ANSI/IEEE Std. C95.1-1992
In accordance with the requirements of
FCC Report and Order: ET Docket 93-62, and OET Bulletin 65 Supplement C

FCC SAR TEST REPORT

For

Product Name: Pulse Oximeter

Brand Name: N/A

Model No.: MD300W4

Series Model: N/A

Test Report Number:
KS111026A02-SF

Issued for

Beijing Choice Electronic Technology Co., Ltd.

Bailangyuan Building B, Rm. 1127-1128, Fuxing Road, A36, 100039 Beijing, China

Issued by

Compliance Certification Services Inc.

Kun shan Laboratory

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ACCREDITED
TESTING CERT #2541.01

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1. CERTIFICATE OF COMPLIANCE (SAR EVALUATION)

Product Name:	Pulse Oximeter
Trade Name:	N/A
Model Name.:	MD300W4
Series Model:	N/A
Applicant Discrepancy:	Initial
Devices supporting GPRS:	Class B
Description Test Modes(worst case):	SIM 1
Device Category:	PORTABLE DEVICES
Exposure Category:	GENERAL POPULATION/UNCONTROLLED EXPOSURE
Date of Test:	2011-12-20~2012-02-18
Applicant:	Beijing Choice Electronic Technology Co., Ltd. Bailangyuan Building B, Rm. 1127-1128, Fuxing Road, A36, 100039 Beijing, China
Manufacturer:	Beijing Choice Electronic Technology Co., Ltd. No. 9 Shuangyuan Road, Badachu High Tech. Zone, Shijingshan District, 100041 Beijing, China
Application Type:	Certification

APPLICABLE STANDARDS AND TEST PROCEDURES	
STANDARDS AND TEST PROCEDURES	**TEST RESULT**
FCC OET 65 Supplement C	No non-compliance noted
Deviation from Applicable Standard	
None	

The device was tested by Compliance Certification Services Inc. in accordance with the measurement methods and procedures specified in OET Bulletin 65 Supplement C(Edition 01-01). The test results in this report apply only to the tested sample of the stated device/equipment. Other similar device/equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Approved by:

Hadiif. Hoo

Hadiif Hoo
RF Manager
Compliance Certification Services Inc.

Tested by:

Luck.Fu

Luck.Fu
Test Engineer
Compliance Certification Services Inc.

2. EUT DESCRIPTION

Product Name:	Pulse Oximeter
Model Name:	MD300W4
Series Model:	N/A
Model Discrepancy:	N/A
Brand Name:	N/A
FCC ID:	WWIMD300W4
GPRS Level:	Multi-Class 10
Multi-slot Class:	2 Up +3 Down
Power reduction:	NO
DTM Description:	N/A
Frequency Range:	GSM: 850: 824.2 ~ 848.8 MHz GSM: 1900: 1850.2 ~ 1909.8MHz
Transmit Power(Average):	GPRS 850: 25.50 dBm GPRS 1900: 23.21 dBm
Max. SAR:	GPRS 850: 0.311 W/kg GPRS 1900: 0.367W/kg
Modulation Technique:	GSM / GPRS : GMSK
Accessories:	Power Adapter Li-ion Battery Chargeable Voltage:4.2V 1200mAh
Antenna Specification:	GSM: PIFA antenna
Operating Mode:	Maximum continuous output

3. REQUIREMENTS FOR COMPLIANCE TESTING DEFINED BY THE FCC

The US Federal Communications Commission has released the report and order “Guidelines for Evaluating the Environmental Effects of RF Radiation", ET Docket No. 93-62 in August 1996. The order requires routine SAR evaluation prior to equipment authorization of portable transmitter devices, including portable telephones. For consumer products, the applicable limit is 1.6 mW/g for an uncontrolled environment and 8.0 mW/g for an occupational/controlled environment as recommended by the ANSI/IEEE standard C95.1-1992. According to the Supplement C of OET Bulletin 65 “Evaluating Compliance with FCC Guide-lines for Human Exposure to Radio frequency Electromagnetic Fields", released on Jun 29, 2001 by the FCC, the device should be evaluated at maximum output power (radiated from the antenna) under “worst-case” conditions for normal or intended use, incorporating normal antenna operating positions, device peak performance frequencies and positions for maximum RF energy coupling.

4. TEST METHODOLOGY

The Specific Absorption Rate (SAR) testing specification, method and procedure for this Mobile Phone is in accordance with the following standards:

■ 47 CFR Part 2 (2.1093)
■ IEEE C95.1-1999
□ KDB 941225 D01 SAR test for 3G devices
□ KDB 248227 D01 SAR measurement procedures for 802.11 a/b/g transmitters
□ KDB 648474 D01 SAR evaluation considerations for handsets with multiple transmitters and antennas
■ OET Bulletin 65 Supplement C (Edition 01-01)
□ Preliminary Guidance for Reviewing Applications for Certification of 3G Device. May 2006.

5. TEST CONFIGURATION

The device was controlled by using a base station emulator R&S CMU200. Communication between the device and the emulator was established by air link. The distance between the DUT and the antenna of the emulator is larger than 50 cm and the output power radiated from the emulator antenna is at least 30 dB smaller than the output power of DUT. The DUT was set from the emulator to radiate maximum output power during all tests.

Measurements were performed on the lowest, middle, and highest channel for each testing position.

For SAR testing, EUT is in GSM/GPRS link mode. In GSM link mode, its crest factor is 8, In GPRS link mode, its crest factor is 2, because EUT is set in GPRS multi-slot class 12 with 4 uplink slots.

