TEST REPORT

Report No. .... :	**CHTEW20120160** Report verificaiton:
Project No. .... :	**SHT2012060101EW**
FCC ID .... :	**2AQV7E360**
Applicant's name .... :	**Caltta Technologies Co., Ltd**
Address...:	Floor 12,Building G2, International E-City, Nanshan District, Shenzhen, China, 518055
Test item description .... :	**Broadband Portable Radio**
Trade Mark ....:	eChat
Model/Type reference.......................:	e360
Listed Model(s) ....:	-
Standard .... :	**FCC 47 CFR Part2.1093** **IEEE Std C95.1, 1999 Edition** **IEEE 1528: 2013**
Date of receipt of test sample……….:	Dec.15, 2020
Date of testing…………………………...:	Dec.16, 2020- Dec.25, 2020
Date of issue………………………….:	Dec.28, 2020
Result................. ……………………..:	**PASS**
Compiled by (position+printedname+signature)...:	File administrators: Fanghui Zhu
Supervised by (position+printedname+signature)...:	Test Engineer: Patrick Qiu
Approved by (position+printedname+signature)...:	Manager: Hans Hu
Testing Laboratory Name .... :	**Shenzhen Huatongwei International Inspection Co., Ltd**
Address...:	1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

The test report merely correspond to the test sample.

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1 . Statement of Compliance

Maximum Reported SAR (W/kg @1g)			
RF Exposure Conditions	PCF	DTS	Simultaneous TX
Head(Dist.= 25mm)	0.240	0.019	0.259
Body-worn(Dist.= 10mm)	0.731	0.076	0.799

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013 and FCC KDB publications.

2 . Test Standards and Report version

2.1. Test Standards

The tests were performed according to following standards:

FCC 47 Part 2.1093: Radiofrequency radiation exposure evaluation: portable devices.
IEEE Std C95.1, 1999 Edition: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz
IEEE Std 1528™-2013: IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques.

FCC published RF exposure KDB procedures:
865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04: SAR Measurement Requirements for 100 MHz to 6 GHz
865664 D02 RF Exposure Reporting v01r02: RF Exposure Compliance Reporting and Documentation Considerations
447498 D01 General RF Exposure Guidance v06: Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies
248227 D01 802 11 Wi-Fi SAR v02r02: SAR Measurement Proceduresfor802.11 a/b/g Transmitters
941225 D01 3G SAR Procedures v03r01: SAR Measurement Procedures for 3G Devices
941225 D05 SAR for LTE Devices v02r05: SAR Evaluation Considerations for LTE Devices

TCB workshop April, 2019; Page 19, Tissue Simulating Liquids (TSL)

2.2. Report version

Revision No.	Date of issue	Description
N/A	2020-12-28	Original

3. Summary

3.1. Client Information

Applicant:	Caltta Technologies Co., Ltd
Address:	Floor 12,Building G2, International E-City, Nanshan District, Shenzhen, China, 518055
Manufacturer:	Caltta Technologies Co., Ltd
Address:	Floor 12,Building G2, International E-City, Nanshan District, Shenzhen, China, 518055
Factory:	Caltta (Shenzhen) Technologies Co., Ltd
Address:	West Side of 3rd Floor, No.1 Building, Ting Wei Industrial Zone, No.6, Liufang Road, No.67 District, Xin An Street, Bao An District, Shenzhen City, Guangdong Province 518000, P.R. China

3.2. Product Description

Main unit	
Name of EUT:	Broadband Portable Radio
Trade Mark:	eChat
Model No.:	e360
Listed Model(s):	-
Power supply:	DC 3.7V
Device Category:	Portable
Product stage:	Production unit
RF Exposure Environment:	General Population/Uncontrolled
HTW test sample No.:	YPHT20120285009
Hardware version:	e320MB_B
Software version:	e360V1.0
Device Dimension:	Overall (Length x Width x Thickness): 115x55x30 mm Antenna length: 40 mm

3.3. RF Specification Description

WCDMA	
Operation Band:	FDD Band IV FDD Band V
Power Class:	Class 3
Operating Mode:	UMTS Rel. 99 (Voice & Data) HSDPA HSUPA
Antenna Type:	Stick antenna

LTE	
Operation Band:	FDD Band 4 FDD Band 5 FDD Band 7
Power Class:	Class 3
Operating Mode:	QPSK 16QAM
Antenna Type:	Stick antenna
Does this device support Carrier Aggregation (CA)? ☐ Yes ☒ No	
Does this device support SV-LTE (1xRTT-LTE)? ☐ Yes ☒ No	
Wi-Fi 2.4G	
Operating Mode:	802.11b 802.11g 802.11n(HT20) 802.11n(HT40)
Antenna Type:	PIFA antenna
Does this device 2.4GHz Wi-Fi support hotspot operation? ☐ Yes ☒ No	
Bluetooth	
Bluetooth version:	V4.0
Support function:	BLE
Operating Mode:	GFSK
Antenna Type:	PIFA antenna
Does this device support Bluetooth Tethering? ☐ Yes ☒ No	
Remark: *1. The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power.*	

3.4. Testing Laboratory Information

Laboratory Name	Shenzhen Huatongwei International Inspection Co., Ltd.	
Laboratory Location	1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China	
Qualifications	Type	Accreditation Number
	CNAS	L1225
	A2LA	3902.01
	FCC	762235
	Canada	5377A

3.5. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Ambient temperature	18 °C to 25 °C
Ambient humidity	30%RH to 70%RH
Air Pressure	950-1050mbar

4. Equipments Used during the Test

Used	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. date (YY-MM-DD)	Due date (YY-MM-DD)
●	Data Acquisition Electronics DAEx	SPEAG	DAE4	1549	2020/04/04	2021/04/03
●	E-field Probe	SPEAG	EX3DV4	7494	2020/04/01	2021/03/31
●	Universal Radio Communication Tester	R&S	CMW500	137681	2020/06/18	2021/06/17
● Tissue-equivalent liquids Validation						
●	Dielectric Assessment Kit	SPEAG	DAK-3.5	1267	N/A	N/A
○	Dielectric Assessment Kit	SPEAG	DAK-12	1130	N/A	N/A
●	Network analyzer	Keysight	E5071C	MY46733048	2020/10/15	2021/10/14
● System Validation						
○	System Validation Antenna	SPEAG	CLA-150	4024	2018/02/21	2021/02/20
○	System Validation Dipole	SPEAG	D450V3	1102	2018/02/23	2021/02/22
○	System Validation Dipole	SPEAG	D750V3	1180	2018/02/07	2021/02/06
●	System Validation Dipole	SPEAG	D835V2	4d238	2018/02/19	2021/02/18
●	System Validation Dipole	SPEAG	D1750V2	1164	2018/02/06	2021/02/05
○	System Validation Dipole	SPEAG	D1900V2	5d226	2018/02/22	2021/02/21
●	System Validation Dipole	SPEAG	D2450V2	1009	2018/02/05	2021/02/04
●	System Validation Dipole	SPEAG	D2600V2	1150	2018/02/05	2021/02/04
●	System Validation Dipole	SPEAG	D5GHzV2	1273	2018/02/21	2021/02/20
●	Signal Generator	R&S	SMB100A	114360	2020/08/11	2021/08/10
●	Power Viewer for Windows	R&S	N/A	N/A	N/A	N/A
●	Power sensor	R&S	NRP18A	101010	2020/08/11	2021/08/10
●	Power sensor	R&S	NRP18A	101386	2020/06/08	2021/06/07
●	Power Amplifier	BONN	BLWA 0160-2M	1811887	2020/11/12	2021/11/11
●	Dual Directional Coupler	Mini-Circuits	ZHDC-10-62-S+	F975001814	2020/11/12	2021/11/11
●	Attenuator	Mini-Circuits	VAT-3W2+	1819	2020/11/12	2021/11/11
●	Attenuator	Mini-Circuits	VAT-10W2+	1741	2020/11/12	2021/11/11

Note:

1. *The Probe,Dipole and DAE calibration reference to the Appendix B and C.*
2. *Referring to KDB865664 D01, the dipole calibration interval can be extended to 3 years with justifcatio. The dipole are also not physically damaged or repaired during the interval.*

5. Measurement Uncertainty

Per KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg and the measured 10-g SAR within a frequency band is < 3.75 W/kg. The expanded SAR measurement uncertainty must be ≤ 30%, for a confidence interval of k = 2. If these conditions are met, extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval.

Therefore, the measurement uncertainty is not required.

6. SAR Measurements System Configuration

6.1. SAR Measurement Set-up

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

A standard high precision 6-axis robot (Stäubli RX family) with controller 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 electronic (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.

A unit to operate the optical surface detector which is connected to the EOC.

The Electro-Optical Coupler (EOC) performs the conversion from the optical into a digital electric signal of the DAE. The EOC is connected to the DASY5 measurement server.

The DASY5 measurement server, which performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation. A computer operating Windows 2003.

DASY5 software and SEMCAD data evaluation software.

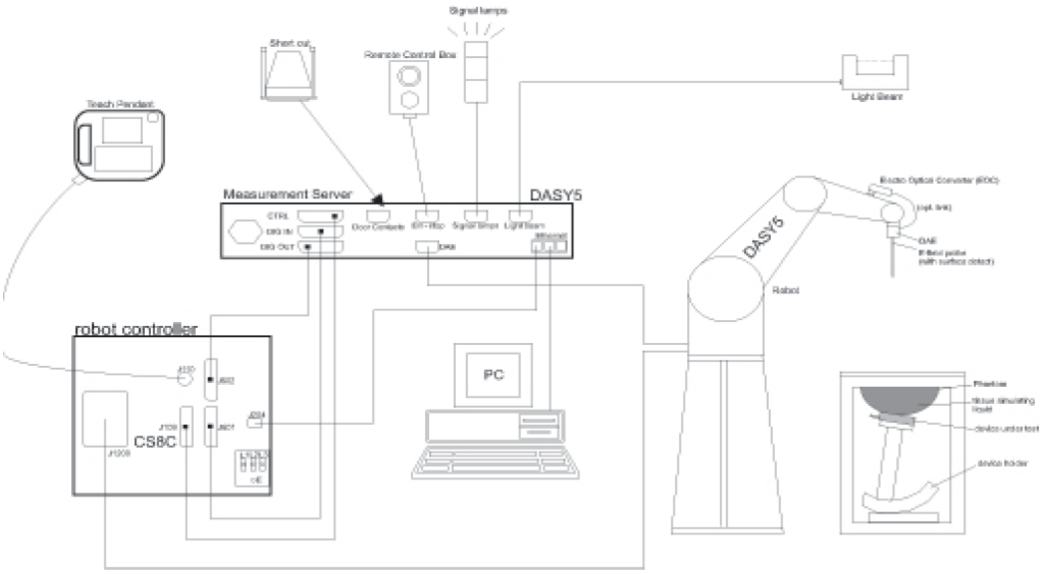
Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.

The generic twin phantom enabling the testing of left-hand and right-hand usage.

The device holder for handheld Mobile Phones.

Tissue simulating liquid mixed according to the given recipes.

System validation dipoles allowing to validate the proper functioning of the system.



6.2. DASY5 E-field Probe System

The SAR measurements were conducted with the dosimetric probe EX3DV4 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation.

