FCC SAR TEST REPORT

Application No.:	KSCR2205000822AT(FYCR2205000177AT)
FCC ID:	2AOJNBS-2001-G1
Applicant:	Zhongshan Transtek Electronics Co.,Ltd
Address of Applicant:	No. 23,Jin'an Road, Minzhong, Zhongshan ,Guangdong, China
Manufacturer:	Zhongshan Transtek Electronics Co.,Ltd
Address of Manufacturer:	No. 23,Jin'an Road, Minzhong, Zhongshan ,Guangdong, China
Factory:	Zhongshan Transtek Electronics Co.,Ltd
Address of Factory:	No. 23,Jin'an Road, Minzhong, Zhongshan ,Guangdong, China
Product Name:	Pro Cellular Body Scale
Model No.(EUT):	BS-2001-G1
Standard(s) :	FCC 47CFR §2.1093
Date of Receipt:	2022-06-01
Date of Test:	2022-06-02 to 2022-06-02
Date of Issue:	2022-07-08
Test Result:	**Pass***

* In the configuration tested, the EUT complied with the standards specified above.

Eric Lin
Laboratory Manager

REVISION HISTORY

Revision Record			
Version	**Description**	**Date**	**Remark**
00	Original	2022-07-08	/

Authorized for issue by:				
		Richard.Kong/ Project Engineer		
		Eric.Lin/Reviewer		

TEST SUMMARY

Frequency Band	Maximum Reported SAR(W/kg)
	Extremity
GSM850	1.78
GSM1900	1.63
LTE Band 2	0.22
LTE Band 4	0.18
LTE Band 12	0.09
LTE Band 13	0.10
SAR Limited(W/kg)	4.0

CONTENTS

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1 General Information

1.1 General Description of EUT

Product Phase:	Production unit		
Device Type:	Portable device		
Exposure Category:	Uncontrolled environment / general population		
SN:	200012000229		
Hardware Version:	TSH2001 2020/09/30		
Software Version:	A5		
Antenna Gain:	700-790MHz:1.38dBi;800-960MHz:1.44dBi;1700-1880MHz:3.86 dBi;1890-2100MHz:1.65 dBi (Provided by Manufacturer)		
Antenna Type:	PIFA Antenna		
Device Operating Configurations:			
Modulation Mode:	GSM:GMSK, 8PSK;LTE:QPSK,16QAM		
Power Class:	4,tested with power level 5(GSM850)		
	1,tested with power level 0(GSM1900)		
	3, tested with power control Max Power(LTE Band 2/4/1213)		
Frequency Bands:	Band	Tx (MHz)	Rx (MHz)
	GSM850	824-849	869-894
	GSM1900	1850-1910	1930-1990
	CatM1 Band 2	1850-1910	1930-1990
	CatM1 Band 4	1710-1755	2110- 2155
	CatM1 Band 12	699-716	729-746
	CatM1 Band 13	777-787	746-756
Power supplier:	4 AA batteries, 6V		

1.2 DUT Antenna Locations

Please see the Appendix D

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1.3 Test Specification

Identity	Document Title
FCC 47CFR §2.1093	Radio frequency Radiation Exposure Evaluation: Portable Devices
IEEE Std C95.1 – 2019	IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz
IEEE 1528-2013	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
KDB447498 D04 v02	RF Exposure Procedures and Equipment Authorization Policies for Mobile and Portable Devices
KDB 865664 D01 v01r04	SAR Measurement Requirements for 100 MHz to 6 GHz
KDB 865664 D02 v01r02	RF Exposure Compliance Reporting and Documentation Considerations
KDB 941225 D05 v02r05	SAR EVALUATION CONSIDERATIONS FOR LTE DEVICES

1.4 RF exposure limits

Human Exposure	Uncontrolled Environment General Population	Controlled Environment Occupational
Spatial Peak SAR* (Brain*Trunk)	1.60 W/kg	8.00 W/kg
Spatial Average SAR** (Whole Body)	0.08 W/kg	0.40 W/kg
Spatial Peak SAR*** (Hands/Feet/Ankle/Wrist)	4.00 W/kg	20.00 W/kg

Notes:

* The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time

** The Spatial Average value of the SAR averaged over the whole body.

*** The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

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

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

1.5 Test Location

All tests were performed at:

Compliance Certification Services (Kunshan) Inc.

No.10 Weiye Rd, Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, China.

Tel: +86 512 5735 5888 Fax: +86 512 5737 0818

No tests were sub-contracted.

Note:

1.SGS is not responsible for wrong test results due to incorrect information (e.g. max. clock frequency, highest internal frequency, antenna gain, cable loss, etc) is provided by the applicant. (if applicable).

2.SGS is not responsible for the authenticity, integrity and the validity of the conclusion based on results of the data provided by applicant. (if applicable).

1.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• CNAS (No. CNAS L4354)

CNAS has accredited Compliance Certification Services (Kunshan) Inc. to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• A2LA (Certificate No. 2541.01)

Compliance Certification Services (Kunshan) Inc. is accredited by the American Association for Laboratory Accreditation (A2LA). Certificate No. 2541.01.

• FCC (Designation Number: CN1172)

Compliance Certification Services (Kunshan) Inc. has been recognized as an accredited testing laboratory.

Designation Number: CN1172.

• ISED (CAB identifier: CN0072)

Compliance Certification Services (Kunshan) Inc. has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory.

Company Number: 2324E

• VCCI (Member No.: 1938)

The 3m and 10m Semi-anechoic chamber and Shielded Room of Compliance Certification Services (Kunshan) Inc. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-20134, R-11600, C-11707, T-11499, G-10216 respectively.

2 Laboratory Environment

Temperature	Min. = 18°C, Max. = 25 °C
Relative humidity	Min. = 30%, Max. = 70%
Ground system resistance	< 0.5 Ω
Ambient noise is checked and found very low and in compliance with requirement of standards. Reflection of surrounding objects is minimized and in compliance with requirement of standards.	

3 SAR Measurements System Configuration

3.1 The SAR Measurement System

This SAR Measurement System uses a Computer-controlled 3-D stepper motor system (SPEAG DASY5 professional system). A E-field probe is used to determine the internal electric fields. The SAR can be obtained from the equation SAR= σ (|Ei|2)/ ρ where σ and ρ are the conductivity and mass density of the tissue-Simulate.

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

A standard high precision 6-axis robot (Stabile RX family) with controller, teach pendant and software .An arm extension for accommodation 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 DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.

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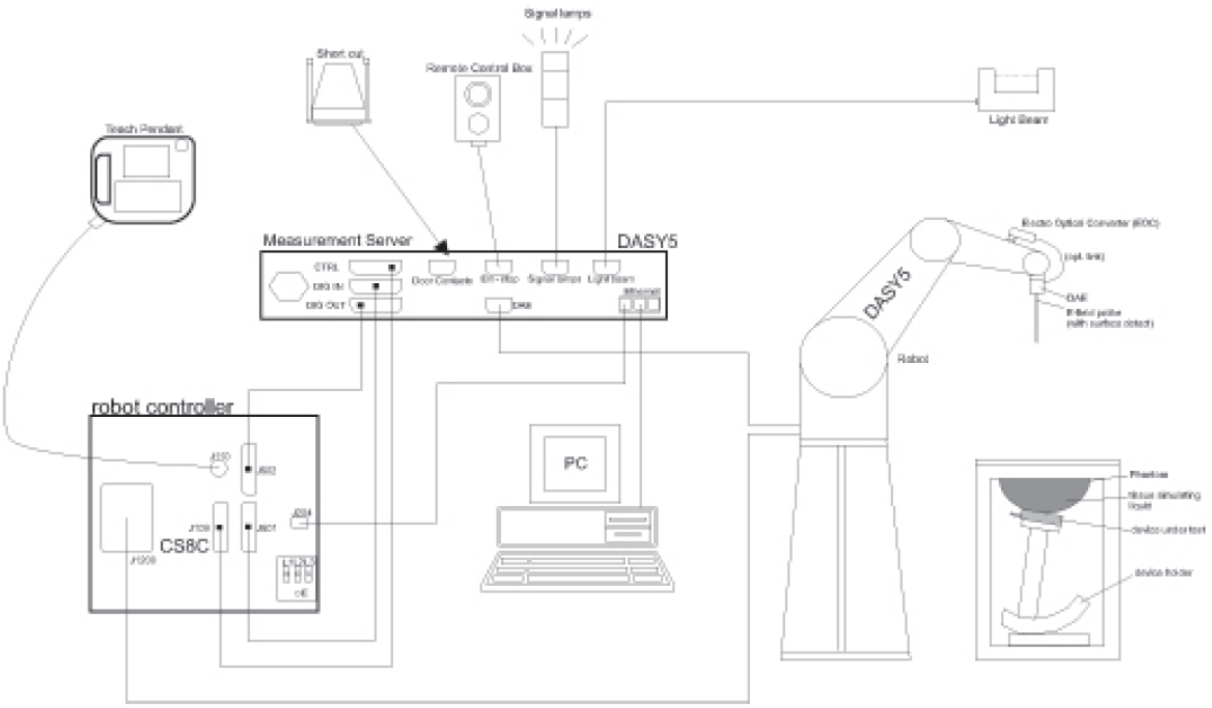

F-1. SAR Measurement System Configuration

- 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 7.
- 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, right-hand and Body Worn usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing to validat the proper functioning of the system.