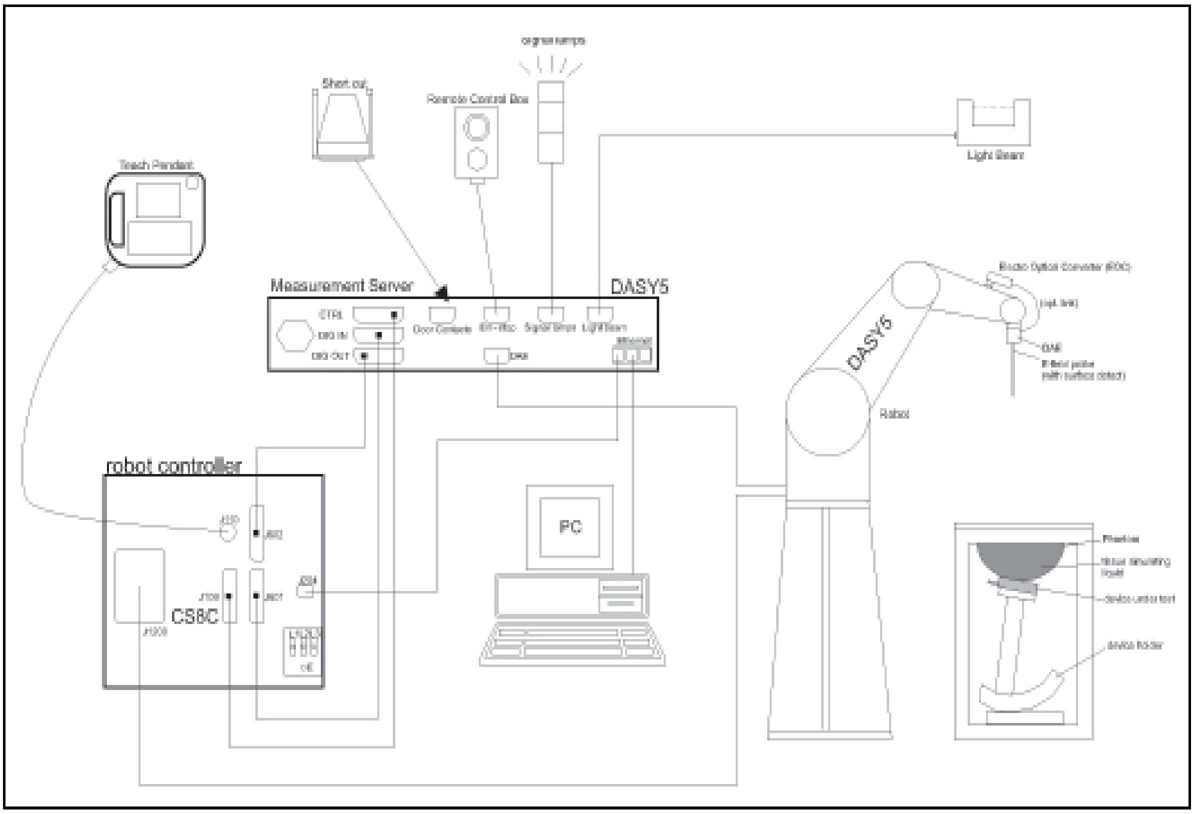
6. DOSIMETRIC ASSESSMENT SETUP

These measurements were performed with the automated near-field scanning system DASY 5 from ATTENNESSA. The system is based on a high precision robot (working range greater than 0.9 m), which positions the probes with a positional repeatability of better than ± 0.02 mm. Special E- and H-field probes have been developed for measurements close to material discontinuity, the sensors of which are directly loaded with a Schottky diode and connected via highly resistive lines to the data acquisition unit. The SAR measurements were conducted with the dosimetric probe E-field PROBE:EX3DV4 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe has been calibrated according to the procedure described in [7] with accuracy of better than ±10%. The spherical isotropy was evaluated with the procedure described in [8] and found to be better than ±0.25 dB. The phantom used was the SAM Twin Phantom as described in FCC supplement C, IEE P1528 and CENELEC EN 62209.

The Tissue simulation liquid used for each test is in according with the FCC OET65 supplement C as listed below.

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

6.1 MEASUREMENT SYSTEM DIAGRAM



The DASY5 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (St¨aubli 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 Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to the DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 2000 or Windows XP.
- DASY5 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 validating the proper functioning of the system.

6.2 SYSTEM COMPONENTS

The DASY5 measurement server is based on a PC/104 CPU board with a 400MHz intel ULV celeron, 128MB chip-disk and 128 MB RAM. The necessary circuits for communication with either the DAE4(or DAE3) electronic box as well as the 16-bit AD-converter system for optical detection and digital I/O interface are contained on the DASY5 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.

Data Acquisition Electronics (DAE)

The data acquisition electronics (DAE4) consists of a highly sensitive electrometer grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD converter and a command decoder and control logic unit. 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 DAE4 box is 200MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

EX3DV4 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)

Calibration: Basic Broad Band Calibration in air: 10-3000 MHz.
Conversion Factors (CF) for HSL 900 and HSL 1800
CF-Calibration for other liquids and frequencies upon request.

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 HSL (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: 337 mm (Tip: 9 mm)
Tip diameter: 2.5 mm (Body: 10 mm)
Distance from probe tip to dipole centers: 1 mm

Application: High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.

Interior of probe

SAM Twin Phantom(V4.0)

Construction: The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528-200X, CENELEC 50360 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: 850mm; Length: 1000mm; Width: 750mm

SAM Phantom (ELI4)
Description Construction:

Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI4 is fully compatible with the latest draft of the standard IEC 62209 Part II and all known tissue simulating liquids. ELI4 has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is supported by software version

DASY4/DASY5.5 and higher and is compatible with all SPEAG dosimetric probes and dipoles

Shell Thickness: 2.0 ± 0.2 mm (sagging: <1%)

Filling Volume: Approx. 25 liters
Dimensions: Major ellipse axis: 600 mm
Minor axis: 400 mm 500mm

Device Holder for SAM Twin Phantom

Construction: In combination with the Twin SAM Phantom, 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, and flat phantom).

System Validation Kits for SAM Twin Phantom

onstruction: 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: 900,1800,2450,5800 MHz

Return loss: > 20 dB at specified validation position

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

nsions: D835V2: dipole length: 161 mm; overall height: 340 mm
D1800V2: dipole length: 72.5 mm; overall height: 300 mm
D1900V2: dipole length: 67.7 mm; overall height: 300 mm
D2450V2: dipole length: 51.5 mm; overall height: 290 mm
D5GHzV2: dipole length: 20.6 mm; overall height: 300 mm

System Validation Kits for ELI4 phantom

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: 900, 1800, 2450, 5800 MHz

Return loss: > 20 dB at specified validation position

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

Dimensions: D835V2: dipole length: 161 mm; overall height: 340 mm
D1800V2: dipole length: 72.5 mm; overall height: 300 mm
D1900V2: dipole length: 67.7 mm; overall height: 300 mm
D2450V2: dipole length: 51.5 mm; overall height: 290 mm
D5GHzV2: dipole length: 20.6 mm; overall height: 300 mm

7. EVALUATION PROCEDURES

DATA EVALUATION

The DASY 5 post processing software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

Probe parameters:	- Sensitivity	$Norm_i$, a_{i0}, a_{i1}, a_{i2}
	- Conversion factor	$ConvF_i$
	- Diode compression point	dcp_i
Device parameters:	- Frequency	f
	- Crest factor	cf
Media parameters:	- Conductivity	σ
	- Density	ρ

