FCC SAR Test Report

FCC ID: O57TB3710I

Project No.	:	1512C068
Equipment	:	Portable Tablet Computer
Model Name	:	Lenovo TB3-710I
Applicant	:	LENOVO (SHANGHAI) ELECTRONICS TECHNOLOGY CO LTD
Address	:	NO 68 BUILDING 199 FENJU RD, CHINA (SHANGHAI) PILOT FREE TRADE ZONE,SHANGHAI, 200131 CHINA

Date of Receipt	:	Dec. 08, 2015
Date of Test	:	Dec. 11, 2015~ Dec. 17, 2015
Issued Date	:	Dec. 24, 2015
Tested by	:	BTL Inc.

PREPARED BY :

(Super Jiang/ Technical Engineer)

APPROVED BY : (Steven Lu / Technical Manager)

BTL INC.

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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**) .

BTL's reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **BTL** issued reports.

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BTL's laboratory quality assurance procedures are in compliance with the **ISO Guide17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

Table of Contents   Page

Table of Contents Page

REPORT ISSUED HISTORY

Issued No.	Description	Issued Date
BTL-FCC-SAR-1512C068	Original Issue.	Dec. 24, 2015

1. GENERAL SUMMARY

Equipment	Portable Tablet Computer
Model Name	Lenovo TB3-710I
Brand Name	Lenovo
Manufacturer	Lenovo PC HK Limited Lenovo PC HK Limited
Address	23/F, Lincoln House, Taikoo Place 979 King's Road, Quarry Bay, Hong Kong
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 **KDB616217 D04** SAR for laptop and tablets v01r02 **KDB941225 D01** 3G SAR Procedures v03r01 **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** SAR 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-1512C068) 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 v01r04,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 Head SAR-1g (W/kg)	Highest Body SAR-1g(W/kg)
PCE	GSM850	0.20	1.35
	GSM1900	0.07	1.32
	WCDMA Band 2	0.11	1.24
	WCDMA Band 5	0.14	0.87
DTS	2.4G WLAN	0.34	0.78
The highest simultaneous SAR value is 1.35 W/kg per KDB690783 D01			

Note:

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.

3.1.1 GENERAL DESCRIPTION OF EUT

<table>
<tr><td>Equipment</td><td colspan="3">Portable Tablet Computer</td></tr>
<tr><td>Model Name</td><td colspan="3">Lenovo TB3-710I</td></tr>
<tr><td>Model Difference</td><td colspan="3">This model has two configurations: main supply, secondary supply.
Please refer to note1.</td></tr>
<tr><td rowspan="3">IMEI Code</td><td rowspan="2">Sample 1(main supply)</td><td colspan="2">868981020013688</td></tr>
<tr><td colspan="2">868981020013977</td></tr>
<tr><td>Sample 2(secondary supply)</td><td colspan="2">868981020013134</td></tr>
<tr><td rowspan="3">S/N</td><td rowspan="2">Sample 1(main supply)</td><td colspan="2">HGEMGT30</td></tr>
<tr><td colspan="2">HGEMGT3V</td></tr>
<tr><td>Sample 2(secondary supply)</td><td colspan="2">HGEMGT1D</td></tr>
<tr><td>HW Version</td><td colspan="3">A1901_MB_PCB_V4.0</td></tr>
<tr><td>SW Version</td><td colspan="3">TB3-710I_S000012_151209_ROW</td></tr>
<tr><td>Modulation</td><td colspan="3">GSM(GMSK/8PSK),WCDMA(QPSK),WiFi(DSSS/OFDM),
BT(GFSK/π /4-DQPSK/8-DPSK)</td></tr>
<tr><td rowspan="7">Operation Frequency Range(s)</td><td>Band</td><td>TX (MHz)</td><td>RX (MHz)</td></tr>
<tr><td>GSM850</td><td>824-849</td><td>869-894</td></tr>
<tr><td>GSM1900</td><td>1850-1910</td><td>1930-1990</td></tr>
<tr><td>WCDMA Band 5</td><td>824-849</td><td>869-894</td></tr>
<tr><td>WCDMA Band 2</td><td>1850-1910</td><td>1930-1990</td></tr>
<tr><td>Bluetooth</td><td colspan="2">2400 ~2483.5</td></tr>
<tr><td>WIFI</td><td colspan="2">2412 ~2462</td></tr>
<tr><td rowspan="3">GPRS/EDGE Multislot Class(12)</td><td colspan="2">Max Number of Timeslots in Uplink:</td><td>4</td></tr>
<tr><td colspan="2">Max Number of Timeslots in Downlink:</td><td>4</td></tr>
<tr><td colspan="2">Max Total Timeslot:</td><td>5</td></tr>
<tr><td>GSM Device class</td><td colspan="3">Class B</td></tr>
<tr><td>HSDPA UE Category</td><td colspan="3">14</td></tr>
<tr><td>HSUPA UE Category</td><td colspan="3">6</td></tr>
<tr><td rowspan="3">Power Class:</td><td colspan="3">4,tested with power level 5(GSM850)</td></tr>
<tr><td colspan="3">1,tested with power level 0(GSM1900)</td></tr>
<tr><td colspan="3">3, tested with power control “all 1”(WCDMA Band 2/5)</td></tr>
<tr><td rowspan="6">Test Channels (low-mid-high):</td><td colspan="3">128-190-251 (GSM850)</td></tr>
<tr><td colspan="3">512-661-810 (GSM1900)</td></tr>
<tr><td colspan="3">9262-9400-9538(WCDMA Band 2)</td></tr>
<tr><td colspan="3">4132-4182-4233 (WCDMA Band 5)</td></tr>
<tr><td colspan="3">1-6 -11 (2.4G WIFI 802.11b/g/n HT20)</td></tr>
<tr><td colspan="3">3-6-9 (2.4G WIFI 802.1n HT40)</td></tr>
<tr><td rowspan="3">Antenna Gain</td><td colspan="3">BT/2.4G WiFi: 0.48dBi</td></tr>
<tr><td colspan="3">GSM850/ WCDMA Band 5:-0.2dBi</td></tr>
<tr><td colspan="3">GSM1900/ WCDMA Band 2:0.4dBi</td></tr>
<tr><td colspan="4">Other Information</td></tr>
<tr><td rowspan="6">Battery</td><td>Brand</td><td colspan="2">Lenovo</td></tr>
<tr><td>Model</td><td colspan="2">L13D1P31</td></tr>
<tr><td>Capacitance</td><td colspan="2">3450 mAh</td></tr>
<tr><td>Rated Voltage</td><td colspan="2">3.8VDC</td></tr>
<tr><td rowspan="2">Manufacturer</td><td colspan="2">1. Sunwoda Eletronic Co., LTD.</td></tr>
<tr><td colspan="2">2. SCUD Electronics.</td></tr>
</table>