3.2 Isotropic E-field Probe EX3DV4

	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available.
Frequency	10 MHz to > 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.3 dB in TSL (rotation around probe axis) ± 0.5 dB in TSL (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: 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); the only probe that enables compliance testing for frequencies up to 6 GHz with precision of better 30%.
Compatibility	DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI

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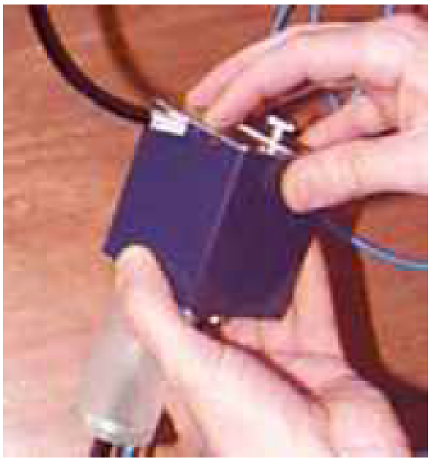
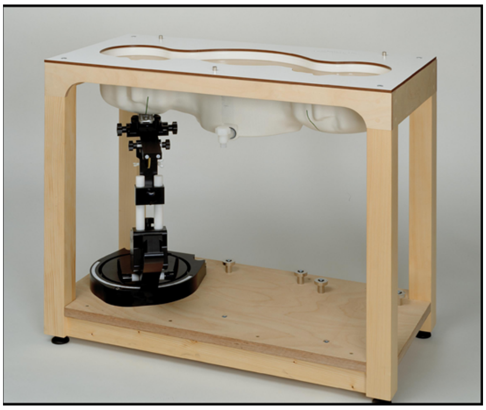
3.3 Data Acquisition Electronics (DAE)

Model	DAE4
Construction	Signal amplifier, multiplexer, A/D converter and control logic. Serial optical link for communication with DASY4/5 embedded system (fully remote controlled). Two step probe touch detector for mechanical surface detection and emergency robot stop.
Measurement Range	-100 to +300 mV (16 bit resolution and two range settings: 4mV,400mV)
Input Offset Voltage	< 5μV (with auto zero)
Input Bias Current	< 50 f A
Dimensions	60 x 60 x 68 mm



3.4 SAM Twin Phantom

Material	Vinylester, glass fiber reinforced (VE-GF)
Liquid Compatibility	Compatible with all SPEAG tissue simulating liquids (incl. DGBE type)
Shell Thickness	2 ± 0.2 mm (6 ± 0.2 mm at ear point)
Dimensions **(incl. Wooden Support)**	Length: 1000 mm Width: 500 mm Height: adjustable feet
Filling Volume	approx. 25 liters
Wooden Support	SPEAG standard phantom table



The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209-1. 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 teaching three points with the robot.

Twin SAM V5.0 has the same shell geometry and is manufactured from the same material as Twin SAM V4.0, but has reinforced top structure.

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3.5 ELI Phantom

Material	Vinylester, glass fiber reinforced (VE-GF)	
Liquid Compatibility	Compatible with all SPEAG tissue simulating liquids (incl. DGBE type)	
Shell Thickness	2.0 ± 0.2 mm (bottom plate)	
Dimensions	Major axis: 600 mm Minor axis: 400 mm	
Filling Volume	approx. 30 liters	
Wooden Support	SPEAG standard phantom table	

Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI is fully compatible with the IEC 62209-2 standard and all known tissue simulating liquids. ELI 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 compatible with all SPEAG dosimetric probes and dipoles.

ELI V5.0 has the same shell geometry and is manufactured from the same material as ELI4, but has reinforced top structure.

3.6 Device Holder for Transmitters

F-2. **Device Holder for Transmitters**

- The DASY device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation centres for both scales are the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.

- The DASY device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity ε=3 and loss tangent δ=0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

3.7 Measurement procedure

3.7.1 Scanning procedure

Step 1: Power reference measurement

The “reference” and “drift” measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure.

Step 2: *Area scan*

The SAR distribution at the exposed side of the head was measured at a distance of 4mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 15mm*15mm or 12mm*12mm or 10mm*10mm.Based on the area scan data, the area of the maximum absorption was determined by spline interpolation.

Step 3: *Zoom scan*

Around this point, a volume of 30mm*30mm*30mm (fine resolution volume scan, zoom scan) was assessed by measuring 5x5x7 points (≤2GHz) and 7x7x7 points (≥2GHz). On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

The data at the surface was extrapolated, since the centre of the dipoles is 2.0mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2mm. (This can be variable. Refer to the probe specification).The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip. The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 3D-Spline interpolation algorithm. The volume was integrated with the trapezoidal algorithm. One thousand points were interpolated to calculate the average. All neighbouring volumes were evaluated until no neighboring volume with a higher average value was found.

The area and zoom scan resolutions specified in the table below must be applied to the SAR measurements Probe boundary effect error compensation is required for measurements with the probe tip closer than half a probe tip diameter to the phantom surface. Both the probe tip diameter and sensor offset distance must satisfy measurement protocols; to ensure probe boundary effect errors are minimized and the higher fields closest to the phantom surface can be correctly measured and extrapolated to the phantom surface for computing 1-g SAR. Tolerances of the post-processing algorithms must be verified by the test laboratory for the scan resolutions used in the SAR measurements, according to the reference distribution functions specified in IEEE Std. 1528-2013.

			≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			5 ± 1 mm	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location			30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}			≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
			When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.

* When zoom scan is required and the *reported* SAR from the *area scan based 1-g SAR estimation* procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.

Step 4: Power reference measurement (drift)

The Power Drift Measurement job measures the field at the same location as the most recent power reference measurement job within the same procedure, and with the same settings. The indicated drift is mainly the variation of the DUT's output power and should vary max. ± 5 %

3.7.2 Data Storage

The DASY software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension ".DAE3". The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated. The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [m W/g], [m W/cm²], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

3.7.3 Data Evaluation by SEMCAD

The SEMCAD 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 Normi, ai0, ai1, ai2

- Conversion factor ConvFi
- Diode compression point Dcpi

Device parameters: - Frequency f

- Crest factor cf

Media parameters: - Conductivity ε

- Density ρ

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY components. In the direct measuring mode of the multimeter 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:

$$V_i = U_i + U_i^2 \cdot cf / dcp_i$$

With Vi = compensated signal of channel i (i = x, y, z)

Ui = input signal of channel i (i = x, y, z)

cf = crest factor of exciting field (DASY parameter)
dcp i = diode compression point (DASY parameter)

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

E-field probes:

$$E_i = (V_i / Norm_i \cdot ConvF)^{1/2}$$

H-field probes:

$$H_i = (V_i)^{1/2} \cdot (a_{i0} + a_{i1} f + a_{i2} f^2) / f$$

With Vi = compensated signal of channel i (i = x, y, z)
Normi = sensor sensitivity of channel I (i = x, y, z)
[mV/(V/m)2] for E-field 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):

$$E_{tot} = (E_x^2 + E_Y^2 + E_z^2)^{1/2}$$

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

$$SAR = (Etot^2 \cdot \sigma) / (\varepsilon \cdot 1000)$$

With SAR = local specific absorption rate in mW/g
Etot = total field strength in V/m
σ= conductivity in [mho/m] or [Siemens/m]
ε= equivalent tissue density in g/cm3

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 to be a free space field.

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

with Ppwe = equivalent power density of a plane wave in mW/cm2
Etot = total electric field strength in V/m
Htot = total magnetic field strength in A/m

4 SAR measurement variability and uncertainty

4.1 SAR measurement variability

Per KDB865664 D01 SAR measurement 100 MHz to 6 GHz v01r04, SAR measurement variability must be assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. The additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.

2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.

3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).

4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

The same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds.

4.2 SAR measurement uncertainty

Per KDB865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg, the extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval. The equivalent ratio (1.5/1.6) is applied to extremity and occupational exposure conditions.

5 Description of Test Position

5.1 Extremity exposure conditions

Devices that are designed or intended for use on extremities, or mainly operated in extremity only exposure conditions, i.e., hands, wrists, feet and ankles, may require extremity SAR evaluation.

The closest distance from the antenna to an adjacent device surface is used to determine if SAR testing is required for the adjacent surfaces, with the adjacent surface positioned against the phantom and the surface containing the antenna positioned perpendicular to the phantom

6 SAR System Verification Procedure

6.1 Tissue Simulate Liquid

6.1.1 Recipes for Tissue Simulate Liquid

The bellowing tables give the recipes for tissue simulating liquids to be used in different frequency bands：

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
HSL5GHz is composed of the following ingredients： Water：50-65% Mineral oil：10-30% Emulsifiers：8-25% Sodium salt：0-1.5%										
MSL5GHz is composed of the following ingredients： Water：64-78% Mineral oil：11-18% Emulsifiers：9-15% Sodium salt：2-3%										

Table 1： Recipe of Tissue Simulate Liquid

6.1.2 Test Liquids Confirmation

Simulated tissue liquid parameter confirmation

The dielectric parameters were checked prior to assessment using the SPEAG DAK3.5 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	35.3	5.27	48.2	6.00

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

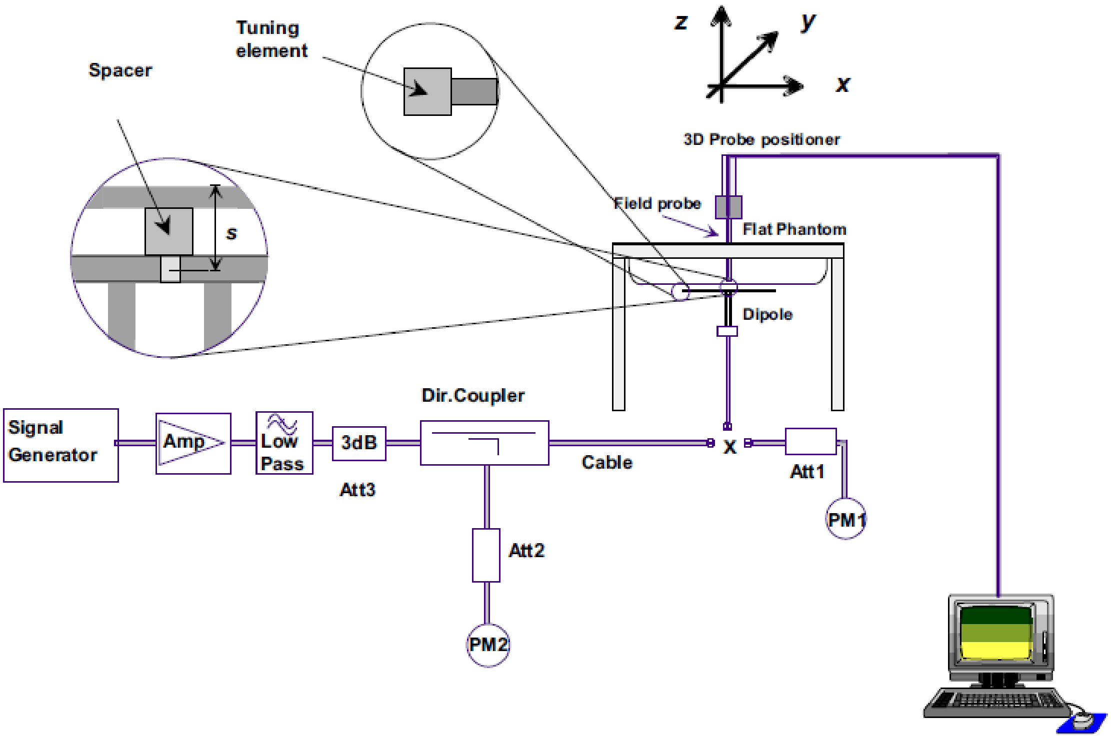
6.1.3 Measurement for Tissue Simulate Liquid

The dielectric properties for this Tissue Simulate Liquids were measured by using the SPEAG DAK3.5 dielectric probe kit in conjunction with Agilent E5071B Network Analyzer (300 KHz-8500 MHz). The Conductivity (σ) and Permittivity (ρ) are listed in bellow table. For the SAR measurement given in this report. The temperature variation of the Tissue Simulate Liquids was 22±2°C.