These parameters must be set correctly in the software. They can be found in the component documents or be imported into the software from the configuration files issued for the DASY 5 components. In the direct measuring mode of the multi-meter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics. If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \cdot \frac{cf}{dcp_i}$$

with V_i = Compensated signal of channel i (i = x, y, z)
U_i = Input signal of channel i (i = x, y, z)
cf = Crest factor of exciting field (DASY 5 parameter)
dcp_i = Diode compression point (DASY 5 parameter)

From the compensated input signals the primary field data for each channel can be evaluated:

E-field probes:

$$E_i = \sqrt{\frac{V_i}{Norm_i \bullet ConvF}}$$

H-field probes:

$$H_i = \sqrt{Vi} \cdot \frac{a_{i10} + a_{i11} f + a_{i12} f^2}{f}$$

with V_i = Compensated signal of channel i (i = x, y, z)
$Norm_i$ = Sensor sensitivity of channel i (i = x, y, z)
$\mu V/(V/m)^2$ for E0field Probes
$ConvF$ = Sensitivity enhancement in solution
aij = Sensor sensitivity factors for H-field probes
f = Carrier frequency (GHz)
Ei = Electric field strength of channel i in V/m
Hi = Magnetic field strength of channel i in A/m

The RSS value of the field components gives the total field strength (Hermitian magnitude):

$$E_{tot} = \sqrt{E_x^2 + E_y^2 + E_z^2}$$

The primary field data are used to calculate the derived field units.

$$SAR = E_{tot}^{2} \cdot \frac{\sigma}{\rho \cdot 1000}$$

with SAR = local specific absorption rate in mW/g
E_{tot} = total field strength in V/m
σ = conductivity in [mho/m] or [Siemens/m]
ρ = equivalent tissue density in g/cm^3

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid.

The power flow density is calculated assuming the excitation field as a free space field.

$$P_{pwe} = \frac{E_{tot}^{2}}{3770} \quad \text{or} \quad P_{pwe} = H_{tot}^{2} \cdot 37.7$$

with P_{pwe} = Equivalent power density of a plane wave in mW/cm^2
E_{tot} = total electric field strength in V/m
H_{tot} = total magnetic field strength in A/m

SAR EVALUATION PROCEDURES

The procedure for assessing the peak spatial-average SAR value consists of the following steps:

- **Power Reference Measurement**

  The reference and drift jobs are useful jobs for monitoring the power drift of the device under test in the batch process. Both jobs measure the field at a specified reference position, at a selectable distance from the phantom surface. The reference position can be either the selected section's grid reference point or a user point in this section. The reference job projects the selected point onto the phantom surface, orients the probe perpendicularly to the surface, and approaches the surface using the selected detection method.

- **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 finer measurement around the hot spot. The sophisticated interpolation routines implemented in DASY 5 software can find the maximum locations even in relatively coarse grids. The scan area is defined by an editable grid. This grid is anchored at the grid reference point of the selected section in the phantom. When the area scan's property sheet is brought-up, grid was at to 15 mm by 15 mm and can be edited by a user.

- **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 default zoom scan measures 5 x 5 x 7 points within a cube whose base faces are centered around the maximum found in a preceding area scan job within the same procedure. If the preceding Area Scan job indicates more then one maximum, the number of Zoom Scans has to be enlarged accordingly (The default number inserted is 1).

- **Power Drift measurement**

  The drift job measures the field at the same location as the most recent reference job within the same procedure, and with the same settings. The drift measurement gives the field difference in dB from the reading conducted within the last reference measurement. Several drift measurements are possible for one reference measurement. This allows a user to monitor the power drift of the device under test within a batch process. In the properties of the Drift job, the user can specify a limit for the drift and have DASY 5 software stop the measurements if this limit is exceeded.

SPATIAL PEAK SAR EVALUATION

The procedure for spatial peak SAR evaluation has been implemented according to the IEEE1529 standard. It can be conducted for 1 g and 10 g.

The DASY 5 system allows evaluations that combine measured data and robot positions, such as:

- maximum search
- extrapolation
- boundary correction
- peak search for averaged SAR

During a maximum search, global and local maximum searches are automatically performed in 2-D after each Area Scan measurement with at least 6 measurement points. It is based on the evaluation of the local SAR gradient calculated by the Quadratic Shepard's method. The algorithm will find the global maximum and all local maxima within -2 dB of the global maxima for all SAR distributions.

Extrapolation

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. Several measurements at different distances are necessary for the extrapolation.

Extrapolation routines require at least 10 measurement points in 3-D space. They are used in the Cube Scan to obtain SAR values between the lowest measurement points and the inner phantom surface. The routine uses the modified Quadratic Shepard's method for extrapolation. For a grid using 5x5x7 measurement points with 5mm resolution amounting to 343 measurement points, the uncertainty of the extrapolation routines is less than 1% for 1 g and 10 g cubes.

Boundary effect

For measurements in the immediate vicinity of a phantom surface, the field coupling effects between the probe and the boundary influence the probe characteristics. Boundary effect errors of different dosimetric probe types have been analyzed by measurements and using a numerical probe model. As expected, both methods showed an enhanced sensitivity in the immediate vicinity of the boundary. The effect strongly depends on the probe dimensions and disappears with increasing distance from the boundary. The sensitivity can be approximately given as:

$$S \approx S_o + S_b exp(-\frac{z}{a}) cos(\pi \frac{z}{\lambda})$$

Since the decay of the boundary effect dominates for small probes ($a \ll \lambda$), the cos-term can be omitted. Factors *Sb* (parameter Alpha in the DASY 5 software) and *a* (parameter Delta in the DASY 5 software) are assessed during probe calibration and used for numerical compensation of the boundary effect. Several simulations and measurements have confirmed that the compensation is valid for different field and boundary configurations.

This simple compensation procedure can largely reduce the probe uncertainty near boundaries. It works well as long as:

- the boundary curvature is small
- the probe axis is angled less than 30_ to the boundary normal
- the distance between probe and boundary is larger than 25% of the probe diameter
- the probe is symmetric (all sensors have the same offset from the probe tip)

Since all of these requirements are fulfilled in a DASY 5 system, the correction of the probe boundary effect in the vicinity of the phantom surface is performed in a fully automated manner via the measurement data extraction during post processing.

