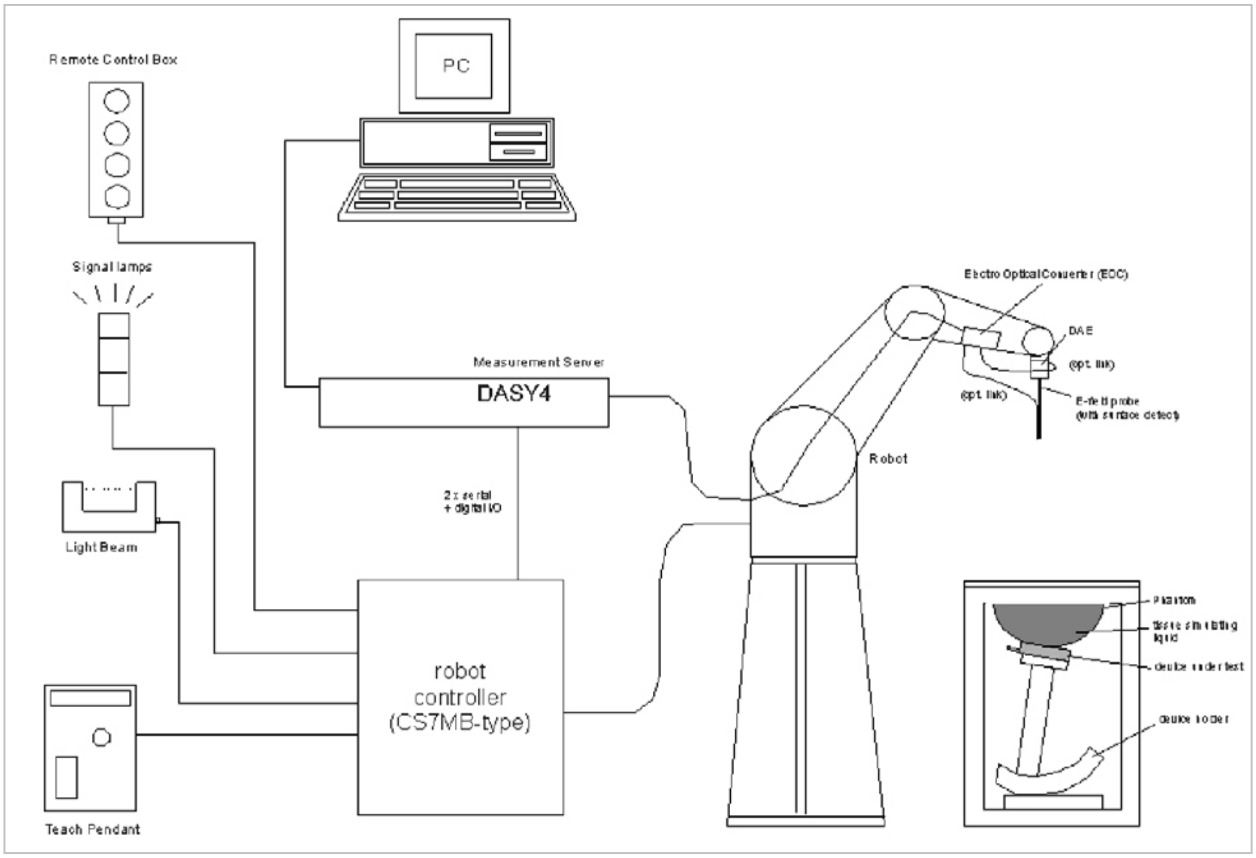
1 EQUIPMENT UNDER TEST (EUT) DESCRIPTION

Dual Band Tri Mode PCS/AMPS/CDMA Cellular Phone	
Normal operation:	☒ Held to year ☒ Worn on body ☐ Held to face
Accessory:	☐ belt clip ☐ holster ☐ neck-strap or lanyard ☒ not supplied or available as options
Earphone/Headset Jack:	☒ Earphone ☐ Headset Manufactured N/A, type/part no. N/A.
Duty cycle:	100% for AMPS 100% for CDMA Cellular Band 100% for CDMA PCS Band
Battery:	Manufactured Compal, type BPE-VC7C-980MA-S-R0, 3.7Vdc (With the system assembled by Compal Electronics, Inc)

2 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 control 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 SYSTEM COMPONENTS

3.1 DASY4 MEASUREMENT SERVER

The DASY4 measurement server is based on a PC/104 CPU board with a 166MHz low-power Pentium, 32MB chip disk and 64MB RAM. The necessary circuits for communication with either the DAE3 electronic box as well as the 16-bit AD-converter system for optical detection and digital I/O interface are contained on the DASY4 I/O-board, which is directly connected to the PC/104 bus of the CPU board.

The measurement server performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation. The PC-operating system cannot interfere with these time critical processes. All connections are supervised by a watchdog, and disconnection of any of the cables to the measurement server will automatically disarm the robot and disable all program-controlled robot movements. Furthermore, the measurement server is equipped with two expansion slots which are reserved for future applications. Please note that the expansion slots do not have a standardized pinout and therefore only the expansion cards provided by SPEAG can be inserted. Expansion cards from any other supplier could seriously damage the measurement server. Calibration: No calibration required.

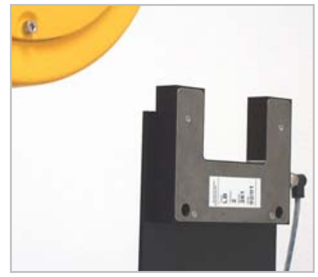
3.2 DATA ACQUISITION ELECTRONICS (DAE)

The data acquisition electronics (DAE3) consists of a highly sensitive electrometer grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock. The mechanical probe mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection. The input impedance of the DAE3 box is 200MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

3.3 EX3DV3 ISOTROPIC E-FIELD PROBE FOR DOSIMETRIC MEASUREMENTS

Construction:	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Frequency:	10 MHz to > 6 GHz; Linearity: ± 0.2 dB (30 MHz to 3 GHz)
Directivity:	± 0.3 dB in HSL (rotation around probe axis); ± 0.5 dB in tissue material (rotation normal to probe axis)
Dynamic Range:	10 µW/g to > 100 mW/g; Linearity: ± 0.2 dB (noise: typically < 1 µW/g)
Dimensions:	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm
Application:	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.