Tissue Type	Measured Frequency （MHz）	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Liquid Temp. (℃)	Date
750 Head	750	0.90	41.66	0.89	41.90	0.90	-0.57	±5	22.1	2022/6/2
835 Head	835	0.91	40.67	0.90	41.50	1.00	-2.00	±5	22.1	2022/6/2
1800 Head	1800	1.37	38.24	1.40	40.00	-1.93	-4.39	±5	22.1	2022/6/2
1900 Head	1900	1.38	38.56	1.40	40.00	-1.14	-3.60	±5	22.1	2022/6/2

6.2 SAR System Check

The microwave circuit arrangement for system check is sketched in bellow figure. The daily system accuracy verification occurs within the flat section of the SAM phantom. A SAR measurement was performed to see if the measured SAR was within +/- 10% from the target SAR values. The tests were conducted on the same days as the measurement of the EUT. The obtained results from the system accuracy verification are displayed in the following table. During the tests, the ambient temperature of the laboratory was in the range 22±2°C, the relative humidity was in the range 60% and the liquid depth above the ear reference points was above 15 cm in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.



F-3. the microwave circuit arrangement used for SAR system verification

6.2.1 Justification for Extended SAR Dipole Calibrations

1) Referring to KDB865664 D01 requirements for dipole calibration, instead of the typical annual calibration recommended by measurement standards, longer calibration intervals of up to three years may be considered when it is demonstrated that the SAR target, impedance and return loss of a dipole have remain stable according to the following requirements. Each measured dipole is expected to evaluate with the following criteria at least on annual interval in Appendix C.

a) There is no physical damage on the dipole;

b) System check with specific dipole is within 10% of calibrated value;

c) Return-loss is within 10% of calibrated measurement;

d) Impedance is within 5Ω from the previous measurement.

2) Network analyzer probe calibration against air, distilled water and a shorting block performed before measuring liquid parameters.

6.2.2 SAR System Validation Result(s)

Validation Kit		Measured SAR 250mW	Measured SAR 250mW	Measured SAR (normalized to 1w)	Measured SAR (normalized to 1w)	Target SAR (normalized to 1w) (±10%)	Target SAR (normalized to 1w) (±10%)	Liquid Temp. (°C)	Measured Date
		1g (W/kg)	10g (W/kg)	1g (W/kg)	10g (W/kg)	1-g(W/kg)	10-g(W/kg)		
D750V2	Head	2.15	1.41	8.6	5.64	8.23 (7.41~9.05)	5.41 (4.87~5.95)	22.1	2022/6/2
D835V2	Head	2.44	1.55	9.76	6.2	9.41 (8.47~10.35)	6.25 (5.63~6.88)	22.1	2022/6/2
D1800V2	Head	8.78	4.71	35.12	18.84	38.4 (34.56~42.24)	20.2 (18.18~22.22)	22.2	2022/6/2
D1900V2	Head	9.3	4.68	37.2	18.72	39.7 (35.73~43.67)	20.5 (18.45~22.55)	22.3	2022/6/2

6.2.3 Detailed System Check Results

Please see the Appendix A

7 Test Configuration

7.1 Operation Configurations

7.1.1 GSM Test Configuration

SAR tests for GSM900 and GSM1800, a communication link is set up with a base station by air link. Using CMW500 the power lever is set to “5”and “0” in SAR of GSM900 and GSM1800. The tests in the band of GSM900 and GSM1800 are performed in the mode of GPRS/EGPRS function. Since the GPRS class is 12 for this EUT, it has at most 4 timeslots in uplink and at most 4 timeslots in downlink, the maximum total timeslot is 5. The EGPRS class is 12 for this EUT, it has at most 4 timeslots in uplink, and at most 4 timeslots in downlink, the maximum total timeslot is 5.

SAR test reduction for GPRS and EDGE modes is determined by the source-based time-averaged output power specified for production units. The data mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power, the higher number time-slot configuration should be tested.

When SAR tests for EGPRS mode is necessary, GMSK modulation should be used to minimize SAR measurement error due to higher peak-to-average power (PAR) ratios inherent in 8-PSK.

The 3G SAR test reduction procedure is applied to 8-PSK EDGE with GMSK GPRS/EDGE as the primary mode.

7.1.2 LTE Test Configuration

Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR. The R&S CMW500 was used for LTE output power measurements and SAR testing. Max power control was used so the UE transmits with maximum output power during SAR testing. SAR must be measured with the maximum TTI (transmit time interval) supported by the device in each LTE configuration.

A) Spectrum Plots for RB Configurations

A properly configured base station simulator was used for SAR tests and power measurements. Therefore, spectrum plots for RB configurations were not required to be included in this report.

B) MPR

MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.

Modulation	Channel bandwidth / Transmission bandwidth (N_{RB})						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

C) A-MPR

A-MPR (Additional MPR) has been disabled for all SAR tests by setting NS=01 on the base station simulator.

D) Largest channel bandwidth standalone SAR test requirements

1) QPSK with 1 RB allocation

Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel. When the measured SAR is ≤ 1.0 W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel. When the measured SAR of a required test channel is > 1.80 W/kg, SAR is required for all three RB offset configurations for that required test channel.

2) QPSK with 50% RB allocation

For QPSK with 50% RB allocation, SAR is only required measure for the worst case of 1RB allocation used the highest maximum output power.

3) QPSK with 100% RB allocation

For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest measured SAR for 1 RB and 50% RB allocation in 1) and 2) are ≤ 1.0 W/kg. Otherwise, SAR is measured for the highest output power channel and if the measured SAR is > 1.80 W/kg, the remaining required test channels must also be tested.

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4) Higher order modulations

For each modulation besides QPSK; e.g., 16-QAM, 64-QAM, apply the QPSK procedures in above sections to determine the QAM configurations that may need SAR measurement. For each configuration identified as required for testing, SAR is required only when the highest maximum output power for the configuration in the higher order modulation is > ½ dB higher than the same configuration in QPSK or when the measured SAR for the QPSK configuration is > 1.80 W/kg.

E) Other channel bandwidth standalone SAR test requirements

For the other channel bandwidths used by the device in a frequency band, apply all the procedures required for the largest channel bandwidth in section A) to determine the channels and RB configurations that need SAR testing and only measure SAR when the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is > ½ dB higher than the equivalent channel configurations in the largest channel bandwidth configuration or the measured SAR of a configuration for the largest channel bandwidth is > 1.80 W/kg.

8 Test Result

8.1 Measurement of RF Conducted Power

8.1.1 Conducted Power Of GSM

GSM 850										
Burst Output Power(dBm)					Tune up	Division Factors	Frame-Average Output Power(dBm)			Tune up
Channel		128	190	251			128	190	251	
GPRS/EGPRS (GMSK)	1 TX Slot	32.76	32.58	31.93	33	-9.03	23.73	23.55	22.9	23.97
	2 TX Slots	**32.07**	**31.6**	**30.81**	**32.5**	-6.02	**26.05**	25.58	24.79	**26.48**
	3 TX Slots	29.35	29.47	28.76	30.5	-4.26	25.09	25.21	24.5	26.24
	4 TX Slots	28.3	27.68	27.7	29	-3.01	25.29	24.67	24.69	25.99
EGPRS(8PSK)	1 TX Slot	24.89	24.59	24.41	25.5	-9.03	15.86	15.56	15.38	16.47
	2 TX Slots	24.83	24.58	24.15	25	-6.02	18.81	18.56	18.13	18.98
	3 TX Slots	23.02	22.92	22.33	23.5	-4.26	18.76	18.66	18.07	19.24
	4 TX Slots	21.8	**23.46**	21.34	**24**	-3.01	18.79	20.45	18.33	**20.99**
GSM 1900										
Burst Output Power(dBm)					Tune up	Division Factors	Frame-Average Output Power(dBm)			Tune up
Channel		512	661	810			512	661	810	
GPRS/EGPRS (GMSK)	1 TX Slot	27.54	27.27	27.13	28	-9.03	18.51	18.24	18.1	18.97
	2 TX Slots	**26.15**	**25.9**	**25.71**	**27**	-6.02	**20.13**	19.88	19.69	**20.98**
	3 TX Slots	24.24	23.97	23.77	25	-4.26	19.98	19.71	19.51	20.74
	4 TX Slots	22.89	22.64	22.51	23.5	-3.01	19.88	19.63	19.5	20.49
EGPRS(8PSK)	1 TX Slot	23.17	22.97	22.59	23.5	-9.03	14.14	13.94	13.56	14.47
	2 TX Slots	22.09	21.95	22.79	23	-6.02	16.07	15.93	16.77	16.98
	3 TX Slots	20.1	20.01	19.8	21	-4.26	15.84	15.75	15.54	16.74
	4 TX Slots	18.85	**18.91**	18.56	**20**	-3.01	15.84	15.9	15.55	**16.99**