Note:
1.

Main Supply			
Part Name	Model Name	Description	Supplier
PCB--MB	A1901_MB_PCB_V4.0_HF	A1901_ PCB_V4.0	HUASHEN
Baseband chip	MT8321A/B	WCDMA	MTK
PMIC	MT6350V/A	-	MTK
PA	AP7169-R95MOG	RFPA_3G_two in one PA_BANDS I, II, III, IV, V, VIII	Airoha
	AP6690-R95MOG	RFPA_ 850/900/1800/1900/TD1900/TD2010	Airoha
Duplexer	RFDIP1608060TM7T62	Electromagnetic interference two-way stopband filters_ 1.575 GHz/2.4 GHz/5GHz	Walsin
	SAYFH897MHA0F00	Electromagnetic interference two-way stopband filters_ W900	MURATA
	SAYFH836MCC0F0A	Electromagnetic interference two-way stopband filters_ _band5_W850	MURATA
	SAYRF1G88CA0B0A	Electromagnetic interference two-way stopband filters_ band2_W1900	MURATA
	SAYRF1G95HQ0F0A	Electromagnetic interference two-way stopband filters_ band1_W2100	MURATA
	MDBF21L914H1897M-DB02H	Electromagnetic interference difference converter _ GSM850/GSM900/DCS1800/PCS1900	MICROGATE
G-sensor	KXTJ2-1009		Kionix
EMMC+DDR3	KMF820012M-B305	MCP_16GB-eMMC_8Gb-LPDDR3	Samsung
Crystal	7L26002009	26M_0.5ppm_2.8V_2520	TXC
audio frequency amplifier	AW8155AFCR	AB type/Dype_sigle-way	Awinic
RF Switch	SKY13489-001	RF Switch_SPDT	Skyworks
LNA	WS7916	GPS_LNA	Will
SAW FILTER	SAFFB1G56KB0F0A	GPS BEIDOU_RX1109	MURATA
TP	TTCT070121	A1900A	Top-Touch
LCD	TXDT700EPLA-68	7Inch_1024*600	TXD
Camera_Front	BLX0A20H-A1900-F	Camera_5x5x2.95mm_30w	BRODSANDS
Camera_Rear	BLX2508H-A1900-B	Camera_6.5x6.5x4.2mm_200w	BRODSANDS
5M AF(3G)	O9B5-AW1507BHQ	Camera_8.5*8.5*4.66mm_500W	HUAQUAN
MIC	OB-F15LX42-1592-C10C33EP	-	HUAFENG
Motor(3G)	HZF-Z04B-RL126B20-90	-	HONGZHIFA
SPK	XHS151118SW43P38-02	-	HAOSHENG
Battery	L13D1P31	3450mAh	SUNWODA
Adapter(UK)	C-P58	5V/1A	Huntkey
Adapter(EU)	C-P57	5V/1A	Huntkey
USB Cable	L16B-05100070L	70cm	LIQI