3.4 LIGHT BEAM UNIT



The light beam switch allows automatic ”tooling” of the probe. During the process, the actual position of the probe tip with respect to the robot arm is measured, as well as the probe length and the horizontal probe offset. The software then corrects all movements, so that the robot coordinates are valid for the probe tip. The repeatability of this process is better than 0.1 mm. If a position has been taught with an aligned probe, the same position will be reached with another aligned probe within 0.1 mm, even if the other probe has different dimensions. During probe rotations, the probe tip will keep its actual position.

3.5 SAM PHANTOM (V4.0)

Construction: The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528-200X, CENELEC 50361 and IEC 62209. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points with the robot.

Shell Thickness: 2 ±0.2 mm

Filling Volume: Approx. 25 liters

Dimensions: Height: 810mm; Length: 1000mm; Width: 500mm

3.6 DEVICE HOLDER FOR SAM TWIN PHANTOM

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

3.7 SYSTEM VALIDATION KITS

Construction: Symmetrical dipole with l/4 balun Enables measurement of feedpoint impedance with NWA Matched for use near flat phantoms filled with brain simulating solutions Includes distance holder and tripod adaptor.

Frequency: 450, 900, 1800, 2450, 5800 MHz

Return loss: > 20 dB at specified validation position

Power capability: > 100 W (f < 1GHz); > 40 W (f > 1GHz)

Dimensions: 450V2: dipole length: 270 mm; overall height: 330 mm
D900V2: dipole length: 149 mm; overall height: 330 mm
D1800V2: dipole length: 72 mm; overall height: 300 mm
D835V2: dipole length: 161; overall height: 330
D1900V2: dipole length: 68; overall height: 300
D2450V2: dipole length: 51.5 mm; overall height: 300 mm D5GHzV2: dipole length: 25.5 mm; overall height: 290 mm

3.8 COMPOSITION OF INGREDIENTS FOR TISSUE SIMULATING LIQUID

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

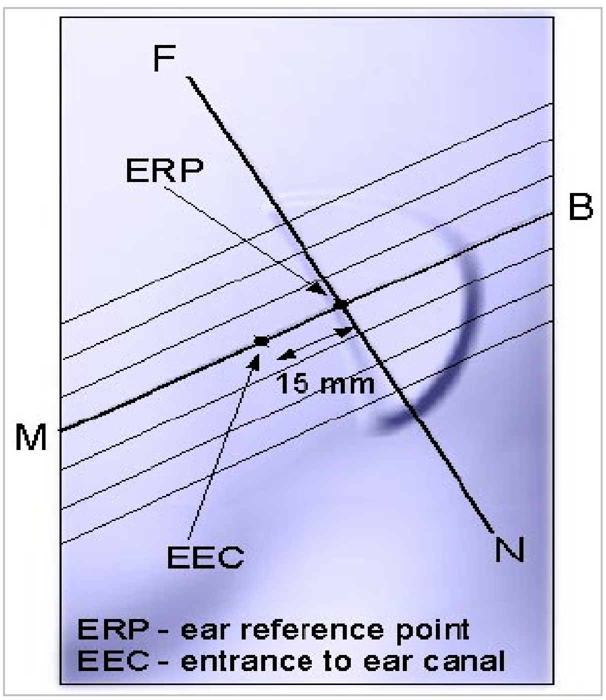
Ingredients (% by weight)	Frequency (MHz) 450		835		915		1900		2450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (NaCl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	0.0	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

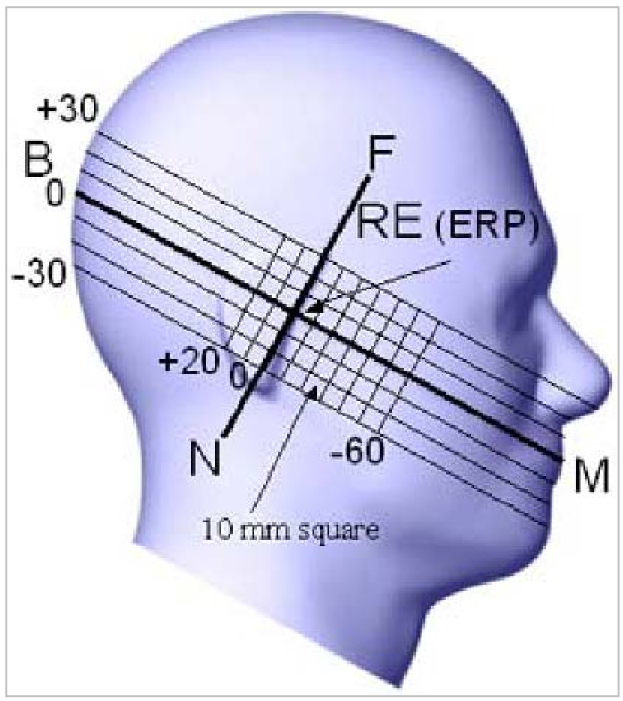
Salt: 99+% Pure Sodium Chloride Sugar: 98+% Pure Sucrose
Water: De-ionized, 16 MΩ+ resistivity HEC: Hydroxyethyl Cellulose
DGBE: 99+% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]
Triton X-100 (ultra pure): Polyethylene glycol mono [4-(1,1, 3, 3-tetramethylbutyl)phenyl]ether

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

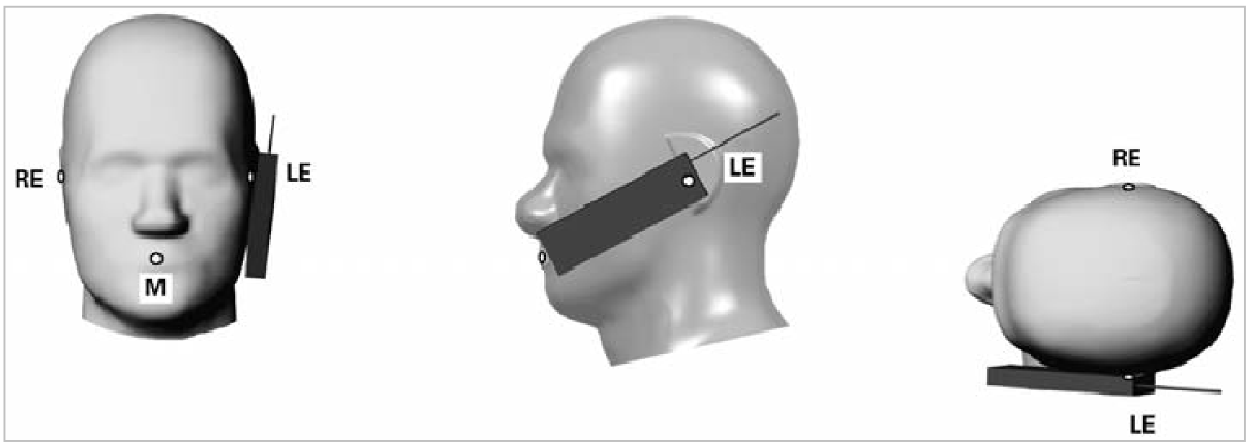
The device is brought toward the mouth of the head phantom by pivoting against the "ear reference point" or along the "N-F" line for the SCC-34/SC-2 head phantom.

