FCC SAR Test Report

FCC ID: QISE5573CS-509

Project No.	:	1702C058
Equipment	:	Mobile WiFi
Model Name	:	E5573Cs-509
Applicant	:	Huawei Technologies Co., Ltd.
Address	:	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

Date of Receipt	:	Feb. 18, 2017
Date of Test	:	Feb. 18, 2017 ~ Mar. 03, 2017
Issued Date	:	Mar. 07, 2017
Tested by	:	BTL Inc.

PREPARED BY : (Super Jiang/ Technical Engineer)

APPROVED BY : (Steven Lu / Technical Manager)

BTL INC.

No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China.

TEL: +86-769-8318-3000 FAX: +86-769-8319-6000

Testing Laboratory 2640

Declaration

BTL represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with the standards traceable to National Measurement Laboratory (**NML**), or National Institute of Standards and Technology (**NIST**) .

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REPORT ISSUED HISTORY

Issued No.	Description	Issued Date
BTL-FCC SAR-1-1702C058	Original Issue.	Mar. 07, 2017

1. GENERAL SUMMARY

Equipment	Mobile WiFi
Model Name	E5573Cs-509
Brand Name	HUAWEI
Manufacturer	Huawei Technologies Co.,Ltd.
Address	Administration Building, Huawei Base, Bantian, Longgang District ,Shenzhen 518129, P.R.China
Standard(s)	**FCC 47CFR §2.1093** Radio frequency Radiation Exposure Evaluation: Portable Devices **ANSI Std C95.1-1992** Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz – 300 GHz.(IEEE Std C95.1-1991) **IEEE Std 1528-2013** Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques **KDB941225 D01** 3G SAR Procedures v03r01 **KDB941225 D05** SAR for LTE Devices v02r05 **KDB941225 D06** Hotspot Mode V02r01 **KDB447498 D01** General RF Exposure Guidance v06 **KDB248227 D01** 802. 11 Wi-Fi SAR v02r02 **KDB865664 D01** SAR measurement 100 MHz to 6 GHz v01r04 **KDB865664 D02** RF Exposure Reporting v01r02 **KDB690783 D01** SAR Listings on Grants v01r03

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.
The test data, data evaluation, and equipment configuration contained in our test report (Ref No. BTL-FCC SAR-1-1702C058) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of TAF according to the ISO-17025 quality assessment standard and technical standard(s).

2. RF EMISSIONS MEASUREMENT

2.1 TEST FACILITY

The test facilities used to collect the test data in this report is **SAR room** at the location of No.3,Jinshagang 1st Road, ShiXia, Dalang Town,Dong Guan, China.523792

2.2 MEASUREMENT UNCERTAINTY

Note: Per KDB865664 D01 SAR Measurement 100 MHz to 6 GHz v01r03,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.

3. GENERAL INFORMATION

3.1 STATEMENT OF COMPLIANCE

Equipment Class	Mode	Highest Body (10mm) SAR-1g(W/kg)
PCE	GSM850	0.50
	GSM1900	0.69
	UMTS Band 2	1.31
	UMTS Band 4	1.31
	UMTS Band 5	1.40
	LTE Band 2	1.38
	LTE Band 4	1.37
	LTE Band 5	0.68
	LTE Band 7	1.37
	LTE Band 12	1.26
	LTE Band 13	1.00
DTS	2.4G WLAN	0.16
Note：The highest reported SAR for body and simultaneous transmission exposure conditions are 1.40W/kg and 1.52 W/kg respectively.		

Note:

1)The device is in compliance with Specific Absorption Rate（SAR）for general population/ uncontrolled exposure limits according to the FCC rule §2.1093, the ANSI/IEEE C95.1:1992, the NCRP Report Number 86 for uncontrolled environment, and had been tested in accordance with the measurement methods and procedures specified in IEEE Std 1528-2013.

2)According to TCB workshop October, 2014 RF Exposure Procedures Update(Overlapping LTE Bands): SAR for LTE Band 17 (Frequency range:704-716 MHz) is covered by LTE Band 12 (Frequency range:699-716 MHz) due to similar frequency range, same maximum tune up limit and same channel bandwidth.

3.1.1 GENERAL DESCRIPTION OF EUT

Equipment	Mobile WiFi		
Model Name	E5573Cs-509		
IMEI Code	Sample 1:004401728543949		
S/N	Sample 1: 3QJ0117216000183		
	Sample 2: XSR0116C16000024(used for testing WiFi only)		
HW Version	CL1E5573CSM01		
SW Version	21.323.00.00.00		
Modulation	GSM(GMSK/8PSK), UMTS(QPSK) , LTE(QPSK/16QAM), WiFi(DSSS/OFDM)		
Operation Frequency Range(s)	Band	TX (MHz)	RX (MHz)
	GSM850	824-849	869-894
	GSM1900	1850-1910	1930-1990
	UMTS Band 2	1850-1910	1930-1990
	UMTS Band 4	1710-1755	2110-2155
	UMTS Band 5	824-849	869-894
	LTE Band 2	1850-1910	1930-1990
	LTE Band 4	1710-1755	2110-2155
	LTE Band 5	824-849	869-894
	LTE Band 7	2500-2570	2620-2690
	LTE Band 12	699-716	729-746
	LTE Band 13	777~787	746-756
	LTE Band 17	704-716	734-746
	WIFI	2412 ~2462	
GPRS/EDGE Multislot Class(12)	Max Number of Timeslots in Uplink:	4	
	Max Number of Timeslots in Downlink:	4	
	Max Total Timeslot:	5	
GSM Device class	Class B		
HSDPA UE Category	14		
HSUPA UE Category	6		
Power Class:	4,tested with power level 5(GSM850)		
	1,tested with power level 0(GSM1900)		
	3, tested with power control “all 1”(UMTS Band 2/4/5)		
	3, tested with power control “all Max” (LTE Band 2/4/5/7/12/13/17)		
Test Channels (low-mid-high):	128-190-251 (GSM850)		
	512-661-810 (GSM1900)		
	9262-9400-9538(UMTS Band 2)		
	1312-1413-1513 (UMTS Band 4)		
	4132-4182-4233 (UMTS Band 5)		
	18700-18900-19100(LTE Band 2 BW=20MHz)		
	20050-20175-20300(LTE Band 4 BW=20MHz)		
	20450-20525-20600(LTE Band 5 BW=10MHz)		
	20850-21100-21350(LTE Band 7 BW=20MHz)		
	23060-23095-23130(LTE Band 12 BW=10MHz)		
	23230 (LTE Band 13 BW=10MHz)		
	23780-23790-23800(LTE Band 17 BW=10MHz)		
	1-6 -11 (2.4G WIFI 802.11b/g/n HT20)		
	3-6 - 9 (2.4G WIFI 802.11n HT40)		
Other Information			

Battery	Huawei Technologies Co., Ltd. Battery Model: HB434666RBC Nominal Voltage: ⎓ +3.8V Charging Voltage: ⎓ +4.35V Rated capacity: 1500mAh 1.Sunwoda Electronic Co., LTD 2.SCUD (FUJIAN) Electronics Co., Ltd

3.2 LABORATORY ENVIRONMENT

Temperature	Min. = 18ºC, Max. = 25ºC
Relative humidity	Min. = 30%, Max. = 70%
Ground system resistance	< 0.5Ω
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.	

3.3 MAIN TEST INSTRUMENTS

Item	Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. Interval
1	Data Acquisition Electronics	Speag	DAE4	1390	Sep. 22, 2016	1 Year
2	E-field Probe	Speag	EX3DV4	3753	May. 11, 2016	1 Year
3	E-field Probe	Speag	EX3DV4	7340	Dec. 27, 2016	1 Year
4	Electro Optical Converter	Speag	ECO90	1151	N/A	N/A
5	System Validation Dipole	Speag	D750V3	1095	Sep. 30, 2015	3 Years
6	System Validation Dipole	Speag	D835V2	4d160	Sep. 30, 2015	3 Years
7	System Validation Dipole	Speag	D1750V2	1101	Sep. 22, 2015	3 Years
8	System Validation Dipole	Speag	D1900V2	5d179	Sep. 29, 2015	3 Years
9	System Validation Dipole	Speag	D2450V2	919	Sep. 28, 2015	3 Years
10	System Validation Dipole	Speag	D2600V2	1067	Sep. 28, 2015	3 Years
11	Twin Sam Phantom	Speag	Twin Sam Phantom V5.0	1784	N/A	N/A
12	Twin Sam Phantom	Speag	Twin Sam Phantom V5.0	1896	N/A	N/A
13	8960 Series 10 Wireless Com Test set	Agilent	E5515E	MY52112163	Sep. 04, 2016	1 Year
14	CMW500-Wideband Radio Communication Tester	RS	CMW500	152366	Mar. 27, 2016	1 Year
15	CMW500-Wideband Radio Communication Tester	RS	CMW500	152372	Mar. 27, 2016	1 Year
16	Power Amplifier	Mini-Circuits	ZHL-42W+	QA1333003	N/A	N/A
17	ENA Network Analyzer	Agilent	E5071C	MY46102965	Mar. 27, 2016	1 Year
18	MXG Analog Signal Generator	Agilent	N5181A	MY49060710	Sep. 04, 2016	1 Year
19	P-series power meter	Agilent	N1911A	MY45100473	Sep. 04, 2016	1 Year
20	wideband power sensor	Agilent	N1921A	MY51100041	Sep. 04, 2016	1 Year
21	power Meter	Anritsu	ML2495A	1128009	Mar. 27, 2016	1 Year
22	Pulse Power Sensor	Anritsu	MA 2411B	1027500	Mar. 27, 2016	1 Year
23	Dielectric Assessment Kit	Speag	DAK-3.5	1226	N/A	N/A
24	Dual directional coupler	Woken	TS-PCC0M-05	107090019	Mar. 16, 2016	1 Year

Remark: 1.” N/A” denotes no model name, serial No. or calibration specified.

2.

1) Per KDB865664 D01 requirements for dipole calibration, the test laboratory has adopted three-year extended calibration interval. 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) The most recent return-loss result , measured at least annually, deviates by no more than 20% from the previous measurement;

d) The most recent measurement of the real or imaginary parts of the impedance, measured at least annually is within 5 Ω from the previous measurement.

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

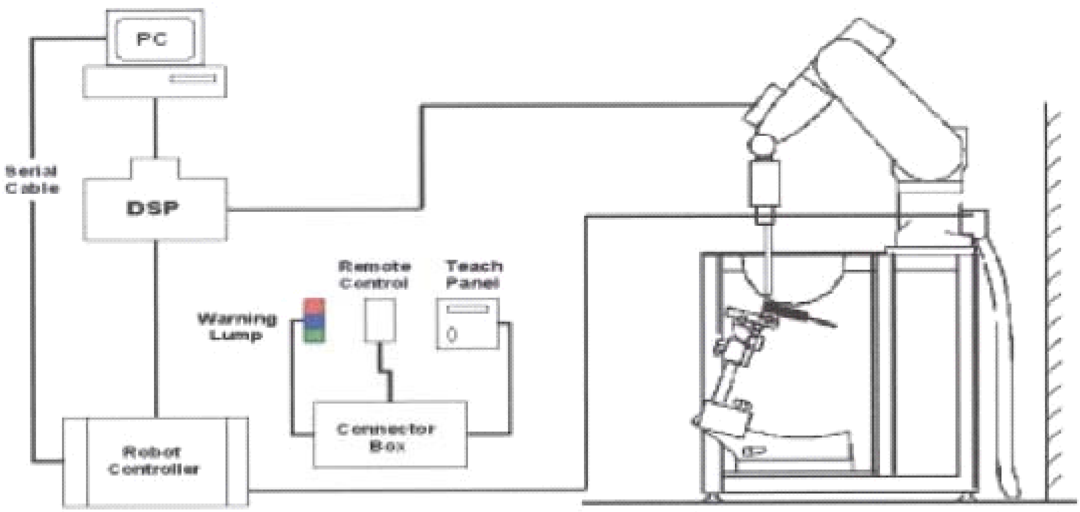
4.SAR MEASUREMENTS SYSTEM CONFIGURATION

4.1SAR MEASUREMENT SET-UP

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

1. A standard high precision 6-axis robot (Stäubli RX family) with controller and software. An arm extension for accommodating the data acquisition electronics (DAE).
2. 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.
3. 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.
4. A unit to operate the optical surface detector which is connected to the EOC.
5. 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.
6. TheDASY5 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 7
7. DASY5 software and SEMCAD data evaluation software.
8. Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.
9. The generic twin phantom enabling the testing of left-hand and right-hand usage.
10. The device holder for handheld mobile phones.
11. Tissue simulating liquid mixed according to the given recipes.
12. System validation dipoles allowing to validate the proper functioning of the system.

4.1.1Test Setup Layout



4.2DASY5E-FIELDPROBESYSTEM

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

4.2.1EX3DV4 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	10 MHz to 6 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 mW/g Linearity:± 0.2dB
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Distance from probe tip to dipole centers: 1.0 mm

EX3DV4 E-field Probe

4.2.2E-FIELD PROBE CALIBRATION

Each probe is calibrated according to a dosimetric assessment procedure with accuracy better than ±10%. The spherical isotropy was evaluated and found to be better than ± 0.25dB. The sensitivity parameters (NormX, NormY, NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested.

The free space E-field from amplified probe outputs is determined in a test chamber. This is performed in a TEM cell for frequencies bellow 1 GHz, and in a wave guide above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees.