Secondary Supply			
Part Name	Model Name	Description	Supplier
PCB--MB	A1901_MB_PCB_V4.0_HF	A1901_ PCB_V4.0	HUASHEN
G-sensor	BMA253		Bosch
EMMC+DDR3	H9TQ17A8GTMCUR-KUM	MCP_16GB-eMMC_8Gb-LPDDR3	Hynix
Crystal	X1E000021043400	26M_10ppm_7.4pF_3225	Epson Toyocom
TP	YCB0880700801A	A1900A	YEJI
LCD	KD070D54-39NH-B2	7Inch_1024*600	GUOXIAN
Camera_Front	GI5953A1D-1P0J0	Camera_5x5x2.95mm_30w	QUNHUI
Camera_Rear	GV5954B1S-1P0J0	Camera_6.5x6.5x4.25_200w	QUNHUI
5M AF(3G)	HNW5889B1S-0P0J0	Camera_8.5*8.5*4.66mm_500W	QUNHUI
MIC	CM4015BC-423-WR138	-	JINZUN
Motor(3G)	CY0408L-021HB-047	-	KUNWANG
SPK	KFSC1115G3.5-08-0.7W-D	-	XICHUN
Battery	L13D1P31	3450mAh	SCUD
Adapter(UK)	C-P58	5V/1A	Acbel
Adapter(EU)	C-P57	5V/1A	Acbel
USB Cable	R16B-05100070	70cm	RIDONGSHENG

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. 18, 2015	1 Year
2	E-field Probe	Speag	EX3DV4	3932	Jan. 30, 2015	1 Year
3	System Validation Dipole	Speag	D835V2	4d160	Sep. 30, 2015	1 Year
4	System Validation Dipole	Speag	D1900V2	5d179	Sep. 29, 2015	1 Year
5	System Validation Dipole	Speag	D2450V2	919	Sep. 28, 2015	1 Year
6	Twin Sam Phantom	Speag	Twin Sam Phantom V5.0	1784	N/A	N/A
7	Twin Sam Phantom	Speag	Twin Sam Phantom V5.0	1896	N/A	N/A
8	8960 Series 10 Wireless Com Test set	Agilent	E5515E	MY52112163	Sep. 09, 2015	1Year
9	Power Amplifier	Mini-Circuits	ZHL-42W+	QA1333003	Mar. 09, 2015	1 Year
10	Power Amplifier	Mini-Circuits	ZVE-8G+	520701341	Mar. 09, 2015	1 Year
11	ENA Network Analyzer	Agilent	E5071C	MY46102965	Mar. 29, 2015	1 Year
12	MXG Analog Signal Generator	Agilent	N5181A	MY49060710	Nov. 02, 2015	1 Year
13	P-series power meter	Agilent	N1911A	MY45100473	Mar. 29, 2015	1 Year
14	wideband power sensor	Agilent	N1921A	MY51100041	Mar. 29, 2015	1 Year
15	Power Meter	Anritsu	ML2487A	6K00004714	Mar. 16, 2015	1 Year
16	Power Meter Sensor	Anritsu	MA2491A	34138	Mar. 16, 2015	1 Year
17	Dielectric Assessment Kit	Speag	DAK-3.5	1226	Aug. 04, 2015	1 Year
18	Low pass filter	Mini-Circuits	SLP-2950+	M108294	Mar. 29, 2015	1 Year
19	Attenuator	Mini-Circuits	VAT-10+	31317-1	Mar. 29, 2015	1 Year
20	Attenuator	Mini-Circuits	VAT-10+	31317-2	Mar. 29, 2015	1 Year
21	Attenuator	MEB	300-affn-03	314	Mar. 29, 2015	1 Year
22	Dual directional coupler	Agilent	777D	50208	Mar. 29, 2015	1 Year

Remark: ” N/A” denotes no model name, serial No. or calibration specified.
All calibration period of equipment list is one year.

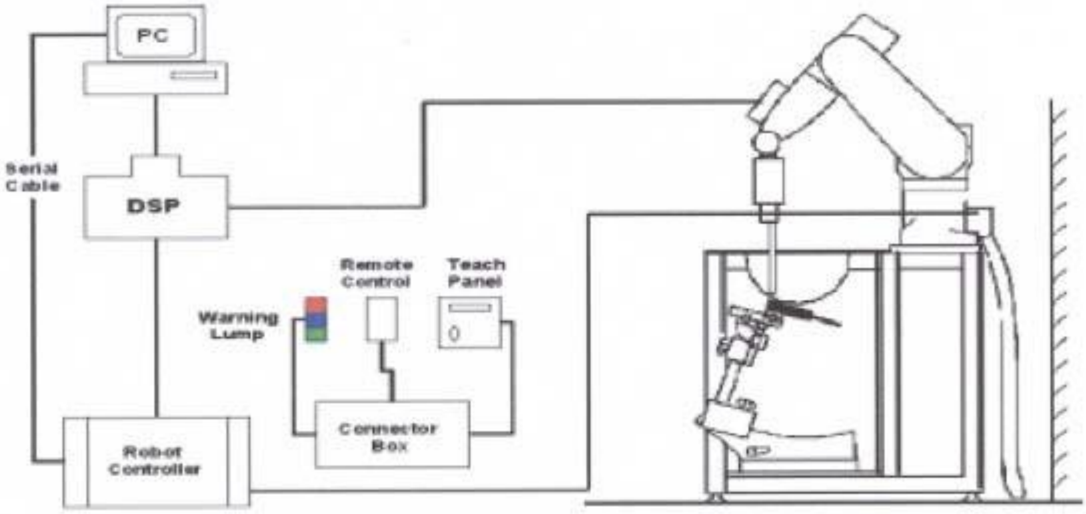
4.SAR MEASUREMENTS SYSTEM CONFIGURATION

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.