8.1.2 Conducted Power of CatM1

LTE Band 2				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel 18607	Channel 18900	Channel 19193	Tune up
1.4MHz	QPSK	1	0	21.47	21.41	21.46	22.5
		1	2	21.31	21.51	21.54	22.5
		1	5	21.11	21.4	21.36	22.5
		3	0	21.22	21.39	21.39	22
		3	2	21.4	21.48	21.44	22
		3	3	21.18	21.34	21.31	22
		6	0	20.08	20.64	20.6	21
	16QAM	1	0	21.08	20.49	20.5	22
		1	2	20.32	20.46	20.52	22
		1	5	20.17	20.61	20.32	22
		3	0	20.65	20.64	20.38	21
		3	2	20.68	20.56	20.59	21
		3	3	20.59	20.4	20.61	21
		6	0	20.63	20.16	20.24	22
Bandwidth	Modulation	RB size	RB offset	Channel 18615	Channel 18900	Channel 19185	Tune up
3MHz	QPSK	1	0	21.42	21.76	21.56	22.5
		1	2	21.14	21.36	21.73	22.5
		1	5	21.03	21.22	21.55	22.5
		3	0	20.13	20.26	20.33	21
		3	2	20.21	20.24	20.32	21
		3	3	20.25	20.22	20.37	21
		6	0	20.26	20.71	20.46	21
	16QAM	1	0	21.11	20.7	20.32	22
		1	2	20.29	20.44	20.1	22
		1	5	20.09	20.76	20.42	22
		3	0	20.04	20.05	20	21
		3	2	20.02	20.12	20	21
		3	3	20.15	20.2	20.02	21
		6	0	20.7	20.49	20.31	22
Bandwidth	Modulation	RB size	RB offset	Channel 18625	Channel 18900	Channel 19175	Tune up
5MHz	QPSK	1	0	21.31	21.51	21.48	22.5
		1	2	21.31	21.47	21.96	22.5
		1	5	21.14	21.3	21.52	22.5
		3	0	20.13	20.16	20.28	21
		3	2	20.11	20.25	20.17	21

		3	3	20.19	20.18	20.2	21
		6	0	20.15	20.62	20.46	21
	16QAM	1	0	21.08	20.57	20.28	22
		1	2	20.2	20.14	20.22	22
		1	5	20.26	20.47	20.71	22
		3	0	20.33	20.23	20.05	21
		3	2	20.23	20.16	20.03	21
		3	3	20.03	20.11	20.06	21
		6	0	20.6	20.35	20.3	21
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				18650	18900	19150	
10MHz	QPSK	1	0	21.54	21.75	21.65	22.5
		1	2	21.73	21.49	21.92	22.5
		1	5	21.29	21.53	21.49	22.5
		3	0	20.19	20.34	20.41	21
		3	2	20.4	20.3	20.38	21
		3	3	20.27	20.22	20.33	21
		6	0	20.16	20.76	20.57	21
	16QAM	1	0	21.42	20.61	20.15	22
		1	2	20.51	20.22	20.51	22
		1	5	20.12	20.48	20.8	22
		3	0	20.35	20.15	20.05	21
		3	2	20.12	20.11	20.1	21
		3	3	20.45	20.11	20.03	21
		6	0	20.8	20.4	20.21	21.5
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				18675	18900	19125	
15MHz	QPSK	1	0	21.56	21.68	21.47	22.5
		1	2	21.75	21.75	21.92	22.5
		1	5	21.36	21.47	21.41	22.5
		3	0	20.3	20.25	20.37	21
		3	2	20.34	20.2	20.32	21
		3	3	20.19	20.26	20.3	21
		6	0	20.35	20.72	20.55	21
	16QAM	1	0	21.3	20.35	20.12	22
		1	2	20.22	20.21	20.2	22
		1	5	20.38	20.42	20.88	22
		3	0	20.15	20.22	20.02	21
		3	2	20.13	20.11	20.1	21
		3	3	20.34	20.12	20.08	21
		6	0	20.91	20.42	20.36	21.5
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				18700	18900	19100	

20MHz	QPSK	1	0	21.64	21.64	21.59	22.5
		1	2	**21.71**	**21.63**	**21.96**	**22.5**
		1	5	21.44	21.46	21.56	22.5
		3	0	20.26	20.3	20.27	21
		3	2	**20.46**	20.27	20.41	21
		3	3	20.4	20.25	20.35	21
		6	0	20.46	20.71	20.45	21
	16QAM	1	0	21.32	20.25	20.16	22
		1	2	20.04	20.45	20.28	22
		1	5	20.71	20.2	20.98	22
		3	0	20.32	20.03	20.07	21
		3	2	20.32	20.15	20.11	21
		3	3	20.41	20.02	20.09	21
		6	0	20.93	20.55	20.27	21.5

LTE Band 4				**Conducted Power(dBm)**			
Bandwidth	Modulation	RB size	RB offset	Channel 19957	Channel 20175	Channel 20393	Tune up
1.4MHz	QPSK	1	0	21.83	21.19	21.27	22
		1	2	21.6	20.96	21.29	22
		1	5	21.55	21.13	21.11	22
		3	0	20.58	20.26	20.39	21
		3	2	20.68	20.26	20.57	21
		3	3	20.24	20.01	20.55	21
		6	0	20.61	20.26	20.05	21
	16QAM	1	0	21.86	20.27	20.16	22
		1	2	20.96	20.22	20.22	22
		1	5	20.97	20.3	20.51	22
		3	0	20.14	20.41	20.12	21
		3	2	20.02	20.25	20.22	21
		3	3	20.29	20.05	20.31	21
		6	0	21.21	20.07	20.26	21.5
Bandwidth	Modulation	RB size	RB offset	Channel 19965	Channel 20175	Channel 20385	Tune up
3MHz	QPSK	1	0	21.38	21.35	21	22
		1	2	21.57	21.13	21.28	22
		1	5	21.56	21.25	21.14	22
		3	0	20.56	20.69	20.72	21
		3	2	20.7	20.62	20.49	21
		3	3	20.71	20.43	20.44	21
		6	0	20.66	20.73	20	21
	16QAM	1	0	21.91	20.69	20.53	22

		1	2	20.94	20.14	20.26	22
		1	5	20.92	20.35	20.85	22
		3	0	20.1	20.43	20.1	21
		3	2	20.05	20.2	20.26	21
		3	3	20.33	20.34	20.05	21
		6	0	21.17	20.49	20.23	21.5
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				19975	20175	20375	
5MHz	QPSK	1	0	21.78	21.18	21.3	22
		1	2	21.37	21.11	21.44	22
		1	5	21.53	21.05	21.22	22
		3	0	20.64	20.24	20.37	21
		3	2	20.62	20.24	20.48	21
		3	3	20.62	20.39	20.45	21
		6	0	20.63	20.71	20.11	21
	16QAM	1	0	21.89	20.66	20.21	22
		1	2	20.95	20.09	20.2	22
		1	5	20.91	20.71	20.54	22
		3	0	20.13	20.37	20.55	21
		3	2	20.04	20.54	20.14	21
		3	3	20.35	20.14	20.26	21
		6	0	21.22	20.52	20.44	21.5
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				20000	20175	20350	
10MHz	QPSK	1	0	21.41	21.18	21.29	22
		1	2	21.28	21.06	21.39	22
		1	5	21.55	21.17	21.2	22
		3	0	20.62	20.24	20.55	21
		3	2	20.64	20.29	20.57	21
		3	3	20.64	20.41	20.51	21
		6	0	20.58	20.28	20.11	21
	16QAM	1	0	21.84	20.73	20.13	22
		1	2	20.96	20.35	19.85	22
		1	5	20.78	20.63	20.84	22
		3	0	20.12	20.45	20.55	21
		3	2	20.39	20.06	20.39	21
		3	3	20.34	20.06	20.33	21
		6	0	21.2	20.51	20.33	21.5
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				20025	20175	20325	
15MHz	QPSK	1	0	21.37	21.51	21.44	22
		1	2	21.6	21.19	21.45	22
		1	5	21.14	21.16	21.05	22

		3	0	20.6	20.31	20.49	21
		3	2	20.62	20.24	20.52	21
		3	3	20.7	20.35	20.57	21
		6	0	20.66	20.3	20.2	21
	16QAM	1	0	21.86	20.67	20.53	22
		1	2	20.93	20.49	20.35	22
		1	5	20.72	20.64	20.85	22
		3	0	20.13	20.45	20.13	21
		3	2	20.23	20.52	20.17	21
		3	3	20.28	20.05	20.14	21
		6	0	21.17	20.1	20.19	21.5
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				20050	20175	20300	
20MHz	QPSK	1	0	**21.48**	21.06	21.42	22
		1	2	21.37	21.21	21.41	22
		1	5	21.16	21.13	21.01	22
		3	0	20.64	20.23	20.5	21
		3	2	20.64	20.2	20.4	21
		3	3	**20.67**	20.33	20.44	21
		6	0	20.62	20.68	20.04	21
	16QAM	1	0	21.91	20.52	20.55	22
		1	2	20.69	20.53	20.64	22
		1	5	20.93	20.66	20.85	22
		3	0	20.11	20.05	20.29	21
		3	2	20.01	20.26	20.49	21
		3	3	20.29	20.05	20.17	21
		6	0	21.2	20.12	20.35	21.5

LTE FDD Band 12				**Conducted Power(dBm)**			
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				23017	23095	23173	
1.4MHz	QPSK	1	0	23.81	23.32	23.16	24
		1	2	23.62	23.1	23.33	24
		1	5	23.57	23.08	23.16	24
		3	0	22.4	22.37	22.56	23
		3	2	22.54	22.43	22.51	23
		3	3	22.47	22.47	22.44	23
		6	0	22.34	22.38	22.04	23
	16QAM	1	0	22.73	22.69	22.13	23
		1	2	22.28	22.2	22.27	23
		1	5	22.34	22.04	22.2	23
		3	0	22.17	22.4	22.24	23

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		3	2	21.89	22.26	22.35	23
		3	3	22.06	22.34	22.31	23
		6	0	22.94	22.15	22.22	23.5
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				23025	23095	23165	
3MHz	QPSK	1	0	23.57	23.41	23.38	24
		1	2	23.53	22.91	23.25	24
		1	5	23.43	23.04	22.9	24
		3	0	22.43	22.42	22.54	23
		3	2	22.38	22.44	22.65	23
		3	3	22.48	22.45	22.56	23
		6	0	22.42	22.46	22.11	23
	16QAM	1	0	22.52	22.36	21.62	23.5
		1	2	22.75	21.86	22.01	23.5
		1	5	22.7	21.71	22.44	23.5
		3	0	21.64	22	22.42	23
		3	2	21.72	21.92	22.54	23
		3	3	22.19	21.89	22.34	23
		6	0	22.95	22.21	22.2	23.5
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				23035	23095	23155	
5MHz	QPSK	1	0	23.52	23.33	23.08	24
		1	2	23.6	23.18	23.38	24
		1	5	23.1	22.81	23.07	24
		3	0	22.32	22.4	22.5	23
		3	2	22.47	22.39	22.59	23
		3	3	22.54	22.41	22.56	23
		6	0	22.51	22.47	22.15	23
	16QAM	1	0	22.97	22.74	21.96	23.5
		1	2	22.55	21.75	22.5	23.5
		1	5	22.66	22.14	22.29	23.5
		3	0	21.67	21.96	22.39	23
		3	2	21.6	21.95	22.28	23
		3	3	22.24	22.16	22.27	23
		6	0	22.92	22.28	22.35	23.5
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				23060	23095	23130	
10MHz	QPSK	1	0	23.46	23.54	23.18	24
		1	2	**23.6**	**23.22**	**23.42**	**24**
		1	5	23.42	23.21	23.07	24
		3	0	22.4	22.48	22.36	23
		3	2	22.57	22.44	**22.6**	23
		3	3	22.54	22.44	22.51	23