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The measured free space E-field in the medium correlates to temperature rise in a dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$SAR = C\frac{\Delta T}{\Delta t}$$

Where: Δt = Exposure time (30 seconds),

C = Heat capacity of tissue (brain or muscle),

ΔT = Temperature increase due to RF exposure.

Or
$$SAR = \frac{|E|^2 \sigma}{\rho}$$

Where: σ = Simulated tissue conductivity,

ρ = Tissue density (kg/m3).

4.2.3OTHER TEST EQUIPMENT

4.2.3.1. Device Holder for Transmitters

Construction: Simple but effective and easy-to-use extension for Mounting Device that facilitates the testing of larger devices (e.g., laptops, cameras, etc.) It is light weight and fits easily on the upper part of the Mounting Device in place of the phone positioner. The extension is fully compatible with the Twin SAM, ELI4and SAM v6.0Phantoms.
Material: POM, Acrylic glass, Foam

4.2.3.2 Phantom

Model	ELI4 Phantom	
Construction	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.	
Shell Thickness	2±0.1 mm	
Filling Volume	Approx. 30 liters	
Dimensions	Length: 600 mm ; Width: 190mm Height: adjustable feet	
Aailable	Special	

Model	Twin SAM	
Construction	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.	
Shell Thickness	2 ± 0.2 mm	
Filling Volume	Approx. 25 liters	
Dimensions	Length:1000mm; Width: 500mm Height: adjustable feet	
Aailable	Special	

4.2.4SCANNING PROCEDURE

The DASY5 installation includes predefined files with recommended procedures for measurements and validation. They are read-only document files and destined as fully defined but unmeasured masks. All test positions (head or Body) are tested with the same configuration of test steps differing only in the grid definition for the different test positions.

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. The indicated drift is mainly the variation of the DUT’s output power and should vary max. ± 5 %.

The “surface check” measurement tests the optical surface detection system of the DASY5 system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above ± 0.1mm). To prevent wrong results tests are only executed when the liquid is free of air bubbles. The difference between the optical surface detection and the actual surface depends on the probe and is specified with each probe. (It does not depend on the surface reflectivity or the probe angle to the surface within ± 30°.)

- Area Scan

The “area scan” measures the SAR above the DUT or verification dipole on a parallel plane to the surface. It is used to locate the approximate location of the peak SAR with 2D spline interpolation. The robot performs a stepped movement along one grid axis while the local electrical field strength is measured by the probe. The probe is touching the surface of the SAM during acquisition of measurement values. The standard scan uses large grid spacing for faster measurement.

Standard grid spacing for head measurements is 15 mm in x- and y- dimension(≤2GHz)，12 mm in x- and y- dimension(2-4 GHz) and 10mm in x- and y- dimension(4-6GHz). If a finer resolution is needed, the grid spacing can be reduced. Grid spacing and orientation have no influence on the SAR result. For special applications where the standard scan method does not find the peak SAR within the grid, e.g. mobile phones with flip cover, the grid can be adapted in orientation.

- Zoom Scan

A “zoom scan” measures the field in a volume around the 2D peak SAR value acquired in the previous “coarse” scan. This is a fine grid with maximum scan spatial resolution: Δx_{zoom}, Δy_{zoom}≤ 2GHz -≤8mm, 2-4GHz -≤5 mm and 4-6 GHz-≤4mm; Δz_{zoom}≤3GHz -≤5 mm, 3-4 GHz-≤4mm and 4-6GHz-≤2mm where the robot additionally moves the probe along the z-axis away from the bottom of the Phantom. DASY is also able to perform repeated zoom scans if more than 1 peak is found during area scan. In this document, the evaluated peak 1g and 10g averaged SAR values are shown in the 2D-graphics in Appendix B. Test results relevant for the specified standard (see chapter 1.4.)are shown in table form form in chapter 7.2.

A Z-axis scan measures the total SAR value at the x-and y-position of the maximum SAR value found during the cube scan. The probe is moved away in z-direction from the bottom of the SAM phantom in 2 mm steps. This measurement shows the continuity of the liquid and can - depending in the field strength – also show the liquid depth.

The following table summarizes the area scan and zoom scan resolutions per FCC KDB 865664D01:

Frequency	Maximun Area Scan resolution (Δx_{area}, Δy_{area})	Maximun Zoom Scan spatial resolution (Δx_{Zoom}, Δy_{Zoom})	Maximun Zoom Scan spatial resolution			Minimum zoom scan volume (x,y,z)
			Uniform Grid	Graded Grad		
			$\Delta z_{Zoom}(n)$	$\Delta z_{Zoom}(1)$*	$\Delta z_{Zoom}(n>1)$*	
≤2GHz	≤15mm	≤8mm	≤5mm	≤4mm	≤1.5*Δz_{Zoom}(n-1)	≥30mm
2-3GHz	≤12mm	≤5mm	≤5mm	≤4mm	≤1.5*Δz_{Zoom}(n-1)	≥30mm
3-4GHz	≤12mm	≤5mm	≤4mm	≤3mm	≤1.5*Δz_{Zoom}(n-1)	≥28mm
4-5GHz	≤10mm	≤4mm	≤3mm	≤2.5mm	≤1.5*Δz_{Zoom}(n-1)	≥25mm
5-6GHz	≤10mm	≤4mm	≤2mm	≤2mm	≤1.5*Δz_{Zoom}(n-1)	≥22mm

4.2.5SPATIAL PEAK SAR EVALUATION

The spatial peak SAR - value for 1 and 10 g is evaluated after the Cube measurements have been done. The basis of the evaluation are the SAR values measured at the points of the fine cube grid consisting of 5 x 5 x 7 points(with 8mm horizontal resolution) or 7 x 7 x 7 points(with 5mm horizontal resolution) or 8 x 8 x 7 points(with 4mm horizontal resolution). The algorithm that finds the maximal averaged volume is separated into three different stages.

- The data between the dipole center of the probe and the surface of the phantom are extrapolated. This data cannot be measured since the center of the dipole is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is about 1 mm (see probe calibration sheet). The extrapolated data from a cube measurement can be visualized by selecting “Graph Evaluated”.
- The maximum interpolated value is searched with a straight-forward algorithm. Around this maximum the SAR - values averaged over the spatial volumes (1g or 10 g) are computed using the 3d-spline interpolation algorithm. If the volume cannot be evaluated (i.e., if a part of the grid was cut off by the boundary of the measurement area) the evaluation will be started on the corners of the bottom plane of the cube.
- All neighboring volumes are evaluated until no neighboring volume with a higher average value is found.

Extrapolation

The extrapolation is based on a least square algorithm [W. Gander, Computermathematik, p.168-180]. Through the points in the first 3 cm along the z-axis, polynomials of order four are calculated. These polynomials are then used to evaluate the points between the surface and the probe tip. The points, calculated from the surface, have a distance of 1 mm from each other.

Interpolation

The interpolation of the points is done with a 3d-Spline. The 3d-Spline is composed of three one-dimensional splines with the "Not a knot"-condition [W. Gander, Computermathematik, p.141-150] (x, y and z -direction) [Numerical Recipes in C, Second Edition, p.123ff].

Volume Averaging

At First the size of the cube is calculated. Then the volume is integrated with the trapezoidal algorithm. 8000 points (20x20x20) are interpolated to calculate the average.

Advanced Extrapolation

DASY5 uses the advanced extrapolation option which is able to compansate boundary effects on E-field probes.

4.2.6DATA STORAGE AND EVALUATION

4.2.5.1Data Storage

The DASY5 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 ".DAE4". 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], [mW/g], [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.

4.4.2 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, a_{i0}, a_{i1}, a_{i2}
	Conversion factor	$ConvF_i$
	Diode compression point	Dcp_i
Device parameters:	Frequency	f
	Crest factor	cf
Media parameters:	Conductivity	
	Density	

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 multi meter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics.

If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

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

With

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

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

cf = crest factor of exciting field (DASY 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 V_i = compensated signal of channel i (i = x, y, z)

$Norm_i$ = 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]

E_i = electric field strength of channel i in V/m

H_i = 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.

$$SAR = (E_{tot})^2 \cdot \sigma / (\rho \cdot 1000)$$

With SAR = local specific absorption rate in mW/g

E_{tot} = total field strength in V/m

= conductivity in [mho/m] or [Siemens/m]

= equivalent tissue density in g/cm^3

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid. The power flow density is calculated assuming the excitation field to be a free space field.

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

With P_{pwe} = equivalent power density of a plane wave in mW/cm^2

E_{tot} = total field strength in V/m

H_{tot} = total magnetic field strength in A/m

5. SYSTEM VERIFICATION PROCEDURE

5.1 TISSUE VERIFICATION

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine of the dielectic parameter are within the tolerances of the specified target values. The measured conductivity and relative permittivity should be within ± 5% of the target values.

The following materials are used for producing the tissue-equivalent materials.

Tissue Type	Bactericide	DGBE	HEC	NaCl	Sucrose	Triton X-100	Water	Diethylene Glycol Mono-hexylether
Body 750	0.2	-	0.2	0.8	48.8	-	50.0	-
Body 835	0.2	-	0.2	0.9	48.5	-	50.2	-
Body 1750	-	31.0	-	0.2	-	-	68.8	-
Body 1900	-	29.5	-	0.3	-	-	70.2	-
Body 2450	-	31.4	-	0.1	-	-	68.5	-
Body 2600	-	31.8	-	0.1	-	-	68.1	-

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

Tissue Verification									
Tissue Type	Frequency (MHz)	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (εr)	Targeted Conductivity (σ)	Targeted Permittivity (εr)	Deviation Conductivity (σ) (%)	Deviation Permittivity (εr) (%)	Date
Body	750	22.5	0.963	56.330	0.96	55.5	0.31	1.50	Feb. 22, 2017
Body	750	22.2	0.966	56.290	0.96	55.5	0.63	1.42	Mar. 03, 2017
Body	835	22.5	0.965	54.270	0.97	55.2	-0.52	-1.68	Feb. 19, 2017
Body	835	22.1	0.967	54.330	0.97	55.2	-0.31	-1.58	Mar. 02, 2017
Body	1750	22.1	1.479	52.400	1.49	53.4	-0.74	-1.87	Feb. 21, 2017
Body	1900	22.4	1.541	53.590	1.52	53.3	1.38	0.54	Feb. 20, 2017
Body	2450	22.6	1.965	53.200	1.95	52.7	0.77	0.95	Feb. 23, 2017
Body	2600	22.5	2.195	52.420	2.16	52.5	1.62	-0.15	Feb. 22, 2017

Note:
1)The dielectric parameters of the tissue-equivalent liquid should be measured under similar ambient conditions and within 2 °C of the conditions expected during the SAR evaluation to satisfy protocol requirements.
2)KDB 865664 was ensured to be applied for probe calibration frequencies greater than or equal to 50MHz of the EUT frequencies.
3)The above measured tissue parameters were used in the DASY software to perform interpolation via the DASY software to determine actual dielectric parameters at the test frequencies. The SAR test plots may slightly differ from the table above since the DASY rounds to three significant digits.

5.2 SYSTEM CHECK

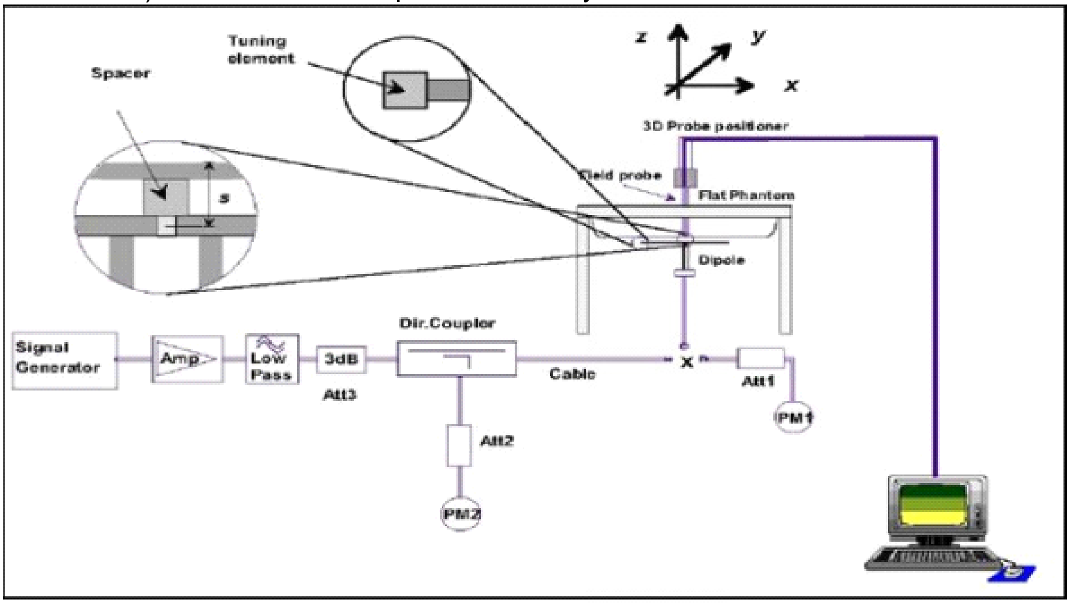
The system check is performed for verifying the accuracy of the complete measurement system and performance of the software. The system check is performed with tissue equivalent material according to IEEE P1528 (described above). The following table shows system check results for all frequency bands and tissue liquids used during the tests.