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

Where: Δt = Exposure time (30 seconds),
C = Heat capacity of tissue (brain or muscle),
ΔT = Temperature increase due to RF exposure.

Or

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

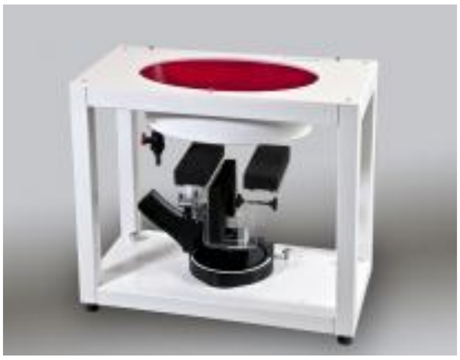
Where: σ = Simulated tissue conductivity,
ρ = Tissue density (kg/m3).

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}, $\Delta y_{zoom} \leq$ 2GHz -≤8mm, 2-4GHz -≤5 mm and 4-6 GHz-≤4mm; $\Delta z_{zoom} \leq$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*$\Delta z_{Zoom}(n-1)$	≥30mm
2-3GHz	≤12mm	≤5mm	≤5mm	≤4mm	≤1.5*$\Delta z_{Zoom}(n-1)$	≥30mm
3-4GHz	≤12mm	≤5mm	≤4mm	≤3mm	≤1.5*$\Delta z_{Zoom}(n-1)$	≥28mm
4-5GHz	≤10mm	≤4mm	≤3mm	≤2.5mm	≤1.5*$\Delta z_{Zoom}(n-1)$	≥25mm
5-6GHz	≤10mm	≤4mm	≤2mm	≤2mm	≤1.5*$\Delta z_{Zoom}(n-1)$	≥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**
Head 835	0.2	-	0.2	1.5	57.0	-	41.1	-
Head 1900	-	44.5	-	0.2	-	-	55.3	-
Head 2450	-	45.0	-	0.1	-	-	54.9	-

Tissue Type	Bactericide	DGBE	HEC	NaCl	Sucrose	Triton X-100	Water	Diethylene Glycol Mono-hexylether
Body 835	0.2	-	0.2	0.9	48.5	-	50.2	-
Body 1900	-	29.5	-	0.3	-	-	70.2	-
Body 2450	-	31.4	-	0.1	-	-	68.5	-

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**
Head	835	22.4	0.889	42.695	0.90	41.5	-1.20	2.88	Dec. 12, 2015
Head	1900	22.2	1.424	39.100	1.40	40.0	1.71	-2.25	Dec. 12, 2015
Head	2450	22.4	1.845	39.080	1.80	39.2	2.50	-0.31	Dec. 11, 2015
Body	835	22.3	0.976	54.660	0.97	55.2	0.58	-0.98	Dec. 15, 2015
Body	1900	22.4	1.551	53.760	1.52	53.3	2.04	0.86	Dec. 16, 2015
Body	2450	22.5	1.999	51.710	1.95	52.7	2.51	-1.88	Dec. 16, 2015