8. MEASUREMENT UNCERTAINTY

UNCERTAINTY BUDGE ACCORDING TO IEEE 1528-2003						
Error Description	**Uncertainty Value ±%**	**Probability distribution**	**Divisor**	**C_1 1g**	**Standard unc.(1g) ±%**	**V_1 or V_{eff}**
Measurement System						
Probe calibration	±5.5	normal	1	1	±5.5	∞
Axial isotropy of probe	±4.7	rectangular	√3	0.7	±1.9	∞
Hemispherical Isotropy of probe	±9.6	rectangular	√3	0.7	±3.9	∞
Probe linearity	±4.7	rectangular	√3	1	±2.7	∞
Detection Limit	±1.0	rectangular	√3	1	±0.6	∞
Boundary effects	±1.0	rectangular	√3	1	±0.6	∞
Readout electronics	±0.3	normal	1	1	±0.3	∞
Response time	±0.8	rectangular	√3	1	±0.5	∞
Integration time	±2.6	rectangular	√3	1	±1.5	∞
Probe positioning	±2.9	rectangular	√3	1	±1.7	∞
Probe positioner	±0.4	rectangular	√3	1	±0.2	∞
RF ambient Noise	±3.0	rectangular	√3	1	±1.7	∞
RF ambient Reflections	±3.0	rectangular	√3	1	±1.7	∞
Max.SAR Eval	±1.0	rectangular	√3	1	±0.6	∞
Test Sample Related						
Device positioning	±2.9	normal	1	1	±2.9	145
Device holder uncertainty	±3.6	normal	1	1	±3.6	5
Power drift	±5.0	rectangular	√3	1	±2.9	∞
Phantom and Set up						
Phantom uncertainty	±4.0	rectangular	√3	1	±2.3	∞
Liquid conductivity(target)	±5.0	rectangular	√3	0.64	±1.8	∞
Liquid conductivity(meas.)	±2.5	rectangular	1	0.64	±1.6	∞
Liquid permittivity(target)	±5.0	rectangular	√3	0.6	±1.7	∞
Liquid permittivity(meas.)	±2.5	rectangular	1	0.6	±1.5	∞
Combined Standard Uncertainty					±10.7	387
Coverage Factor for 95%		kp=2				
Expanded Standard Uncertainty					±21.4	

Table: Worst-case uncertainty for DASY5 assessed according to IEEE1528-2003.
The budge is valid for the frequency range 300 MHz to 6G Hz and represents a worst-case analysis.

9. EXPOSURE LIMIT

(A). Limits for Occupational/Controlled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.4	8.0	20.0

(B). Limits for General Population/Uncontrolled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.08	1.6	4.0

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

Population/Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

Occupational/Controlled Environments are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure, (i.e. as a result of employment or occupation).

NOTE
GENERAL POPULATION/UNCONTROLLED EXPOSURE
PARTIAL BODY LIMIT
1.6 W/kg

10. EUT ARRANGEMENT

The EUT is at typical example of a limb worn and a waist-worn device with an integrated RF module.

The device shall be positioned directly against the phantom surface .

The device should be measured to assess the exposure of a person approaching the device from different orientations to that of the intended user of the device.

So each face of the EUT are all tested directly against the phantom surface.

11. MEASUREMENT RESULTS

11.1 TEST LIQUIDS CONFIRMATION

SIMULATED TISSUE LIQUID PARAMETER CONFIRMATION

The dielectric parameters were checked prior to assessment using the HP85070C dielectric probe kit. The dielectric parameters measured are reported in each correspondent section.

IEEE SCC-34/SC-2 P1528 RECOMMENDED TISSUE DIELECTRIC PARAMETERS

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 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 P1528

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	45.3	5.27	48.2	6.00

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

11.2 LIQUID MEASUREMENT RESULTS

Ambient condition: Temperature: 21 °C Relative humidity: 58%

Liquid Type	Frequency	Temp. [°C]	Depth [cm]	Parameters	Target	Measured	Deviation[%]	Limited[%]	Measured Date
Body1900	1900 MHz	21	15	Permitivity	53.30	52.15	-2.16	± 5	20-Dec-11
		21	15	Conductivity	1.52	1.50	-1.32	± 5	20-Dec-11

Ambient condition: Temperature: 21 °C Relative humidity: 58%

Liquid Type	Frequency	Temp. [°C]	Depth [cm]	Parameters	Target	Measured	Deviation[%]	Limited[%]	Measured Date
Body850	850 MHz	21	15	Permitivity	55.20	55.45	0.45	± 5	18-Feb-12
		21	15	Conductivity	0.97	0.98	1.03	± 5	18-Feb-12

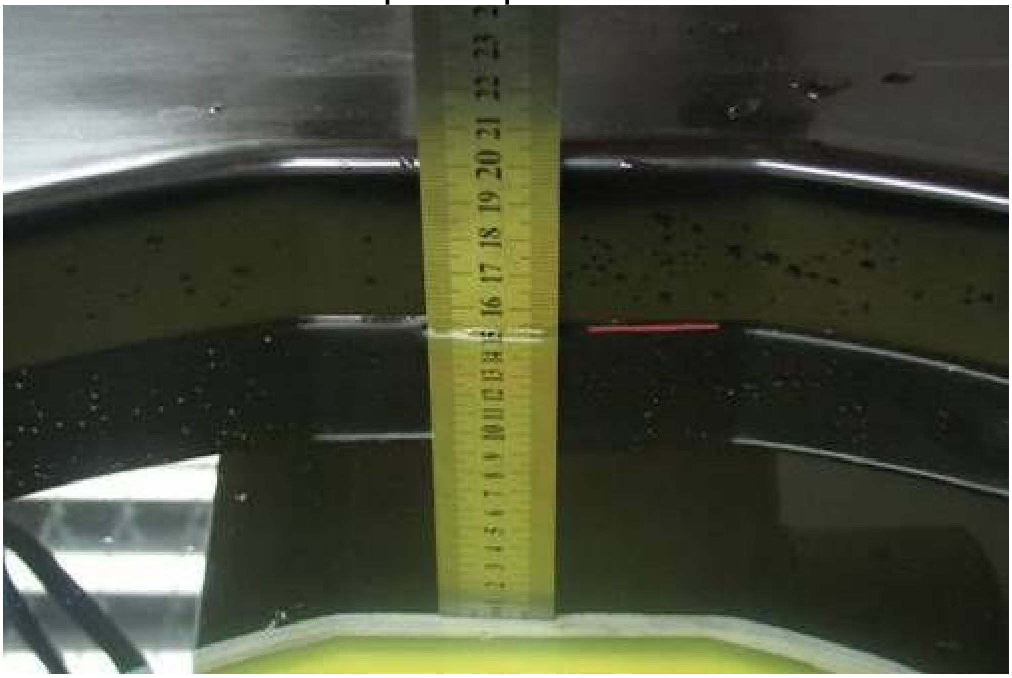
11.3 SYSTEM PERFORMANCE CHECK

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%. The system performance check results are tabulated below. And also the corresponding SAR plot is attached as well in the SAR plots files.