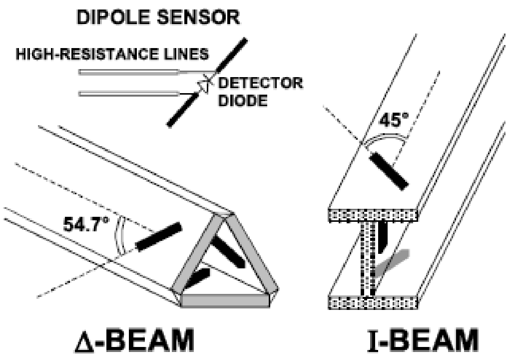
- **Probe Specification**

Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available.
Frequency	4 MHz to 10 GHz; Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)
Dynamic Range	10 µW/g to > 100 W/kg; Linearity: ± 0.2 dB
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Distance from probe tip to dipole centers: 1.0 mm
Application	General dosimetry up to 6 GHz Dosimetry in strong gradient fields Compliance tests of Mobile Phones
Compatibility	DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI

- **Isotropic E-Field Probe**

The isotropic E-Field probe has been fully calibrated and assessed for isotropicity, and boundary effect within a controlled environment. Depending on the frequency for which the probe is calibrated the method utilized for calibration will change.

The E-Field probe utilizes a triangular sensor arrangement as detailed in the diagram below:



6.3. Phantoms

The phantom used for all tests i.e. for both system checks and device testing, was the twin-headed "SAM Phantom", manufactured by SPEAG. The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region, where shell thickness increases to 6mm).
System checking was performed using the flat section, whilst Head SAR tests used the left and right head profile sections. Body SAR testing also used the flat section between the head profiles.

SAM-Twin Phantom

6.4. Device Holder

The device was placed in the device holder (illustrated below) that is supplied by SPEAG as an integral part of the DASY system.
The DASY device holder is designed to cope with the different positions given in the standard. It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.

Device holder supplied by SPEAG

7. SAR Test Procedure

7.1. Scanning Procedure

Step 1: Power Reference Measurement

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. Measure the local SAR at a test point within 8 mm of the phantom inner surface that is closest to the DUT. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

Step 2: Area Scan

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

Area Scan Resolutions per FCC KDB Publication 865664 D01v04

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 mm ± 1 mm	½·δ·ln(2) mm ± 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.	

Step 3: Zoom Scan

Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1g and 10g of simulated tissue. The Zoom Scan measures points (refer to table below) within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the Zoom Scan evaluates the averaged SAR for 1 g and 10 g and displays these values next to the job's label.

Zoom Scan Resolutions per FCC KDB Publication 865664 D01v04

<table>
<tr><td colspan="3">Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}</td><td>≤ 2 GHz: ≤ 8 mm
2 – 3 GHz: ≤ 5 mm*</td><td>3 – 4 GHz: ≤ 5 mm*
4 – 6 GHz: ≤ 4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">uniform grid: $\Delta z_{Zoom}(n)$</td><td>≤ 5 mm</td><td>3 – 4 GHz: ≤ 4 mm
4 – 5 GHz: ≤ 3 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td rowspan="2">graded grid</td><td>$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface</td><td>≤ 4 mm</td><td>3 – 4 GHz: ≤ 3 mm
4 – 5 GHz: ≤ 2.5 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td>$\Delta z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$ mm</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>≥ 30 mm</td><td>3 – 4 GHz: ≥ 28 mm
4 – 5 GHz: ≥ 25 mm
5 – 6 GHz: ≥ 22 mm</td></tr>
<tr><td colspan="5">Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see IEEE Std 1528-2013 for details.
* When zoom scan is required and the <u>*reported*</u> SAR from the *area scan based 1-g SAR estimation* procedures of KDB Publication 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.</td></tr>
</table>

Step 4: Power drift measurement

The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1. The SAR drift shall be kept within ± 5 %.

7.2. Data Storage and Evaluation

Data Storage

The DASY5 software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors),s 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 ".DA4". 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], [W/kg], [mW/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.

Data Evaluation

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:	σ
	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 DASY5 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:

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

Vi: compensated signal of channel (i = x, y, z)
Ui: input signal of channel (i = x, y, z)
cf: crest factor of exciting field (DASY parameter)
dcpi: diode compression point (DASY parameter)

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

$$\text{E} - \text{fieldprobes :} \qquad E_i = \sqrt{\frac{V_i}{Norm_i \cdot ConvF}}$$

$$\text{H} - \text{fieldprobes :} \qquad H_i = \sqrt{V_i} \cdot \frac{a_{i0} + a_{i1} f + a_{i2} f^2}{f}$$

Vi: compensated signal of channel (i = x, y, z)
Normi: sensor sensitivity of channel (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):

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

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

$$SAR = E_{tot}^2 \cdot \frac{\sigma}{\rho \cdot 1'000}$$

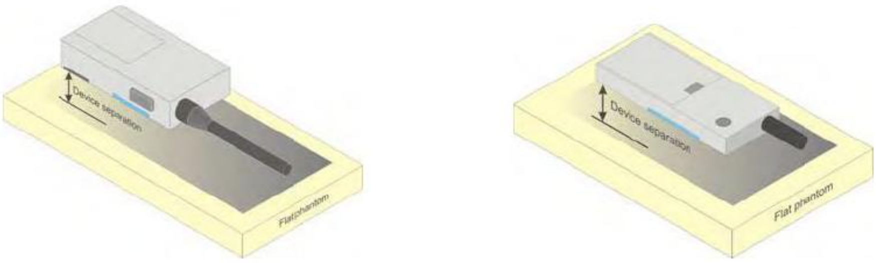
SAR: local specific absorption rate in W/kg
Etot: total field strength in V/m
σ: conductivity in [mho/m] or [Siemens/m]
ρ: equivalent tissue density in g/cm3

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.

8. Position of the wireless device in relation to the phantom

8.1. Front-of-face

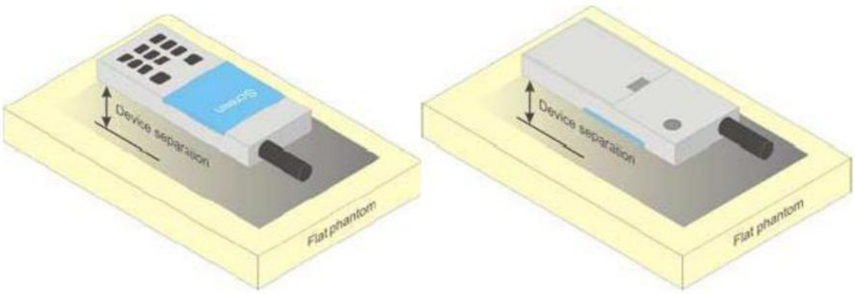
A typical example of a front-of-face device is a two-way radio that is held at a distance from the face of the user when transmitting. In these cases the device under test shall be positioned at the distance to the phantom surface that corresponds to the intended use as specified by the manufacturer in the user instructions. If the intended use is not specified, a separation distance of 25 mm between the phantom surface and the device shall be used.



Test positions for Front-of-face devices

8.2. Body Position

Devices that support transmission while used with body-worn accessories must be tested for body-worn accessory SAR compliance, typically according to the smallest test separation distance required for the group of body-worn accessories with similar operating and exposure characteristics.
Devices that are designed to operate on the body of users using lanyards and straps or without requiring additional body-worn accessories must be tested for SAR compliance using a conservative minimum test separation distance ≤ 5mm to support compliance.



Picture 4 Test positions for body-worn devices

9. Dielectric Property Measurements & System Check

9.1. Tissue Dielectric Parameters

The temperature of the tissue-equivalent medium used during measurement must also be within 18℃ to 25℃ and within ± 2℃ of the temperature when the tissue parameters are characterized.

The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements. The parameters should be re-measured after each 3-4 days of use; or earlier if the dielectric parameters can become out of tolerance; for example, when the parameters are marginal at the beginning of the measurement series.

The dielectric constant (ε_r) and conductivity (σ) of typical tissue-equivalent media recipes are expected to be within ± 5% of the required target values; but for SAR measurement systems that have implemented the SAR error compensation algorithms documented in IEEE Std 1528-2013, to automatically compensate the measured SAR results for deviations between the measured and required tissue dielectric parameters, the tolerance for ε_r and σ may be relaxed to ± 10%. This is limited to frequencies ≤ 3 GHz.

Tissue Dielectric Parameters

FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

Tissue dielectric parameters for Head and Body				
Target Frequency (MHz)	Head		Body	
	ε_r	σ(S/m)	ε_r	σ(S/m)
835	41.5	0.90	55.2	0.97
1750	40.1	1.37	53.4	1.49
2450	39.2	1.80	52.7	1.95
2600	39.0	1.96	52.5	2.16

IEEE Std 1528-2013

Refer to Table 3 within the IEEE Std 1528-2013

Dielectric Property Measurements Results:

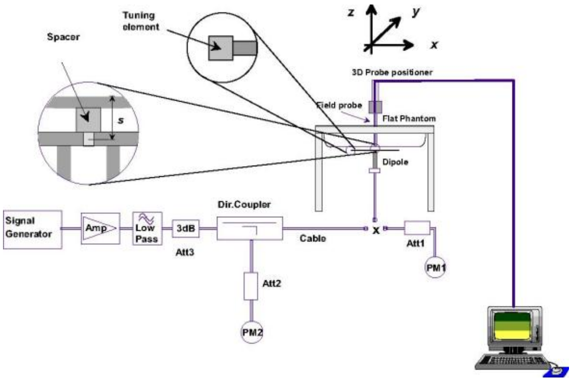
Dielectric performance of Head tissue simulating liquid									
Frequency (MHz)	ε_r		σ(S/m)		Delta (ε_r)	Delta (σ)	Limit	Temp (℃)	Date
	Target	Measured	Target	Measured					
835	41.50	42.70	0.900	0.914	2.89%	1.60%	±5%	22.3	2020-12-17
1750	40.10	41.18	1.370	1.331	2.69%	-2.85%	±5%	22.3	2020-12-17
2450	39.20	40.34	1.800	1.796	2.91%	-0.22%	±5%	22.1	2020-12-18
2600	39.00	40.10	1.960	1.922	2.82%	-1.94%	±5%	22.1	2020-12-18

9.2. System Check

SAR system verification is required to confirm measurement accuracy, according to the tissue dielectric media, probe calibration points and other system operating parameters required for measuring the SAR of a test device. The system verification must be performed for each frequency band and within the valid range of each probe calibration point required for testing the device. The same SAR probe(s) and tissue-equivalent media combinations used with each specific SAR system for system verification must be used for device testing. When multiple probe calibration points are required to cover substantially large transmission bands, independent system verifications are required for each probe calibration point. A system verification must be performed before each series of SAR measurements using the same probe calibration point and tissue-equivalent medium. Additional system verification should be considered according to the conditions of the tissue-equivalent medium and measured tissue dielectric parameters, typically every three to four days when the liquid parameters are re-measured or sooner when marginal liquid parameters are used at the beginning of a series of measurements.

System Performance Check Measurement Conditions:

- The measurements were performed in the flat section of the TWIN SAM or ELI phantom, shell thickness: 2.0±0.2 mm (bottom plate) filled with Body or Head simulating liquid of the following parameters.
- The depth of tissue-equivalent liquid in a phantom must be ≥ 15.0 cm for SAR measurements ≤ 3 GHz and ≥10.0 cm for measurements > 3 GHz.
- The DASY system with an E-Field Probe was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10 mm (above 1 GHz) and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 15 mm was aligned with the dipole.
  For 5 GHz band - The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
- Special 7x7x7 (below 3 GHz) and/or 8x8x7 (above 3 GHz) fine cube was chosen for the cube.
- The results are normalized to 1 W input power.