		6	0	22.51	22.43	22.09	23
	16QAM	1	0	22.98	22.02	22.27	23.5
		1	2	22.97	22.39	22.71	23.5
		1	5	22.82	22	22.55	23.5
		3	0	21.91	22.38	22.59	23
		3	2	21.91	21.98	22.33	23
		3	3	22.24	22.16	22.39	23
		6	0	22.72	22.25	22.4	23

LTE FDD Band 13				**Conducted Power(dBm)**			
Bandwidth	Modulation	RB size	RB offset	Channel 23205	Channel 23230	Channel 23255	Tune up
5MHz	QPSK	1	0	23.69	23.44	23.21	24
		1	2	23.85	23.21	23.14	24
		1	5	23.58	23.11	22.96	24
		3	0	22.74	22.49	22.53	23
		3	2	22.8	22.4	22.53	23
		3	3	22.77	22.48	22.56	23
		6	0	22.77	22.48	22.19	23
	16QAM	1	0	23.06	23.11	23.05	23.5
		1	2	22.8	22.86	22.73	23.5
		1	5	22.96	22.3	22.51	23.5
		3	0	22.37	22.36	22.29	23
		3	2	22.27	22.3	22.58	23
		3	3	22.59	22.19	22.34	23
		6	0	22.85	22.46	22.6	23.5
Bandwidth	Modulation	RB size	RB offset	Channel NA	Channel 23230	Channel NA	Tune up
10MHz	QPSK	1	0	NA	**23.6**	NA	24
		1	2	NA	22.78	NA	24
		1	5	NA	23.35	NA	24
		3	0	NA	**22.59**	NA	23
		3	2	NA	22.51	NA	23
		3	3	NA	22.48	NA	23
		6	0	NA	22.6	NA	23
	16QAM	1	0	NA	22.56	NA	23
		1	2	NA	22.49	NA	23
		1	5	NA	22.47	NA	23
		3	0	NA	22.48	NA	23
		3	2	NA	22.06	NA	23
		3	3	NA	22.18	NA	23
		6	0	NA	22.46	NA	23

8.2 Stand-alone SAR test evaluation

The following SAR test exclusion Thresholds based on KDB 447498 D04 Interim General RF Exposure Guidance v01 Appendix B B.4

For Extremity

Freq.Band	Frequency (MHz)	Position	Max Power (dBm)	Max Power (mW)	separation distance (cm)	Exclusion Power (mW)	Exclusion (Yes/No)
GSM850	0.848	Extremity	32.5	1778.3	0.5	22.6	No
GSM1900	1.909	Extremity	28.0	631.0	0.5	8.4	No
LTE Band 2	1.91	Extremity	22.5	177.8	0.5	8.4	No
LTE Band 4	1.755	Extremity	22.0	158.5	0.5	9.0	No
LTE Band 12	0.716	Extremity	24	251.2	0.5	28.7	No
LTE Band 13	0.787	Extremity	24	251.2	0.5	25.1	No

Note:

1. Maximum power is the source-based time-average power and represents the maximum RF output power among production units
2. Per KDB 447498 D04, for larger devices, the test separation distance of adjacent edge configuration is determined by the closest separation between the antenna and the user.
3. Per KDB 447498 D04, standalone SAR test exclusion threshold is applied; If the distance of the antenna to the user is < 5mm, 5mm is used to determine SAR exclusion threshold
4. Per KDB 447498 D04, the 1-g and 10-g SAR test exclusion thresholds for 300 MHz to 6 GHz

This method shall only be used at separation distances from 0.5 cm to 40 cm and at frequencies from 0.3 GHz to 6 GHz (inclusive). Pth is given by Formula (B.2).

$$P_{\text{th}}\ (\text{mW}) = ERP_{20\ \text{cm}}\ (\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \le f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \end{cases} \qquad (\text{B}.1)$$

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$$P_{th}\,(\mathrm{mW}) = \begin{cases} ERP_{20\,cm}(d/20\,\mathrm{cm})^{x} & d \le 20\,\mathrm{cm} \\ ERP_{20\,cm} & 20\,\mathrm{cm} < d \le 40\,\mathrm{cm} \end{cases} \qquad (B.2)$$

where

$$x = -\log_{10}\left(\frac{60}{ERP_{20\,cm}\sqrt{f}}\right)$$

and *f* is in GHz, *d* is the separation distance (cm), and ERP_{20cm} is per Formula (B.1).
The example values shown in Table B.2 are for illustration only.

Table B.2—Example Power Thresholds (mW)

Frequency (MHz)	Distance (mm)									
	5	10	15	20	25	30	35	40	45	50
300	39	65	88	110	129	148	166	184	201	217
450	22	44	67	89	112	135	158	180	203	226
835	9	25	44	66	90	116	145	175	207	240
1900	3	12	26	44	66	92	122	157	195	236
2450	3	10	22	38	59	83	111	143	179	219
3600	2	8	18	32	49	71	96	125	158	195
5800	1	6	14	25	40	58	80	106	136	169

5. when 10-g extremity SAR applies, SAR test exemption may be considered by applying a factor of 2.5 to the

8.3 Measurement of SAR Data

8.3.1 SAR Result Of GSM 850

Test position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	SAR (W/kg) 10-g	Power Drift (dB)	Conducted Power (dBm)	Tune up Limit (dBm)	Scaled factor	Scaled SAR (W/kg) 10-g	Liquid Temp	SAR limit (W/kg)
Extremity Test data 0mm												
Front side	GPRS 2TS	128/824.2	1:2.075	2.06	1.29	0.06	32.07	32.5	1.104	1.424	22.1	4.0
Front side	GPRS 2TS	190/836.6	1:2.075	2.18	1.45	-0.03	31.6	32.5	1.230	**1.784**	22.1	4.0
Front side	GPRS 2TS	251/848.8	1:2.075	1.52	0.951	-0.11	30.81	32.5	1.476	1.403	22.1	4.0
Front side	EGPRS 4TS	190/836.6	1:2.075	1.76	1.01	0.05	23.46	24	1.132	1.144	22.1	4.0

Note:

1) The maximum Scaled SAR value is marked in bold. Graph Results refer to Appendix B

2) If the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg (2.0W/kg for 10g) then testing at the other channels is not required for such test configuration(s).

8.3.2 SAR Result Of PCS 1900

Test position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	SAR (W/kg) 10-g	Power Drift(dB)	Conducted Power (dBm)	Tune up Limit (dBm)	Scaled factor	Scaled SAR (W/kg) 10-g	Liquid Temp	SAR limit (W/kg)
Extremity Test data 0mm												
Front side	GPRS 2TS	512/1850.2	1:2.075	2.36	1.34	0.04	26.15	27	1.216	**1.630**	22.3	4.0
Front side	GPRS 2TS	661/1880	1:2.075	2.22	1.05	0.13	25.9	27	1.288	1.353	22.3	4.0
Front side	GPRS 2TS	810/1909.8	1:2.075	2.08	1.17	-0.15	25.71	27	1.346	1.575	22.3	4.0
Front side	EGPRS 4TS	661/1880	1:2.075	1.79	0.97	-0.09	18.91	20	1.285	1.247	22.3	4.0

Note:

3) The maximum Scaled SAR value is marked in bold. Graph Results refer to Appendix B

4) If the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg (2.0W/kg for 10g) then testing at the other channels is not required for such test configuration(s).

8.3.3 SAR Result Of LTE CatM1 band 2

Test position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	SAR (W/kg) 10-g	Power Drift (dB)	Conducted power (dBm)	Tune up Limit (dBm)	Scaled factor	Scaled SAR (W/kg) 10-g	Liquid Temp.	SAR limit (W/kg)
Extremity Test data 0mm												
Front side	20M_QPSK 1RB_2	19100/1900	1:1	0.301	0.169	0.17	21.96	22.5	1.132	0.191	22.3	4.0
Front side	20M_QPSK 1RB_2	18900/1880	1:1	0.33	0.181	-0.18	21.63	22.5	1.222	**0.221**	22.3	4.0
Front side	20M_QPSK 1RB_2	18700/1860	1:1	0.248	0.147	0.05	21.71	22.5	1.199	0.176	22.3	4.0
Front side	20M_QPSK 3RB_2	18700/1860	1:1	0.258	0.133	0.07	20.46	21	1.132	0.151	22.3	4.0

Note:

5) The maximum Scaled SAR value is marked in bold. Graph Results refer to Appendix B

6) If the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg (2.0W/kg for 10g) then testing at the other channels is not required for such test configuration(s).

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8.3.4 SAR Result Of LTE CatM1 band 4

Test position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	SAR (W/kg) 10-g	Power Drift (dB)	Conducted power (dBm)	Tune up Limit (dBm)	Scaled factor	Scaled SAR (W/kg) 10-g	Liquid Temp.	SAR limit (W/kg)
Extremity Test data 0mm												
Front side	20M_QPSK 1RB_0	20050/1720	1:1	0.208	0.105	-0.17	21.48	22	1.127	0.118	22.2	4.0
Front side	20M_QPSK 1RB_0	20175/1732.5	1:1	0.253	0.145	0.04	21.06	22	1.242	**0.180**	22.2	4.0
Front side	20M_QPSK 1RB_0	20300/1745	1:1	0.211	0.122	-0.05	21.42	22	1.143	0.139	22.2	4.0
Front side	20M_QPSK 3RB_2	20050/1720	1:1	0.188	0.097	0.01	20.67	21	1.079	0.105	22.2	4.0

Note:

7) The maximum Scaled SAR value is marked in bold. Graph Results refer to Appendix B

8) If the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg (2.0W/kg for 10g) then testing at the other channels is not required for such test configuration(s).