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

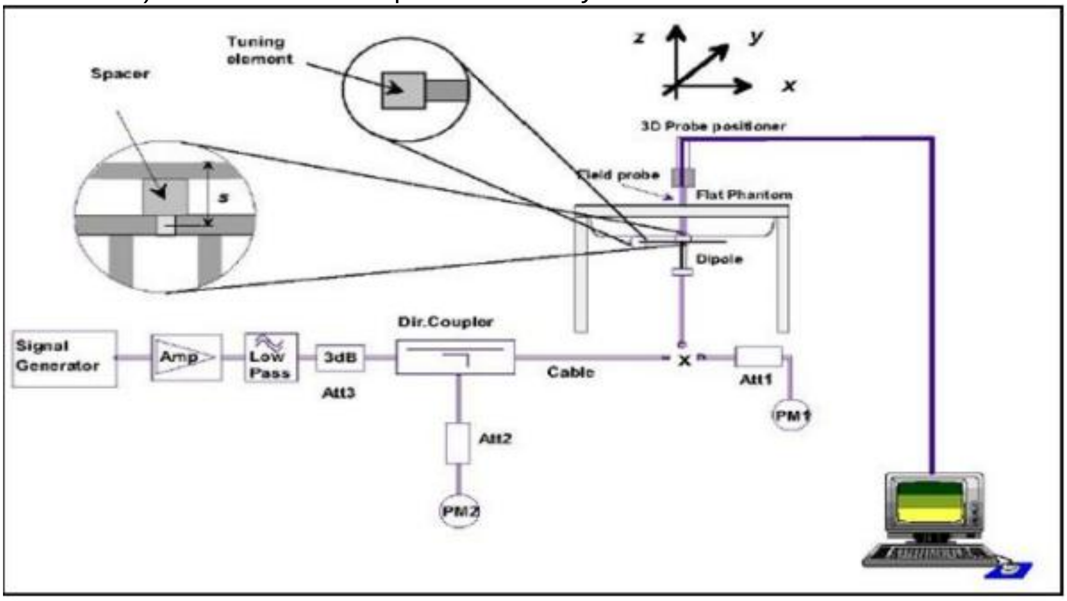
The system check is performed for verifying the accuracy of the complete measurement system and performance of the software. The system check is performed with tissue equivalent material according to IEEE P1528 (described above). The following table shows system check results for all frequency bands 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
Head	Dec. 12, 2015	835	9.50	2.40	9.60	1.05	4d160
Head	Dec. 12, 2015	1900	39.70	9.96	39.84	0.35	5d179
Head	Dec. 11, 2015	2450	52.00	12.90	51.60	-0.77	919
Body	Dec. 15, 2015	835	9.52	2.39	9.56	0.42	4d160
Body	Dec. 16, 2015	1900	39.60	9.75	39.00	-1.52	5d179
Body	Dec. 16, 2015	2450	51.10	12.65	50.60	-0.98	919

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 GENERAL DESCRIPTION OF TEST PROCEDURES

Connection to the EUT is established via air interface with Agilent 8960, and the EUT is Set to maximum output power by Agilent 8960. The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power output. The antenna connected to the output of the base station simulator shall be placed at least 50cm away from the EUT. The signal transmitted by the simulator to the antenna feeding point shall be lower than the output power level of the EUT by at least 30dB.

7.2SAR SENSOR WORKING

When the capsensor active，the active distance as below：

Test Position	Active distance（mm）
Rear	9
Bottom	9

The SAR power reduce as below：

Band	Reduce power（dBm）
GSM850（GPRS/EDGE）	10
GSM1900（GPRS/EDGE）	10
WCDMA Band 2	8
WCDMA Band 5	8

Note: When the sensor is malfunctioned, refer to operational description for the further details.

7.3 SAR TEST CONFIGURATION

7.3.1 GSM TEST CONFIGURATION

SAR tests for GSM850 and GSM1900, a communication link is set up with a base station by air link. Using Agilent 8960 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.

7.3.2 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

(1).Head SAR Measurements
SAR for Head exposure configurations in voice mode is measured using a 12.2 kbps RMC with TPC bits configured to all “1s”. SAR in AMR configurations is not required when the maximum average output of each RF channel for 12.2 kbps AMR is less than ¼ dB higher than that measured in 12.2 kbps RMC. Otherwise SAR is measured on the maximum output channel in 12.2 kbps AMR with 3.4kbps SRB(signalling radio bearer) using the exposure configuration that results in the highest SAR in12.2kbps RMC for that RF channel.

(2).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 feedRear 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 Δ ACK, Δ NACK, Δ 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: ΔACK, ΔNACK and ΔCQI = 8 $A_{hs} = \beta_{hs}/\beta_c = 30/15$ $\beta_{hs} = 30/15 * \beta_c$
Note 2 : CM=1 for β_c/β_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 β_c = 11/15 and β_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: ΔACK, ΔNACK and ΔCQI = 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).

7.3.3 WIFI TEST CONFIGURATION

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

Mode	802.11b	802.11g	802.11n (20M/40M)
Power Setting	15.5	14.5	14.5
Duty cycle	100%		
Crest factor	1		

7.3.3.1 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.

7.4. POWER REDUCTION BY PROXIMITY SENSING

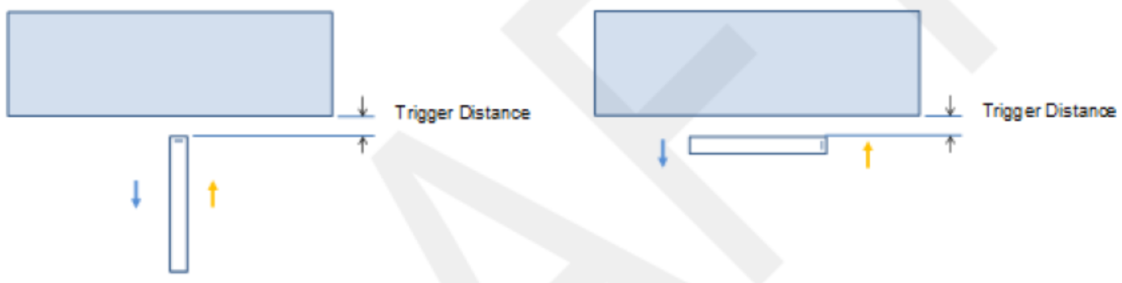
7.4.1. Proximity Sensor Triggering Distance (KDB 616217 §6.2)

The bottom of the DUT was placed directly below the flat phantom. The DUT was moved toward the phantom in accordance with the steps outlined in KDB 616217 §6.2 to determine the trigger distance for enabling power reduction. The DUT was moved away from the phantom to determine the trigger distance for resuming full power.