System Check	Date	Frequency (MHz)	Targeted SAR-1g (W/kg)	Measured SAR-1g (W/kg)	normalized SAR-1g (W/kg)	Deviation (%)	Dipole S/N
Body	Feb. 22, 2017	750	8.65	2.18	8.72	0.81	1095
Body	Mar. 03, 2017	750	8.65	2.07	8.28	-4.28	1095
Body	Feb. 19, 2017	835	9.52	2.39	9.56	0.42	4d160
Body	Mar. 02, 2017	835	9.52	2.36	9.44	-0.84	4d160
Body	Feb. 21, 2017	1750	35.70	8.96	35.84	0.39	1101
Body	Feb. 20, 2017	1900	39.60	9.94	39.76	0.40	5d179
Body	Feb. 23, 2017	2450	51.10	12.50	50.00	-2.15	919
Body	Feb. 22, 2017	2600	54.10	13.10	52.40	-3.14	1067

5.3 SYSTEM CHECK PROCEDURE

The system check is performed by using a system check dipole which is positioned parallel to the planar part of the SAM phantom at the reference point. The distance of the dipole to the SAM phantom is determined by a plexiglass spacer. The dipole is connected to the signal source consisting of signal generator and amplifier via a directional coupler, N-connector cable and adaption to SMA. It is fed with a power of 250 mW(below 5GHz) or 100mW(above 5GHz). To adjust this power a power meter is used. The power sensor is connected to the cable before the system check to measure the power at this point and do adjustments at the signal generator. At the outputs of the directional coupler both return loss as well as forward power are controlled during the system check to make sure that emitted power at the dipole is kept constant. This can also be checked by the power drift measurement after the test.

System check results have to be equal or near the values determined during dipole calibration (target SAR in table above) with the relevant liquids and test system.



6.SAR MEASUREMENT VARIABILITY AND UNCERTAINTY

6.1SAR 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.

The detailed repeated measurement results are shown in Section 8.2.

6.2SAR MEASUREMENT UNCERTAINTY

Per KDB865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04,when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg, the extensive SAR measurement uncertainty analysis.

7. OPERATIONAL CONDITIONS DURING TEST

7.1 SAR TEST CONFIGURATION

7.1.1 GSM TEST CONFIGURATION

SAR tests for GSM850 and GSM1900, a communication link is set up with a base station by air link. Using 8960 Series the power lever is set to “5”and “0” in SAR of GSM850 and GSM1900. The tests in the band of GSM850 and GSM1900 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.

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.

According to specification 3GPP TS 51.010, the maximum power of the GSM can do the power reduction for the multi-slot.

The allowed power reduction in the multi-slot configuration is as following:

Number of timeslots in uplink assignment		Reduction of maximum output power (dB)	
Band	Time Slots	GPRS (GMSK)	EDGE (8PSK)
GSM850	1 TX slot	0	0
	2 TX slots	2.2	2.5
	3 TX slots	4.3	4.7
	4 TX slots	6	6.5
GSM1900	1 TX slot	0	0
	2 TX slots	2	2
	3 TX slots	3.8	3.8
	4 TX slots	5	5

7.1.2 UMTS TEST CONFIGURATION

1. Output Power Verification

Maximum output power is verified on the High, Middle and Low channels according to the procedures description in section 5.2 of 3GPP TS 34.121,using the appropriate RMC or AMR with TPC(transmit power control) set to all "1s" for WCDMA/HSDPA or applying the required inner loop power control procedure to maintain maximum output power while HSUPA is active. Result for all applicable physical channel configurations(DPCCH,DPDCHn and spreading codes, HSDPA, HSPA)
Should be tabulated in the SAR report .All configuration that are not supported by the DUT or cannot be measured due to technical or equipment limitation should be clearly identified.

2. WCDMA

Body SAR Measurements
SAR for body exposure configurations is measured using the 12.2 kbps RMC with the TPC bits configured to all "1s". SAR for other spreading codes and multiple DPDCHn, when supported by the EUT, are not required when the maximum average outputs of each RF channel, for each spreading code and DPDCHn configuration, are less than ¼ dB higher than those measured in 12.2 kbps RMC.

3. HSDPA

SAR for body exposure configurations is measured according to the "Body SAR Measurements"" procedures of 3G device. In addition, body SAR is also measured for HSDPA when the maximum average outputs of each RF channel with HSDPA active is at ¼ dB higher than that measured without HSDPA using 12.2kbps RMC or the maximum SAR 12.2kbps RMC is above 75% of the SAR limit. Body SAR for HSDPA is measured using an FRC with H-Set 1 in Sub-test 1 and a 12.2kbps RMC configured in Test Loop Mode 1, using the highest body SAR configuration in 12.2 kbps RMC without HSDPA.
HSDPA should be configured according to UE category of a test device. The number of HS-DSCH/HS-PDSCHs, HAPRQ processes, minimum inter-TTI interval, transport block sizes and RV coding sequence are defined by the H-set. To maintain a consistent test configuration and stable transmission condition, QPSK is used in the H-set for SAR testing. HS-DPCCH should be configured with a CQI feedback cycle of 4ms with a CQI repetition factor of 2 to maintain a constant rate of active CQI slots. The β_c and β_d gain factors for DPCCH and DPDCH were set according to the values in the below table, β_{hs} for HS-DPCCH is set automatically to the correct value when △ACK, △NACK, △CQI = 8. The variation of the β_c / β_d ratio causes a power reduction at sub-tests 2 - 4.

Sub-test	β_c	β_d	β_d (SF)	β_c / β_d	β_{hs} (1)	CM(dB)(2)	MPR (dB)
1	2/15	15/15	64	2/15	4/15	0.0	0
2	12/15(3)	15/15(3)	64	12/15(3)	24/15	1.0	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: △ACK, △NACK and △CQI = 8 $A_{hs} = \beta_{hs}/\beta_c = 30/15$ $\beta_{hs} = 30/15 * \beta_c$
Note 2 : CM=1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$. 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 3 : 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 $\beta_c = 11/15$ and $\beta_d = 15/15$

The measurements were performed with a Fixed Reference Channel (FRC) and H-Set 1 QPSK.

Settings of required H-Set 1 QPSK acc. to 3GPP 34.121

Parameter	Value
Nominal average inf. bit rate	534 kbit/s
Inter-TTI Distance	3 TTI"s
Number of HARQ Processes	2 Processes
Information Bit Payload	3202 Bits
MAC-d PDU size	336 Bits
Number Code Blocks	1 Block
Binary Channel Bits Per TTI	4800 Bits
Total Available SMLs in UE	19200 SMLs
Number of SMLs per HARQ Process	9600 SMLs
Coding Rate	0.67
Number of Physical Channel Codes	5

HSDPA UE category

HS-DSCH Category	Maximum HS-DSCH Codes Received	Minimum Inter-TTI Interval	Maximum HS-DSCH Transport Block Bits/HS-DSCH TTI	Total Soft Channel Bits
1	5	3	7298	19200
2	5	3	7298	28800
3	5	2	7298	28800
4	5	2	7298	38400
5	5	1	7298	57600
6	5	1	7298	67200
7	10	1	14411	115200
8	10	1	14411	134400
9	15	1	25251	172800
10	15	1	27952	172800
11	5	2	3630	14400
12	5	1	3630	28800
13	15	1	34800	259200
14	15	1	42196	259200
15	15	1	23370	345600
16	15	1	27952	345600

4. HSUPA

SAR for Body exposure configurations is measured according to the "Body SAR Measurements" procedures of 3G device. 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 primary mode and the adjusted SAR is ≤ 1.2W/kg, SAR measurement is not required for the secondary mode.

Per KDB941225 D01v03r01, the 3G SAR test reduction procedures is applied to HSPA (HSUPA/HSDPA with RMC) body configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for HSPA using the HSPA body SAR procedures for the highest reported body exposure SAR configuration in 12.2 kbps RMC.

Due to inner loop power control requirements in HSUPA, a commercial communication test set should be used for the output power and SAR tests. The 12.2 kbps RMC, FRC H-set 1 and E-DCH configurations for HSDPA should be configured according to the values indicated below as well as other applicable procedures described in the "WCDMA Handset" and „Release 5 HSDPA Data Device" sections of 3G device.

Subtests for UMTS Release 6 HSUPA

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (1)	β_{ec}	β_{ed}	β_{ec} (SF)	β_{ed} (code)	CM (2) (dB)	MPR (dB)	AG (4) Index	E-TFCI
1	11/15 (3)	15/15 (3)	64	11/15 (3)	22/15	209/225	1039/225	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_{ed1}:47/15 β_{ed2}:47/15	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 (4)	15/15 (4)	64	15/15 (4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: ∆ ACK, ∆ NACK and ∆ CQI = 8 $A_{hs} = \beta_{hs}/\beta_c = 30/15$ $\beta_{hs} = 30/15 * \beta_c$

Note 2: CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$. 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 $\beta_c = 10/15$ and $\beta_d = 15/15$

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 $\beta_c = 14/15$ and $\beta_d = 15/15$

Note 5 : Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Table 5.1g

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

HSUPA UE category

UE E-DCH Category	Maximum E-DCH Codes Transmitted	Number of HARQ Processes	E-DCH TTI(ms)	Minimum Speading Factor	Maximum E-DCH Transport Block Bits	Max Rate (Mbps)
1	1	4	10	4	7110	0.7296
2	2	8	2	4	2798	1.4592
	2	4	10	4	14484	
3	2	4	10	4	14484	1.4592
4	2	8	2	2	5772	2.9185
	2	4	10	2	20000	2.00
5	2	4	10	2	20000	2.00
6 (No DPDCH)	4	8	10	2SF2&2SF4	11484	5.76
	4	4	2		20000	2.00
7 (No DPDCH)	4	8	2	2SF2&2SF4	22996	?
	4	4	10		20000	?

NOTE: When 4 codes are transmitted in parallel, two codes shall be transmitted with SF2 and two with SF4.UE categories 1 to 6 support QPSK only. UE category 7 supports QPSK and 16QAM.(TS25.306-7.3.0).

7.1.3 LTE TEST CONFIGURATION

SAR for LTE band exposure configurations is measured according to the procedures of KDB 941225 D05 SAR for LTE Devices v02r05. The CMW500 Wide Band Radio Communication Tester was used for LTE output power measurements and SAR testing. Closed loop power control was used so the UE transmits with maximum output power during SAR testing. SAR test were performed with the same number of RB and RB offsets transmitting on all TTI frames(Maximum TTI)

1. Spectrum Plots for RB configurations

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

2. MPR

When MPR is implemented permanently within the UE, regardless of network requirements, only those RB configurations allowed by 3GPP for the channel bandwidth and modulation combinations may be tested with MPR active. Configurations with RB allocations less than the RB thresholds required by 3GPP must be tested without MPR.

The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS36.101:

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 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

3. A-MPR

A-MPR(Additional MPR) has been disabled for all SAR tests by using Network Signalling Value of "NS_01"on the base station simulator.

4. LTE procedures for SAR testing

A) Largest channel bandwidth standalone SAR test requirements

i) 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 reported SAR is ≤ 0.8 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 reported SAR of a required test channel is > 1.45 W/kg, SAR is required for all three RB offset configurations for that required test channel.

ii) QPSK with 50% RB allocation

The procedures required for 1 RB allocation in i) are applied to measure the SAR for QPSK with 50% RB allocation

iii) 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 reported SAR for 1 RB and 50% RB allocation in i) and ii) are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.

iv) 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 reported SAR for the QPSK configuration is > 1.45 W/kg.

B) 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 reported SAR of a configuration for the largest channel bandwidth is > 1.45 W/kg.

7.1.4 WIFI TEST CONFIGURATION

For WLAN SAR testing, WLAN engineering testing software installed on the DUT can provide continuous transmitting RF signal.

2.4G

Mode	802.11b	802.11g	802.11n HT20	802.11n HT40
Duty cycle	100%			
Crest factor	1			

For the 802.11b SAR tests, a communication link is set up with the test mode software for WiFi mode test. The Absolute Radio Frequency Channel Number(ARFCN) is allocated to 1 ,6 and 11 respectively in the case of 2450 MHz. During the test, at the each test frequency channel, the EUT is operated at the RF continuous emission mode. Each channel should be tested at the lowest data rate.

7.1.4.1 2.4G SAR TEST REQUIREMENTS

✧ **802.11b DSSS SAR Test Requirements**

SAR is measured for 2.4 GHz 802.11b DSSS using either a fixed test position or, when applicable, the initial test position procedure. SAR test reduction is determined according to the following:

1) When the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.
2) When the reported SAR is > 0.8 W/kg, SAR is required for that exposure configuration using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.

✧ **2.4 GHz 802.11g/n OFDM SAR Test Exclusion Requirements**

When SAR measurement is required for 2.4 GHz 802.11g/n OFDM configurations, the measurement and test reduction procedures for OFDM are applied. SAR is not required for the following 2.4 GHz OFDM conditions.

1) When KDB Publication 447498 SAR test exclusion applies to the OFDM configuration.
2) 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.