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

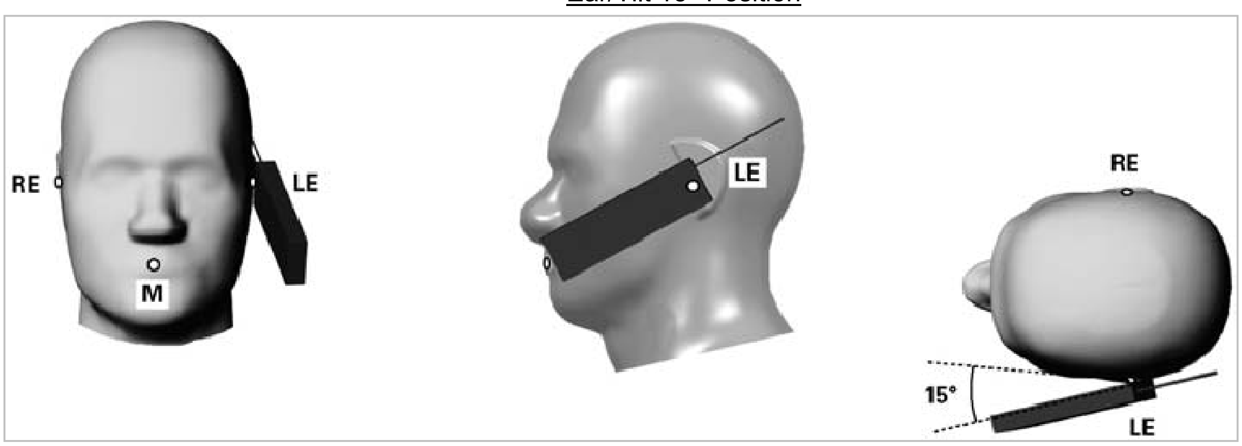
With the handset aligned in the "Cheek/Touch Position":

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



5 TEST POSITIONS FOR BODY-WORN AND OTHER SIMILAR CONFIGURATIONS

☐ With the belt-clips or holsters

Body-worn operating configurations should be tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in normal use configurations. Devices with a headset output should be tested with a headset connected to the device. For purpose of determining test requirements, accessories may be divided into two categories: those that do not contain metallic components and those that do.

☐ When multiple accessories

When multiple accessories that do not contain metallic components are supplied with the device, the device may be tested with only the accessory that dictates the closest spacing to the body. When multiple accessories that contain metallic components are supplied with the device, the device must be tested with each accessory that contains a unique metallic component. If multiple accessories share an identical metallic component (e.g., the same metallic belt-clip used with different holsters with no other metallic components), only the accessory that dictates the closest spacing to the body must be tested.

☒ 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.

☐ Transmitter that is designed to operate in front of a person’s face (face-held)

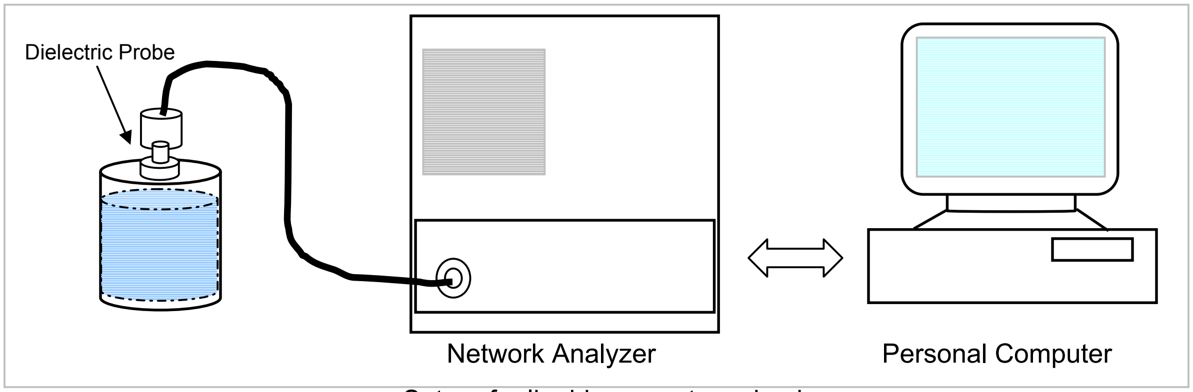
Transmitters that are designed to operate in front of a person’s face, in push-to-talk configurations, should be tested for SAR compliance with the front of the device positioned at 2.5 cm from a flat phantom. Frontal face-phantoms are typically not recommended because of the potential of higher E-field probe boundary-effects errors in the non-smooth regions of these face phantoms, such as the nose, lips and eyes etc. For devices that are carried next to the body, such as shoulder, waist or chest-worn transmitters, SAR compliance should be tested with the accessories, including headsets and microphones, attached to the device and positioned against a flat phantom in normal use configurations.