System Performance Check Setup

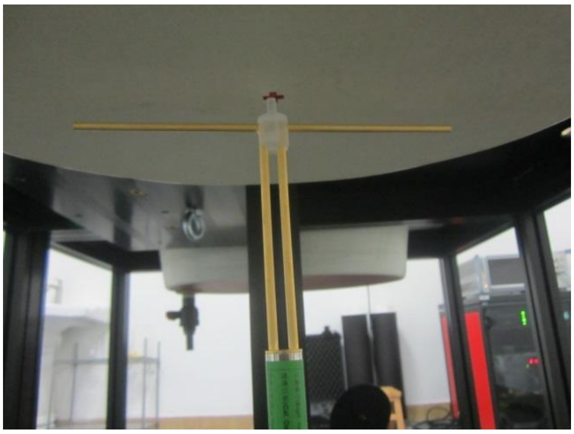


Photo of Dipole Setup

System Check Result:

The 1-g and 10-g SAR measured with a reference dipole, using the required tissue-equivalent medium at the test frequency, must be within ±10% of the manufacturer calibrated dipole SAR target.

Head											
Frequency (MHz)	1g SAR			10g SAR			Delta (1g)	Delta (10g)	Limit	Temp (℃)	Date
	Target 1W	Normalize to 1W	Measured 250mW	Target 1W	Normalize to 1W	Measured 250mW					
835	9.51	9.96	2.49	6.15	6.52	1.63	4.73%	6.02%	±10%	22.3	2020-12-17
1750	36.60	38.28	9.57	19.40	20.40	5.10	4.59%	5.15%	±10%	22.3	2020-12-17
2450	51.50	54.00	13.50	24.10	25.24	6.31	4.85%	4.73%	±10%	22.1	2020-12-18
2600	55.60	58.00	14.50	25.00	26.12	6.53	4.32%	4.48%	±10%	22.1	2020-12-18

Plots of System Performance Check

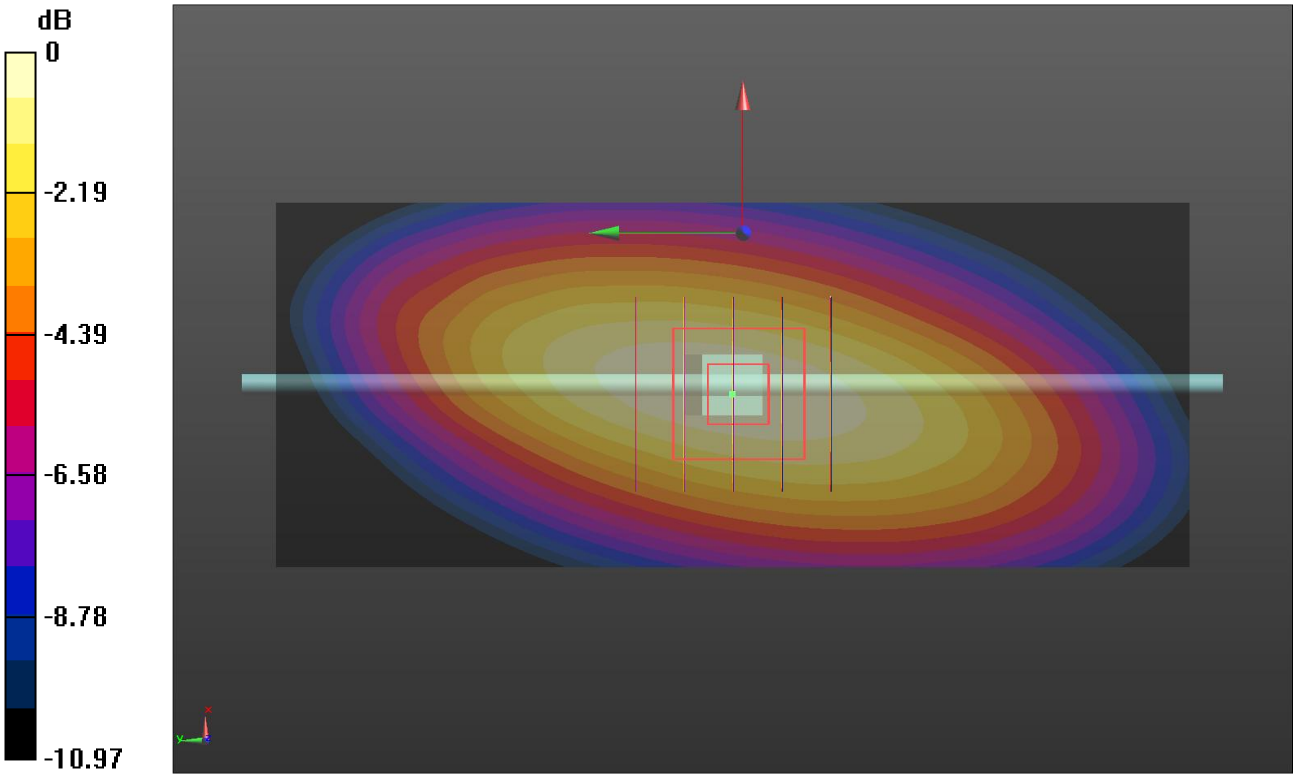
System Performance Check-Head 835MHz

DUT: D835V2; Type: D835V2; Serial: 4d238
Date: 2020-12-17
Communication System: UID 0, CW (0); Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.914 S/m; εr = 42.704; ρ = 1000 kg/m3
Phantom section: Flat Section
Ambient Temperature:22.8℃;Liquid Temperature:22.6℃;

DASY5 Configuration:

- Probe: EX3DV4 - SN7494; ConvF(10.46, 10.46, 10.46) @ 835 MHz; Calibrated: 4/1/2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1549; Calibrated: 4/4/2020
- Phantom: Twin-SAM V8.0 ; Type: QD 000 P41 AA; Serial: 1974
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

Head/d=15mm, Pin=250mW/Area Scan (41x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 3.39 W/kg
Head/d=15mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 62.68 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 3.91W/kg
SAR(1 g) = 2.49 W/kg; SAR(10 g) = 1.63 W/kg
Maximum value of SAR (measured) = 3.40 W/kg



0 dB = 3.40 W/kg = 5.31 dBW/kg

System Performance Check-Head 1750MHz

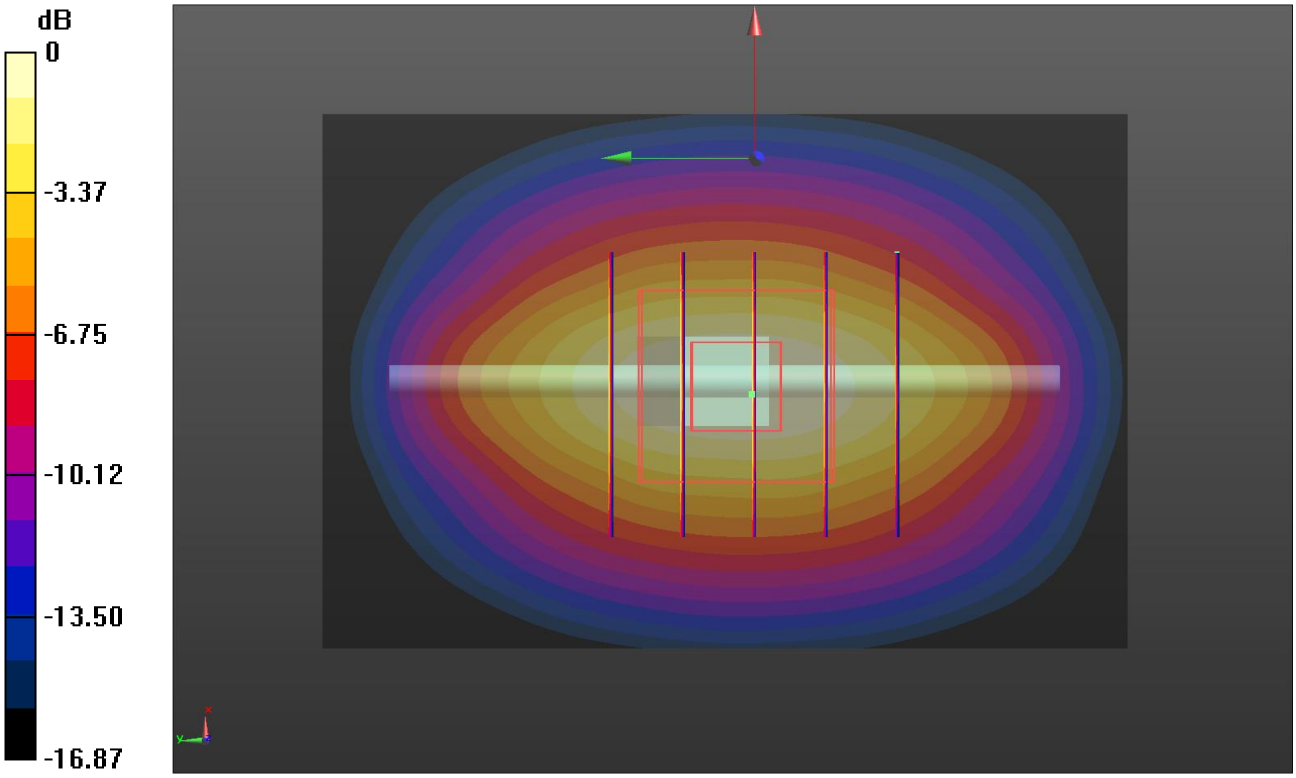
DUT: D1750V2; Type: D1750V2; Serial: 1164
Date: 2020-12-17
Communication System: UID 0, CW (0); Frequency: 1750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1750 MHz; σ = 1.331 S/m; εr = 41.183; ρ = 1000 kg/m3
Phantom section: Flat Section
Ambient Temperature:22.6℃;Liquid Temperature:22.4℃;

DASY5 Configuration:

- Probe: EX3DV4 - SN7494; ConvF(8.92, 8.92, 8.92) @ 1750 MHz; Calibrated: 4/1/2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1549; Calibrated: 4/4/2020
- Phantom: Twin-SAM V8.0 ; Type: QD 000 P41 AA; Serial: 1974
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

Head/d=10mm,Pin=250mW/Area Scan (41x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 14.8 W/kg

Head/d=10mm,Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 107.9 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 17.7 W/kg
SAR(1 g) = 9.57 W/kg; SAR(10 g) = 5.1 W/kg
Maximum value of SAR (measured) = 14.7 W/kg