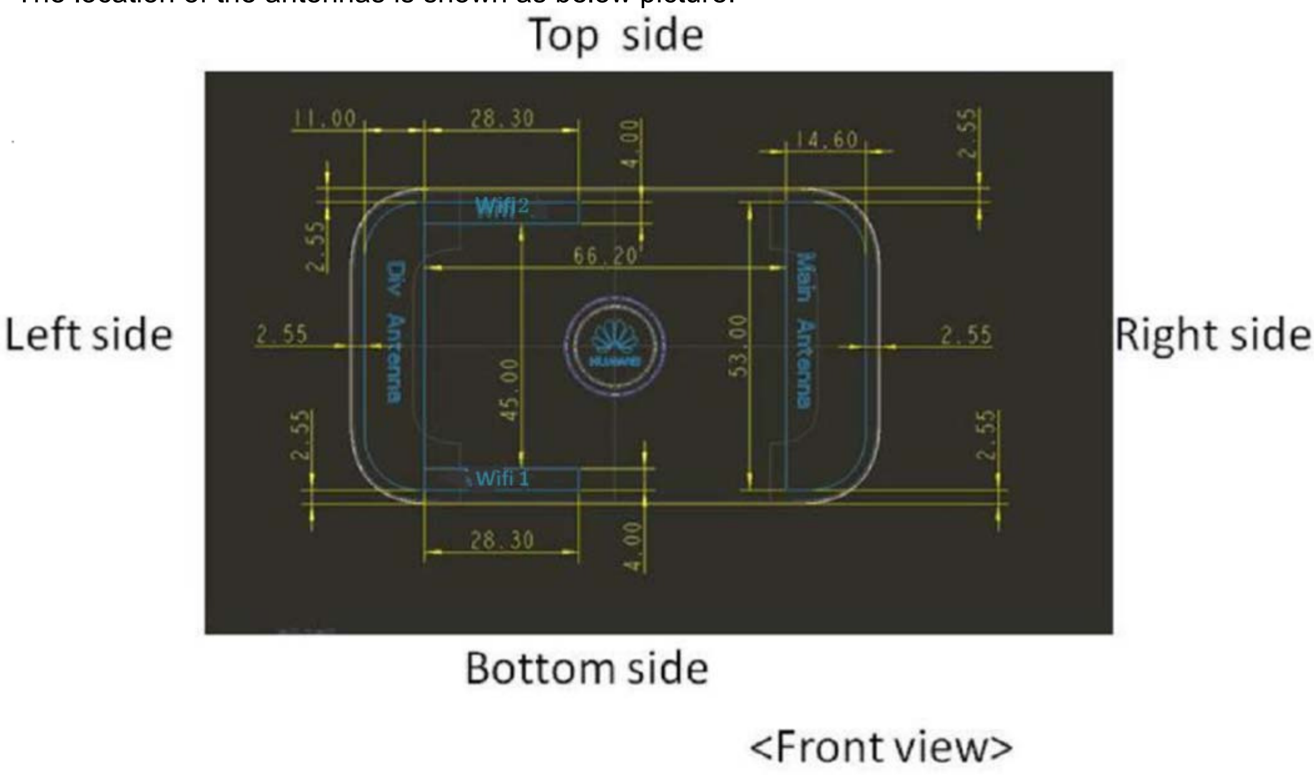
7.2 TEST POSITION

According to KDB 941225 D06v02r01, 3G/4G TRINITY PORTABLE SIM-BASED WI-FI HOTSPOT is tested for SAR compliance in body configurations described in the following subsections.

7.2.1 Hotspot Mode Exposure conditions

A test separation of 10mm is required.SAR must be measured for all sides and surfaces with a transmitting antenna located within 25mm from that surface or edge, for the data modes, wireless technologies and frequency bands supporting hotspot mode. The standalone SAR results in each device test orientation must be analyzed for the applicable hotspot mode simultaneous transmission configurations to determine SAR test exclusion and volume scan requirements. The simultaneous transmission configurations must be clearly described in the SAR report to support the analyses or test results. When the device form factor is smaller than 9cm X 5cm, unless a test separation distance of 5 mm or less is used a KDB inquiry is required to determine the acceptable test distance.

The location of the antennas is shown as below picture:



Note:
1) Diversity antenna is used to improve the acceptance of performance of the main antenna, it does not have a transmitter function.

Table 7.2.1 Hotspot Side For SAR Testing

Mode	Front Side	Rear Side	Left Side	Right Side	Top Side	Bottom Side
GSM850/1900	YES	YES	NO	YES	YES	YES
UMTS Band 2/4/5	YES	YES	NO	YES	YES	YES
LTE Band2/4/5/7/12/13/17	YES	YES	NO	YES	YES	YES
802.11b ANT1	YES	YES	YES	NO	NO	YES
802.11b ANT2	YES	YES	YES	NO	YES	NO
802.11N40(ANT1+2)	YES	YES	YES	NO	YES	YES

8. POWER TEST RESULT

8.1CONDUCTED POWER MEASUREMENTS OF GSM850

GSM850		Tune-up	Max Burst Average Power (dBm)			Tune-up	Max Frame Average Power (dBm)		
			128CH	190CH	251CH		128CH	190CH	251CH
			824.2MHz	836.6MHz	848.8MHz		824.2MHz	836.6MHz	848.8MHz
GPRS/ EDGE (GMSK)	1 Tx Slot	33.00	32.12	32.36	32.49	23.81	22.93	23.17	23.30
	2 Tx Slot	30.80	29.94	30.15	30.39	**24.67**	23.81	24.02	24.26
	3 Tx Slot	28.70	27.98	28.26	28.36	24.28	23.56	23.84	23.94
	4 Tx Slot	27.00	26.03	26.27	26.41	23.82	22.85	23.09	23.23
EDGE (8PSK)	1 Tx Slot	27.50	26.43	26.62	26.71	18.31	17.24	17.43	17.52
	2 Tx Slot	25.00	24.06	24.13	24.23	18.87	17.93	18.00	18.10
	3 Tx Slot	22.80	21.94	22.16	22.28	18.38	17.52	17.74	17.86
	4 Tx Slot	21.00	20.06	20.24	20.32	17.82	16.88	17.06	17.14

Note:
1) The conducted power of GSM850 is measured with RMS detector.
2) Frame-averaged output power was calculated from the measured burst-averaged output power by converting the slot powers into linear units and calculating the energy over 8 time slots.
3) Per KDB941225 D01v03r01, the bolded GPRS 2Tx mode was selected for SAR testing according to the highest frame –averaged output power table.

8.2CONDUCTED POWER MEASUREMENTS OF GSM1900

GSM1900		Tune-up	Max Burst Average Power (dBm)			Tune-up	Max Frame Average Power (dBm)		
			512CH	661CH	810CH		512CH	661CH	810CH
			1850.2MHz	1880MHz	1909.8MHz		1850.2MHz	1880MHz	1909.8MHz
GPRS /EDGE (GMSK)	1 Tx Slot	30.00	29.54	29.51	29.49	20.81	20.35	20.32	20.30
	2 Tx Slots	28.00	27.36	27.28	27.35	**21.87**	21.23	21.15	21.22
	3 Tx Slots	26.20	25.37	25.23	25.21	21.78	20.95	20.81	20.79
	4 Tx Slots	25.00	24.13	24.02	23.81	21.82	20.95	20.84	20.63
EDGE (8PSK)	1 Tx Slot	26.00	25.27	25.26	25.31	16.81	16.08	16.07	16.12
	2 Tx Slots	24.00	22.96	22.88	22.93	17.87	16.83	16.75	16.80
	3 Tx Slots	22.20	21.07	20.86	20.92	17.78	16.65	16.44	16.50
	4 Tx Slots	21.00	19.24	19.21	19.14	17.82	16.06	16.03	15.96

Note:
1) The conducted power of GSM1900 is measured with RMS detector.
2) Frame-averaged output power was calculated from the measured burst-averaged output power by converting the slot powers into linear units and calculating the energy over 8 time slots.
3) Per KDB941225 D01v03r01, the bolded GPRS 2Tx mode was selected for SAR testing according to the highest frame –averaged output power table.

8.3CONDUCTED POWER MEASUREMENTS OF UMTS Band 2

UMTS Band 2		Tune-up	SAR Conducted Power (dBm)		
			9262CH	9400CH	9538CH
			1852.4	1880	1907.6
WCDMA	12.2kbps RMC	23.50	22.53	22.62	22.49
	64kbps RMC	23.50	22.59	22.69	22.48
	144kbps RMC	23.50	22.62	22.63	22.49
	384kbps RMC	23.50	22.57	22.68	22.47
HSDPA	Subtest 1	23.50	22.43	22.49	22.26
	Subtest 2	23.50	22.38	22.48	22.23
	Subtest 3	22.50	21.87	21.93	21.78
	Subtest 4	22.50	21.82	21.83	21.81
HSUPA	Subtest 1	22.30	20.59	20.34	20.43
	Subtest 2	20.80	19.57	19.75	19.44
	Subtest 3	21.80	20.51	20.78	20.74
	Subtest 4	20.80	19.79	19.78	19.60
	Subtest 5	22.30	20.82	20.91	20.87

HSPA+
Since 16QAM is not used for uplink, the uplink category and release is same as HSUPA,i.e,CAT6 Rel 6.Therefore,the RF conducted power is not measured.

Note:
1) The conducted power of UMTS Band 2 is measured with RMS detector.
2)Note: Per KDB941225 D01v03r01, 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.

8.4CONDUCTED POWER MEASUREMENTS OF UMTS Band 4

UMTS Band 4		Tune-up	SAR Conducted Power (dBm)		
			1312CH	1413CH	1513CH
			1712.4	1732.6	1752.6
WCDMA	12.2kbps RMC	23.50	22.63	22.58	22.42
	64kbps RMC	23.50	22.66	22.59	22.41
	144kbps RMC	23.50	22.67	22.58	22.44
	384kbps RMC	23.50	22.65	22.57	22.40
HSDPA	Subtest 1	23.50	22.44	22.45	22.21
	Subtest 2	23.50	22.43	22.43	22.23
	Subtest 3	23.00	21.85	21.93	21.74
	Subtest 4	23.00	21.89	21.91	21.76
HSUPA	Subtest 1	22.30	20.68	20.38	20.61
	Subtest 2	20.80	19.54	19.47	19.71
	Subtest 3	21.80	20.57	20.77	20.75
	Subtest 4	20.80	19.78	19.63	19.51
	Subtest 5	22.30	20.93	20.93	20.47

HSPA+
Since 16QAM is not used for uplink, the uplink category and release is same as HSUPA,i.e,CAT6 Rel 6.Therefore,the RF conducted power is not measured.

Note:
1) The conducted power of UMTS Band 4 is measured with RMS detector.
2)Note: Per KDB941225 D01v03r01, 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.

8.5CONDUCTED POWER MEASUREMENTS OF UMTS Band 5

UMTS Band 5		Tune-up	SAR Conducted Power (dBm)		
			4132CH	4182CH	4233CH
			826.4	836.4	846.6
WCDMA	12.2kbps RMC	23.50	23.19	23.02	23.16
	64kbps RMC	23.50	23.13	22.93	23.15
	144kbps RMC	23.50	23.12	22.95	23.14
	384kbps RMC	23.50	23.13	22.93	23.15
HSDPA	Subtest 1	23.50	22.97	22.79	22.95
	Subtest 2	23.50	22.95	22.81	22.93
	Subtest 3	22.50	22.36	22.28	22.35
	Subtest 4	22.50	22.34	22.15	22.27
HSUPA	Subtest 1	22.50	20.65	20.62	20.95
	Subtest 2	20.80	20.23	19.84	20.12
	Subtest 3	21.80	20.94	20.73	20.98
	Subtest 4	20.80	20.31	20.25	20.24
	Subtest 5	22.30	21.05	21.01	21.12

HSPA+
Since 16QAM is not used for uplink, the uplink category and release is same as HSUPA,i.e,CAT6 Rel 6.Therefore,the RF conducted power is not measured.

Note:
1) The conducted power of UMTS Band 5 is measured with RMS detector.
2)Note: Per KDB941225 D01v03r01, 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.

8.6CONDUCTED POWER MEASUREMENTS OF LTE Band 2

FDD LTE B2					Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Tune-up	Low	Mid	High
					18625	18900	19175
					1852.5	1880	1907.5
5MHz	QPSK	1	0	23.00	21.43	21.90	21.79
		1	12	23.00	22.03	22.55	22.64
		1	24	23.00	21.43	22.04	21.95
		12	0	22.00	20.75	21.40	21.50
		12	6	22.00	21.01	21.54	21.81
		12	13	22.00	20.96	21.49	21.70
		25	0	22.00	20.78	21.34	21.44
	16QAM	1	0	22.00	20.69	21.43	21.00
		1	12	22.00	21.39	21.85	21.99
		1	24	22.00	20.78	21.56	21.31
		12	0	22.50	20.91	21.46	21.46
		12	6	22.50	21.14	21.58	21.78
		12	13	22.50	21.08	21.52	21.66
		25	0	22.50	20.82	21.32	21.40
Bandwidth	Modulation	RB size	RB offset	Tune-up	Low	Mid	High
					18650	18900	19150
					1855	1880	1905
10MHz	QPSK	1	0	23.00	22.10	22.53	21.87
		1	24	23.00	22.81	22.99	22.91
		1	49	23.00	21.61	22.12	21.89
		25	0	22.00	21.34	21.78	21.19
		25	12	22.00	21.55	21.98	21.66
		25	25	22.00	21.32	21.88	21.58
		50	0	22.00	21.37	21.77	21.31
	16QAM	1	0	22.00	21.21	21.84	21.00
		1	24	22.00	21.91	21.99	21.91
		1	49	22.00	20.88	21.47	21.05
		25	0	22.50	21.29	21.74	21.14
		25	12	22.50	21.49	21.93	21.60
		25	25	22.50	21.27	21.83	21.51
		50	0	22.50	21.30	21.71	21.23