The measurement was then repeated for the Rear surface.

The DUT featured a sound indicator on its player that showed the status of the proximity sensor (Triggered or not triggered). This was used to determine the status of the sensor during the proximity sensor assessment as monitoring the output power directly was not practical without affecting the measurement.

It was confirmed separately that the output power was altered according to the proximity sensor status indication. This was achieved by observing the proximity sensor status at the same time as monitoring the conducted power. Section 9 contains both the full and reduced conducted power measurements.



Proximity Sensor Trigger Distance Assessment
KDB 616219 §6.2, Edge 1

Proximity Sensor Trigger Distance Assessment
KDB 616219 §6.2, Rear

LEGEND

Direction of DUT travel for determination of power reduction triggering point

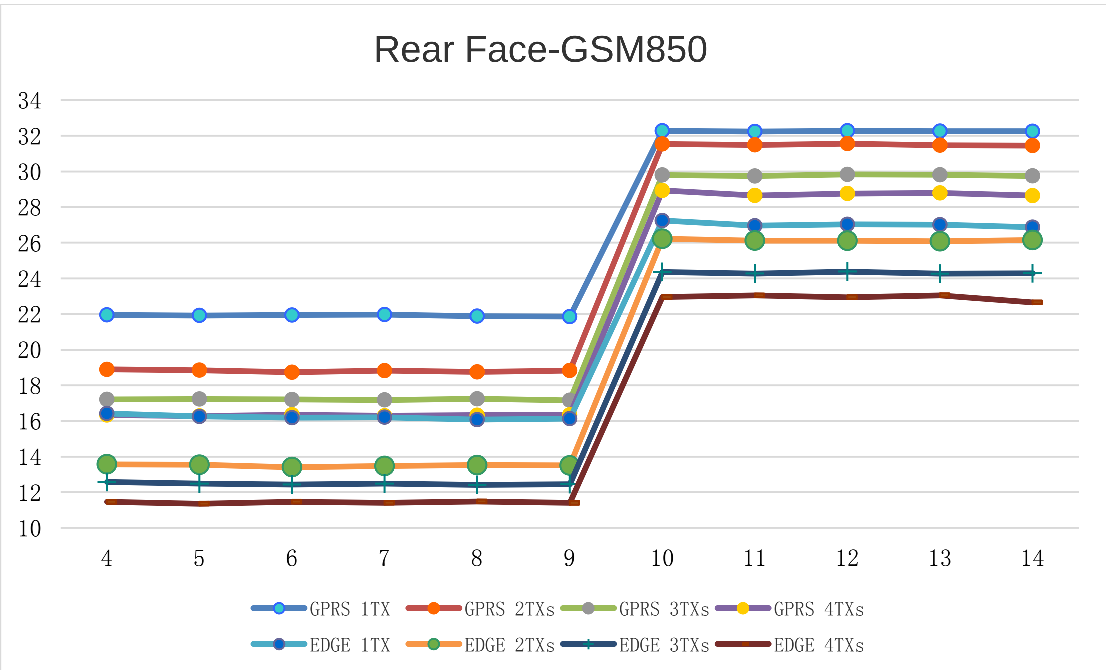
Direction of DUT travel for determination of full power resumption triggering point