8.3.5 SAR Result Of LTE CatM1 band 12

Test position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	SAR (W/kg) 10-g	Power Drift (dB)	Conducted power (dBm)	Tune up Limit (dBm)	Scaled factor	Scaled SAR (W/kg) 10-g	Liquid Temp.	SAR limit (W/kg)
Extremity Test data 0mm												
Front side	10M_QPSK 1RB_2	23060/704	1:1	0.102	0.062	-0.11	23.6	24	1.096	0.068	22.1	4.0
Front side	10M_QPSK 1RB_2	23095/707.5	1:1	0.126	0.076	-0.02	23.22	24	1.197	**0.091**	22.1	4.0
Front side	10M_QPSK 1RB_2	23130/711	1:1	0.099	0.064	0.09	23.42	24	1.143	0.073	22.1	4.0
Front side	10M_QPSK 3RB_2	23130/711	1:1	0.089	0.047	0.18	22.6	23	1.096	0.052	22.1	4.0

Note:

9) The maximum Scaled SAR value is marked in bold. Graph Results refer to Appendix B

10) If the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg (2.0W/kg for 10g) then testing at the other channels is not required for such test configuration(s).

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8.3.6 SAR Result Of LTE CatM1 band 13

Test position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	SAR (W/kg) 10-g	Power Drift (dB)	Conducted power (dBm)	Tune up Limit (dBm)	Scaled factor	Scaled SAR (W/kg) 10-g	Liquid Temp.	SAR limit (W/kg)
Extremity Test data 0mm												
Front side	10M_QPSK 1RB_0	23230/782	1:1	0.138	0.088	0.07	23.6	24	1.096	**0.096**	22.1	4.0
Front side	10M_QPSK 3RB_0	23230/782	1:1	0.101	0.064	-0.1	22.59	23	1.099	0.070	22.1	4.0

Note:

11) The maximum Scaled SAR value is marked in bold. Graph Results refer to Appendix B

12) If the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg (2.0W/kg for 10g) then testing at the other channels is not required for such test configuration(s).

8.4 Multiple Transmitter Evaluation

8.4.1 Simultaneous SAR SAR test evaluation

N/A

9 Equipment list

Test Platform	SPEAG DASY5 Professional					
Location	Compliance Certification Services (Kunshan) Inc.					
Software Reference	DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)					
Hardware Reference						
	Equipment	Manufacturer	Model	Serial Number	Calibration Date	Due date of calibration
☒	P C	HP	Core(rm)3.16G	CZCO48171H	N/A	N/A
☒	Signal Generator	Agilent	N5182A	MY50142015	2021/09/24	2022/09/23
☒	S-Parameter Network Analyzer	Agilent	E5071B	MY42301382	2022/02/20	2023/02/19
☒	DAK-3.5 probe	SPEAG	DAK-3.5	1102	N/A	N/A
☒	DAE	SPEAG	DAE4	1305	2022/04/27	2023/04/26
☒	E-field PROBE	SPEAG	EX3DV4	7515	2021/12/28	2022/12/27
☒	Dipole	SPEAG	D750V2	1188	2022/03/29	2025/03/28
☒	Dipole	SPEAG	D835V2	4d114	2022/03/31	2025/03/30
☒	Dipole	SPEAG	D1800V2	2d170	2022/03/31	2025/03/30
☒	Dipole	SPEAG	D1900V2	5d142	2021/06/25	2024/06/24
☒	Electro Thermometer	DTM	DTM3000	3030	2021/10/17	2022/10/16
☒	Amplifier	Mini-circuits	ZVE-8G	110405	N/A	N/A
☒	Amplifier	Mini-circuits	ZHL-42	QA1331003	N/A	N/A
☒	3db ATTENUATOR	MINI	MCL BW-S3W5	0533	N/A	N/A
☒	DUMMY PROBE	SPEAG	DP_2	SPDP2001AA	N/A	N/A
☒	Dual Directional Coupler	Woken	20W couple	DOM2BHW1A1	N/A	N/A
☒	SAM PHANTOM (ELI4 v4.0)	SPEAG	QDOVA001BB	1102	N/A	N/A
☐	Twin SAM Phantom	SPEAG	QD000P40CD	1609	N/A	N/A
☒	ROBOT	SPEAG	TX60	F10/5E6AA1/A101	N/A	N/A
☒	ROBOT KRC	SPEAG	CS8C	F10/5E6AA1/C101	N/A	N/A
☒	LIQUID CALIBRATION KIT	ANTENNESSA	41/05 OCP9	00425167	N/A	N/A

Note: All the equipments are within the valid period when the tests are performed.

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

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10 Calibration certificate

Please see the Appendix C

11 Photographs

Please see the Appendix D

Appendix A: Detailed System Check Results

The plots are showing as followings.

Date: 2022/06/02

Test Laboratory: Compliance Certification Services (Kunshan) Inc.

System Performance Check-D750

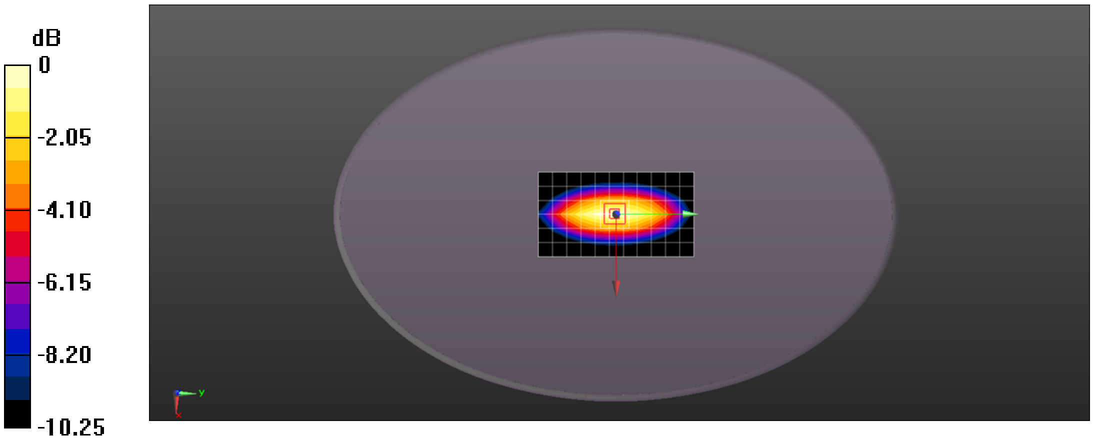
DUT: Dipole 750 MHz D750V3; Type: D750V2; Serial: 1188

Communication System: UID 0, CW (0); Frequency: 750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 750 MHz; σ = 0.898 S/m; ε_r = 41.66; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7515; ConvF(10.02, 10.02, 10.02); Calibrated: 2021/12/28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1305; Calibrated: 2022/04/27
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1102
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

System Performance Check at Frequencies Low 1 GHz/Pin=250 mW, dist=15 mm (EX-Probe)/Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.90 W/kg
System Performance Check at Frequencies Low 1 GHz/Pin=250 mW, dist=15 mm (EX-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.11 V/m; Power Drift = 0.01 dB; Peak SAR (extrapolated) = 3.43 W/kg
SAR(1 g) = 2.15 W/kg; SAR(10 g) = 1.41 W/kg
Maximum value of SAR (measured) = 2.94 W/kg



0 dB = 2.94 W/kg = 4.68 dBW/kg

Date: 2022/06/02

Test Laboratory: Compliance Certification Services (Kunshan) Inc.

System Performance Check-D835

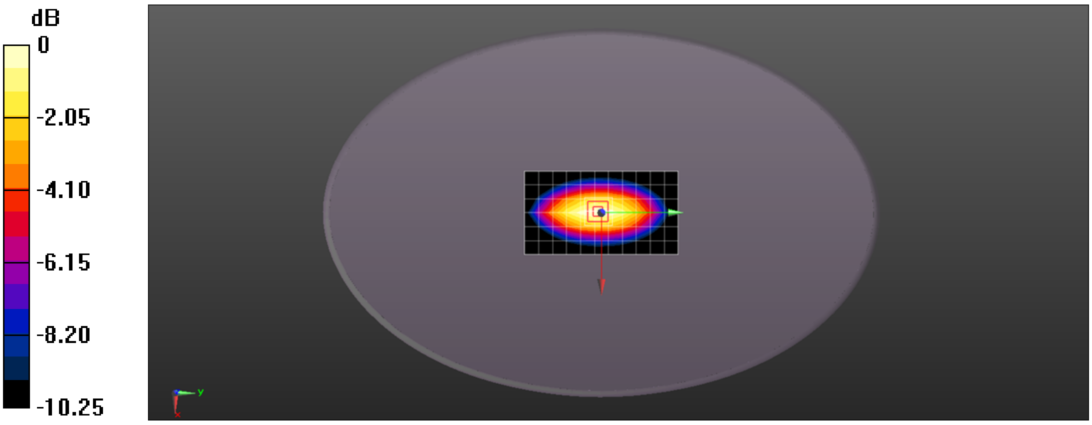
DUT: Dipole 835 MHz D835V2; Type: D835V2; Serial: 4d114

Communication System: UID 0, CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.909 S/m; ε_r = 40.668; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7515; ConvF(9.65, 9.65, 9.65); Calibrated: 2021/12/28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1305; Calibrated: 2022/04/27
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:xxxx
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

System Performance Check at Frequencies Low 1 GHz/dist=15mm, Pin=250 mW(EX-Probe)/Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 3.57 W/kg
System Performance Check at Frequencies Low 1 GHz/dist=15mm, Pin=250 mW(EX-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 64.54 V/m; Power Drift = -0.06 dB; Peak SAR (extrapolated) = 4.13 W/kg
SAR(1 g) = 2.44 W/kg; SAR(10 g) = 1.55 W/kg
Maximum value of SAR (measured) = 3.48 W/kg



0 dB = 3.48 W/kg = 5.42 dBW/kg

Date: 2022/06/02

Test Laboratory: Compliance Certification Services (Kunshan) Inc.