<table>
<tr><th rowspan="3">Bandwidth</th><th rowspan="3">Modulation</th><th rowspan="3">RB size</th><th rowspan="3">RB offset</th><th rowspan="3">Tune-up</th><th>Low</th><th>Mid</th><th>High</th></tr>
<tr><th>18675</th><th>18900</th><th>19125</th></tr>
<tr><th>1857.5</th><th>1880</th><th>1902.5</th></tr>
<tr><td rowspan="14">15MHz</td><td rowspan="7">QPSK</td><td>1</td><td>0</td><td>23.00</td><td>22.09</td><td>22.45</td><td>21.87</td></tr>
<tr><td>1</td><td>38</td><td>23.00</td><td>22.15</td><td>22.64</td><td>21.98</td></tr>
<tr><td>1</td><td>74</td><td>23.00</td><td>21.66</td><td>22.02</td><td>21.90</td></tr>
<tr><td>36</td><td>0</td><td>22.00</td><td>20.95</td><td>21.92</td><td>20.84</td></tr>
<tr><td>36</td><td>18</td><td>22.00</td><td>21.11</td><td>21.54</td><td>21.01</td></tr>
<tr><td>36</td><td>39</td><td>22.00</td><td>20.99</td><td>21.42</td><td>21.12</td></tr>
<tr><td>75</td><td>0</td><td>22.00</td><td>21.04</td><td>21.41</td><td>20.95</td></tr>
<tr><td rowspan="7">16QAM</td><td>1</td><td>0</td><td>22.00</td><td>21.53</td><td>22.00</td><td>21.29</td></tr>
<tr><td>1</td><td>38</td><td>22.00</td><td>21.49</td><td>21.94</td><td>21.35</td></tr>
<tr><td>1</td><td>74</td><td>22.00</td><td>20.99</td><td>21.67</td><td>21.32</td></tr>
<tr><td>36</td><td>0</td><td>22.50</td><td>20.91</td><td>21.67</td><td>20.87</td></tr>
<tr><td>36</td><td>18</td><td>22.50</td><td>21.03</td><td>21.63</td><td>21.02</td></tr>
<tr><td>36</td><td>39</td><td>22.50</td><td>20.91</td><td>21.49</td><td>21.12</td></tr>
<tr><td>75</td><td>0</td><td>22.50</td><td>20.90</td><td>21.46</td><td>20.94</td></tr>
<tr><th rowspan="3">Bandwidth</th><th rowspan="3">Modulation</th><th rowspan="3">RB size</th><th rowspan="3">RB offset</th><th rowspan="3">Tune-up</th><th>Low</th><th>Mid</th><th>High</th></tr>
<tr><th>18700</th><th>18900</th><th>19100</th></tr>
<tr><th>1860</th><th>1880</th><th>1900</th></tr>
<tr><td rowspan="14">20MHz</td><td rowspan="7">QPSK</td><td>1</td><td>0</td><td>23.00</td><td>22.32</td><td>22.65</td><td>22.46</td></tr>
<tr><td>1</td><td>50</td><td>23.00</td><td>22.09</td><td>22.26</td><td>22.15</td></tr>
<tr><td>1</td><td>99</td><td>23.00</td><td>21.94</td><td>22.28</td><td>22.42</td></tr>
<tr><td>50</td><td>0</td><td>22.00</td><td>21.24</td><td>21.59</td><td>21.06</td></tr>
<tr><td>50</td><td>25</td><td>22.00</td><td>21.18</td><td>21.57</td><td>21.39</td></tr>
<tr><td>50</td><td>50</td><td>22.00</td><td>21.26</td><td>21.66</td><td>21.48</td></tr>
<tr><td>100</td><td>0</td><td>22.00</td><td>21.14</td><td>21.63</td><td>21.41</td></tr>
<tr><td rowspan="7">16QAM</td><td>1</td><td>0</td><td>22.00</td><td>21.55</td><td>21.77</td><td>21.57</td></tr>
<tr><td>1</td><td>50</td><td>22.00</td><td>21.27</td><td>20.97</td><td>21.09</td></tr>
<tr><td>1</td><td>99</td><td>22.00</td><td>21.19</td><td>21.46</td><td>21.49</td></tr>
<tr><td>50</td><td>0</td><td>22.50</td><td>20.97</td><td>21.31</td><td>20.75</td></tr>
<tr><td>50</td><td>25</td><td>22.50</td><td>20.91</td><td>21.28</td><td>20.74</td></tr>
<tr><td>50</td><td>50</td><td>22.50</td><td>20.97</td><td>21.37</td><td>20.81</td></tr>
<tr><td>100</td><td>0</td><td>22.50</td><td>20.84</td><td>21.34</td><td>20.74</td></tr>
</table>

8.7CONDUCTED POWER MEASUREMENTS OF LTE Band 4

FDD LTE B4					Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Tune-up	Low	Mid	High
					19975	20175	20375
					1712.5	1732.5	1752.5
5MHz	QPSK	1	0	23.00	21.74	21.87	21.98
		1	12	23.00	22.48	22.59	22.61
		1	24	23.00	21.97	21.98	21.92
		12	0	22.00	21.11	21.29	21.38
		12	6	22.00	21.38	21.55	21.60
		12	13	22.00	21.36	21.42	21.40
		25	0	22.00	21.41	21.33	21.26
	16QAM	1	0	22.00	21.08	21.29	21.30
		1	12	22.00	21.83	21.91	21.91
		1	24	22.00	21.34	21.42	21.26
		12	0	22.50	21.42	21.28	21.41
		12	6	22.50	21.70	21.54	21.62
		12	13	22.50	21.67	21.40	21.42
		25	0	22.50	21.41	21.25	21.26
Bandwidth	Modulation	RB size	RB offset	Tune-up	Low	Mid	High
					20000	20175	20350
					1715	1732.5	1750
10MHz	QPSK	1	0	23.00	22.09	22.11	22.55
		1	24	23.00	22.89	22.67	22.99
		1	49	23.00	21.91	21.73	21.99
		25	0	22.00	21.32	21.27	21.53
		25	12	22.00	21.52	21.39	21.77
		25	25	22.00	21.51	21.32	21.51
		50	0	22.00	21.35	21.56	21.50
	16QAM	1	0	22.00	21.45	21.68	21.69
		1	24	22.00	21.84	21.90	21.84
		1	49	22.00	21.16	21.32	21.11
		25	0	22.50	21.30	21.43	21.37
		25	12	22.50	21.59	21.56	21.60
		25	25	22.50	21.75	21.38	21.34
		50	0	22.50	21.59	21.34	21.31

Bandwidth	Modulation	RB size	RB offset	Tune-up	Low	Mid	High
					20025	20175	20325
					1717.5	1732.5	1747.5
15MHz	QPSK	1	0	23.00	22.64	22.66	22.49
		1	37	23.00	22.97	22.68	22.57
		1	74	23.00	22.25	22.31	22.19
		36	0	22.00	21.64	21.91	21.46
		36	19	22.00	21.89	21.59	21.55
		36	39	22.00	21.62	21.60	21.46
		75	0	22.00	21.80	21.49	21.42
	16QAM	1	0	22.00	21.90	21.92	21.89
		1	37	22.00	21.96	21.91	21.97
		1	74	22.00	21.47	21.99	21.60
		36	0	22.50	21.54	21.99	21.64
		36	19	22.50	21.76	21.75	21.71
		36	39	22.50	21.46	21.77	21.57
		75	0	22.50	21.62	21.63	21.54
Bandwidth	Modulation	RB size	RB offset	Tune-up	Low	Mid	High
					20050	20175	20300
					1720	1732.5	1745
20MHz	QPSK	1	0	23.00	22.39	22.47	22.53
		1	50	23.00	22.35	21.34	22.51
		1	99	23.00	21.93	22.14	22.31
		50	0	22.00	21.33	21.36	21.40
		50	25	22.00	21.19	20.99	21.27
		50	50	22.00	21.34	21.23	21.42
		100	0	22.00	21.34	21.25	21.47
	16QAM	1	0	22.00	21.90	21.94	21.86
		1	50	22.00	21.70	21.55	21.82
		1	99	22.00	21.33	21.62	21.65
		50	0	22.50	21.34	21.39	21.22
		50	25	22.50	21.34	21.09	21.10
		50	50	22.50	21.45	21.28	21.23
		100	0	22.50	21.46	21.32	21.26

8.8CONDUCTED POWER MEASUREMENTS OF LTE Band 5

FDD LTE B5					Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Tune-up	Low	Mid	High
					20425	20525	20625
					826.5	836.5	846.5
5MHz	QPSK	1	0	24.00	22.10	22.08	22.44
		1	12	24.00	23.05	22.65	22.74
		1	24	24.00	22.26	22.02	22.13
		12	0	23.00	21.40	21.25	21.66
		12	6	23.00	21.82	21.58	21.69
		12	13	23.00	21.71	21.52	21.67
		25	0	23.00	21.56	21.74	21.80
	16QAM	1	0	23.00	21.34	21.44	21.73
		1	12	23.00	22.49	22.08	22.16
		1	24	23.00	21.73	21.45	21.58
		12	0	22.00	21.58	21.42	21.66
		12	6	22.00	21.99	21.74	21.75
		12	13	22.00	21.88	21.66	21.73
		25	0	22.00	21.64	21.46	21.59
Bandwidth	Modulation	RB size	RB offset	Tune-up	Low	Mid	High
					20450	20525	20600
					829	836.5	844
10MHz	QPSK	1	0	24.00	22.77	22.96	22.94
		1	24	24.00	23.50	23.41	23.58
		1	49	24.00	22.31	22.57	22.30
		25	0	23.00	22.02	21.82	21.94
		25	12	23.00	22.21	21.97	22.17
		25	25	23.00	21.98	21.88	22.01
		50	0	23.00	22.03	21.89	21.91
	16QAM	1	0	23.00	21.99	22.12	22.34
		1	24	23.00	22.63	22.53	22.91
		1	49	23.00	21.52	21.76	21.72
		25	0	22.00	21.85	21.74	21.78
		25	12	22.00	21.94	21.89	22.00
		25	25	22.00	21.81	21.96	21.83
		50	0	22.00	21.89	21.99	21.76

8.9CONDUCTED POWER MEASUREMENTS OF LTE BAND 7

FDD LTE B7					Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Tune-up	Low	Mid	High
					20775	21100	21425
					2502.5	2535	2567.5
5MHz	QPSK	1	0	23.00	21.81	21.32	21.50
		1	12	23.00	21.93	22.13	22.18
		1	24	23.00	21.24	21.75	21.52
		12	0	22.00	20.61	21.15	21.16
		12	6	22.00	20.86	21.43	21.34
		12	13	22.00	20.78	21.37	21.20
		25	0	22.00	20.62	21.21	21.11
	16QAM	1	0	22.00	20.43	20.53	20.66
		1	12	22.00	21.15	21.33	21.38
		1	24	22.00	20.49	20.70	20.69
		12	0	22.50	20.53	20.61	20.65
		12	6	22.50	20.73	20.88	20.82
		12	13	22.50	20.64	20.81	20.68
		25	0	22.50	20.53	20.63	20.53
Bandwidth	Modulation	RB size	RB offset	Tune-up	Low	Mid	High
					20800	21100	21400
					2505	2535	2565
10MHz	QPSK	1	0	23.00	22.07	22.49	22.59
		1	24	23.00	22.18	22.55	22.65
		1	49	23.00	22.06	22.18	21.90
		25	0	22.00	21.77	21.68	21.77
		25	12	22.00	21.98	21.95	21.92
		25	25	22.00	21.85	21.85	21.67
		50	0	22.00	21.80	21.76	21.84
	16QAM	1	0	22.50	21.26	21.54	21.63
		1	24	22.50	22.11	22.32	22.16
		1	49	22.50	20.96	21.20	20.93
		25	0	22.50	20.86	21.22	21.20
		25	12	22.50	21.13	21.49	21.36
		25	25	22.50	21.28	21.36	21.11
		50	0	22.50	21.20	21.24	21.22

Bandwidth	Modulation	RB size	RB offset	Tune-up	Low 20825 2507.5	Mid 21100 2535	High 21375 2562.5
15MHz	QPSK	1	0	23.00	22.13	22.41	22.61
		1	38	23.00	22.49	22.59	22.58
		1	74	23.00	21.80	22.17	21.86
		36	0	22.00	21.17	21.44	21.91
		36	18	22.00	21.29	21.56	21.74
		36	39	22.00	21.16	21.47	21.65
		75	0	22.00	21.18	21.50	21.84
	16QAM	1	0	22.50	21.50	21.59	21.97
		1	38	22.50	21.81	21.81	22.00
		1	74	22.50	21.15	21.36	21.18
		36	0	22.50	21.22	21.13	21.52
		36	18	22.50	21.33	21.23	21.56
		36	39	22.50	21.18	21.16	21.28
		75	0	22.50	21.14	21.37	21.58

Bandwidth	Modulation	RB size	RB offset	Tune-up	Low 20850 2510	Mid 21100 2535	High 21350 2560
20MHz	QPSK	1	0	23.00	22.35	22.36	22.98
		1	50	23.00	22.73	22.40	22.67
		1	99	23.00	22.09	22.55	22.09
		50	0	22.00	21.39	21.65	21.92
		50	25	22.00	21.35	21.65	21.83
		50	50	22.00	21.48	21.79	21.62
		100	0	22.00	21.33	21.76	21.88
	16QAM	1	0	22.50	21.84	21.83	22.26
		1	50	22.50	22.00	21.80	22.05
		1	99	22.50	21.63	21.70	21.37
		50	0	22.50	21.36	21.27	21.87
		50	25	22.50	21.32	21.24	21.78
		50	50	22.50	21.46	21.61	21.55
		100	0	22.50	21.28	21.70	21.81