0 dB = 14.7 W/kg = 11.67 dBW/kg

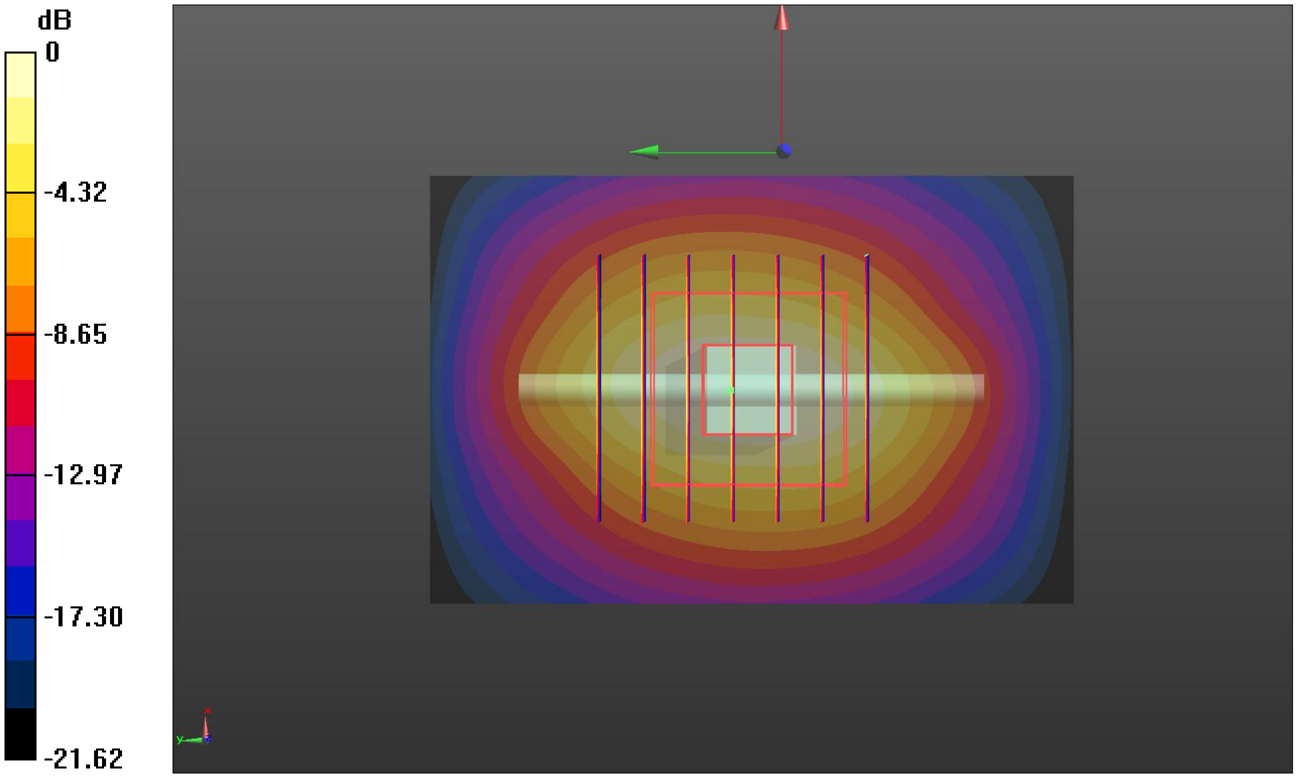
SystemPerformanceCheck-Head 2450MHz

DUT: D2450V2; Type: D2450V2; Serial: 1009
Date: 2020-12-18
Communication System: UID 0, CW (0); Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2450 MHz; σ = 1.796 S/m; εr = 40.338; ρ = 1000 kg/m3
Phantom section: Flat Section
Ambient Temperature:22.4℃;Liquid Temperature:22.2℃;

DASY5 Configuration:

- Probe: EX3DV4 - SN7494; ConvF(7.91, 7.91, 7.91) @ 2450 MHz; Calibrated: 4/1/2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1549; Calibrated: 4/4/2020
- Phantom: Twin-SAM V8.0 ; Type: QD 000 P41 AA; Serial: 1974
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

Head/d=10mm,Pin=250mW/Area Scan (41x61x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 23.0 W/kg
Head/d=10mm,Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 117.7 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 27.9 W/kg
SAR(1 g) = 13.5 W/kg; SAR(10 g) = 6.31 W/kg
Maximum value of SAR (measured) = 22.3 W/kg



0 dB = 22.3 W/kg = 13.48 dBW/kg

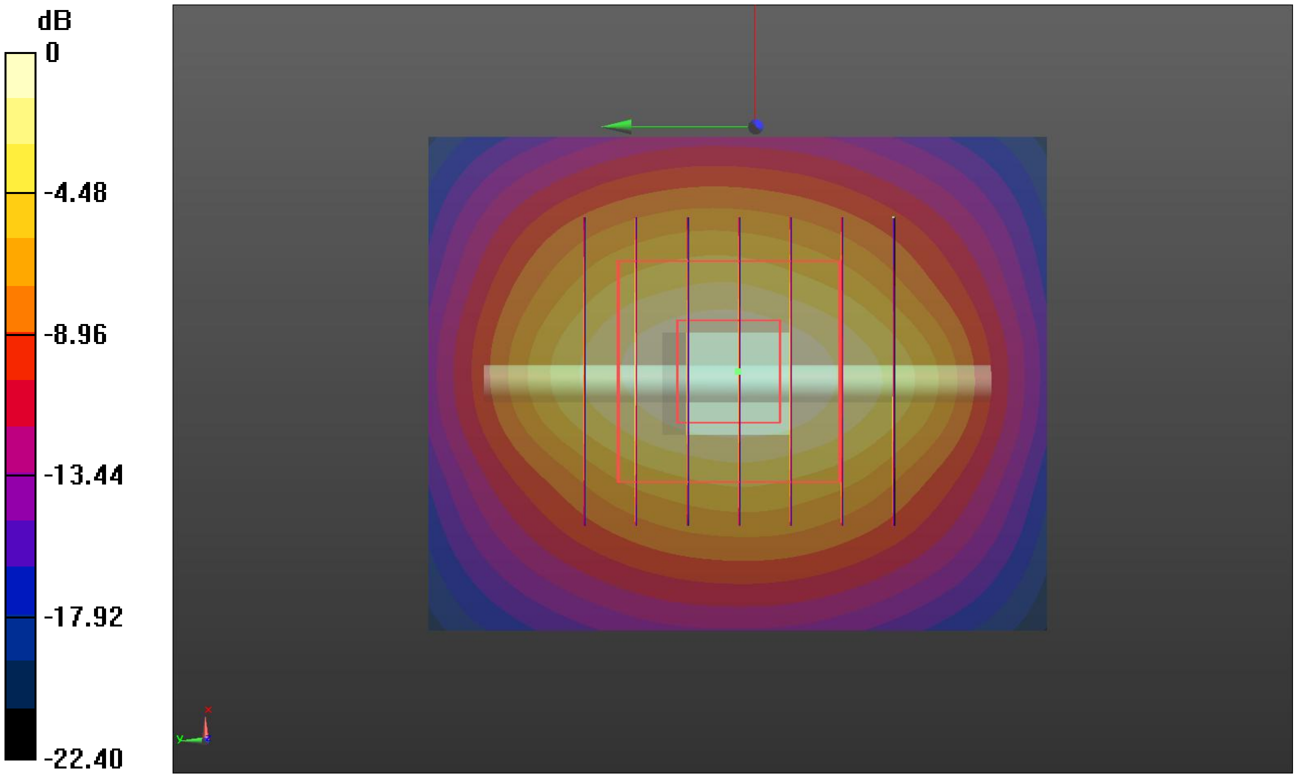
SystemPerformanceCheck-Head 2600MHz

DUT: D2600V2; Type: D2600V2; Serial: 1150
Date: 2020-12-18
Communication System: UID 0, CW (0); Frequency: 2600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2600 MHz; σ = 1.922 S/m; εr = 40.098; ρ = 1000 kg/m3
Phantom section: Flat Section
Ambient Temperature:22.3℃;Liquid Temperature:22.1℃;

DASY5 Configuration:

- Probe: EX3DV4 - SN7494; ConvF(7.72, 7.72, 7.72) @ 2600 MHz; Calibrated: 4/1/2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1549; Calibrated: 4/4/2020
- Phantom: Twin-SAM V8.0 ; Type: QD 000 P41 AA; Serial: 1974
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

Head/d=10mm,Pin=250mW/Area Scan (41x51x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 26.6 W/kg
Head/d=10mm,Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 117.8 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 30.9 W/kg
SAR(1 g) = 14.5 W/kg; SAR(10 g) = 6.53 W/kg
Maximum value of SAR (measured) = 24.5 W/kg



0 dB = 24.5 W/kg = 13.89 dBW/kg

10. SAR Exposure Limits

SAR assessments have been made in line with the requirements of FCC 47 CFR § 2.1093.

Type Exposure	Limit (W/kg)	
	General Population/ Uncontrolled Exposure Environment	Occupational/ Controlled Exposure Environment
Spatial Average SAR (whole body)	0.08	0.4
Spatial Peak SAR (1g cube tissue for head and trunk)	1.6	8.0
Spatial Peak SAR (10g for limb)	4.0	20.0

Population/Uncontrolled Environments: are defined as locations where there is the exposure of individual 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).

11. Conducted Power Measurement Results

11.1. WCDMA

1. *The following tests were conducted according to the test requirements outlines in 3GPP TS34.121 specification.*
2. *The procedures in KDB 941225 D01 are applied for 3GPP Rel. 6 HSPA to configure the device in the required sub-test mode to determine SAR test exclusion*

A summary of thest setting are illustrated belowe:

HSDPA Setup Configureation:

a) The EUT was connected to base station RS CMU200 referred to the setup configuration
b) The RF path losses were compensated into the measurements
c) A call was established between EUT and base station with following setting:
   i. Set Gain Factors (βc and βd) and parameters were set according to each specific sub-test in the following table, C10.1.4, Quoted from the TS 34.121
   ii. Set RMC 12.2Kbps + HSDPA mode
   iii. Set Cell Power=-86dBm
   iv. Set HS-DSCH Configuration Type to FRC (H-set 1, QPSK)
   v. Select HSDPA uplink parameters
   vi. Set Delta ACK, Delta NACK and Delta CQI=8
   vii. Set Ack-Nack repetition Factor to 3
   viii. Set CQI Feedback Cycle (K) to 4ms
   ix. Set CQI repetition factor to 2
   x. Power ctrl mode= all up bits
d) The transmitter maximum output power waw recorded.

Table C.10.1.4: β values for transmitter characteristics tests with HS-DPCCH

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1, Note 2)	CM (dB) (Note 3)	MPR (dB) (Note 3)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 (Note 4)	15/15 (Note 4)	64	12/15 (Note 4)	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with $\beta_{hs} = 30/15 * \beta_c$.

Note 2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA, Δ_{ACK} and Δ_{NACK} = 30/15 with $\beta_{hs} = 30/15 * \beta_c$, and Δ_{CQI} = 24/15 with $\beta_{hs} = 24/15 * \beta_c$.

Note 3: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

Note 4: For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 11/15 and β_d = 15/15.

Setup Configuration

HSUPA Setup Configureation:

a) The EUT was connected to base station RS CMU200 referred to the setup configuration
b) The RF path losses were compensated into the measurements
c) A call was established between EUT and base station with following setting:
   i. Call configs = 5.2b, 5.9b, 5.10b, and 5.13.2B with QPSK
   ii. Set Gain Factors (βc and βd) and parameters (AG index) were set according to each specific sub-test in the following table, C11.1.3, Quoted from the TS 34.121
   iii. Set Cell Power=-86dBm
   iv. Set channel type= 12.2Kbps + HSPA mode
   v. Set UE Target power
   vi. Set Ctrl mode=Alternating bits
   vii. Set and observe the E-TFCI
   viii. Confirm that E-TFCI is equal the target E-TFCI of 75 for Sub-test 1, and other subtest's E-TFCI
d) The transmitter maximum output power waw recorded.

Table C.11.1.3: β values for transmitter characteristics tests with HS-DPCCH and E-DCH

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1)	β_{ec}	β_{ed} (Note 5) (Note 6)	β_{ed} (SF)	β_{ed} (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 6)	E-TFCI
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed}1: 47/15 β_{ed}2: 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 (Note 4)	15/15 (Note 4)	64	15/15 (Note 4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c .

Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.

Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 10/15 and β_d = 15/15.

Note 4: For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 14/15 and β_d = 15/15.

Note 5: In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g.

Note 6: β_{ed} can not be set directly, it is set by Absolute Grant Value.

Setup Configuration

General Note:

1. Per KDB 941225 D01, SAR for Head / Hotsport / Body-worn Exposure is measured using a 12.2Kbps RMC with TPC bit ocnfigured to all 1s
2. Per KDB 941225 D01 RMC12.2Kbps setting is used to evaluate SAR. If the maximum output power and Tune-up tolerance specified for production units in HSDPA/HSUPA is ≦1/4dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio fo specified maximum output power and tune-up tolerance of HSDPA / HSUPA to RMC 12.2Kbps and the adjusted SAR is ≦1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA.

Mode		WCDMA Band IV			WCDMA Band V		
		Conducted Power (dBm)			Conducted Power (dBm)		
		CH1312	CH1413	CH1513	CH4132	CH4183	CH4233
		1712.4MHz	1732.6MHz	1752.6MHz	826.4MHz	836.6MHz	846.6MHz
AMR 12.2K		22.89	22.81	22.95	23.30	23.33	23.19
RMC 12.2K		22.92	22.84	22.98	23.34	23.37	23.22
HSDPA	Subtest-1	21.83	21.79	21.85	22.24	22.30	22.40
	Subtest-2	21.41	21.46	21.47	21.77	21.86	21.99
	Subtest-3	21.40	21.47	21.50	21.80	21.90	22.05
	Subtest-4	21.39	21.46	21.39	21.78	21.88	22.03
HSUPA	Subtest-1	21.54	21.89	21.66	21.59	21.58	21.48
	Subtest-2	20.88	20.29	20.72	21.01	21.06	20.92
	Subtest-3	20.72	19.95	19.80	20.90	20.98	20.67
	Subtest-4	21.32	20.75	20.64	21.43	21.50	21.37
	Subtest-5	22.09	21.59	21.68	21.95	22.05	22.08

11.2. LTE

General Note:

1. CMW500 base station simulator was used to setup the connection with EUT; the frequency band, channel,bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUTtransmitting at maximum power and at different configurations which are requested to be reported to FCC, forconducted power measurement and SAR testing.
2. Per KDB 941225 D05v02r03, when a properly configured base station simulator is used for the SAR and powermeasurements, spectrum plots for each RB allocation and offset configuration is not required.
3. Per KDB 941225 D05v02r03, start with the largest channel bandwidth and measure SAR for QPSK with 1 RBallocation, using the RB offset and required test channel combination with the highest maximum output power for RBoffsets at the upper edge, middle and lower edge of each required test channel.
4. Per KDB 941225 D05v02r03, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05v02r03, for QPSK with 100% RB allocation, SAR is not required when the highest maximumoutput power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations andthe highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highestoutput power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also betested.
6. Per KDB 941225 D05v02r03, 16QAM output power for each RB allocation configuration is > not ½ dB higher than thesame configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225D05v02r03, 16QAM SAR testing is not required.
7. Per KDB 941225 D05v02r03, smaller bandwidth output power for each RB allocation configuration is > not ½ dBhigher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supportedbandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r03, smaller bandwidth SAR testing is not required.

According to April 2015 TCB workshop, SAR test exclusion can be applied for testing overlapping LTE bands as follows:

a) The maximum output power, including tolerance, for the smaller band must be ≤ the larger band to qualify for the SAR test exclusion.
b) The channel bandwidth and other operating parameters for the smaller band must be fully supported by the larger band.
   - LTE Band 2 (1850-1910 MHz) is covered by LTE Band 25 (1850-1915 MHz)
   - LTE Band 4 (1710-1755 MHz) is covered by LTE Band 66 (1710-1780 MHz)
   - LTE Band 5 (824-849 MHz) is covered by LTE Band 26 (814-849 MHz)
   - LTE Band 17 (704-716 MHz) is covered by LTE Band 12 (699-716 MHz)

LTE-FDD Band 4				Conducted Power(dBm)		
Band-width	Modulation	RB allocation	RB offset	19957	20175	20393
				1710.7MHz	1732.5MHz	1754.3MHz
1.4MHz	QPSK	1	0	23.74	23.63	23.79
			2	23.86	23.80	23.69
			5	23.96	23.69	23.93
		3	0	23.79	23.74	23.80
			1	23.98	23.64	23.83
			3	23.94	23.84	23.89
		6	0	22.81	22.83	22.83
	16QAM	1	0	23.28	22.51	22.81
			2	23.45	23.10	22.87
			5	23.34	22.97	22.67
		3	0	22.74	22.64	22.80
			1	22.74	22.72	22.81
			3	22.76	22.73	22.57
		6	0	21.93	21.82	21.90
Band-width	Modulation	RB allocation	RB offset	19965	20175	20385
				1711.5MHz	1732.5MHz	1753.5MHz
3MHz	QPSK	1	0	23.81	23.88	23.71
			8	23.64	23.63	23.68
			14	23.94	24.14	23.75
		8	0	22.93	22.92	23.01
			4	23.10	22.75	22.97
			7	23.02	22.89	22.91
		15	0	22.97	22.78	23.08
	16QAM	1	0	22.84	23.10	22.98
			8	22.98	23.06	22.91
			14	23.02	23.15	22.81
		8	0	22.02	21.82	22.03
			4	22.06	21.82	22.06
			7	22.03	22.01	22.01
		15	0	21.83	21.75	22.13

LTE-FDD Band 4				Conducted Power(dBm)		
Band-width	Modulation	RB allocation	RB offset	19975	20175	20375
				1712.5MHz	1732.5MHz	1752.5MHz
5MHz	QPSK	1	0	23.82	23.74	23.66
			12	23.86	24.07	23.67
			24	23.71	24.13	23.79
		12	0	23.01	22.98	22.99
			7	23.02	22.82	22.84
			13	22.95	22.87	23.00
		25	0	23.02	22.88	22.96
	16QAM	1	0	23.12	22.79	22.68
			12	23.00	22.61	22.26
			24	22.77	22.89	22.79
		12	0	21.90	21.96	21.78
			7	21.90	21.77	21.81
			13	21.99	22.01	22.16
		25	0	21.82	22.04	22.10
Band-width	Modulation	RB allocation	RB offset	20000	20175	20350
				1715MHz	1732.5MHz	1750MHz
10MHz	QPSK	1	0	24.04	23.99	23.80
			24	23.85	23.97	23.76
			49	23.62	23.95	23.76
		25	0	23.06	22.94	23.18
			24	23.05	22.86	23.15
			49	22.86	22.87	22.84
		50	0	22.94	22.83	22.99
	16QAM	1	0	22.88	22.99	22.17
			24	22.07	22.12	22.98
			49	22.52	22.32	22.97
		25	0	22.00	21.99	22.15
			24	22.37	22.00	21.98
			49	21.98	22.02	21.79
		50	0	21.99	21.93	21.96

LTE-FDD Band 4				Conducted Power(dBm)		
Band-width	Modulation	RB allocation	RB offset	20025	20175	20325
				1717.5MHz	1732.5MHz	1747.5MHz
15MHz	QPSK	1	0	24.02	24.09	23.66
			38	23.70	23.77	23.80
			74	23.87	24.12	24.15
		38	0	23.43	23.29	22.78
			18	22.46	23.09	22.76
			37	22.48	23.41	22.77
		75	0	22.93	22.99	23.10
	16QAM	1	0	23.30	23.13	22.96
			38	23.13	22.96	23.29
			74	23.10	23.17	23.06
		38	0	22.35	22.25	22.77
			18	22.43	22.17	22.85
			37	22.38	22.41	22.76
		75	0	21.95	22.11	22.11
Band-width	Modulation	RB allocation	RB offset	20050	20175	20300
				1720MHz	1732.5MHz	1745MHz
20MHz	QPSK	1	0	24.43	24.00	24.22
			49	23.89	23.87	24.18
			99	24.01	23.94	24.25
		50	0	23.04	22.94	23.00
			25	22.87	22.90	23.07
			50	22.74	22.99	23.15
		100	0	22.83	22.93	23.02
	16QAM	1	0	23.57	22.91	22.95
			49	23.09	23.12	23.19
			99	23.17	23.24	23.02
		50	0	21.89	21.95	22.20
			25	21.90	21.94	22.32
			50	21.74	22.19	22.17
		100	0	21.85	22.00	22.07

LTE-FDD Band 5				Conducted Power(dBm)		
Band-width	Modulation	RB allocation	RB offset	20407	20525	20643
				8.4.7MHz	836.5MHz	848.3MHz
1.4MHz	QPSK	1	0	24.39	24.64	24.28
			2	24.37	24.71	23.96
			5	24.38	24.66	23.92
		3	0	24.66	24.54	23.94
			1	24.43	24.53	23.94
			3	24.39	24.66	23.87
		6	0	23.47	23.62	23.97
	16QAM	1	0	23.39	23.56	23.31
			2	23.62	23.80	23.22
			5	23.56	23.68	23.14
		3	0	23.45	23.58	22.97
			1	23.57	23.56	22.97
			3	23.60	23.70	22.90
		6	0	22.45	22.54	22.82
Band-width	Modulation	RB allocation	RB offset	20415	20525	20635
				825.5MHz	836.5MHz	847.5MHz
3MHz	QPSK	1	0	24.55	24.75	24.58
			8	24.32	24.68	24.35
			14	24.35	24.87	24.26
		8	0	23.62	23.56	23.79
			4	23.45	23.67	23.74
			7	23.33	23.71	23.68
		15	0	23.64	23.53	23.71
	16QAM	1	0	23.59	23.77	23.69
			8	23.53	23.67	23.56
			14	23.61	23.69	23.49
		8	0	22.46	22.72	22.91
			4	22.47	22.72	22.90
			7	22.68	22.69	22.83
		15	0	22.59	22.54	22.79

LTE-FDD Band 5				Conducted Power(dBm)		
Band-width	Modulation	RB allocation	RB offset	20425	20525	20625
				826.5MHz	836.5MHz	846.5MHz
5MHz	QPSK	1	0	24.40	24.59	24.31
			12	24.47	24.75	24.42
			24	24.38	24.78	24.34
		12	0	23.57	23.54	23.73
			7	23.43	23.54	23.65
			13	23.40	23.68	23.63
		25	0	23.48	23.54	23.73
	16QAM	1	0	23.58	23.57	23.46
			12	23.67	23.61	23.47
			24	23.64	23.54	23.46
		12	0	22.53	22.65	22.71
			7	22.54	22.73	22.81
			13	22.44	22.71	22.69
		25	0	22.43	22.64	22.83
Band-width	Modulation	RB allocation	RB offset	20450	20525	20600
				829MHz	836.5MHz	844MHz
10MHz	QPSK	1	0	23.51	23.22	23.58
			24	23.38	23.14	23.37
			49	23.68	23.30	23.08
		25	0	23.72	23.62	24.19
			24	23.58	23.64	23.71
			49	23.64	23.77	23.74
		50	0	23.62	23.69	23.79
	16QAM	1	0	23.58	23.09	23.71
			24	23.58	23.88	23.62
			49	22.95	23.35	23.36
		25	0	22.67	22.81	22.86
			24	22.60	22.60	22.76
			49	22.71	22.78	22.81
		50	0	22.73	22.70	22.79