System Performance Check-D1800

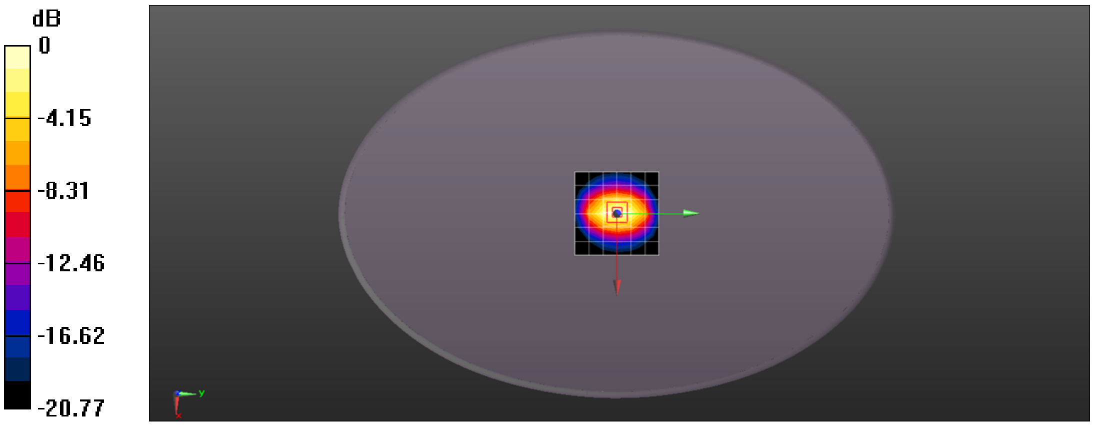
DUT: Dipole 1800 MHz D1800V2; Type: D1800V2; Serial: 2d170

Communication System: UID 10000, CW; Frequency: 1800 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1800 MHz; σ = 1.373 S/m; ε_r = 38.243; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7515; ConvF(8.4, 8.4, 8.4); Calibrated: 2021/12/28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1305; Calibrated: 2022/04/27
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:xxxx
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

System Performance Check at Frequencies above 1 GHz/dist=10mm, Pin=250 mW,(EX-Probe)/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 13.6 W/kg
System Performance Check at Frequencies above 1 GHz/dist=10mm, Pin=250 mW,(EX-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 103.3 V/m; Power Drift = -0.06 dB; Peak SAR (extrapolated) = 17.8 W/kg
SAR(1 g) = 8.78 W/kg; SAR(10 g) = 4.71 W/kg
Maximum value of SAR (measured) = 13.1 W/kg



0 dB = 13.1 W/kg = 11.17 dBW/kg

Date: 2022/06/02

Test Laboratory: Compliance Certification Services (Kunshan) Inc.

System Performance Check-D1900

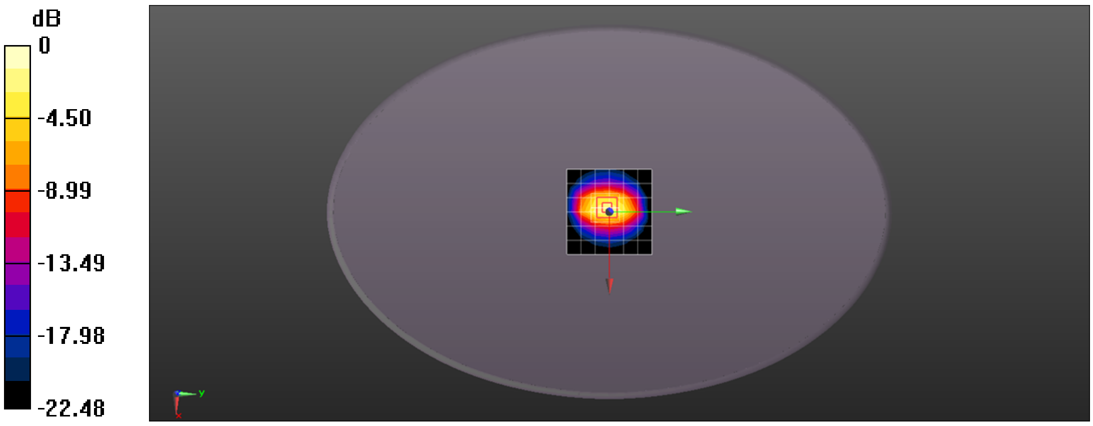
DUT: Dipole 1900 MHz D1900V2; Type: D1900V2; Serial: D1900V2 - SN:5d142

Communication System: UID 0, CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.384 S/m; ε_r = 38.56; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7515; ConvF(8.16, 8.16, 8.16); Calibrated: 2021/12/28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1305; Calibrated: 2022/04/27
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:xxxx
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=250 mW, dist=2.0mm (EX-Probe)/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 11.3 W/kg
System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=250 mW, dist=2.0mm (EX-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 92.07 V/m; Power Drift = 0.15 dB; Peak SAR (extrapolated) = 19.8 W/kg
SAR(1 g) = 9.3 W/kg; SAR(10 g) = 4.68 W/kg
Maximum value of SAR (measured) = 14.3 W/kg



0 dB = 14.3 W/kg = 11.55 dBW/kg

Appendix B: Detailed Test Results

The plots of worse case are showing as followings.

No.10, Weiye Road, Innovation Park, Kunshan, Jiangsu, China 215300 t(86-512)57355888 f(86-512)57370818 www.sgsgroup.com.cn
中国・江苏・昆山市留学生创业园伟业路10号 邮编 215300 t(86-512)57355888 f(86-512)57370818 sgs.china@sgs.com

Date: 2022/06/02

Test Laboratory: Compliance Certification Services (Kunshan) Inc.

GSM850 GPRS 2TS Front side 0mm Ch190

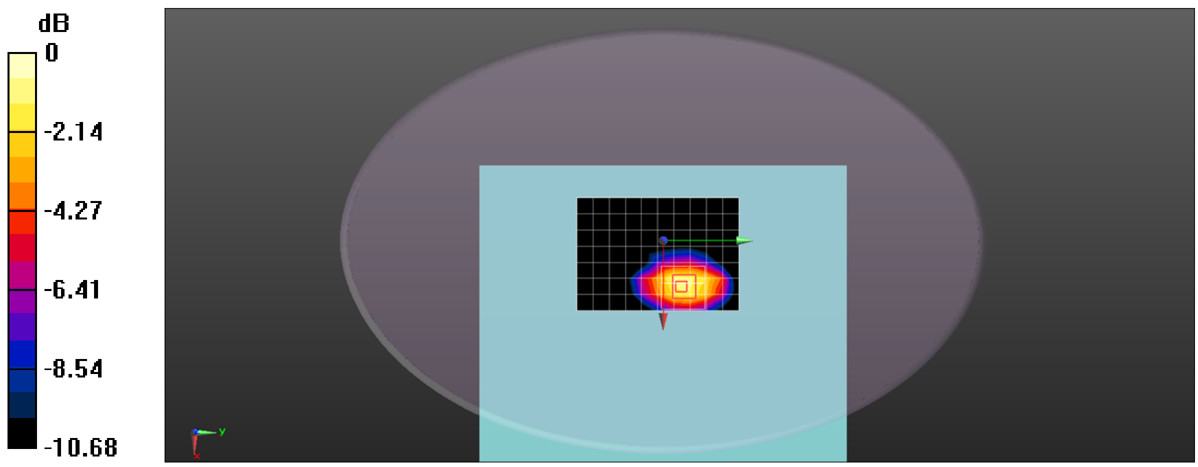
DUT: Body Scale; Type: BS-2001-G1

Communication System: UID 0, GPRS/EGPRS 2TX Slots (0); Frequency: 836.6 MHz;Duty Cycle: 1:2.07491
Medium parameters used: f = 837 MHz; σ = 0.912 S/m; ε_r = 40.599; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7515; ConvF(9.65, 9.65, 9.65); Calibrated: 2021/12/28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1305; Calibrated: 2022/04/27
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1102
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/Body/Area Scan (8x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.47 W/kg
Configuration/Body/Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.50 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 3.75 W/kg
SAR(1 g) = 2.18 W/kg; SAR(10 g) = 1.45 W/kg
Maximum value of SAR (measured) = 3.02 W/kg



0 dB = 3.02 W/kg = 4.80 dBW/kg

Test Laboratory: Compliance Certification Services (Kunshan) Inc.

GSM1900 GPRS 2TS Front side 0mm Ch512

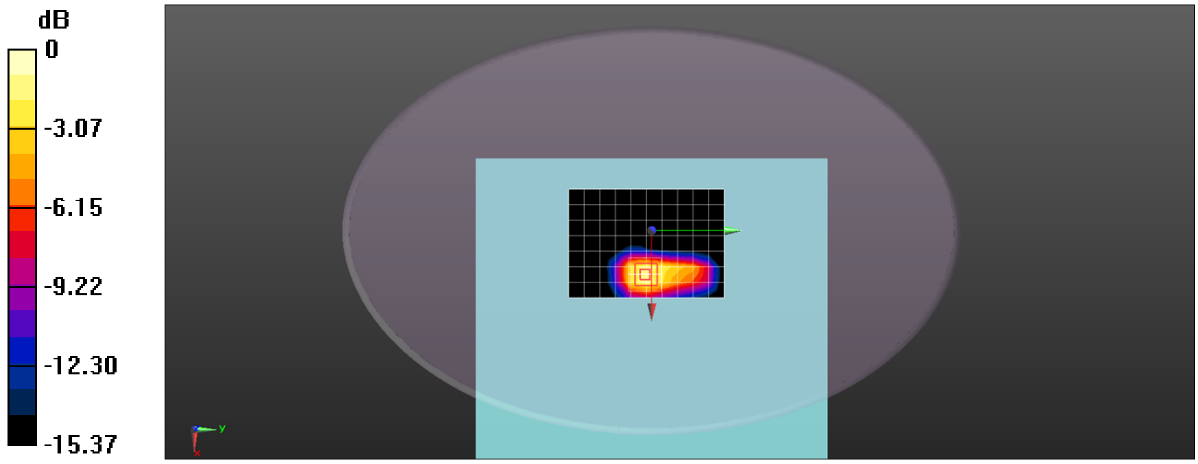
DUT: Body Scale; Type: BS-2001-G1

Communication System: UID 0, GPRS/EGPRS 2TX Slots (0); Frequency: 1850.2 MHz;Duty Cycle: 1:2.07491
Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.346 S/m; ε_r = 38.766; ρ = 1000 kg/m³
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7515; ConvF(8.16, 8.16, 8.16); Calibrated: 2021/12/28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1305; Calibrated: 2022/04/27
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1102
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/Body/Area Scan (8x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.66 W/kg
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.200 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 3.92 W/kg
SAR(1 g) = 2.36 W/kg; SAR(10 g) = 1.34 W/kg
Maximum value of SAR (measured) = 3.36 W/kg



0 dB = 3.36 W/kg = 5.26 dBW/kg

Date: 2022/06/02

Test Laboratory: Compliance Certification Services (Kunshan) Inc.