8.10 CONDUCTED POWER MEASUREMENTS OF LTE Band 12

FDD LTE B12					Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Tune-up	Low	Mid	High
					23035	23095	23155
					701.5	707.5	713.5
5MHz	QPSK	1	0	23.50	22.07	22.45	22.31
		1	12	23.50	22.87	22.94	22.84
		1	24	23.50	22.67	22.38	22.23
		12	0	22.50	21.61	21.90	21.77
		12	6	22.50	21.99	21.97	21.85
		12	13	22.50	21.87	21.87	21.86
		25	0	22.50	21.69	21.74	21.73
	16QAM	1	0	22.50	21.45	21.80	21.88
		1	12	22.50	22.22	22.30	22.41
		1	24	22.50	21.79	21.72	21.86
		12	0	22.00	21.49	21.79	21.91
		12	6	22.00	21.85	21.93	21.99
		12	13	22.00	21.74	22.00	21.99
		25	0	22.00	21.55	21.82	21.80
Bandwidth	Modulation	RB size	RB offset	Tune-up	Low	Mid	High
					23060	23095	23130
					704	707.5	711
10MHz	QPSK	1	0	23.50	22.27	22.55	22.77
		1	24	23.50	23.16	22.94	23.10
		1	49	23.50	22.10	22.04	22.14
		25	0	22.50	21.53	21.64	21.77
		25	12	22.50	21.79	21.63	21.75
		25	25	22.50	21.71	21.58	21.61
		50	0	22.50	21.53	21.77	21.61
	16QAM	1	0	22.50	21.74	21.91	21.87
		1	24	22.50	22.43	22.47	22.16
		1	49	22.50	21.44	21.67	21.27
		25	0	22.00	21.47	21.82	21.74
		25	12	22.00	21.74	21.81	21.73
		25	25	22.00	21.65	21.80	21.59
		50	0	22.00	21.46	21.68	21.57

8.11 CONDUCTED POWER MEASUREMENTS OF LTE Band 13

FDD LTE B13					Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Tune-up	Low	Mid	High
					23205	23230	23255
					779.5	782	784.5
5MHz	QPSK	1	0	23.50	21.78	22.16	22.19
		1	12	23.50	22.77	22.95	23.06
		1	24	23.50	22.11	22.23	22.25
		12	0	22.50	21.37	21.55	21.75
		12	6	22.50	21.79	21.83	22.00
		12	13	22.50	21.72	21.83	21.83
		25	0	22.50	21.65	21.63	21.74
	16QAM	1	0	22.50	21.16	21.60	21.44
		1	12	22.50	22.22	22.39	22.15
		1	24	22.50	21.61	21.71	21.53
		12	0	22.00	21.54	21.57	21.72
		12	6	22.00	21.79	21.84	21.97
		12	13	22.00	21.68	21.85	21.79
		25	0	22.00	21.56	21.64	21.61
Bandwidth	Modulation	RB size	RB offset	Tune-up	Mid		
					23230		
					782		
10MHz	QPSK	1	0	23.50	22.23		
		1	24	23.50	23.06		
		1	49	23.50	22.36		
		25	0	22.50	21.61		
		25	12	22.50	21.83		
		25	25	22.50	21.87		
		50	0	22.50	21.73		
	16QAM	1	0	22.50	21.75		
		1	24	22.50	22.41		
		1	49	22.50	21.88		
		25	0	22.00	21.60		
		25	12	22.00	21.85		
		25	25	22.00	21.87		
		50	0	22.00	21.64		

8.12 CONDUCTED POWER MEASUREMENTS OF LTE Band 17

Bandwidth	Modulation	RB size	RB offset	Tune-up	Low	Mid	High
					23755	23790	23825
					706.5	710	713.5
5MHz	QPSK	1	0	23.50	21.57	21.85	21.89
		1	12	23.50	22.73	22.62	22.54
		1	24	23.50	22.06	22.00	21.69
		12	0	22.50	21.43	21.33	21.33
		12	6	22.50	21.71	21.43	21.54
		12	13	22.50	21.64	21.35	21.43
		25	0	22.50	21.45	21.20	21.29
	16QAM	1	0	22.50	20.99	21.31	21.22
		1	12	22.50	22.11	22.09	21.90
		1	24	22.50	21.48	21.52	21.08
		12	0	22.00	21.60	21.47	21.47
		12	6	22.00	21.86	21.58	21.67
		12	13	22.00	21.78	21.49	21.56
		25	0	22.00	21.59	21.30	21.35
Bandwidth	Modulation	RB size	RB offset	Tune-up	Low	Mid	High
					23780	23790	23800
					709	710	711
10MHz	QPSK	1	0	23.50	21.82	22.06	22.12
		1	24	23.50	22.56	22.51	22.43
		1	49	23.50	21.71	21.56	21.54
		25	0	22.50	21.10	21.08	21.08
		25	12	22.50	21.21	21.04	21.05
		25	25	22.50	20.96	21.05	21.05
		50	0	22.50	21.10	20.94	20.92
	16QAM	1	0	22.50	21.36	21.50	21.56
		1	24	22.50	22.14	21.97	21.88
		1	49	22.50	21.34	21.07	21.03
		25	0	22.00	21.41	21.31	21.30
		25	12	22.00	21.53	21.28	21.29
		25	25	22.00	21.29	21.30	21.28
		50	0	22.00	21.37	21.15	21.10

8.13 CONDUCTED POWER MEASUREMENTS OF WiFi 2.4G

Mode	Ant	Channel	Frequency (MHz)	Data Rate (Mbps)	Power Setting	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11b	Ant1	1	2412	1	14.00	15.00	13.52	No
		6	2437		13.50	15.00	13.21	No
		11	2462		14.00	15.00	13.68	Yes
	Ant2	1	2412		14.00	15.00	13.34	No
		6	2437		13.50	15.00	13.85	Yes
		11	2462		13.50	15.00	13.24	No
802.11g	Ant1	1	2412	6	Not Required	12.00	Not Required	No
		6	2437		Not Required	12.00	Not Required	No
		11	2462		Not Required	12.00	Not Required	No
	Ant2	1	2412		Not Required	12.00	Not Required	No
		6	2437		Not Required	12.00	Not Required	No
		11	2462		Not Required	12.00	Not Required	No
802.11n HT20 (SISO)	Ant1	1	2412	6.5	Not Required	11.00	Not Required	No
		6	2437		Not Required	11.00	Not Required	No
		11	2462		Not Required	11.00	Not Required	No
	Ant2	1	2412		Not Required	11.00	Not Required	No
		6	2437		Not Required	11.00	Not Required	No
		11	2462		Not Required	11.00	Not Required	No
802.11n HT20 (MIMO)	Ant1+2	1	2412	13	11.00	14.00	12.48	No
		6	2437		11.00	14.00	13.05	No
		11	2462		11.00	14.00	12.79	No
802.11n HT40 (SISO)	Ant1	3	2422	13.5	Not Required	11.00	Not Required	No
		6	2437		Not Required	11.00	Not Required	No
		9	2452		Not Required	11.00	Not Required	No
	Ant2	3	2422		Not Required	11.00	Not Required	No
		6	2437		Not Required	11.00	Not Required	No
		9	2452		Not Required	11.00	Not Required	No
802.11n HT40 (MIMO)	Ant1+2	3	2422	27	11.00	14.00	12.90	No
		6	2437		11.00	14.00	12.97	Yes
		9	2452		11.00	14.00	12.88	No

Note:

1) The Average conducted power of WiFi is measured with RMS detector.

2) Per KDB248227, for WiFi 2.4GHz, the highest measured maximum output power Channel for DSSS

modes(802.11b)was selected for SAR measurement.SAR for OFDM modes(2.4GHz 802.11g/n) was not required When the highest reported SAR for DSSS is adjusted by the ratio of OFDM modes(802.11g/n)to DSSS modes(802.11b)specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

9．SAR TEST RESULTS

General Notes:

1) Per KDB447498 D01v06, all measurement SAR results are scaled to the maximum tune-up tolerance limit to demonstrate compliant.
2) Per KDB447498 D01v06, 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. When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel must be used.
3) Per KDB865664 D01v01r04,for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/Kg; if the deviation among the repeated measurement is ≤20%,and the measured SAR <1.45W/Kg, only one repeated measurement is required.
4) Per KDB865664 D02v01r02, SAR plot is only required for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination; Plots are also required when the measured SAR is > 1.5 W/kg, or > 7.0 W/kg for occupational exposure. The published RF exposure KDB procedures may require additional plots; for example, to support SAR to peak location separation ratio test exclusion and/or volume scan post-processing.

GSM Notes:

1) Per KDB941225 D01v03r01, 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.

WCDMA Notes:

Per KDB941225 D01v03r01, 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.

LTE notes:

1) The LTE test configurations are determined according to KDB941225 D05 SAR for LTE Devices v02r05.The general test procedures used for SAR testing can be found in Section 7.1.3.
2) A-MPR was disabled for all SAR test by setting NS_01 on the base station simulator. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames(maximum TTI)

WLAN Notes:

1. For exposure conditions with multiple test positions, such as handset operating next to the ear, devices with hotspot mode, procedures for initial test position can be applied. Using the transmission mode determined by the DSSS procedure or initial test configuration, area scans are measured for all positions in an exposure condition. The test position with the highest extrapolated(peak)SAR is used as the initial test position. When the reported SAR of the initial test position is ≤ 0.4 W/kg, further SAR measurement is not required for the other (remaining) test positions. Otherwise, SAR is evaluated at the subsequent highest peak SAR position until the reported SAR result is ≤ 0.8 W/kg or all test positions are measured.
2. Justification for test configurations for WLAN per KDB Publication 248227 for 2.4GHZ WIFI single transmission chain operations, the highest measured maximum output power Channel for DSSS was selected for SAR measurement.SAR for OFDM modes(2.4GHz 802.11g/n) was not required due to the maximum allowed powers and the highest reported DSSS SAR. See Section 7.1.4 for more information.

9.1 SAR MEASUREMENT RESULT

SAR test results of GSM&UMTS

Test No.	Band	Mode	CH	Test Position (with 10mm)	Battery	Tune up	Measured	Drift(dB)	SAR Value (W/kg)1-g	Reported SAR
T01	GSM 850	GPRS 2TX	190	Front Face	1	30.8	30.15	-0.01	**0.427**	**0.496**
T02	GSM 850	GPRS 2TX	190	Rear Face	1	30.8	30.15	0.03	0.314	0.365
T03	GSM 850	GPRS 2TX	190	Right Side	1	30.8	30.15	0.01	0.065	0.075
T04	GSM 850	GPRS 2TX	190	Top Side	1	30.8	30.15	0.05	0.106	0.123
T05	GSM 850	GPRS 2TX	190	Bottom Side	1	30.8	30.15	0.02	0.053	0.062
T06	GSM 850	GPRS 2TX	190	Front Face	2	30.8	30.15	0.01	0.404	0.469
T20	GSM 1900	GPRS 2TX	661	Front Face	1	28	27.08	0.08	**0.560**	**0.692**
T21	GSM 1900	GPRS 2TX	661	Rear Face	1	28	27.08	0.03	0.463	0.572
T22	GSM 1900	GPRS 2TX	661	Right Side	1	28	27.08	-0.02	0.090	0.111
T23	GSM 1900	GPRS 2TX	661	Top Side	1	28	27.08	0.01	0.050	0.062
T24	GSM 1900	GPRS 2TX	661	Bottom Side	1	28	27.08	0	0.224	0.277
T25	GSM 1900	GPRS 2TX	661	Front Face	2	28	27.08	0.06	0.526	0.650
T30	UMTS B2	RMC12.2K	9400	Front Face	1	23.5	22.62	0.05	0.917	1.123
T31	UMTS B2	RMC12.2K	9400	Rear Face	1	23.5	22.62	0.04	0.777	0.952
T32	UMTS B2	RMC12.2K	9400	Right Side	1	23.5	22.62	0.03	0.108	0.132
T33	UMTS B2	RMC12.2K	9400	Top Side	1	23.5	22.62	0.01	0.175	0.214
T34	UMTS B2	RMC12.2K	9400	Bottom Side	1	23.5	22.62	-0.06	0.250	0.306
T35	UMTS B2	RMC12.2K	9262	Front Face	1	23.5	22.53	0.02	**1.050**	**1.313**
T36	UMTS B2	RMC12.2K	9538	Front Face	1	23.5	22.49	0	0.990	1.249
T37	UMTS B2	RMC12.2K	9262	Rear Face	1	23.5	22.53	0.02	0.856	1.070
T38	UMTS B2	RMC12.2K	9538	Rear Face	1	23.5	22.49	0.03	0.862	1.088
T39	UMTS B2	RMC12.2K	9262	Front Face	2	23.5	22.53	-0.07	1.040	1.300
T40	UMTS B2	RMC12.2K	9262	Front Face (1st repeated)	1	23.5	22.53	0.03	1.030	1.288
T35	UMTS B2	RMC12.2K	9262	Front Face(with replaced holder)	1	23.5	22.53	0.02	1.040	1.300
T50	UMTS B4	RMC12.2K	1413	Front Face	1	23.5	22.58	-0.03	0.754	0.932
T51	UMTS B4	RMC12.2K	1413	Rear Face	1	23.5	22.58	0.05	**1.060**	**1.310**
T52	UMTS B4	RMC12.2K	1413	Right Side	1	23.5	22.58	0.05	0.108	0.133
T53	UMTS B4	RMC12.2K	1413	Top Side	1	23.5	22.58	0.03	0.284	0.351
T54	UMTS B4	RMC12.2K	1413	Bottom Side	1	23.5	22.58	-0.03	0.516	0.638
T55	UMTS B4	RMC12.2K	1312	Front Face	1	23.5	22.63	0.02	0.783	0.957
T56	UMTS B4	RMC12.2K	1513	Front Face	1	23.5	22.42	0	0.771	0.989
T57	UMTS B4	RMC12.2K	1312	Rear Face	1	23.5	22.63	0.06	0.966	1.180
T58	UMTS B4	RMC12.2K	1513	Rear Face	1	23.5	22.42	0.01	1.010	1.295
T59	UMTS B4	RMC12.2K	1413	Rear Face	2	23.5	22.58	0.04	1.030	1.273
T60	UMTS B4	RMC12.2K	1413	Rear Face (1st repeated)	1	23.5	22.58	0.01	1.050	1.298
T61	UMTS B4	RMC12.2K	1413	Rear Face(with replaced holder)	1	23.5	22.58	-0.03	1.030	1.273
T80	UMTS B5	RMC12.2K	4182	Front Face	1	23.5	23.02	0.01	1.220	1.363
T81	UMTS B5	RMC12.2K	4182	Rear Face	1	23.5	23.02	-0.01	1.030	1.150
T82	UMTS B5	RMC12.2K	4182	Right Side	1	23.5	23.02	0.02	0.057	0.064