LTE-FDD Band 7				Conducted Power(dBm)		
Band-width	Modulation	RB allocation	RB offset	20775	21100	21425
				2502.5MHz	2535MHz	2567.5MHz
5MHz	QPSK	1	0	22.77	22.06	22.54
			12	22.12	22.14	22.08
			24	22.03	22.54	22.34
		12	0	22.32	22.27	22.09
			7	22.33	22.31	22.71
			13	21.91	22.41	22.64
		25	0	22.09	22.38	22.41
	16QAM	1	0	21.92	21.91	21.35
			12	21.23	21.18	21.27
			24	21.14	21.45	21.20
		12	0	21.48	21.41	21.58
			7	21.48	21.44	21.70
			13	21.03	21.52	21.64
		25	0	21.24	21.13	21.61
Band-width	Modulation	RB allocation	RB offset	20800	21100	21400
				2505MHz	2535MHz	2565MHz
10MHz	QPSK	1	0	22.68	22.12	22.87
			24	22.24	22.48	22.26
			49	21.68	22.15	22.46
		25	0	22.32	22.51	22.11
			24	22.31	22.64	22.88
			49	22.46	22.66	22.71
		50	0	22.02	22.10	22.75
	16QAM	1	0	22.01	22.72	22.63
			24	22.06	22.35	22.56
			49	22.48	22.17	22.71
		25	0	21.48	21.49	21.44
			24	21.45	21.74	21.85
			49	21.65	21.82	21.74
		50	0	21.17	21.19	21.49

LTE-FDD Band 7				Conducted Power(dBm)		
Band-width	Modulation	RB allocation	RB offset	20825	21100	21375
				2507.5MHz	2535MHz	2562.5MHz
15MHz	QPSK	1	0	22.57	22.35	22.30
			38	21.75	22.14	22.88
			74	22.70	22.08	22.65
		38	0	22.05	22.24	22.40
			18	22.14	22.06	22.13
			37	22.09	22.41	22.91
		75	0	22.04	22.52	22.36
	16QAM	1	0	22.02	22.41	22.41
			38	22.09	22.96	22.25
			74	22.10	22.83	22.34
		38	0	22.02	22.38	22.28
			18	22.13	22.99	22.24
			37	22.12	22.85	22.49
		75	0	21.12	21.36	21.58
Band-width	Modulation	RB allocation	RB offset	20850	21100	21350
				2510MHz	2535MHz	2560MHz
20MHz	QPSK	1	0	22.27	22.06	22.97
			49	22.05	22.31	22.51
			99	22.36	22.41	22.34
		50	0	22.14	22.63	22.62
			25	22.46	22.71	22.47
			50	22.53	22.36	22.52
		100	0	22.22	22.74	22.24
	16QAM	1	0	21.58	21.18	21.75
			49	21.23	21.06	21.77
			99	21.00	21.29	21.41
		50	0	21.26	21.43	21.44
			25	21.87	21.58	21.52
			50	21.72	21.09	21.65
		100	0	21.29	21.84	21.65

11.3. Wi-Fi

For 2.4GHz Wi-Fi SAR testing, highest average RF output power channel for the lowest data rate for 802.11b were for SAR evaluation.

The maximum output power specified for production units are determined for all applicable 802.11 transmission modes in each standalone and aggregated frequency band. Maximum output power is measured for the highest maximum output power configuration(s) in each frequency band according to the default power measurement procedures.
SAR testing is not required for OFDM mode(s) when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

Wi-Fi 2.4G				
Mode	Channel	Frequency (MHz)	Conducted Peak Power (dBm)	Conducted Average Power (dBm)
802.11b	1	2412	10.45	7.97
	6	2437	9.72	7.29
	11	2462	12.54	10.09
802.11g	1	2412	9.05	6.52
	6	2437	8.86	5.01
	11	2462	11.32	7.38
802.11n (HT20)	1	2412	10.46	6.67
	6	2437	8.93	5.24
	11	2462	11.80	8.00
802.11n (HT40)	3	2422	9.95	5.87
	6	2437	10.05	6.25
	9	2452	11.29	7.16

11.4. Bluetooth

Bluetooth				
Mode	Channel	Frequency (MHz)	Conducted Peak Power (dBm)	Conducted Average Power (dBm)
BLE	0	2402	**1.44**	**1.42**
	19	2440	1.17	1.15
	39	2480	0.30	0.29

12. Maximum Tune-up Limit

WCDMA		
Mode	Maximum Tune-up (dBm)	
	FDD Band IV	FDD Band V
AMR 12.2Kbps	23.00	23.50
RMC 12.2Kbps	23.00	23.50
HSDPA Subtest-1	22.00	22.50
HSDPA Subtest-2	21.50	22.00
HSDPA Subtest-3	22.00	22.50
HSDPA Subtest-4	21.50	22.50
HSUPA Subtest-1	22.00	22.00
HSUPA Subtest-2	21.00	21.50
HSUPA Subtest-3	21.00	21.00
HSUPA Subtest-4	21.50	22.00
HSUPA Subtest-5	22.50	22.50

LTE				
Fequency Band	Band-width(MHz)	Modulation	RB allocation	Maximum Tune-up (dBm)
FDD Band 4	1.4	QPSK	1	24.00
			3	24.00
			6	23.00
		16QAM	1	23.50
			3	23.00
			6	22.00
	3	QPSK	1	24.50
			8	23.50
			15	23.50
		16QAM	1	23.50
			8	22.50
			15	22.50
	5	QPSK	1	24.50
			12	23.50
			25	23.50
		16QAM	1	23.50
			12	22.50
			25	22.50
	10	QPSK	1	24.50
			25	23.50
			50	23.00
		16QAM	1	23.00
			25	22.50
			50	22.00
	15	QPSK	1	24.50
			38	23.50
			75	23.50
		16QAM	1	23.50
			38	23.00
			75	22.50
	20	QPSK	1	24.50
			50	23.50
			100	23.50
		16QAM	1	24.00
			50	22.50
			100	22.50

LTE				
Fequency Band	Band-width(MHz)	Modulation	RB allocation	Maximum Tune-up (dBm)
FDD Band 5	1.4	QPSK	1	25.00
			3	25.00
			6	24.00
		16QAM	1	24.00
			3	24.00
			6	23.00
	3	QPSK	1	25.00
			8	24.00
			15	24.00
		16QAM	1	24.00
			8	23.00
			15	23.00
	5	QPSK	1	25.00
			12	24.00
			25	24.00
		16QAM	1	24.00
			12	23.00
			25	23.00
	10	QPSK	1	24.00
			25	24.50
			50	24.00
		16QAM	1	24.00
			25	23.00
			50	23.00

LTE				
Fequency Band	Band-width(MHz)	Modulation	RB allocation	Maximum Tune-up (dBm)
FDD Band 7	5	QPSK	1	23.00
			12	23.00
			25	22.50
		16QAM	1	22.00
			12	22.00
			25	22.00
	10	QPSK	1	23.00
			25	23.00
			50	23.00
		16QAM	1	23.00
			25	22.00
			50	21.50
	15	QPSK	1	23.00
			38	23.00
			75	23.00
		16QAM	1	23.00
			38	23.00
			75	22.00
	20	QPSK	1	23.00
			50	23.00
			100	23.00
		16QAM	1	22.00
			50	22.00
			100	22.00

The allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2.2-1due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1.

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3

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
64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3
256 QAM	≥ 1						≤ 5

Wi-Fi 2.4G		
Mode	Channel	Maximum Tune-up (dBm) Conducted Average Power
802.11b	1	8.00
	6	7.50
	11	10.50
802.11g	1	7.00
	6	5.50
	11	7.50
802.11n(HT20)	1	7.00
	6	5.50
	11	8.00
802.11n(HT40)	3	6.00
	6	6.50
	9	7.50

Bluetooth		
Mode	Channel	Maximum Tune-up (dBm) Conducted Average Power
BLE	0	1.50
	19	1.50
	39	0.50

Per KDB 447498 D01, the 1-g and 10-g SAR test exclusion thresholds for 100MHz to 6GHz at test separation distances ≦50mm are determined by:

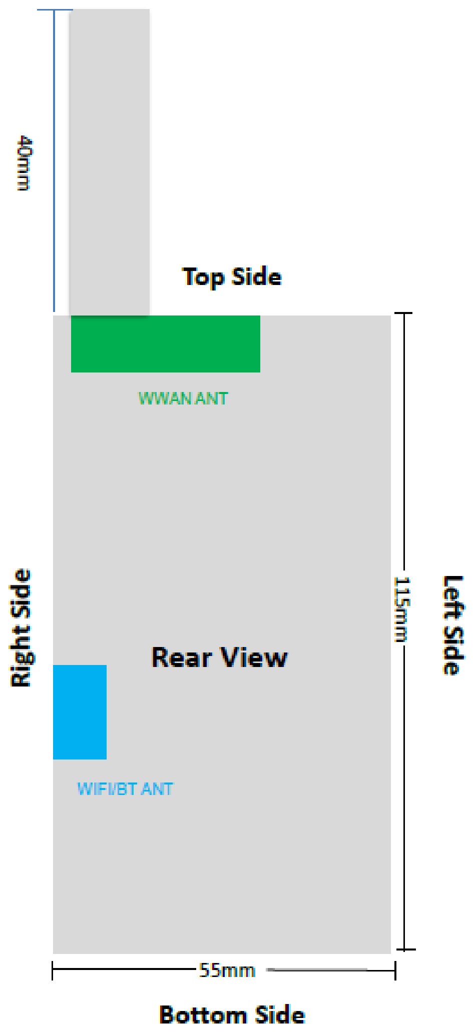
[(max. Power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] * [√f(GHz)] ≦3.0 for 1-g SAR

Band/Mode	F(GHz)	Position	Separation Distance (mm)	Exclusion Thresholds	SAR test exclusion
Bluetooth	2.45	Body	10	0.2	yes

Per KDB 447498 D01, when the minimum test separation distance is <5mm, a distance of 5mm is applied to determine SAR test exclusion.

The test exclusion thereshold is ≦3, SAR testing is not required.

13. Antenna Location



14. Measured and Reported SAR Results

SAR Test Reduction criteria are as follows:

- Reported SAR(W/kg) for WWAN = Measured SAR *Tune-up Scaling Factor
- Reported SAR(W/kg) for Wi-Fi and Bluetooth = Measured SAR * Tune-up scaling factor * Duty Cycle scaling factor
- Duty Cycle scaling factor = 1 / Duty cycle (%)

KDB 447498 D01 General RF Exposure Guidance:

Testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is:

- ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
- ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
- ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz

KDB 941225 D01 SAR test for 3G SAR Test Reduction Procedure:

When the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ ¼ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode.

GSM Guidance

SAR test reduction for GPRS and EDGE modes is determined by the source-based time-averaged output power specified for production units, including tune-up tolerance. 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 and tolerance, the higher number time-slot configuration should be tested. Please refer to section 9. for GSM power verification.
SAR is not required for EDGE (8PSK) mode because the maximum output power and tune-up limit is ≤ 1/4dB higher than GPRS/EDGE (GMSK) or the adjusted SAR of the highest reported SAR of GPRS/EDGE (GMSK) is ≤ 1.2W/kg.