LTE CatM1 Band 2 20M QPSK 1RB2 Front side 0mm Ch18900

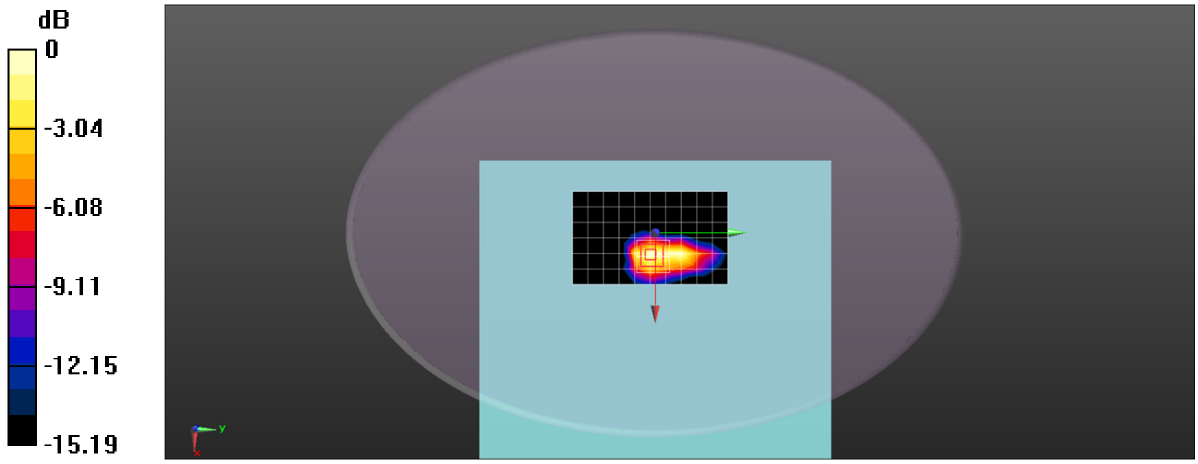
DUT: Body Scale; Type: BS-2001-G1

Communication System: UID 0, FDD_LTE (0); Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.364 S/m; ε_r = 38.641; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7515; ConvF(8.16, 8.16, 8.16); Calibrated: 2021/12/28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1305; Calibrated: 2022/04/27
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1102
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/Body/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.437 W/kg
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.896 V/m; Power Drift = -0.18 dB
Peak SAR (extrapolated) = 0.553 W/kg
SAR(1 g) = 0.330 W/kg; SAR(10 g) = 0.181 W/kg
Maximum value of SAR (measured) = 0.449 W/kg



0 dB = 0.449 W/kg = -3.48 dBW/kg

Date: 2022/06/02

Test Laboratory: Compliance Certification Services (Kunshan) Inc.

LTE CatM1 Band 4 20M QPSK 1RB2 Front side 0mm Ch20175

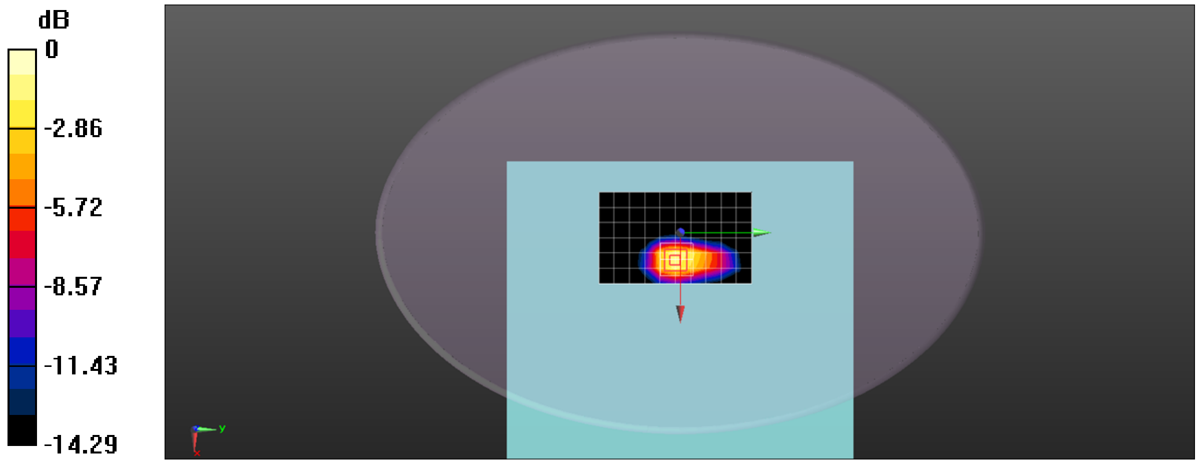
DUT: Body Scale; Type: BS-2001-G1

Communication System: UID 0, FDD_LTE (0); Frequency: 1732.5 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1732.5 MHz; σ = 1.312 S/m; ε_r = 38.553; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7515; ConvF(8.4, 8.4, 8.4); Calibrated: 2021/12/28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1305; Calibrated: 2022/04/27
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1102
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/Body/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.291 W/kg
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.481 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.430 W/kg
SAR(1 g) = 0.253 W/kg; SAR(10 g) = 0.145 W/kg
Maximum value of SAR (measured) = 0.355 W/kg



0 dB = 0.355 W/kg = -4.50 dBW/kg

Date: 2022/06/02

Test Laboratory: Compliance Certification Services (Kunshan) Inc.

LTE CatM1 Band 12 10M QPSK 1RB2 Front side 0mm Ch23095

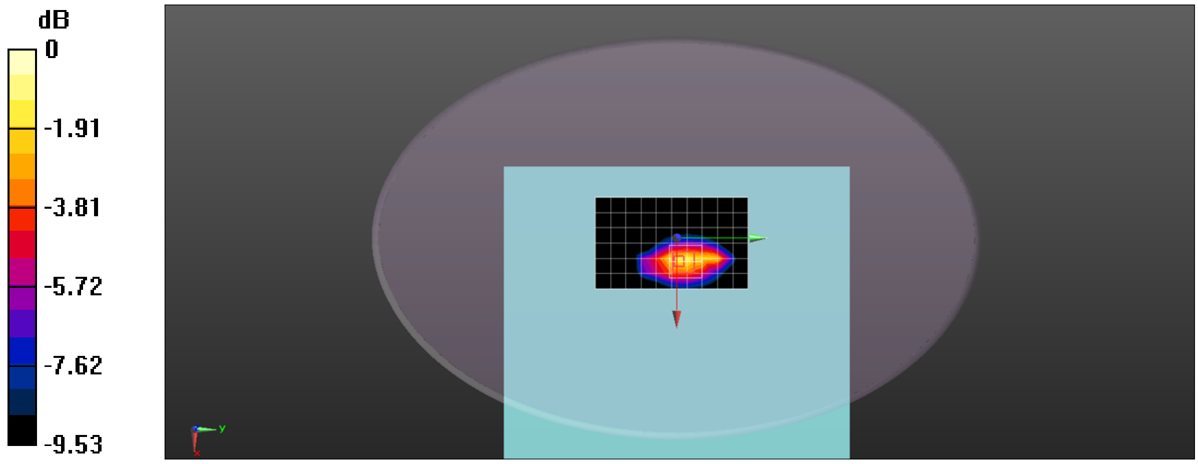
DUT: Body Scale; Type: BS-2001-G1

Communication System: UID 0, FDD_LTE (0); Frequency: 707.5 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 707.5 MHz; σ = 0.852 S/m; ε_r = 42.309; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7515; ConvF(10.02, 10.02, 10.02); Calibrated: 2021/12/28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1305; Calibrated: 2022/04/27
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1102
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/Body/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.158 W/kg
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.496 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.263 W/kg
SAR(1 g) = 0.126 W/kg; SAR(10 g) = 0.076 W/kg
Maximum value of SAR (measured) = 0.212 W/kg



0 dB = 0.212 W/kg = -6.74 dBW/kg

Date: 2022/06/02

Test Laboratory: Compliance Certification Services (Kunshan) Inc.

LTE CatM1 Band 13 10M QPSK 1RB2 Front side 0mm Ch23230

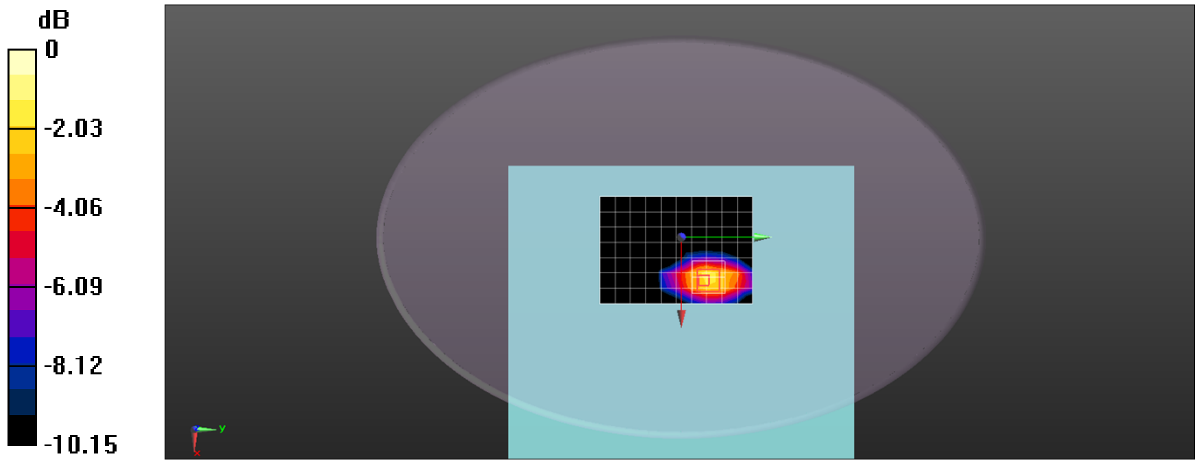
DUT: Body Scale; Type: BS-2001-G1

Communication System: UID 0, FDD_LTE (0); Frequency: 782 MHz;Duty Cycle: 1:1
Medium parameters used: f = 782 MHz; σ = 0.93 S/m; ε_r = 41.198; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7515; ConvF(10.02, 10.02, 10.02); Calibrated: 2021/12/28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1305; Calibrated: 2022/04/27
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1102
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/Body/Area Scan (8x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.154 W/kg
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.465 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.272 W/kg
SAR(1 g) = 0.138 W/kg; SAR(10 g) = 0.088 W/kg
Maximum value of SAR (measured) = 0.212 W/kg



0 dB = 0.212 W/kg = -6.74 dBW/kg

Appendix C: Calibration certificate

Appendix D: Photographs

---END---