T83	UMTS B5	RMC12.2K	4182	Top Side	1	23.5	23.02	0.02	0.376	0.420
T84	UMTS B5	RMC12.2K	4182	Bottom Side	1	23.5	23.02	-0.03	0.264	0.295
T85	UMTS B5	RMC12.2K	4132	Front Face	1	23.5	23.19	-0.04	1.050	1.128
T86	UMTS B5	RMC12.2K	4233	Front Face	1	23.5	23.16	0.08	0.936	1.012
T87	UMTS B5	RMC12.2K	4132	Rear Face	1	23.5	23.19	0.01	0.955	1.026
T88	UMTS B5	RMC12.2K	4233	Rear Face	1	23.5	23.16	-0.02	0.786	0.850
T89	UMTS B5	RMC12.2K	4182	Front Face	2	23.5	23.02	0.05	**1.250**	**1.396**
T90	UMTS B5	RMC12.2K	4182	Front Face (1st repeated)	1	23.5	23.02	0.03	1.230	1.374
T91	UMTS B5	RMC12.2K	4182	Rear Face(with replaced holder)	1	23.5	23.02	0.03	1.210	1.351

Note: 1.The value with boldface is the maximum SAR Value of each test band.

2. According to 201610 FCC TCB workshop RF exposure slides, when the highest reported SAR of an antenna is ＞1.2W/kg, holder perturbation verification is required for each antenna, using the highest SAR configuration among all applicable frequency bands.

SAR test results of LTE

Test No.	Band	Mode	CH	RB	Offset	Test Position With 10cm	Battery	Tune up	Measured	Drift (dB)	SAR Value (W/kg)1-g	Reported SAR
T100	LTE B2	QPSK20M	18900	1	0	Front Face	1	23	22.65	0.05	0.822	0.891
T101	LTE B2	QPSK20M	18900	1	0	Rear Face	1	23	22.65	0.04	0.756	0.819
T102	LTE B2	QPSK20M	18900	1	0	Right Side	1	23	22.65	0.01	0.149	0.162
T103	LTE B2	QPSK20M	18900	1	0	Top Side	1	23	22.65	-0.06	0.186	0.202
T104	LTE B2	QPSK20M	18900	1	0	Bottom Side	1	23	22.65	0.03	0.376	0.408
T105	LTE B2	QPSK20M	18900	50	50	Front Face	1	22	21.66	0.07	0.618	0.668
T106	LTE B2	QPSK20M	18900	50	50	Rear Face	1	22	21.66	-0.03	0.624	0.675
T107	LTE B2	QPSK20M	18900	50	50	Right Side	1	22	21.66	0.02	0.141	0.152
T108	LTE B2	QPSK20M	18900	50	50	Top Side	1	22	21.66	-0.02	0.155	0.168
T109	LTE B2	QPSK20M	18900	50	50	Bottom Side	1	22	21.66	-0.03	0.323	0.349
T110	LTE B2	QPSK20M	18700	1	0	Front Face	1	23	22.32	0.06	1.160	1.357
T111	LTE B2	QPSK20M	19100	1	0	Front Face	1	23	22.46	0.02	**1.220**	**1.382**
T112	LTE B2	QPSK20M	18700	1	0	Rear Face	1	23	22.32	0.02	1.100	1.286
T113	LTE B2	QPSK20M	19100	1	0	Rear Face	1	23	22.46	0.01	1.130	1.280
T114	LTE B2	QPSK20M	19100	1	0	Front Face	2	23	22.46	0.03	1.170	1.325
T115	LTE B2	QPSK20M	19100	1	0	Front Face(1st repeated)	2	23	22.46	0.06	1.180	1.336
T116	LTE B2	QPSK20M	19100	1	0	Front Face(with replaced holder)	2	23	22.46	-0.03	1.190	1.348
T117	LTE B2	QPSK20M	18900	100	0	Front Face	2	22	21.63	-0.02	0.624	0.679
T118	LTE B2	QPSK20M	18900	100	0	Rear Face	2	22	21.63	0	0.562	0.612
T120	LTE B4	QPSK20M	20300	1	0	Front Face	1	23	22.53	0.09	0.644	0.718
T121	LTE B4	QPSK20M	20300	1	0	Rear Face	1	23	22.53	0.01	0.941	1.049
T122	LTE B4	QPSK20M	20300	1	0	Right Side	1	23	22.53	0.07	0.142	0.158
T123	LTE B4	QPSK20M	20300	1	0	Top Side	1	23	22.53	0.06	0.192	0.214
T124	LTE B4	QPSK20M	20300	1	0	Bottom Side	1	23	22.53	0.02	0.396	0.441
T125	LTE B4	QPSK20M	20300	50	50	Front Face	1	22	21.42	-0.05	0.565	0.646
T126	LTE B4	QPSK20M	20300	50	50	Rear Face	1	22	21.42	0.06	0.882	1.008
T127	LTE B4	QPSK20M	20300	50	50	Right Side	1	22	21.42	-0.03	0.126	0.144
T128	LTE B4	QPSK20M	20300	50	50	Top Side	1	22	21.42	0.02	0.182	0.208
T129	LTE B4	QPSK20M	20300	50	50	Bottom Side	1	22	21.42	-0.01	0.359	0.410
T130	LTE B4	QPSK20M	20050	1	0	Rear Face	1	23	22.39	0.01	1.170	1.346
T131	LTE B4	QPSK20M	20175	1	0	Rear Face	1	23	22.47	-0.02	**1.210**	**1.367**
T132	LTE B4	QPSK20M	20050	50	50	Rear Face	1	22	21.34	0.05	1.020	1.187
T133	LTE B4	QPSK20M	20175	50	0	Rear Face	1	22	21.36	0.09	0.914	1.059
T134	LTE B4	QPSK20M	20175	1	0	Rear Face	2	23	22.53	0.01	0.920	1.025
T135	LTE B4	QPSK20M	20175	1	0	Rear Face(1st repeated)	1	23	22.53	0.03	1.190	1.326
T136	LTE B4	QPSK20M	20175	1	0	Rear Face(with replaced holder)	1	23	22.53	0.03	1.200	1.337
T137	LTE B4	QPSK20M	20300	100	0	Rear Face	1	22	21.47	0.01	0.805	0.909

T150	LTE B5	QPSK10M	20600	1	24	Front Face	1	24	23.58	0.04	**0.620**	**0.683**
T151	LTE B5	QPSK10M	20600	1	24	Rear Face	1	24	23.58	0.03	0.607	0.669
T152	LTE B5	QPSK10M	20600	1	24	Right Side	1	24	23.58	0.01	0.078	0.086
T153	LTE B5	QPSK10M	20600	1	24	Top Side	1	24	23.58	0.04	0.221	0.243
T154	LTE B5	QPSK10M	20600	1	24	Bottom Side	1	24	23.58	0.05	0.260	0.286
T155	LTE B5	QPSK10M	20450	25	12	Front Face	1	23	22.21	0.02	0.493	0.591
T156	LTE B5	QPSK10M	20450	25	12	Rear Face	1	23	22.21	-0.03	0.507	0.608
T157	LTE B5	QPSK10M	20450	25	12	Right Side	1	23	22.21	0.06	0.084	0.101
T158	LTE B5	QPSK10M	20450	25	12	Top Side	1	23	22.21	-0.01	0.201	0.241
T159	LTE B5	QPSK10M	20450	25	12	Bottom Side	1	23	22.21	0.03	0.208	0.249
T160	LTE B5	QPSK10M	20600	1	24	Front Face	2	24	23.58	0.01	0.607	0.669
T180	LTE B7	QPSK20M	21350	1	0	Front Face	1	23	22.98	-0.09	1.170	1.175
T181	LTE B7	QPSK20M	21350	1	0	Rear Face	1	23	22.98	-0.06	1.030	1.035
T182	LTE B7	QPSK20M	21350	1	0	Right Side	1	23	22.98	0.02	1.230	1.236
T183	LTE B7	QPSK20M	21350	1	0	Top Side	1	23	22.98	0.03	0.121	0.122
T184	LTE B7	QPSK20M	21350	1	0	Bottom Side	1	23	22.98	0.02	0.816	0.820
T185	LTE B7	QPSK20M	21350	50	0	Front Face	1	22	21.92	0.01	0.805	0.820
T186	LTE B7	QPSK20M	21350	50	0	Rear Face	1	22	21.92	0.08	0.833	0.848
T187	LTE B7	QPSK20M	21350	50	0	Right Side	1	22	21.92	-0.03	1.060	1.080
T188	LTE B7	QPSK20M	21350	50	0	Top Side	1	22	21.92	-0.01	0.065	0.066
T189	LTE B7	QPSK20M	21350	50	0	Bottom Side	1	22	21.92	0.04	0.592	0.603
T190	LTE B7	QPSK20M	20850	1	50	Front Face	1	23	22.73	0.02	1.000	1.064
T191	LTE B7	QPSK20M	21100	1	99	Front Face	1	23	22.55	-0.07	1.030	1.142
T192	LTE B7	QPSK20M	20850	1	50	Rear Face	1	23	22.73	0.06	1.020	1.085
T193	LTE B7	QPSK20M	21100	1	99	Rear Face	1	23	22.55	0.01	1.090	1.209
T194	LTE B7	QPSK20M	20850	1	50	Right Side	1	23	22.73	-0.08	**1.290**	**1.373**
T195	LTE B7	QPSK20M	21100	1	99	Right Side	1	23	22.55	0.08	1.120	1.242
T196	LTE B7	QPSK20M	20850	1	50	Bottom Side	1	23	22.73	-0.06	0.934	0.994
T197	LTE B7	QPSK20M	21100	1	99	Bottom Side	1	23	22.55	0.04	0.794	0.881
T198	LTE B7	QPSK20M	20850	50	50	Front Face	1	22	21.48	0.03	0.872	0.983
T199	LTE B7	QPSK20M	21100	50	50	Front Face	1	22	21.79	0.01	1.020	1.071
T200	LTE B7	QPSK20M	20850	50	50	Rear Face	1	22	21.48	-0.06	0.754	0.850
T201	LTE B7	QPSK20M	21100	50	50	Rear Face	1	22	21.79	0.07	0.863	0.906
T202	LTE B7	QPSK20M	20850	50	50	Right Side	1	22	21.48	0.05	1.210	1.364
T203	LTE B7	QPSK20M	21100	50	50	Right Side	1	22	21.79	-0.03	1.120	1.175
T204	LTE B7	QPSK20M	20850	1	50	Right Side	2	23	22.73	-0.02	1.260	1.341
T205	LTE B7	QPSK20M	20850	1	50	Right Side(1st repeated)	2	23	22.73	0.08	1.260	1.341
T206	LTE B7	QPSK20M	20850	1	50	Right Side(with replaced holder)	2	23	22.73	0.04	1.250	1.330
T207	LTE B7	QPSK20M	21350	100	0	Front Face	2	22	21.88	-0.02	0.921	0.947
T208	LTE B7	QPSK20M	21350	100	0	Rear Face	2	22	21.88	0.03	0.753	0.774
T209	LTE B7	QPSK20M	21350	100	0	Right Side	2	22	21.88	-0.06	0.889	0.914
T210	LTE B7	QPSK20M	21350	100	0	Bottom Side	2	22	21.88	0.04	0.733	0.754