Proximity Sensor Triggering Distance Measurement Results

GSM850

Rear, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

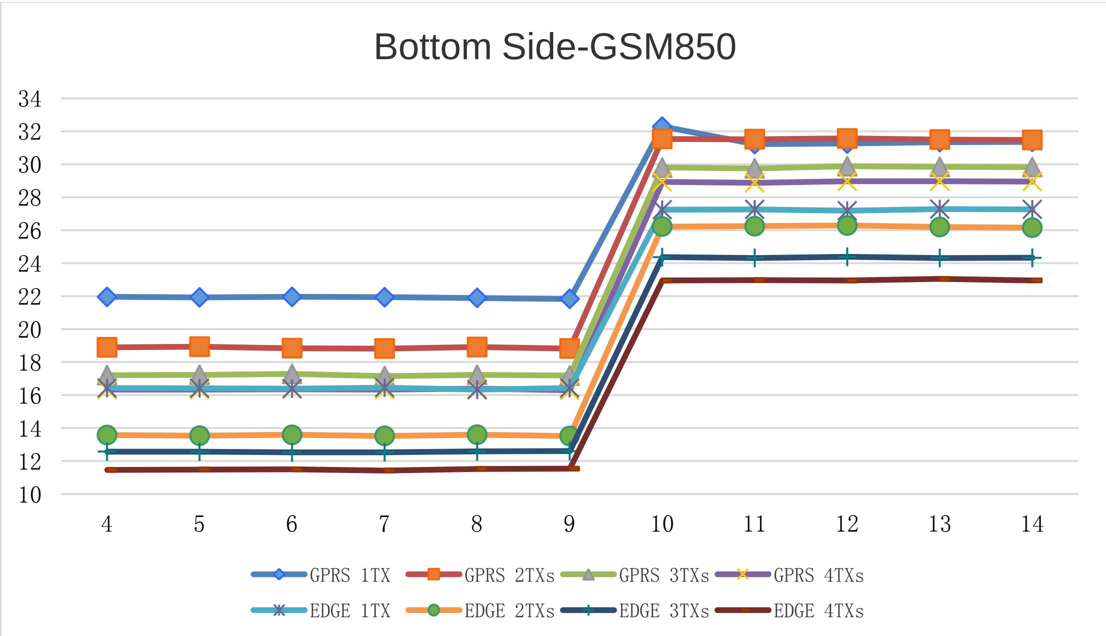
Distance to DUT vs. Output Power in dBm												
Distance(mm)		4	5	6	7	8	9	10	11	12	13	14
GSM850	GPRS 1TX	21.95	21.92	21.94	21.97	21.88	21.85	32.28	32.24	32.28	32.26	32.25
	GPRS 2TXs	18.89	18.85	18.73	18.82	18.75	18.83	31.54	31.49	31.56	31.47	31.45
	GPRS 3TXs	17.21	17.23	17.2	17.18	17.24	17.16	29.8	29.74	29.83	29.81	29.75
	GPRS 4TXs	16.33	16.28	16.35	16.29	16.32	16.34	28.93	28.65	28.76	28.79	28.64
	EDGE 1TX	16.42	16.25	16.18	16.21	16.07	16.13	27.24	26.95	27.03	27.01	26.87
	EDGE 2TXs	13.57	13.54	13.41	13.47	13.52	13.5	26.22	26.12	26.11	26.08	26.15
	EDGE 3TXs	12.57	12.48	12.43	12.48	12.41	12.45	24.36	24.27	24.38	24.26	24.28
	EDGE 4TXs	11.46	11.36	11.47	11.41	11.48	11.4	22.95	23.04	22.94	23.05	22.65



GSM850

Bottom, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

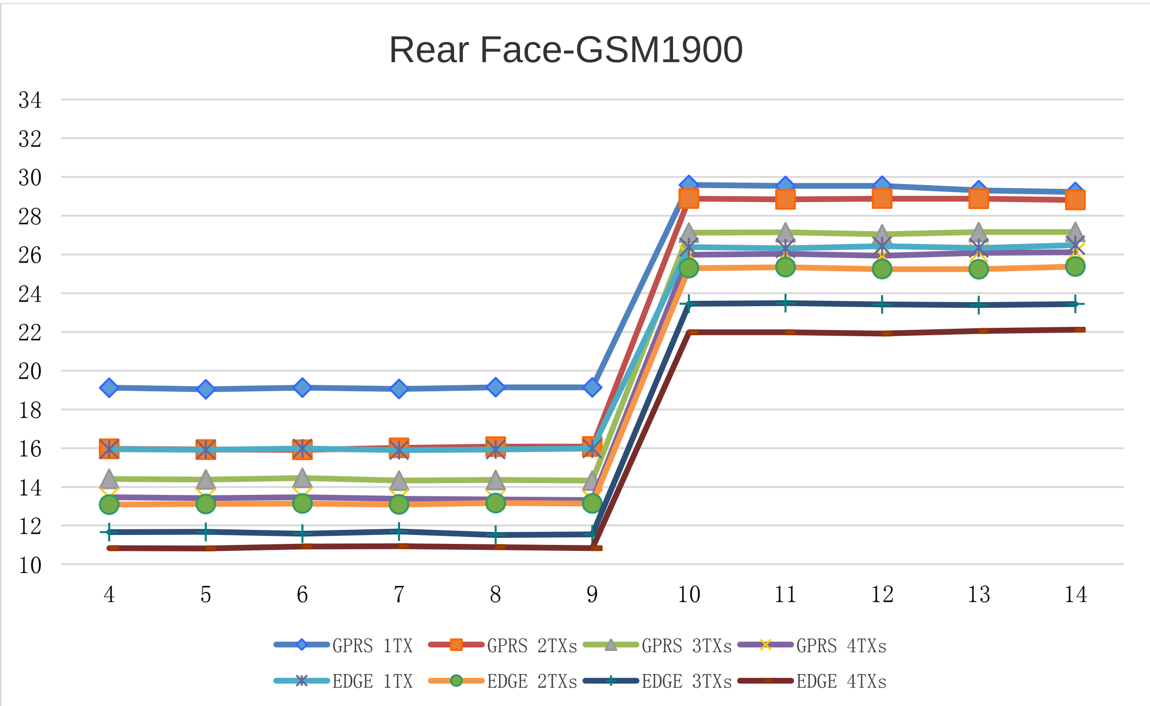
Distance to DUT vs. Output Power in dBm												
Distance(mm)		4	5	6	7	8	9	10	11	12	13	14
GSM850	GPRS 1TX	21.95	21.92	21.95	21.93	21.89	21.83	32.28	31.22	31.25	31.34	31.36
	GPRS 2TXs	18.89	18.93	18.84	18.82	18.91	18.82	31.54	31.52	31.56	31.5	31.47
	GPRS 3TXs	17.21	17.23	17.28	17.15	17.23	17.18	29.8	29.75	29.88	29.84	29.83
	GPRS 4TXs	16.33	16.32	16.35	16.32	16.38	16.28	28.93	28.88	28.96	28.97	28.95
	EDGE 1TX	16.42	16.41	16.38	16.45	16.32	16.42	27.24	27.26	27.18	27.28	27.26
	EDGE 2TXs	13.57	13.53	13.58	13.52	13.59	13.51	26.22	26.24	26.28	26.19	26.15
	EDGE 3TXs	12.57	12.56	12.52	12.53	12.58	12.59	24.36	24.31	24.38	24.31	24.32
	EDGE 4TXs	11.46	11.48	11.49	11.42	11.52	11.53	22.95	22.97	22.94	23.04	22.95