W-CDMA Guidance

SAR for next to the ear head exposure is measured using a 12.2 kbps RMC with TPC bits configured to all “1’s”. The 3G SAR test reduction procedure is applied to AMR configurations with 12.2 kbps RMC (Head) and other spreading codes and multiple DPDCHn configurations supported by the handset with 12.2 kbps RMC (Body-Worn Accessory) as the primary mode.
SAR measurement is not required for the HSDPA, HSUPA, DC-HSDPA and HSPA+. When primary mode and the adjusted SAR is ≤ 1.2 W/kg and secondary mode is ≤ ¼ dB higher than the primary mode

KDB 941225 D05 SAR for LTE Devices:

SAR test reduction is applied using the following criteria:

- Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB, and 50% RB allocation, using the RB offset and required test channel combination with the highest maximum output power among RB offsets at the upper edge, middle and lower edge of each required test channel.
- When the reported SAR is > 0.8 W/kg, testing for other Channels is performed at the highest output power level for 1RB, and 50% RB configuration for that channel.
- Testing for 100% RB configuration is performed at the highest output power level for 100% RB configuration across the Low, Mid and High Channel when the highest reported SAR for 1 RB and 50% RB are > 0.8 W/kg. Testing for the remaining required channels is not needed because the reported SAR for 100% RB Allocation < 1.45 W/kg.
- Testing for 16-QAM and 64-QAM modulation is not required because the reported SAR for QPSK is < 1.45 W/Kg and its output power is not more than 0.5 dB higher than that of QPSK.

- Testing for the other channel bandwidths is not required because the reported SAR for the highest channel bandwidth is < 1.45 W/Kg and its output power is not more than 0.5 dB higher than that of the highest channel bandwidth.

KDB 248227 D01 SAR meas for 802.11:

When 802.11 frame gaps are accounted for in the transmission, a maximum transmission duty factor of 92 - 96% is typically achievable in most test mode configurations. A minimum transmission duty factor of 85% is required to avoid certain hardware and device implementation issues related to wide range SAR scaling. The reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit.

SAR test reduction for 802.11 Wi-Fi transmission mode configurations are considered separately for DSSS and OFDM. An initial test position is determined to reduce the number of tests required for certain exposure configurations with multiple test positions. An initial test configuration is determined for each frequency band and aggregated band according to maximum output power, channel bandwidth, wireless mode configurations and other operating parameters to streamline the measurement requirements. For 2.4 GHz DSSS, either the initial test position or DSSS procedure is applied to reduce the number of SAR tests; these are mutually exclusive. For OFDM, an initial test position is only applicable to next to the ear, UMPC mini-tablet and hotspot mode configurations, which is tested using the initial test configuration to facilitate test reduction. For other exposure conditions with a fixed test position, SAR test reduction is determined using only the initial test configuration.

The multiple test positions require SAR measurements in head, hotspot mode or UMPC mini-tablet configurations may be reduced according to the highest reported SAR determined using the initial test position(s) by applying the DSSS or OFDM SAR measurement procedures in the required wireless mode test configuration(s). The initial test position(s) is measured using the highest measured maximum output power channel in the required wireless mode test configuration(s). When the reported SAR for the initial test position is:

- ≤ 0.4 W/kg, further SAR measurement is not required for the other test positions in that exposure configuration and wireless mode combination within the frequency band or aggregated band. DSSS and OFDM configurations are considered separately according to the required SAR procedures.
- > 0.4 W/kg, SAR is repeated using the same wireless mode test configuration tested in the initial test position to measure the subsequent next closet/smallest test separation distance and maximum coupling test position, on the highest maximum output power channel, until the reported SAR is ≤ 0.8 W/kg or all required test positions are tested.
  - For subsequent test positions with equivalent test separation distance or when exposure is dominated by coupling conditions, the position for maximum coupling condition should be tested.
  - When it is unclear, all equivalent conditions must be tested.
- For all positions/configurations tested using the initial test position and subsequent test positions,when the reported SAR is > 0.8 W/kg, measure the SAR for these positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required test channels are considered.
  - The additional power measurements required for this step should be limited to those necessary for identifying subsequent highest output power channels to apply the test reduction.
- When the specified maximum output power is the same for both UNII 1 and UNII 2A, begin SAR measurements in UNII 2A with the channel with the highest measured output power. If the reported SAR for UNII 2A is ≤ 1.2 W/kg, SAR is not required for UNII 1; otherwise treat the remaining bands separately and test them independently for SAR.
- When the specified maximum output power is different between UNII 1 and UNII 2A, begin SAR with the band that has the higher specified maximum output. If the highest reported SAR for the band with the highest specified power is ≤ 1.2 W/kg, testing for the band with the lower specified output power is not required; otherwise test the remaining bands independently for SAR.

To determine the initial test position, Area Scans were performed to determine the position with the Maximum Value of SAR (measured). The position that produced the highest Maximum Value of SAR is considered the worst case position; thus used as the initial test position.

14.1. Head SAR

WCDMA Band IV										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift (dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Plot No.
		CH	MHz							
RMC 12.2K	Front	1312	1712.4	22.92	23.00	1.019	-	-	-	-
		1413	1732.6	22.84	23.00	1.038	-	-	-	-
		1513	1752.6	22.98	23.00	1.005	0.01	0.173	0.174	1

WCDMA Band V										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift (dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Plot No.
		CH	MHz							
RMC 12.2K	Front	4132	826.4	23.34	23.50	1.038	-	-	-	-
		4183	836.6	23.37	23.50	1.030	0.03	0.230	0.237	2
		4233	846.6	23.22	23.50	1.067	-	-	-	-

LTE Band 4										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift (dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Plot No.
		CH	MHz							
20M QPSK 1RB	Front	20050	1720	24.43	24.50	1.016	-0.07	0.190	0.193	3
		20175	1732.5	24.00	24.50	1.122	-	-	-	-
		20300	1745	24.22	24.50	1.067	-	-	-	-
20M QPSK 50RB	Front	20050	1720	22.74	23.50	1.191	-	-	-	-
		20175	1732.5	22.99	23.50	1.125	-	-	-	-
		20300	1745	23.15	23.50	1.084	-0.06	0.169	0.183	-

LTE Band 5										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift (dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Plot No.
		CH	MHz							
10M QPSK 1RB	Front	20450	829	23.68	24.00	1.076	0.10	0.223	0.240	4
		20525	836.5	23.30	24.00	1.175	-	-	-	-
		20600	844	23.08	24.00	1.236	-	-	-	-
10M QPSK 25RB	Front	20450	829	23.72	24.50	1.197	-	-	-	-
		20525	836.5	23.62	24.50	1.225	-	-	-	-
		20600	844	24.19	24.50	1.074	0.09	0.199	0.214	-

LTE Band 7										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift (dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Plot No.
		CH	MHz							
20M QPSK 1RB	Front	20850	2510	22.27	23.00	1.183	-	-	-	-
		21100	2535	22.06	23.00	1.242	-	-	-	-
		21350	2560	22.97	23.00	1.007	0.06	0.112	0.113	5
20M QPSK 50RB	Front	20850	2510	22.46	23.00	1.132	-	-	-	-
		21100	2535	22.71	23.00	1.069	-0.08	0.099	0.106	-
		21350	2560	22.47	23.00	1.130	-	-	-	-

Wi-Fi 2.4G												
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune-up limit (dBm)	Tune-up scaling factor	Duty Cycle	Duty Cycle Scaling Factor	Power Drift (dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Plot No.
		CH	MHz									
802.11b	Front	1	2412	7.97	8.00	1.007	97.50%	1.03	-	-	-	-
		6	2437	7.29	7.50	1.050	97.50%	1.03	-	-	-	-
		11	2462	10.09	10.50	1.099	97.50%	1.03	-0.18	0.017	0.019	6

14.2. Body SAR

WCDMA Band IV										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift (dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Plot No.
		CH	MHz							
RMC 12.2Kbps	Front	1312	1712.4	22.92	23.00	1.019	-	-	-	-
		1413	1732.6	22.84	23.00	1.038	-	-	-	-
		1513	1752.6	22.98	23.00	1.005	0.04	0.614	0.617	7
	Rear	1312	1712.4	22.92	23.00	1.019	-	-	-	-
		1413	1732.6	22.84	23.00	1.038	-	-	-	-
		1513	1752.6	22.98	23.00	1.005	0.14	0.331	0.333	-
	Rear (With Belt clip)	1312	1712.4	22.92	23.00	1.019	-	-	-	-
		1413	1732.6	22.84	23.00	1.038	-	-	-	-
		1513	1752.6	22.98	23.00	1.005	0.17	0.366	0.368	-

WCDMA Band V										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift (dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Plot No.
		CH	MHz							
RMC 12.2Kbps	Front	4132	826.4	23.34	23.50	1.038	-	-	-	-
		4183	836.6	23.37	23.50	1.030	-0.04	0.461	0.475	8
		4233	846.6	23.22	23.50	1.067	-	-	-	-
	Rear	4132	826.4	23.34	23.50	1.038	-	-	-	-
		4183	836.6	23.37	23.50	1.030	-0.01	0.283	0.292	-
		4233	846.6	23.22	23.50	1.067	-	-	-	-
	Rear (With Belt clip)	4132	826.4	23.34	23.50	1.038	-	-	-	-
		4183	836.6	23.37	23.50	1.030	-0.11	0.215	0.222	-
		4233	846.6	23.22	23.50	1.067	-	-	-	-

LTE Band 4										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift (dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Plot No.
		CH	MHz							
20M QPSK 1RB	Front	20050	1720	24.43	24.50	1.016	-0.10	0.719	0.731	9
		20175	1732.5	24.00	24.50	1.122	-	-	-	-
		20300	1745	24.22	24.50	1.067	-	-	-	-
	Rear	20050	1720	24.43	24.50	1.016	0.17	0.404	0.411	-
		20175	1732.5	24.00	24.50	1.122	-	-	-	-
		20300	1745	24.22	24.50	1.067	-	-	-	-
	Rear (With Belt clip)	20050	1720	24.43	24.50	1.016	0.05	0.417	0.424	-
		20175	1732.5	24.00	24.50	1.122	-	-	-	-
		20300	1745	24.22	24.50	1.067	-	-	-	-
20M QPSK 50RB	Front	20050	1720	22.74	23.50	1.191	-	-	-	-
		20175	1732.5	22.99	23.50	1.125	-	-	-	-
		20300	1745	23.15	23.50	1.084	-0.13	0.664	0.720	-
	Rear	20050	1720	22.74	23.50	1.191	-	-	-	-
		20175	1732.5	22.99	23.50	1.125	-	-	-	-
		20300	1745	23.15	23.50	1.084	-0.06	0.361	0.391	-
	Rear (With Belt clip)	20050	1720	22.74	23.50	1.191	-	-	-	-
		20175	1732.5	22.99	23.50	1.125	-	-	-	-
		20300	1745	23.15	23.50	1.084	0.01	0.369	0.400	-