SYSTEM PERFORMANCE CHECK MEASUREMENT CONDITIONS

- The measurements were performed in the flat section of the SAM twin phantom filled with head and body simulating liquid of the following parameters.
- The DASY5 SAR system withan E-fileld probe EX3DV4 SN: 3755 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 15 mm (below 1 GHz) and 10 mm (above 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 10mm was aligned with the dipole.
- Special 7x7x7 fine cube was chosen for cube integration (dx= 5 mm, dy= 5 mm, dz= 5 mm).
- Distance between probe sensors and phantom surface was set to 2.5 mm.
- The dipole input power was 1W±3%.
- The results are normalized to 1 W input power.

Depth of Liquid is 15cm



Note: For SAR testing, the depth is larger than 15cm shown above

Reference SAR values

The reference SAR values were using measurement results indicated in the dipole calibration document (see table below)

Frequency (MHz)	1g SAR	10g SAR	Local SAR at Surface (Above Feed Point)	Local SAR at Surface (y = 2cm offset from feed point)
850 Body	9.92	6.55	14.1	4.9
1900 Body	39.70	21.10	67.6	6.6

SYSTEM PERFORMANCE CHECK RESULTS

Ambient conduction

Temperature: 21 °C Relative humidity: 58%

System Validation Dipole: D835V2-SN:4d114 **Date: 2012-02-18**

Body Simulatinf Liquid			Parameters	Target	Measured	Deviation[%]	Limited[%]
Frequency	Temp. [°C]	Depth [cm]					
850 MHz	20.30	15.00	1g SAR	9.92	10.16	2.42	±10
			10g SAR	6.55	6.44	-1.68	±10

Temperature: 21 °C Relative humidity: 58%

System Validation Dipole: D1900V2-SN:5d136 **Date: 2011-12-20**

Body Simulatinf Liquid			Parameters	Target	Measured	Deviation[%]	Limited[%]
Frequency	Temp. [°C]	Depth [cm]					
1900 MHz	20.30	15.00	1g SAR	39.70	41.36	4.18	±10
			10g SAR	21.10	20.56	-2.56	±10

11.4 EUT TUNE-UP PROCEDURES AND TEST MODE

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

a. To setup the desire channel frequency and the maximum output power. A Radio Communication Tester “CMU200 ” was used to program the EUT.

GPRS 850 / GPRS 1900:

Network Support: only GPRS
Main Service: Packet data
Power Setting: 33dBm / 30dBm

11.5 CONDUCTED OUTPUT POWER

Conducted output power (Average):
For GPRS: It support GPRS Class 10

System and Channel	Power values (dbm)	Average factor (db)	Time average (dbm) (before)	Time average (dbm) (after)
GSM850 CH190(1TS)	---	---	---	---
GPRS850 CH190				
1TS	32.26	-9.03	23.23	---
2TS	31.52	-6.02	**25.50**	**25.32**
GSM1900 Ch 661(1TS)	---	---	---	---
GPRS1900 Ch 661				
1TS	30.10	-9.03	21.07	---
2TS	29.23	-6.02	**23.21**	**23.20**

NOTE:
1) For GSM ,complete set of tests are performed ,For GPRS ,only the modes with maximum time average power values need to be tested respectively, So GPRS 850 only 2timeslot mode and GPRS 1900 only 2timeslot mode are tested.
2) For GPRS ,the test modes are the worst case of GSM modes
3) GSM has 8 timeslot
Average factor: when 1TS : 10*LOG1/8=-9.03
2TS: 10*LOG2/8=-6.02
3TS: 10*LOG3/8=-4.26
4TS: 10*LOG4/8=-3.01
Time average power: when 1TS=Power value+ Average factor=32.26+(-9.03)=23.23dbm
2TS,3TS and 4TS in a similar way
4) Based GSM ,Only the modes with maximum average power channel(CH 190 and CH 661) values to be tested.

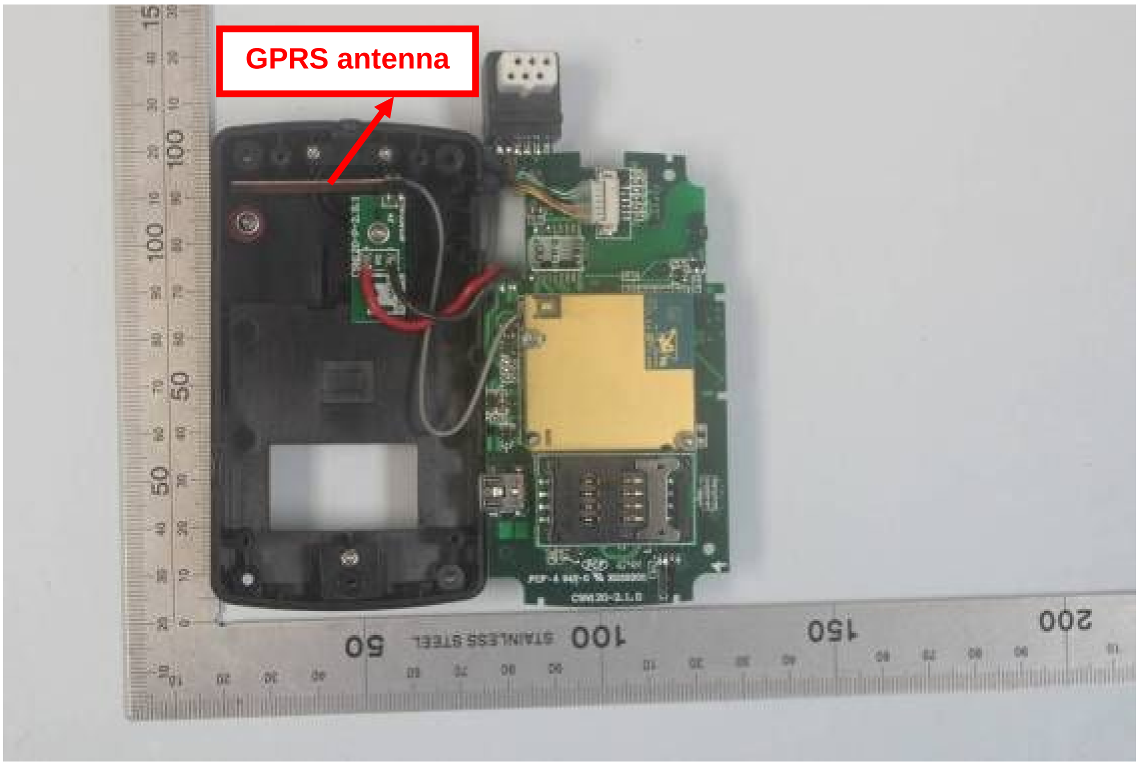
GSM Multi-slot classes supported by the devices:

Multislot Class	Max Slot Allocation			Allowable Configuration	Max Data Rate
	Downlink	Uplink	Active		
10	4	2	5	1 up; 4 down	8-12K bps Send 32-48K bps Receive
				2 up; 3 down	16-24K bps Send 24-36K bps Receive

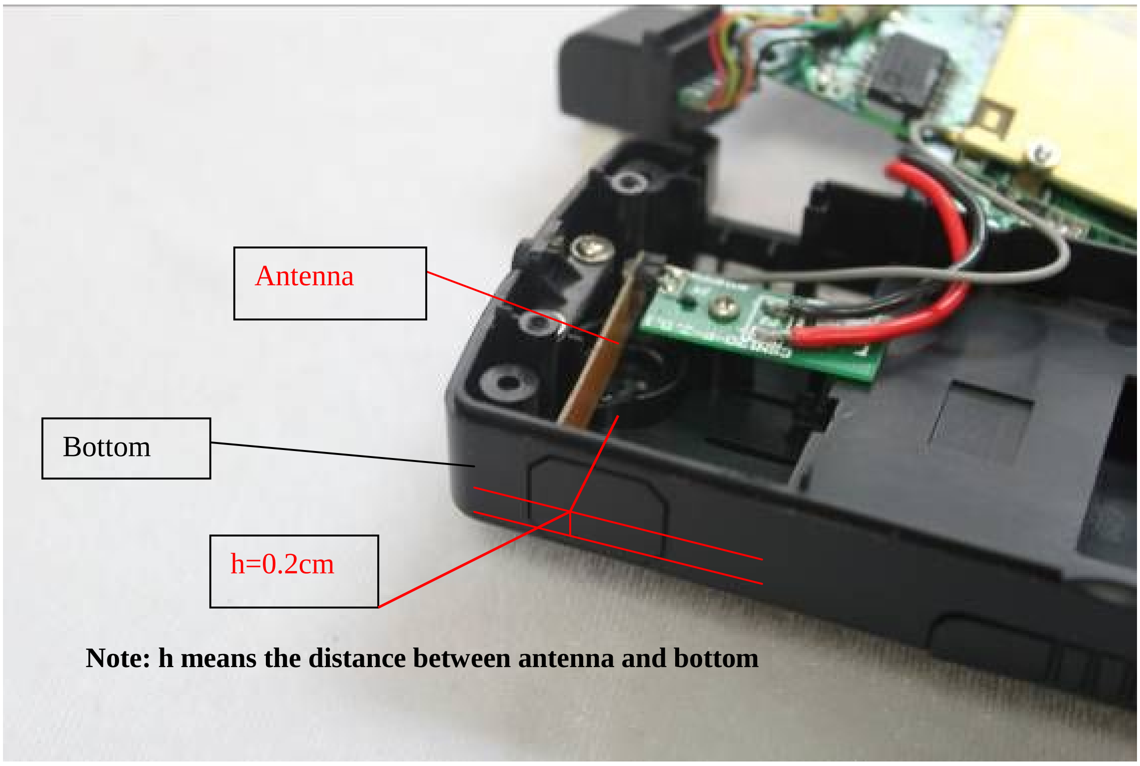
11.6 SAR MULTI TRANSMITTER ASSESSMENT

Note: Only one transmitting unit , So no assessment

Antenna:

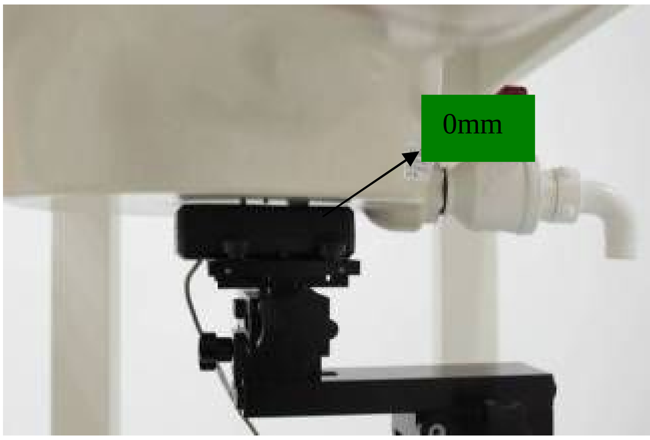


Antenna Location:



11.7 EUT SETUP PHOTOS

Body position face Down

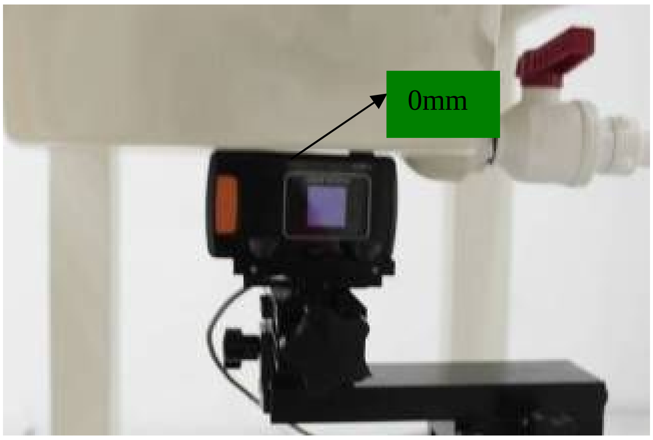


EUT Setup Configuration 1

Body position face Up

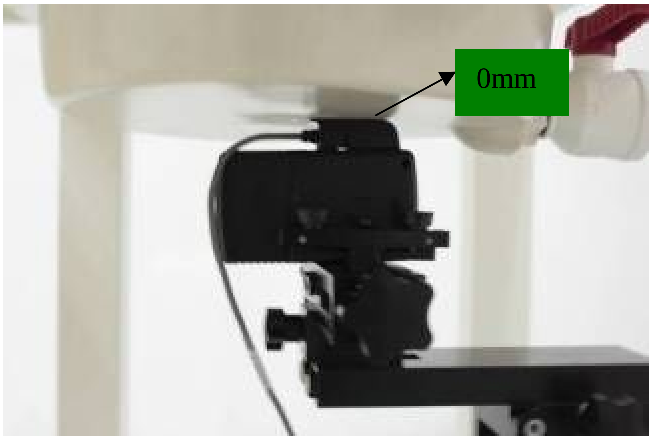
EUT Setup Configuration 2

Body position Left edge



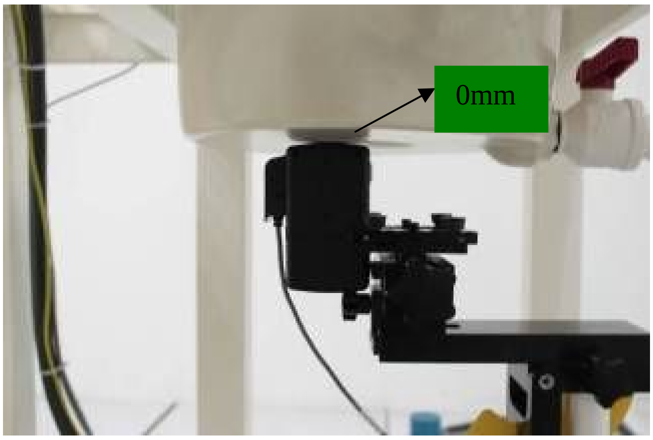
EUT Setup Configuration 3

Body position Right edge



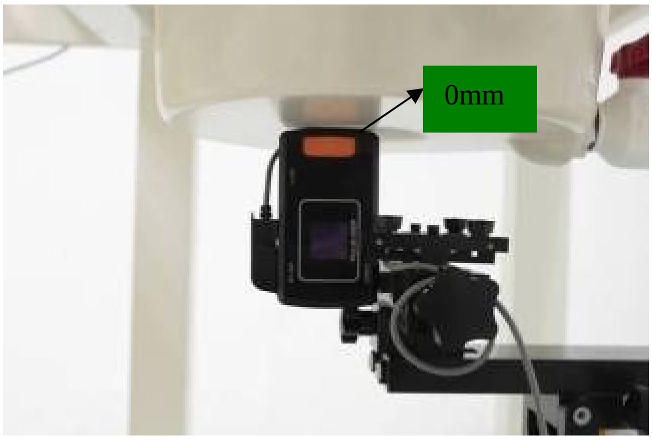
EUT Setup Configuration 4

Body position Tip edge



EUT Setup Configuration 5

Body position Rear edge



EUT Setup Configuration 6

11.8 SAR MEASUREMENT RESULTS

Date of Measurement: 2012-02-18

SAR Measurement GPRS 850						
Crest Factor: 4 (Duty cycle: 25%) Depth of Liquid: 15.0 cm						
EUT Setup Condition		Frequency		Liquid Temp[°C]	SAR(1g)(W/kg)	
Position	Antenna	Channel	MHz			
EUT Configuration 1		190	836.6	20.0	0.173	Limit (1.6W/kg)
EUT Configuration 2		190	836.6	20.0	**0.299**	
EUT Configuration 3		190	836.6	20.0	0.145	
EUT Configuration 4		190	836.6	20.0	0.193	
EUT Configuration 5		190	836.6	20.0	0.080	
EUT Configuration 6		190	836.6	20.0	0.165	
EUT Configuration 2		128	824.2	20.0	0.301	
EUT Configuration 2		251	848.8	20.0	**0.311**	

Date of Measurement : 2011-12-20

SAR Measurement GPRS 1900						
Crest Factor: 4 (Duty cycle: 25%) Depth of Liquid: 15.0 cm						
EUT Setup Condition		Frequency		Liquid Temp [°C]	SAR(1g) (W/kg)	
Position	Antenna	Channel	MHz			
EUT Configuration 1		661	1880.0	20.0	0.159	Limit (1.6W/kg)
EUT Configuration 2		661	1880.0	20.0	**0.367**	
EUT Configuration 3		661	1880.0	20.0	0.179	
EUT Configuration 4		661	1880.0	20.0	0.204	
EUT Configuration 5		661	1880.0	20.0	0.159	
EUT Configuration 6		661	1880.0	20.0	0.101	
EUT Configuration 2		512	1850.2	20.0	0.279	
EUT Configuration 2		810	1909.8	20.0	**0.328**	

Notes:
1) Front panel / Bottom face in parallel with flat phantom.
2) Please refer to attachment for the result presentation in plot format.
3) Used SAM Twin Phantom(V4.0)

12. EUT PHOTO


150
100
STAINLESS STEEL
50
150
200


150
100
STAINLESS STEEL
50
100
150
200

13. EQUIPMENT LIST & CALIBRATION STATUS

Name of Equipment	Manufacturer	Type/Model	Serial Number	Calibration Due
P C	HP	Core(rm)3.16G	CZCO48171H	N/A
Signal Generator	Agilent	E8257C	MY43321570	05/13/2012
S-Parameter Network Analyzer	Agilent	E5071B	MY42301382	03/16/2012
Wireless Communication Test Set	R&S	CMU200	SN:B23-03291	05/13/2012
Power Meter	Agilent	E4416A	QB41292714	03/16/2012
Peak & Average sensor	Agilent	E9327A	CF0001	03/16/2012
E-field PROBE	SPEAG	EX3DV4	3755	01/20/2013
DIPOLE 835MHZ ANTENNA	SPEAG	D835V2	4d114	01/10/2013
DIPOLE 1900MHZ ANTENNA	SPEAG	D1900V2	5d136	01/05/2012
DUMMY PROBE	SPEAG	DP_2	SPDP2001AA	N/A
SAM PHANTOM	SPEAG	SAM29	SN 41_05	N/A
PHANTON WOOD TABLE	SPEAG	1609	QD000P40CD	N/A
ROBOT	SPEAG	TX60	F10/5E6AA1/A101	N/A
ROBOT KRC	SPEAG	CS8C	F10/5E6AA1/C101	N/A
LIQUID CALIBRATION KIT	ANTENNESSA	41/05 OCP9	00425167	N/A
DAE	SD000D04BJ	DEA4	1245	01/11/2013

14. FACILITIES

All measurement facilities used to collect the measurement data are located at

☒ No.10, Weiye Rd., Innovation Park, Eco & Tec. Development Part, Kunshan City, Jiangsu Province, China.