☐ With neck-strap or lanyard

SAR data is requested for cellphones designed to be used with a headset while worn next to the body using a neck-strap or lanyard; device should be tested with front and back sides in contact with a flat phantom

6 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

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)

6.1 SIMULATING LIQUID PARAMETER CHECK RESULT

Simulating Liquid Parameter Check Result @ Head 1900 MHz

Room Ambient Temperature = 24°C; Relative humidity = 40% Measured by: Sunny Shih

Simulating Liquid f (MHz)	Temp. (°C)	Depth (cm)	Parameters		Target	Measured	Deviation (%)	Limit (%)
1900	23	15	ε"	Relative Permittivity (ϵ_r):	40.0	40.7469	1.87	± 5
			13.5172	Conductivity (σ):	1.40	1.4288	2.05	± 5

Simulating Liquid Dielectric Parameters Check @ 1900 MHz
Room ambient temperature: 24.0 deg. C; Liquid temperature: 23.0 deg. C
October 18, 2004 10:09 AM

Frequency	e'	e''
1710000000.	41.4739	12.9731
1720000000.	41.4257	12.9946
1730000000.	41.4154	13.0089
1740000000.	41.3551	13.0317
1750000000.	41.3186	13.0807
1760000000.	41.2946	13.0969
1770000000.	41.2410	13.1285
1780000000.	41.2147	13.1617
1790000000.	41.1804	13.1998
1800000000.	41.1436	13.2364
1810000000.	41.1060	13.2551
1820000000.	41.0573	13.2686
1830000000.	41.0220	13.3013
1840000000.	40.9750	13.3326
1850000000.	40.9360	13.3647
1860000000.	40.8938	13.3991
1870000000.	40.8612	13.4182
1880000000.	40.8138	13.4684
1890000000.	40.7824	13.4717
1900000000.	40.7469	13.5172
1910000000.	40.7151	13.5301

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 Parameter Check Result @ Head 1900 MHz

Room Ambient Temperature = 24°C; Relative humidity = 41% Measured by: Sunny Shih

Simulating Liquid			Parameters		Target	Measured	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
1900	23	15	ε''	Relative Permittivity (ε_r):	40.0	40.1165	0.29	± 5
			13.5662	Conductivity (σ):	1.40	1.4339	2.42	± 5

Simulating Liquid Dielectric Parameters Check @ 1900 MHz
Room ambient temperature: 24.0 deg. C; Liquid temperature: 23.0 deg. C
October 19, 2004 10:41 AM

Frequency	e'	e''
1710000000.	40.8696	13.0571
1720000000.	40.8523	13.0691
1730000000.	40.8063	13.0731
1740000000.	40.7679	13.1134
1750000000.	40.7201	13.1716
1760000000.	40.6733	13.1982
1770000000.	40.6159	13.2406
1780000000.	40.5739	13.2553
1790000000.	40.5633	13.2938
1800000000.	40.5159	13.3303
1810000000.	40.4570	13.3313
1820000000.	40.3848	13.3286
1830000000.	40.3632	13.3221
1840000000.	40.3261	13.3377
1850000000.	40.2882	13.4266
1860000000.	40.2335	13.4626
1870000000.	40.1730	13.4873
1880000000.	40.1355	13.5036
1890000000.	40.1457	13.5222
1900000000.	40.1165	13.5662
1910000000.	40.0911	13.5178

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 Parameter Check Result @ Muscle 1900 MHz

Room Ambient Temperature = 24°C; Relative humidity = 41% Measured by: Sunny Shih

Simulating Liquid			Parameters		Target	Measured	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
1900	23	15	є"	Relative Permittivity (ϵ_r):	53.3	53.7305	0.81	± 5
			14.6024	Conductivity (σ):	1.52	1.54347	1.54	± 5

Simulating Liquid Dielectric Parameters Check @ 1900 MHz
Room ambient temperature: 24.0 deg. C; Liquid temperature: 23.0 deg. C
October 19, 2004 11:25 AM

Frequency	e'	e"
1710000000.	54.2925	14.0820
1720000000.	54.2920	14.0981
1730000000.	54.2628	14.1087
1740000000.	54.2278	14.1539
1750000000.	54.1992	14.2125
1760000000.	54.1548	14.2327
1770000000.	54.1163	14.2743
1780000000.	54.0883	14.2957
1790000000.	54.0818	14.3096
1800000000.	54.0406	14.3616
1810000000.	53.9803	14.3605
1820000000.	53.9232	14.3608
1830000000.	53.9084	14.3569
1840000000.	53.8813	14.3866
1850000000.	53.8415	14.4649
1860000000.	53.8102	14.5136
1870000000.	53.7645	14.5241
1880000000.	53.7447	14.5444
1890000000.	53.7470	14.5627
1900000000.	53.7305	14.6024
1910000000.	53.6909	14.5644

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 Parameter Check Result @ Head 835 MHz

Room Ambient Temperature = 24°C; Relative humidity = 41% Measured by: Sunny Shih

Simulating Liquid			Parameters		Target	Measured	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
835	23	15	ε"	Relative Permittivity (ε_r):	41.5	40.2525	-3.01	± 5
			19.0618	Conductivity (σ):	0.90	0.8855	-1.62	± 5

Simulating Liquid Dielectric Parameters Check @ 835 MHz
Room ambient temperature: 24.0 deg. C; Liquid temperature: 23.0 deg. C
October 19, 2004 12:36 PM

Frequency	e'	e''
800000000.	40.6561	19.2068
805000000.	40.5990	19.1756
810000000.	40.5281	19.1700
815000000.	40.4903	19.1238
820000000.	40.4463	19.1117
825000000.	40.3520	19.0868
830000000.	40.3210	19.0770
835000000.	40.2525	19.0618
840000000.	40.1921	19.0342
845000000.	40.1213	19.0411
850000000.	40.0751	19.0207
855000000.	39.9984	18.9988
860000000.	39.9402	19.0028
865000000.	39.8913	18.9637
870000000.	39.8123	18.9233
875000000.	39.7408	18.9420
880000000.	39.6878	18.9153
885000000.	39.6290	18.9007
890000000.	39.5552	18.9006
895000000.	39.5479	18.8521
900000000.	39.4856	18.8344
905000000.	39.4042	18.8324
910000000.	39.3412	18.8058
915000000.	39.3278	18.8139
920000000.	39.2936	18.7650
925000000.	39.2570	18.7558
930000000.	39.1850	18.7380
935000000.	39.0902	18.7369
940000000.	39.0464	18.7115
945000000.	39.0110	18.7123
950000000.	38.9650	18.7069

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 Parameter Check Result @ Head 835 MHz

Room Ambient Temperature = 24°C; Relative humidity = 41% Measured by: Sunny Shih

Simulating Liquid			Parameters		Target	Measured	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
835	23	15	є"	Relative Permittivity (ε_r):	41.5	40.4979	-2.41	± 5
			19.1941	Conductivity (σ):	0.90	0.8916	-0.93	± 5

Simulating Liquid Dielectric Parameters Check @ 835 MHz
Room ambient temperature: 24.0 deg. C; Liquid temperature: 23.0 deg. C
October 20, 2004 09:31 AM