LTE Band 5										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift(dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Plot No.
		CH	MHz							
10M QPSK 1RB	Front	20450	829	23.68	24.00	1.076	-0.13	0.491	0.529	10
		20525	836.5	23.30	24.00	1.175	-	-	-	-
		20600	844	23.08	24.00	1.236	-	-	-	-
	Rear	20450	829	23.68	24.00	1.076	-0.16	0.306	0.329	-
		20525	836.5	23.30	24.00	1.175	-	-	-	-
		20600	844	23.08	24.00	1.236	-	-	-	-
	Rear (With Belt clip)	20450	829	23.68	24.00	1.076	0.03	0.297	0.320	-
		20525	836.5	23.30	24.00	1.175	-	-	-	-
		20600	844	23.08	24.00	1.236	-	-	-	-
10M QPSK 25RB	Front	20450	829	23.72	24.50	1.197	-	-	-	-
		20525	836.5	23.62	24.50	1.225	-	-	-	-
		20600	844	24.19	24.50	1.074	-0.07	0.462	0.496	-
	Rear	20450	829	23.72	24.50	1.197	-	-	-	-
		20525	836.5	23.62	24.50	1.225	-	-	-	-
		20600	844	24.19	24.50	1.074	0.15	0.284	0.305	-
	Rear (With Belt clip)	20450	829	23.72	24.50	1.197	-	-	-	-
		20525	836.5	23.62	24.50	1.225	-	-	-	-
		20600	844	24.19	24.50	1.074	0.11	0.263	0.282	-

LTE Band 7										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift(dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Plot No.
		CH	MHz							
20M QPSK 1RB	Front	20850	2510	22.27	23.00	1.183	-	-	-	-
		21100	2535	22.06	23.00	1.242	-	-	-	-
		21350	2560	22.97	23.00	1.007	-0.02	0.418	0.421	11
	Rear	20850	2510	22.27	23.00	1.183	-	-	-	-
		21100	2535	22.06	23.00	1.242	-	-	-	-
		21350	2560	22.97	23.00	1.007	0.06	0.193	0.194	-
	Rear (With Belt clip)	20850	2510	22.27	23.00	1.183	-	-	-	-
		21100	2535	22.06	23.00	1.242	-	-	-	-
		21350	2560	22.97	23.00	1.007	0.10	0.206	0.207	-
20M QPSK 50RB	Front	20850	2510	22.46	23.00	1.132	-	-	-	-
		21100	2535	22.71	23.00	1.069	-0.12	0.375	0.401	-
		21350	2560	22.47	23.00	1.130	-	-	-	-
	Rear	20850	2510	22.46	23.00	1.132	-	-	-	-
		21100	2535	22.71	23.00	1.069	0.04	0.164	0.175	-
		21350	2560	22.47	23.00	1.130	-	-	-	-
	Rear (With Belt clip)	20850	2510	22.46	23.00	1.132	-	-	-	-
		21100	2535	22.71	23.00	1.069	0.03	0.183	0.196	-
		21350	2560	22.47	23.00	1.130	-	-	-	-

Wi-Fi 2.4G												
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune-up limit (dBm)	Tune-up scaling factor	Duty Cycle	Duty Cycle Scaling Factor	Power Drift (dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Plot No.
		CH	MHz									
802.11b	Front	1	2412	7.97	8.00	1.007	97.50%	1.03	-	-	-	-
		6	2437	7.29	7.50	1.050	97.50%	1.03	-	-	-	-
		11	2462	10.09	10.50	1.099	97.50%	1.03	-0.12	0.061	0.069	-
	Rear	1	2412	7.97	8.00	1.007	97.50%	1.03	-	-	-	-
		6	2437	7.29	7.50	1.050	97.50%	1.03	-	-	-	-
		11	2462	10.09	10.50	1.099	97.50%	1.03	-0.01	0.046	0.052	-
	Rear (With Belt clip)	1	2412	7.97	8.00	1.007	97.50%	1.03	-	-	-	-
		6	2437	7.29	7.50	1.050	97.50%	1.03	-	-	-	-
		11	2462	10.09	10.50	1.099	97.50%	1.03	-0.09	0.067	0.076	12

SAR Test Data Plots to the Appendix A.

15. SAR Measurement Variability

In accordance with published RF Exposure KDB 865664 D01 SAR measurement 100 MHz to 6 GHz. These 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 <0.8 or 2 W/kg (1-g or 10-g respectively); steps 2) through 4) do not apply.

2) When the original highest measured SAR is ≥ 0.8 or 2 W/kg (1-g or 10-g respectively), 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 or 3.6 W/kg (~ 10% from the 1-g or 10-g respective SAR limit).

4) Perform a third repeated measurement only if the original, first, or second repeated measurement is ≥ 1.5 or 3.75 W/kg (1-g or 10-g respectively) and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

Band	Test Position	Frequency		Highest Measured SAR (W/kg)	First Repeated		Second Repeated	
		CH	MHz		Measured SAR(W/kg)	Largest to Smallest SAR Ratio	Measured SAR(W/kg)	Largest to Smallest SAR Ratio
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

16. Simultaneous Transmission analysis

No.	Simultaneous Transmission Configurations	Head	Body-worn	Note
1	WCDMA(voice) + Bluetooth (data)	Yes	Yes	
2	WCDMA(voice) + WLAN (data)	Yes	Yes	
3	WCDMA (data) + Bluetooth (data)	Yes	Yes	
4	WCDMA (data) + WLAN (data)	Yes	Yes	
5	LTE + Bluetooth (data)	Yes	Yes	
6	LTE + WLAN (data)	Yes	Yes	

General note:

1. WLAN and Bluetooth share the same antenna, and cannot transmit simultaneously.
2. EUT will choose either GSM or WCDMA LTE according to the network signal condition; therefore, they will not operate simultaneously at any moment.
3. The reported SAR summation is calculated based on the same configuration and test position
4. For simultaneous transmission analysis, Bluetooth SAR is estimated per KDB 447498 D01 based on the formula below
   a) [(max. Power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] * [√f(GHz)/x]W/kg for test separation distances ≦50mm; whetn x=7.5 for 1-g SAR, and x=18.75 for 10-g SAR.
   b) When the minimum separation distance is <5mm, the distance is used 5mm to determine SAR test exclusion
   c) 0.4 W/kg for 1-g SAR and 1.0W/kg for 10-g SAR, when the test separation distances is >50mm.

Bluetooth Max power	Exposure position	Body-worn
	Test separation	10mm
1.50dBm	Estimated SAR (W/kg)	0.029

16.1. Head

PCF+ WLAN DTS					
WWAN Band		Exposure Position	Standalone SAR (W/kg)		Σ 1-g SAR (W/kg)
			PCF	WLAN DTS	
WCDMA	Band IV	Front	0.174	0.019	0.193
	Band V	Front	0.237	0.019	0.256
LTE	B4 1RB	Front	0.193	0.019	0.212
	B4 50RB	Front	0.183	0.019	0.202
	B5 1RB	Front	0.240	0.019	**0.259**
	B5 25RB	Front	0.214	0.019	0.233
	B7 1RB	Front	0.113	0.019	0.132
	B7 50RB	Front	0.106	0.019	0.125

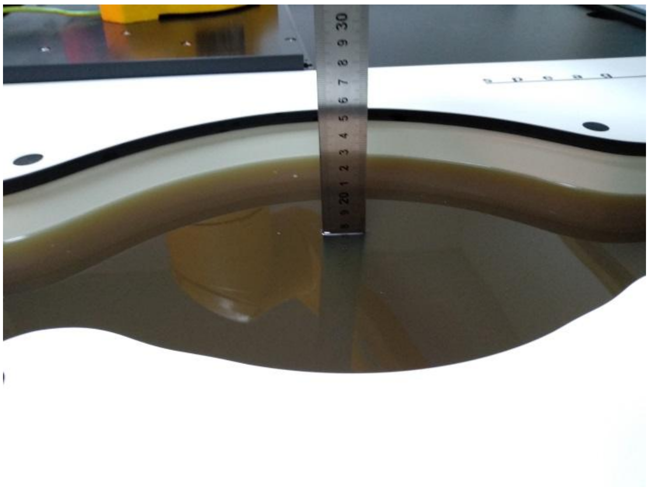
PCF+ BT					
WWAN Band		Exposure Position	Standalone SAR (W/kg)		Σ 1-g SAR (W/kg)
			PCF	WLAN U-NII	
WCDMA	Band IV	Front	0.174	0.029	0.203
	Band V	Front	0.237	0.029	0.266
LTE	B4 1RB	Front	0.193	0.029	0.223
	B4 50RB	Front	0.183	0.029	0.213
	B5 1RB	Front	0.240	0.029	**0.270**
	B5 25RB	Front	0.214	0.029	0.243
	B7 1RB	Front	0.113	0.029	0.142
	B7 50RB	Front	0.106	0.029	0.135

16.2. Body-worn

PCF + WLAN DTS					
WWAN Band		Exposure Position	Standalone SAR (W/kg)		Σ 1-g SAR
			PCF	WLAN DTS	(W/kg)
WCDMA	Band IV	Front	0.617	0.069	0.686
		Rear	0.333	0.052	0.384
		Rear (With Belt clip)	0.368	0.076	0.443
	Band V	Front	0.475	0.069	0.544
		Rear	0.292	0.052	0.343
		Rear (With Belt clip)	0.222	0.076	0.297
LTE	B4 1RB	Front	0.731	0.069	**0.799**
		Rear	0.411	0.052	0.462
		Rear (With Belt clip)	0.424	0.076	0.499
	B4 50RB	Front	0.720	0.069	0.788
		Rear	0.391	0.052	0.443
		Rear (With Belt clip)	0.400	0.076	0.475
	B5 1RB	Rear (With Belt clip)	0.529	0.069	0.597
		Front	0.329	0.052	0.381
		Rear	0.320	0.076	0.395
	B5 25RB	Rear (With Belt clip)	0.496	0.069	0.565
		Front	0.305	0.052	0.357
		Rear	0.282	0.076	0.358
	B7 1RB	Rear (With Belt clip)	0.421	0.069	0.490
		Front	0.194	0.052	0.246
		Rear	0.207	0.076	0.283
	B7 50RB	Front	0.401	0.069	0.470
		Rear	0.175	0.052	0.227
		Rear (With Belt clip)	0.196	0.076	0.271

PCF + BT					
WWAN Band		Exposure Position	Standalone SAR (W/kg)		Σ 1-g SAR (W/kg)
			PCF	WLAN DTS	
WCDMA	Band IV	Front	0.617	0.029	0.646
		Rear	0.333	0.029	0.362
		Rear (With Belt clip)	0.368	0.029	0.397
	Band V	Front	0.475	0.029	0.504
		Rear	0.292	0.029	0.321
		Rear (With Belt clip)	0.222	0.029	0.251
LTE	B4 1RB	Front	0.731	0.029	**0.760**
		Rear	0.411	0.029	0.440
		Rear (With Belt clip)	0.424	0.029	0.453
	B4 50RB	Front	0.720	0.029	0.749
		Rear	0.391	0.029	0.421
		Rear (With Belt clip)	0.400	0.029	0.429
	B5 1RB	Rear (With Belt clip)	0.529	0.029	0.558
		Front	0.329	0.029	0.359
		Rear	0.320	0.029	0.349
	B5 25RB	Rear (With Belt clip)	0.496	0.029	0.526
		Front	0.305	0.029	0.334
		Rear	0.282	0.029	0.312
	B7 1RB	Rear (With Belt clip)	0.421	0.029	0.450
		Front	0.194	0.029	0.224
		Rear	0.207	0.029	0.237
	B7 50RB	Front	0.401	0.029	0.430
		Rear	0.175	0.029	0.205
		Rear (With Belt clip)	0.196	0.029	0.225

17. TestSetup Photos



Liquid depth in the Body phantom

Front-of-face(25mm)

Body Front(10mm)

Body Rear(10mm)

Body Rear(0mm)- With Belt clip

18. External and Internal Photos of the EUT

Please reference to the report No.: CHTEW20120155

---------End of Report----------