T310	LTE B12	QPSK10M	23060	1	24	Front Face	1	23.5	23.16	0.05	0.853	0.922
T311	LTE B12	QPSK10M	23060	1	24	Rear Face	1	23.5	23.16	0.03	0.597	0.646
T312	LTE B12	QPSK10M	23060	1	24	Right Side	1	23.5	23.16	0.02	0.103	0.111
T313	LTE B12	QPSK10M	23060	1	24	Top Side	1	23.5	23.16	-0.06	0.276	0.298
T314	LTE B12	QPSK10M	23060	1	24	Bottom Side	1	23.5	23.16	0.01	0.278	0.301
T315	LTE B12	QPSK10M	23060	25	12	Front Face	1	22.5	21.79	-0.04	0.412	0.485
T316	LTE B12	QPSK10M	23060	25	12	Rear Face	1	22.5	21.79	0.02	0.338	0.398
T317	LTE B12	QPSK10M	23060	25	12	Right Side	1	22.5	21.79	-0.03	0.036	0.042
T318	LTE B12	QPSK10M	23060	25	12	Top Side	1	22.5	21.79	0.01	0.148	0.174
T319	LTE B12	QPSK10M	23060	25	12	Bottom Side	1	22.5	21.79	0.03	0.161	0.190
T320	LTE B12	QPSK10M	23095	1	24	Front Face	1	23.5	22.94	-0.03	**1.110**	**1.263**
T321	LTE B12	QPSK10M	23130	1	24	Front Face	1	23.5	23.1	-0.03	1.030	1.129
T322	LTE B12	QPSK10M	23095	1	24	Front Face	2	23.5	22.94	0.01	1.050	1.195
T323	LTE B12	QPSK10M	23095	1	24	Front Face(1st repeated)	1	23.5	22.94	0.07	1.060	1.206
T324	LTE B12	QPSK10M	23095	1	24	Front Face(with replaced holder)	1	23.5	22.94	0.02	1.070	1.217
T325	LTE B12	QPSK10M	23095	50	0	Front Face	1	22.5	21.75	0.01	0.535	0.636
T220	LTE B13	QPSK10M	23230	1	24	Front Face	1	23.5	23.06	0.03	0.860	0.952
T221	LTE B13	QPSK10M	23230	1	24	Rear Face	1	23.5	23.06	0.02	0.673	0.745
T222	LTE B13	QPSK10M	23230	1	24	Right Side	1	23.5	23.06	0.01	0.055	0.061
T223	LTE B13	QPSK10M	23230	1	24	Top Side	1	23.5	23.06	-0.03	0.258	0.286
T224	LTE B13	QPSK10M	23230	1	24	Bottom Side	1	23.5	23.06	0.02	0.322	0.356
T225	LTE B13	QPSK10M	23230	25	25	Front Face	1	22.5	21.87	-0.05	0.822	0.950
T226	LTE B13	QPSK10M	23230	25	25	Rear Face	1	22.5	21.87	-0.01	0.742	0.858
T227	LTE B13	QPSK10M	23230	25	25	Right Side	1	22.5	21.87	-0.08	0.035	0.040
T228	LTE B13	QPSK10M	23230	25	25	Top Side	1	22.5	21.87	0.03	0.244	0.282
T229	LTE B13	QPSK10M	23230	25	25	Bottom Side	1	22.5	21.87	0.07	0.220	0.254
T230	LTE B13	QPSK10M	23230	1	24	Front Face	2	23.5	23.06	0.01	**0.908**	**1.005**
T231	LTE B13	QPSK10M	23230	1	24	Front Face(1st repeated)	2	23.5	23.06	0.02	0.896	0.992
T232	LTE B13	QPSK10M	23230	50	0	Front Face	2	22.5	21.73	0.01	0.565	0.675

Note: 1.The value with boldface is the maximum SAR Value of each test band.

2. According to 201610 FCC TCB workshop RF exposure slides, when the highest reported SAR of an antenna is ＞1.2W/kg, holder perturbation verification is required for each antenna, using the highest SAR configuration among all applicable frequency bands.

SAR test results of WIFI

Test No.	Band	CH	Test Position (with 10mm)	Ant	Battery	Data Rate	Power Setting	Tune up	Measured	Drift(dB)	SAR Value (W/kg)1-g	Reported SAR
T270	802.11b	11	Front Face	1	1	1	14	15	13.68	-0.03	0.068	0.091
T271	802.11b	11	Rear Face	1	1	1	14	15	13.68	0.02	0.035	0.048
T272	802.11b	11	Left Side	1	1	1	14	15	13.68	-0.01	0.048	0.065
T273	802.11b	11	Bottom Side	1	1	1	14	15	13.68	-0.08	0.087	0.118
T274	802.11b	11	Bottom Side	1	2	1	14	15	13.68	-0.01	**0.108**	**0.146**
T280	802.11b	6	Front Face	2	1	1	13.5	15	13.85	0.06	0.092	0.120
T281	802.11b	6	Rear Face	2	1	1	13.5	15	13.85	0.05	0.057	0.075
T282	802.11b	6	Left Side	2	1	1	13.5	15	13.85	0.01	0.034	0.044
T283	802.11b	6	Top Side	2	1	1	13.5	15	13.85	-0.05	0.113	0.147
T284	802.11b	6	Top Side	2	2	1	13.5	15	13.85	-0.09	**0.125**	**0.163**
T290	802.11n40	6	Front Face	1+2	1	27	11	14	12.97	-0.02	**0.060**	**0.075**
T291	802.11n40	6	Rear Face	1+2	1	27	11	14	12.97	0.01	0.048	0.061
T292	802.11n40	6	Left Side	1+2	1	27	11	14	12.97	0.02	0.042	0.053
T293	802.11n40	6	Top Side	1+2	1	27	11	14	12.97	0.03	0.045	0.057
T294	802.11n40	6	Bottom Side	1+2	1	27	11	14	12.97	0.02	0.022	0.028
T295	802.11n40	6	Front Face	1+2	2	27	11	14	12.97	0.04	0.052	0.066

Note: 1.The value with boldface is the maximum SAR Value of each test band.

2. Per KDB248227 D01, the highest SAR measured for the initial test position or initial test configuration should be used to determine SAR test exclusion according to the sum of 1-g SAR and SAR peak to location ratio provisions in KDB 447498. In addition, a test lab may also choose to perform standalone SAR measurements for test positions and 802.11 configurations that are not required by the initial test position or initial test configuration procedures and apply the results to determine simultaneous transmission SAR test exclusion, according to sum of 1-g and SAR peak to location ratio requirements to reduce the number of simultaneous transmission SAR measurements.

10. SIMULTANEOUS TRANSMISSION CONDITIONS

Per KDB 447498D01v06, SAR compliance for simultaneous transmission must be considered when the maximum duration of overlapping transmissions, including network hand-offs, is greater than 30 seconds. This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis.

The Simultaneous Transmission Possibilities of this device are as below:

No.	Configuration	Body
1	GPRS/EDGE (DATA)+ WiFi 2.4G	Yes
2	UMTS(DATA)+ WiFi 2.4G	Yes
3	LTE(DATA)+ WiFi 2.4G	Yes

Note:
i) 2G&3G&LTE share the same antenna and can't transmit simultaneously.
ii) The device does not support DTM function.

11. SAR SUMMATION SCENARIO

About 2.4G WiFi and GSM/UMTS/LTE antenna

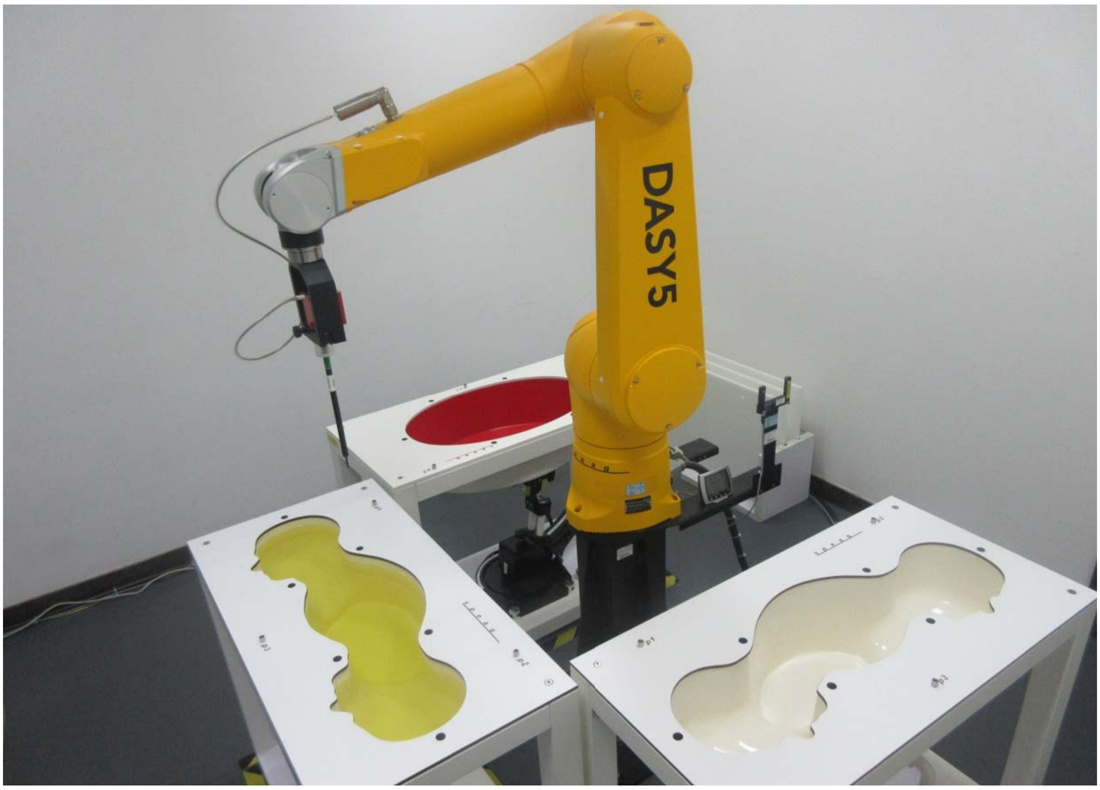
Test Position / Reported SAR_{1g}	Body					
	Front	Rear	Left	Right	Top	Bottom
GSM850	0.496	0.365	-	0.075	0.123	0.062
GSM1900	0.692	0.572	-	0.111	0.062	0.277
UMTS B2	1.313	0.952	-	0.132	0.214	0.306
UMTS B4	0.989	1.310	-	0.133	0.351	0.638
UMTS B5	1.396	1.150	-	0.064	0.420	0.295
LTE B2	1.382	1.286	-	0.162	0.202	0.408
LTE B4	0.718	1.367	-	0.158	0.214	0.441
LTE B5	0.683	0.669	-	0.101	0.243	0.286
LTE B7	1.175	1.209	-	1.373	0.122	0.994
LTE B12	1.263	0.646	-	0.111	0.298	0.301
LTE B13	1.005	0.858	-	0.061	0.286	0.356
WiFi 2.4G	0.120	0.075	0.065	-	0.163	0.146
MAX∑SAR1g	**1.516**	1.442	0.065	1.373	0.583	1.140

MAX. $\sum SAR_{1g}$=1.516W/Kg<1.6 W/Kg,so the SAR to peak location separation ratio should not be considered.

APPENDIX

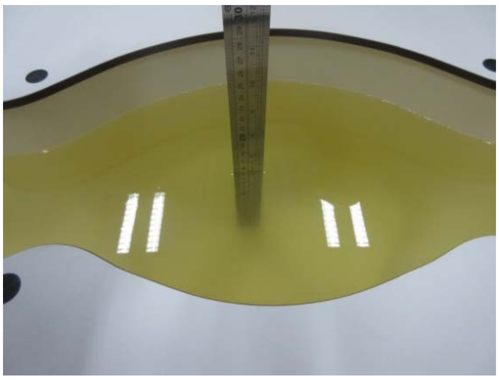
1. Test Layout

Specific Absorption Rate Test Layout

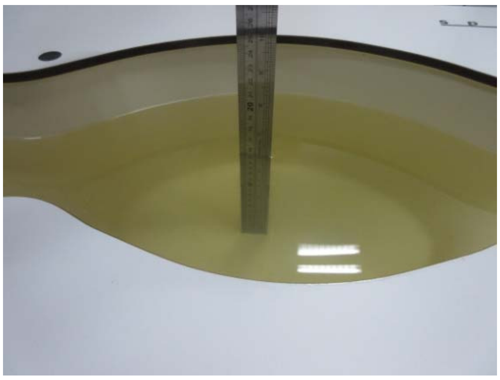


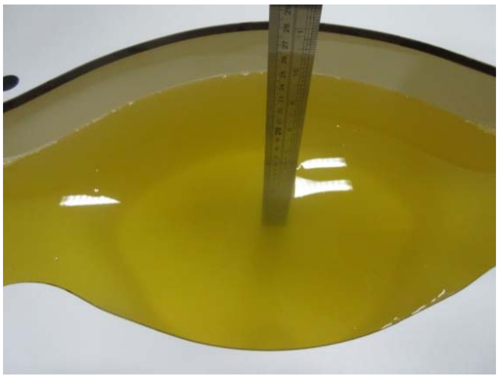
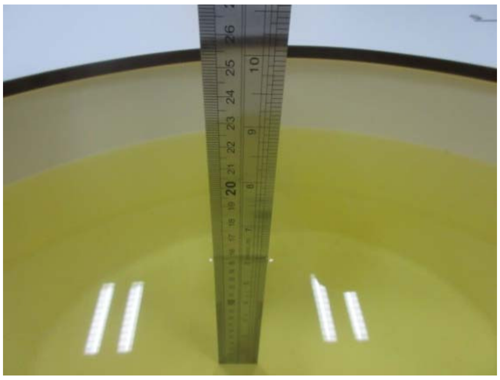
Liquid depth in the flat Phantom (≥15cm depth)

Body(750MHz)



Body(835MHz)



Body(1750MHz)	Body(1900~3800MHz)
	

Appendix A. SAR Plots of System Verification

(Pls See Appendix A.)

Appendix B. SAR Plots of SAR Measurement

(Pls See Appendix B.)

Appendix C. Calibration Certificate for Probe and Dipole

(Pls See Appendix C.)

Appendix D. Photographs of the Test Set-Up

(Pls See Appendix D.)

End