Frequency	e'	e''
800000000.	40.8991	19.3057
805000000.	40.8334	19.2864
810000000.	40.7888	19.2619
815000000.	40.7314	19.2465
820000000.	40.6790	19.2460
825000000.	40.6267	19.2033
830000000.	40.5479	19.2157
835000000.	40.4979	19.1941
840000000.	40.4143	19.1612
845000000.	40.3785	19.1470
850000000.	40.2953	19.1459
855000000.	40.2176	19.1231
860000000.	40.1505	19.0978
865000000.	40.0870	19.0821
870000000.	39.9978	19.0436
875000000.	39.9150	19.0241
880000000.	39.8612	18.9969
885000000.	39.7765	18.9988
890000000.	39.7113	18.9954
895000000.	39.6968	18.9579
900000000.	39.6697	18.9441
905000000.	39.5913	18.9207
910000000.	39.5475	18.9121
915000000.	39.5289	18.9207
920000000.	39.5062	18.8965
925000000.	39.4980	18.8875
930000000.	39.4151	18.9006
935000000.	39.3343	18.8845
940000000.	39.2860	18.8783
945000000.	39.2584	18.8755
950000000.	39.2149	18.8492

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 Parameter Check Result @ Muscle 835 MHz

Room Ambient Temperature = 24.0 °C; Relative humidity = 41% Measured by: Sunny Shih

Simulating Liquid			Parameters		Target	Measured	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
835	23	15	ε"	Relative Permittivity (ε_r):	55.2	54.9931	-0.37	± 5
			20.1629	Conductivity (σ):	0.97	0.9366	-3.44	± 5

Simulating Liquid Dielectric Parameters Check @ 835 MHz
Room ambient temperature: 24.0 deg. C; Liquid temperature: 23.0 deg. C
October 20, 2004 10:16 AM

Frequency	e'	e''
800000000.	55.3092	20.2903
805000000.	55.2661	20.2467
810000000.	55.2347	20.2328
815000000.	55.1988	20.2039
820000000.	55.1617	20.2146
825000000.	55.1050	20.1992
830000000.	55.0586	20.1636
835000000.	54.9931	20.1629
840000000.	54.9805	20.1534
845000000.	54.9327	20.1354
850000000.	54.8633	20.1149
855000000.	54.7739	20.1239
860000000.	54.7431	20.0570
865000000.	54.6770	20.0363
870000000.	54.6193	20.0340
875000000.	54.5554	20.0131
880000000.	54.5038	19.9665
885000000.	54.4401	19.9673
890000000.	54.3866	19.9642
895000000.	54.3937	19.9268
900000000.	54.3769	19.8936
905000000.	54.3330	19.9078
910000000.	54.2963	19.9242
915000000.	54.2906	19.9125
920000000.	54.2729	19.8952
925000000.	54.2639	19.8846
930000000.	54.1959	19.8778
935000000.	54.1117	19.8780
940000000.	54.0755	19.8687
945000000.	54.0557	19.8728
950000000.	54.0502	19.8607

The conductivity (σ) can be given as:

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

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

7 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 f 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.
- Special 5 x 5 x 7 fine cube was chosen for cube integration(dx=dy=7.5mm; dz=5mm).
- Distance between probe sensors and phantom surface was set to 2.5 mm.
- The dipole input power (forward power) was 250 mW±3%.
- The results are normalized to 1 W input power.

Reference SAR Values

IEEE Standard 1528 Recommended Reference Value

Frequency (MHz)	1 g SAR	10 g SAR	Local SAR at surface (Above feed point)	Local SAR at surface (y=2cm offset from feed point)
300	3.0	2.0	4.4	2.1
450	4.9	3.3	7.2	3.2
835	9.5	6.2	14.1	4.9
900	10.8	6.9	16.4	5.4
1450	29.0	16.0	50.2	6.5
1800	38.1	19.8	69.5	6.8
1900	39.7	20.5	72.1	6.6
2450	52.4	24.0	104.2	7.7
3000	63.8	25.7	140.2	9.5

7.1 SYSTEM PERFORMANCE CHECK RESULTS

@ System Validation Dipole: D1900V2 SN:5d043 Date: October 18, 2004

Ambient Temperature = 24°C; Relative humidity = 40% Measured by: Sunny Shih

Head Simulating Liquid			Mrasured		Target_1g	Deviation[%]	Limit [%]
f (MHz)	Temp. [°C]	Depth [cm]	1g	Normalized to 1 W			
1900	23	15	9.73	38.92	39.7	-1.96	± 10

@ System Validation Dipole: D1900V2 SN:5d043 Date: October 19, 2004

Ambient Temperature = 24°C; Relative humidity = 41% Measured by: Sunny Shih

Head Simulating Liquid			Mrasured		Target_1g	Deviation[%]	Limit [%]
f (MHz)	Temp. [°C]	Depth [cm]	1g	Normalized to 1 W			
1900	23	15	9.88	39.52	39.7	-0.45	± 10

@ System Validation Dipole: D835V2 SN:4d002 Date: October 19, 2004

Ambient Temperature = 24°C; Relative humidity = 41% Measured by: Sunny Shih

Head Simulating Liquid			Mrasured		Target_1g	Deviation[%]	Limit [%]
f (MHz)	Temp. [°C]	Depth [cm]	1g	Normalized to 1 W			
835	23	15	2.35	9.4	9.5	-1.05	± 10

@ System Validation Dipole: D835V2 SN:4d002 Date: October 20, 2004

Ambient Temperature = 24°C; Relative humidity = 41% Measured by: Sunny Shih

Head Simulating Liquid			Mrasured		Target_1g	Deviation[%]	Limit [%]
f (MHz)	Temp. [°C]	Depth [cm]	1g	Normalized to 1 W			
835	23	15	2.4	9.6	9.5	1.05	± 10

8 SAR MEASUREMENT PROCEDURES

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 2.5 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.

c) Around this point, a volume of X=Y=Z=30 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:

(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.

DASY4 SAR MEASUREMENT 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.

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.

9 PROCEDURES USED TO ESTABLISH TEST SIGNAL

The following procedures had been used to prepare the EUT for the SAR test.