15. REFERENCES

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16. ATTACHMENTS

Exhibit	Content
1	System Performance Check Plots
2	SAR Test Plots
3	Probe calibration report EX3DV4 SN3755
4	Dipole calibration report D835V2 SN:4d114
5	Dipole calibration report D1900V2-SN:5d136
6	DAE calibration report DEA4 SD000D04BJ SN: 1245

Appendix A: DASY Calibration Certificate-Extended Dipole

DASY Calibration Certificate-Extended Dipole-835MHz Calibrations

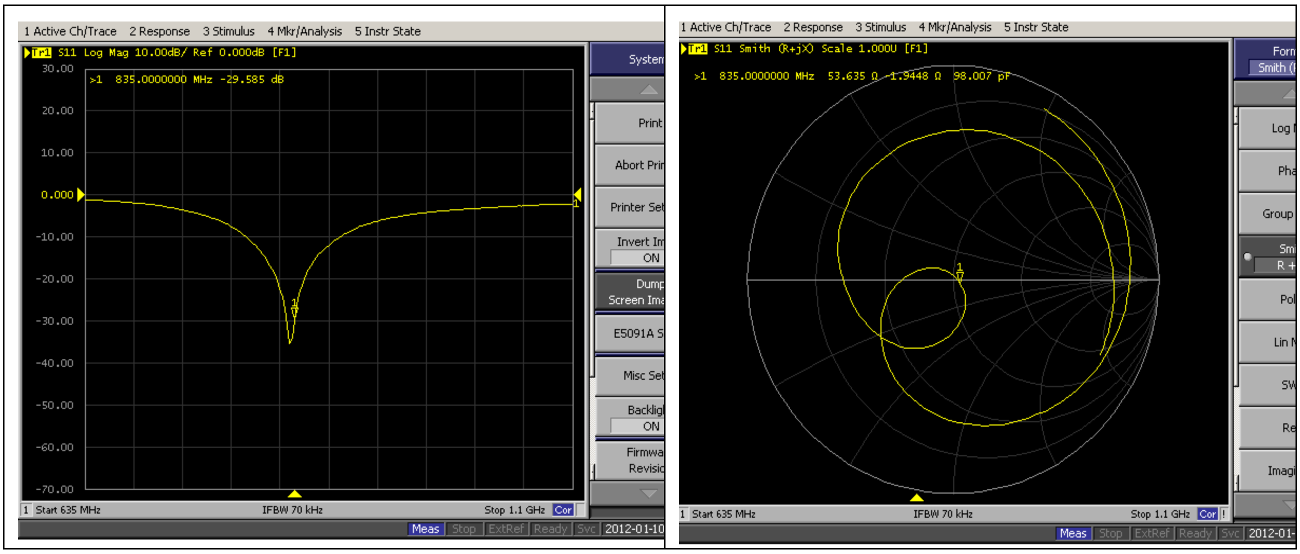
According to KDB 450824 D02, Dipoles must be recalibrated at least once every three years; however, immediate re-calibration is required for the following conditions. The test laboratory must ensure that the required supporting information and documentation have been included in the SAR report to qualify for the extended 3-year calibration interval

1)When the most recent return-loss, measured at least annually, deviates by more than 20% from the previous measurement (i.e. 0.2 of the dB value) or not meeting the required -20 dB return-loss specification

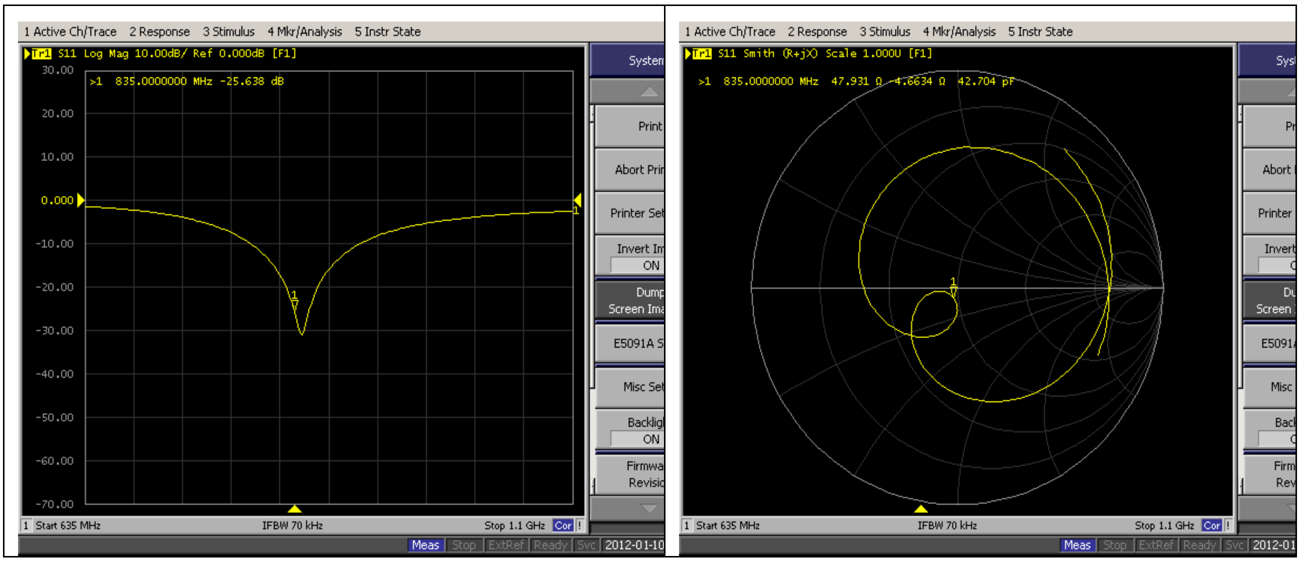
2)When the most recent measurement of the real or imaginary parts of the impedance, measured at least annually, deviates by more than 5 Ω from the previous measurement

Dipole Verification plot : D835V2 S/N:4d114

835MHz for Head:



835MHz for Body:



D835V2 S/N:4d114 For HEAD						
Return-Loss (dB)	Deviate (dB)	Real Impedance (Ω)	Deviate (Ω)	Imaginary Impedance (Ω)	Deviate (Ω)	Calibrate Date
-29.466	---	52.262	---	-2.5822	---	2011-01-10
-29.585	0.119	53.635	1.373	-1.9448	0.6374	2012-01-10
D835V2 S/N:4d114 For BODY						
Return-Loss (dB)	Deviate (dB)	Real Impedance (Ω)	Deviate (Ω)	Imaginary Impedance (Ω)	Deviate (Ω)	Calibrate Date
-25.505	---	47.585	---	-4.5941	---	2011-01-10
-25.638	0.133	47.931	0.346	-4.6634	0.0693	2012-01-10

According to up table, the return loss is <-20dB, deviates by less than 20% from the previous measurement ; the Real Impedance and Imaginary Impedance are all within 5 Ω compared to the previous measurement .
So, the Dipole verification result should extended calibration.

END OF REPORT