AMPS Mode

Press the key “**000000##”
Using the u/down key to select the following items
1. Chan Tune – Select Channels (991, 383, 799)
2. FM TX Up/ Down – Adjust RF power

CDMA Mode

Press the key “**000000##”
Using the u/down key to select the following items
1. CDMA TX On/Off – Transmitter on or off
2. CDMA TX Up/Dwn – Adjust RF power
3. Channel Tune – Select Channels (1015, 363 and 775) for CDMA Cell band
Select Channels (25, 600 and 1175) for CDMA PCS band

Maximum conducted power was measured by replacing the antenna with an adapter for conductive measurements, before and after the SAR measurements were done.

10 SAR MEASUREMENT RESULTS

10.1 LEFT HEAD TOUCH POSITION

AMPS - Duty cycle: 100%; Crest factor: 1 Depth of liquid: 15 cm

Antenna	Ch. #	f [MHz]	*Conducted Power [dBm]		SAR_1g [mW/g]	
			Before	After	Measured	Limit
Fixed	991	824.04	26.60			
Fixed	383	836.49	26.60	26.55	0.623	1.6
Fixed	799	848.97	26.65			
CDMA Cellular band - Duty cycle: 100%; Crest factor: 1						
Fixed	1015	824.76	24.10			
Fixed	363	835.89	24.10	24.00	0.393	1.6
Fixed	775	848.25	24.20			
CDMA PCS band - Duty cycle: 100%; Crest factor: 1						
Fixed	25	1851.25	23.65	23.60	1.090	1.6
Fixed	600	1880.00	23.60	23.55	1.050	1.6
Fixed	1175	1908.75	23.60	23.55	1.030	1.6

Notes:
1. *: Average power.
2. If the SAR measured at the middle channel for this configuration is at least 3 dB lower than SAR limit, testing at low & high channel is optional.
3. The EUT battery was charged in accordance with manufacture's instructions prior to commencement of measurement.
4. Please see attachment for the detailed measurement data and plots showing the maximum SAR location of the EUT.

10.2 LEFT HEAD TILT POSITION

AMPS - Duty cycle: 100%; Crest factor: 1 Depth of liquid: 15 cm

Antenna	Ch. #	f [MHz]	*Conducted Power [dBm]		SAR_1g [mW/g]	
			Before	After	Measured	Limit
Fixed	991	824.04	26.60			1.6
Fixed	383	836.49	26.60	26.55	0.198	1.6
Fixed	799	848.97	26.65			1.6
CDMA Cellular band - Duty cycle: 100%; Crest factor: 1						
Fixed	1015	824.76	24.10			1.6
Fixed	363	835.89	24.10	24.00	0.122	1.6
Fixed	775	848.25	24.20			1.6
CDMA PCS band - Duty cycle: 100%; Crest factor: 1						
Fixed	25	1851.25	23.65			1.6
Fixed	600	1880.00	23.60	23.50	0.061	1.6
Fixed	1175	1908.75	23.60			1.6

Notes:
1. *: Average power.
2. If the SAR measured at the middle channel for this configuration is at least 3 dB lower than SAR limit, testing at low & high channel is optional.
3. The EUT battery was charged in accordance with manufacture's instructions prior to commencement of measurement.
4. Please see attachment for the detailed measurement data and plots showing the maximum SAR location of the EUT.

10.3 RIGHT HEAD TOUCH POSITION

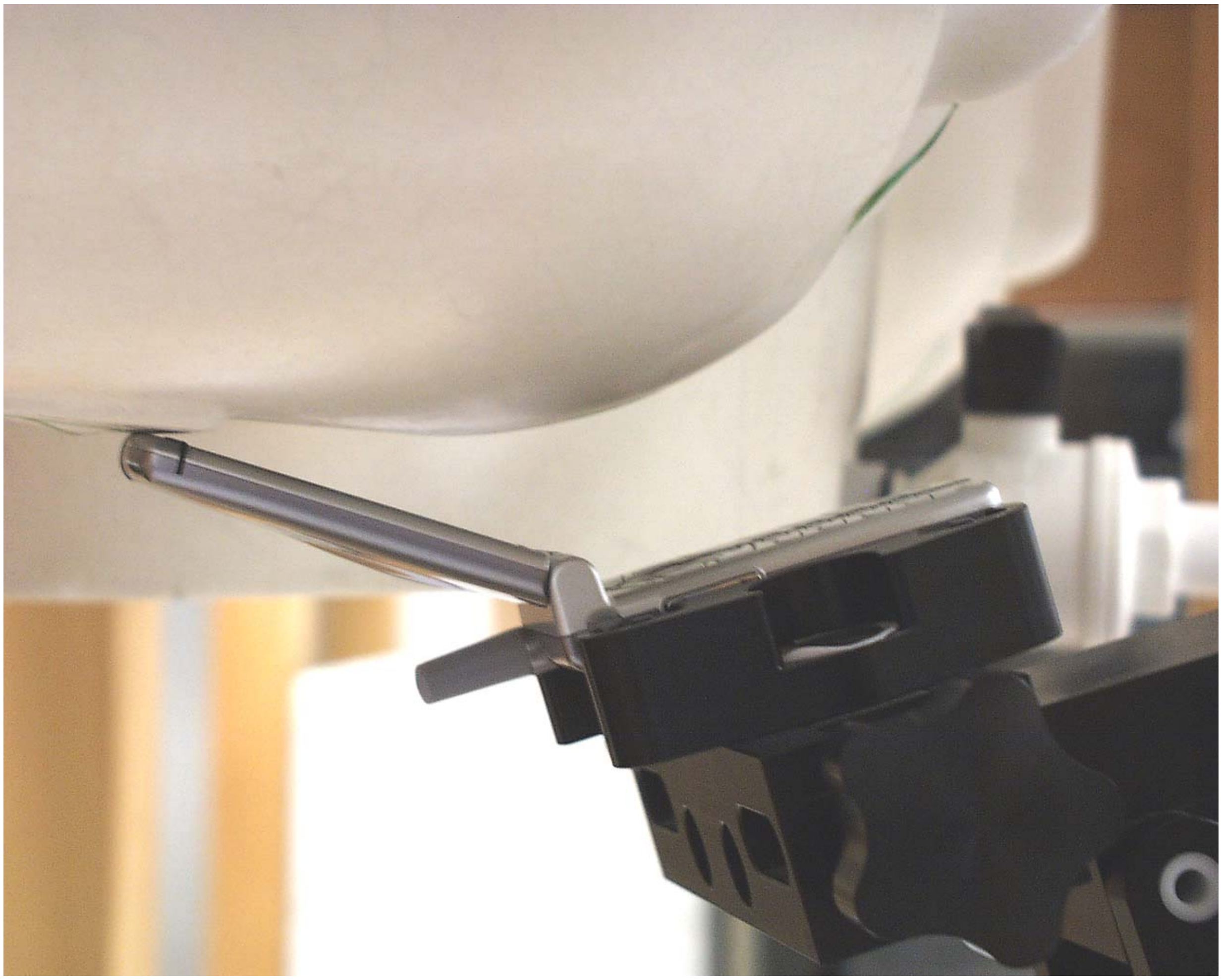
AMPS - Duty cycle: 100%; Crest factor: 1 Depth of liquid: 15 cm

Antenna	Ch. #	f [MHz]	*Conducted Power [dBm]		SAR_1g [mW/g]	
			Before	After	Measured	Limit
Fixed	991	824.04	26.60	26.55	0.538	1.6
Fixed	383	836.49	26.60	26.55	0.646	1.6
Fixed	799	848.97	26.65	26.55	0.907	1.6
CDMA Cellular band - Duty cycle: 100%; Crest factor: 1						
Fixed	1015	824.76	24.10	24.00	0.327	1.6
Fixed	363	835.89	24.10	24.00	0.398	1.6
Fixed	775	848.25	24.20	24.10	0.460	1.6
Fixed	25	1851.25	23.65	23.60	1.010	1.6
Fixed	600	1880.00	23.60	23.55	0.846	1.6
Fixed	1175	1908.75	23.60	23.55	0.886	1.6

Notes:

1. *: Average power.
2. If the SAR measured at the middle channel for this configuration is at least 3 dB lower than SAR limit, testing at low & high channel is optional.
3. The EUT battery was charged in accordance with manufacture's instructions prior to commencement of measurement.
4. Please see attachment for the detailed measurement data and plots showing the maximum SAR location of the EUT.

10.4 RIGHT HEAD TILT POSITION



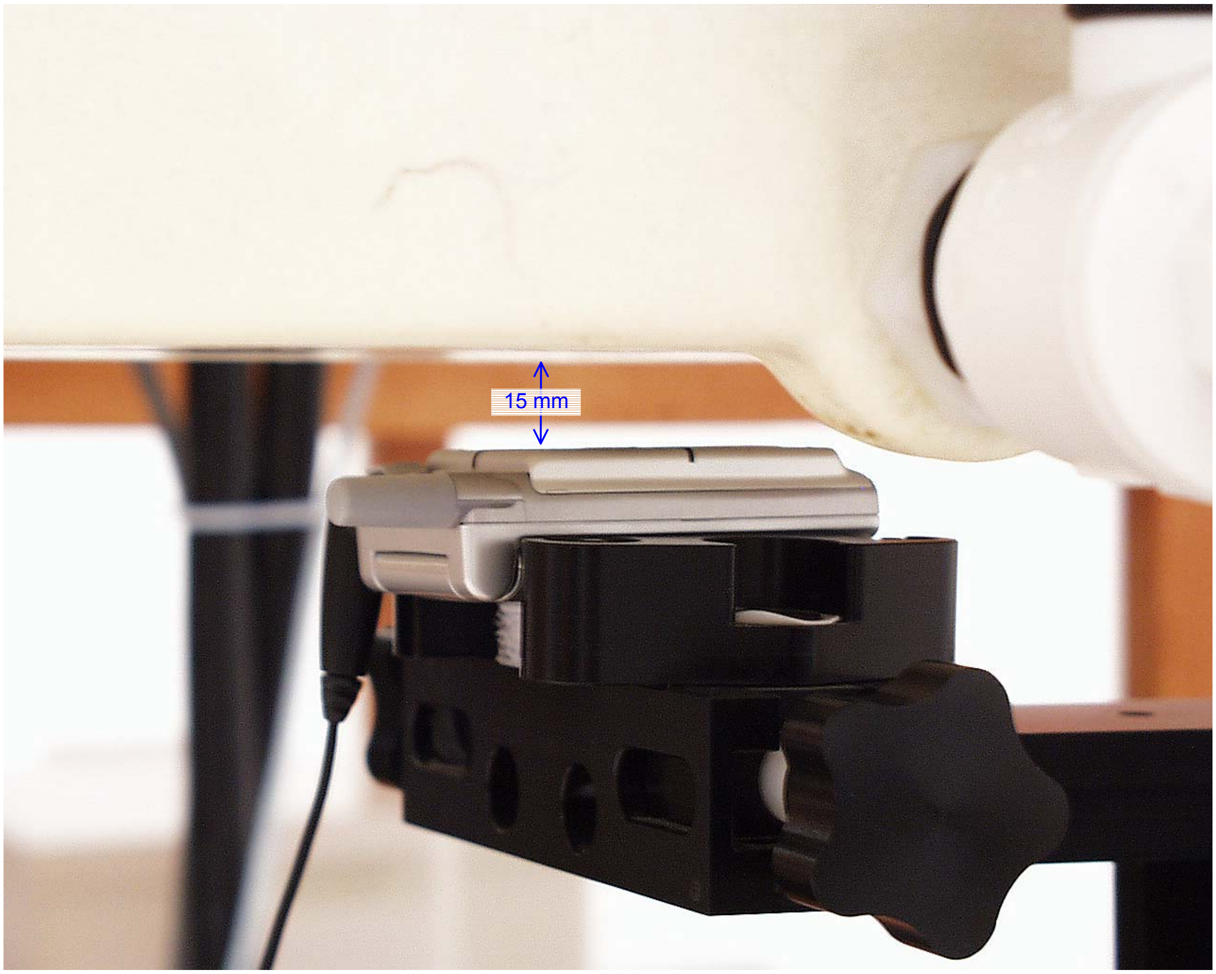
AMPS - Duty cycle: 100%; Crest factor: 1 Depth of liquid: 15 cm

Antenna	Ch. #	f [MHz]	*Conducted Power [dBm]		SAR_1g [mW/g]	
			Before	After	Measured	Limit
Fixed	991	824.04	26.60			
Fixed	383	836.49	26.60	26.55	0.182	1.6
Fixed	799	848.97	26.65			
CDMA Cellular band - Duty cycle: 100%; Crest factor: 1						
Fixed	1015	824.76	24.10			
Fixed	363	835.89	24.10	24.00	0.112	1.6
Fixed	775	848.25	24.20			
CDMA PCS band - Duty cycle: 100%; Crest factor: 1						
Fixed	25	1851.25	23.65			
Fixed	600	1880.00	23.60	23.55	0.051	1.6
Fixed	1175	1908.75	23.60			

Notes:

1. *: Average power.
2. If the SAR measured at the middle channel for this configuration is at least 3 dB lower than SAR limit, testing at low & high channel is optional.
3. The EUT battery was charged in accordance with manufacture's instructions prior to commencement of measurement.
4. Please see attachment for the detailed measurement data and plots showing the maximum SAR location of the EUT.

10.5 BODY POSITION



AMPS - Duty cycle: 100%; Crest factor: 1 Depth of liquid: 15 cm

Sep. dist. [mm]	Antenna	Ch. #	f [MHz]	*Conducted Power [dBm]		SAR_1g [mW/g]	
				Before	After	Measured	Limit
15	Fixed	991	824.04	26.60	26.55	0.250	1.6
15	Fixed	383	836.49	26.60	26.55	0.298	1.6
15	Fixed	799	848.97	26.65	26.55	0.348	1.6
CDMA Cellular band - Duty cycle: 100%; Crest factor: 1							
15	Fixed	1015	824.76	24.10	24.00	0.163	1.6
15	Fixed	363	835.89	24.10	24.00	0.194	1.6
15	Fixed	775	848.25	24.20	24.10	0.265	1.6
CDMA PCS band - Duty cycle: 100%; Crest factor: 1							
15	Fixed	25	1851.25	23.65	23.60	0.184	1.6
15	Fixed	600	1880.00	23.60	23.55	0.155	1.6
15	Fixed	1175	1908.75	23.60	23.55	0.140	1.6

Notes:
1. *: Average power.
2. If the SAR measured at the middle channel for this configuration is at least 3 dB lower than SAR limit, testing at low & high channel is optional.
3. The EUT battery was charged in accordance with manufacture's instructions prior to commencement of measurement.
4. Please see attachment for the detailed measurement data and plots showing the maximum SAR location of the EUT.

11 EUT PHOTOS

EUT PHOTOS (1/4)

EUT PHOTOS (2/4)

EUT PHOTOS (3/4)

EUT PHOTOS (4/4)

12 MEASUREMENT UNCERTAINTY

UNCERTAINTY BUDGE ACCORDING TO IEEE P1528								
Error Description	Uncertainty Value [%]	Prob. Dist.	Div.	(c_i) 1g	(c_i) 10g	Std. Unc.(1 g)	Std. Unc. (10g)	*(vi)* v_{eff}
Measurement System								
Probe Calibration	±4.8	N	1	1	1	±4.8%	±4.8%	∞
Axial Isotropy	±4.7	R	$\sqrt{3}$	0.7	0.7	±1.9%	±1.9%	∞
Hemispherical Isotropy	±9.6	R	$\sqrt{3}$	0.7	0.7	±3.9%	±3.9%	∞
Boundary Effects	±1.0	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Linearity	±4.7	R	$\sqrt{3}$	1	1	±2.7%	±2.7%	∞
System Detection Limits	±1.0	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Readout Electronics	±1.0	N	$\sqrt{3}$	1	1	±1.0%	±1.0%	∞
Response Time	±0.8	R	$\sqrt{3}$	1	1	±0.5%	±0.5%	∞
Integration Time	±2.6	R	$\sqrt{3}$	1	1	±1.5%	±1.5%	∞
RF Ambient Condition	±1.59	R	$\sqrt{3}$	1	1	±0.9%	±0.9%	∞
Probe Positioner	±1.6	R	$\sqrt{3}$	1	1	±0.2%	±0.2%	∞
Probe Positioning	±2.9	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
Max. SAR Eval.	±1.0	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Test sample Related								
Device Positioning	±1.1	N	1	1	1	±1.1%	±1.1%	145
Device Holder	±3.6	N	1	1	1	±3.6%	±3.6%	**5**
Power Drift	±5.0	R	$\sqrt{3}$	1	1	±2.9%	±2.9%	∞
Phantom and Setup								
Phantom Uncertainty	±4.0	R	$\sqrt{3}$	1	1	±2.3%	±2.3%	∞
Liquid Conductivity (target)	±5.0	R	$\sqrt{3}$	0.64	0.43	±1.8%	±1.2%	∞
Liquid Conductivity (meas.)	±2.5	N	1	0.64	0.43	±1.6%	±1.1%	∞
Liquid Peermittivity (target)	±5.0	R	$\sqrt{3}$	0.6	0.49	±1.7%	±1.4%	∞
Liquid Permittivity (meas.)	±2.5	N	1	0.6	0.49	±1.5%	±1.2%	∞
Combined Std. Uncertainty						±9.8%	±9.6%	330
Expanded STD Uncertainty						***±19.6 %***	***±19.2%***	

Table: Worst-case uncertainty for DASY4 assessed according to IEEE P1528.

The budge is valid for the frequency range 300MHz – 3GHz and represents a worst-case analysis.

13 EQUIPMENT LIST & CALIBRATION STATUS

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	SEUMS001BA1041		N/A
Probe Alignment Unit	SPEAG	LB (V2)	261	N/A
S-Parameter Network Analyzer	Agilent	8753ES-6	US39173569	8/19/05
Electronic Probe kit	Hewlett Packard	85070C	N/A	N/A
E-Field Probe	SPEAG	EX3DV3	3531	7/18/05
Thermometer	ERTCO	639-1	8402	1/13/2006
SAM Phantom (SAM1)	SPEAG	TP-1185	QD000P40CA	N/A
SAM Phantom (SAM2)	SPEAG	TP-1015	N/A	N/A
Data Acquisition Electronics	SPEAG	DAE3 V1	500	12/23/04
System Validation Dipole	SPEAG	D835V2	4d002	2/11/06
System Validation Dipole	SPEAG	D1900V2	5d043	2/16/04
Power Meter	Giga-tronics	8651A	8651404	9/16/05
Power Sensor	Giga-tronics	80701A	1834588	9/16/05
Amplifier	Mini-Circuits	ZHL-42W	D072701-5	N/A
Radio Communication Tester	Rohde & Schwarz		CMU 200	838114/032 12/1/04
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	M835	N/A	Within 24 hrs of first test
Simulating Liquid	CCS	M1900	N/A	Within 24 hrs of first test

14 ATTACHMENTS

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END OF REPORT