GSM1900

Rear, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

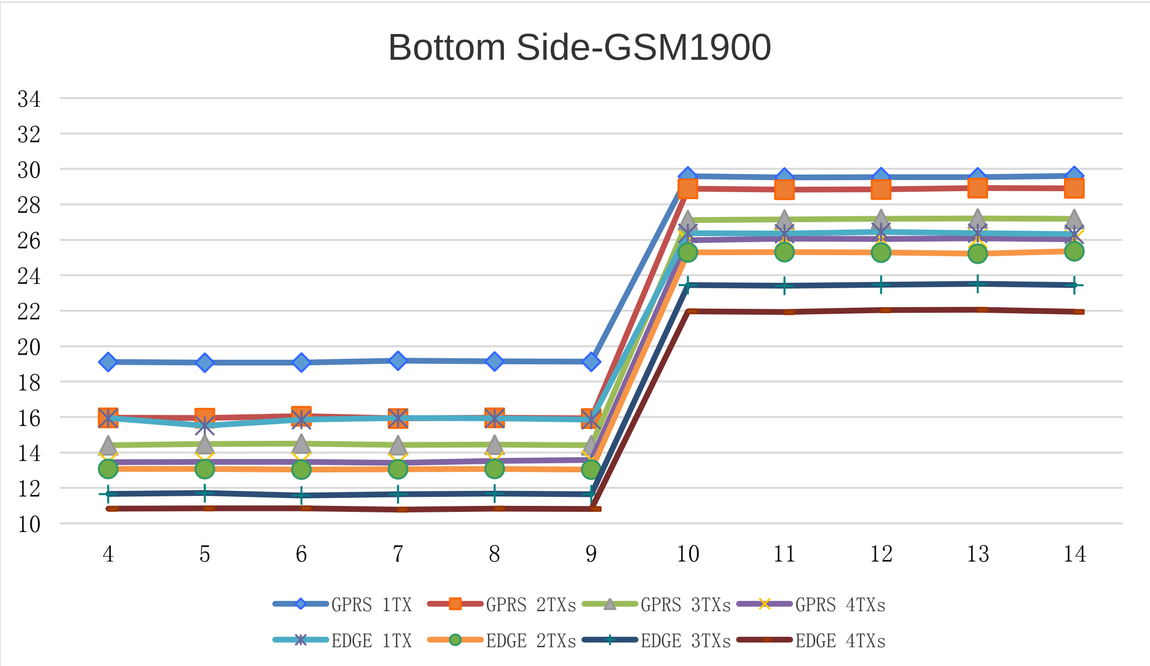
Distance to DUT vs. Output Power in dBm												
Distance(mm)		4	5	6	7	8	9	10	11	12	13	14
GSM1900	GPRS 1TX	19.11	19.03	19.12	19.05	19.14	19.13	29.58	29.53	29.54	29.31	29.22
	GPRS 2TXs	15.96	15.92	15.91	16.01	16.07	16.08	28.88	28.84	28.88	28.87	28.81
	GPRS 3TXs	14.41	14.38	14.46	14.32	14.35	14.32	27.12	27.14	27.03	27.15	27.16
	GPRS 4TXs	13.46	13.41	13.47	13.38	13.34	13.32	25.98	26.03	25.93	26.08	26.11
	EDGE 1TX	15.94	15.91	15.98	15.89	15.92	15.97	26.37	26.31	26.42	26.33	26.47
	EDGE 2TXs	13.08	13.11	13.14	13.09	13.16	13.14	25.29	25.34	25.24	25.23	25.37
	EDGE 3TXs	11.66	11.67	11.58	11.69	11.52	11.54	23.45	23.48	23.41	23.38	23.44
	EDGE 4TXs	10.83	10.82	10.92	10.94	10.89	10.83	21.97	21.97	21.91	22.04	22.11



GSM1900

Bottom, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

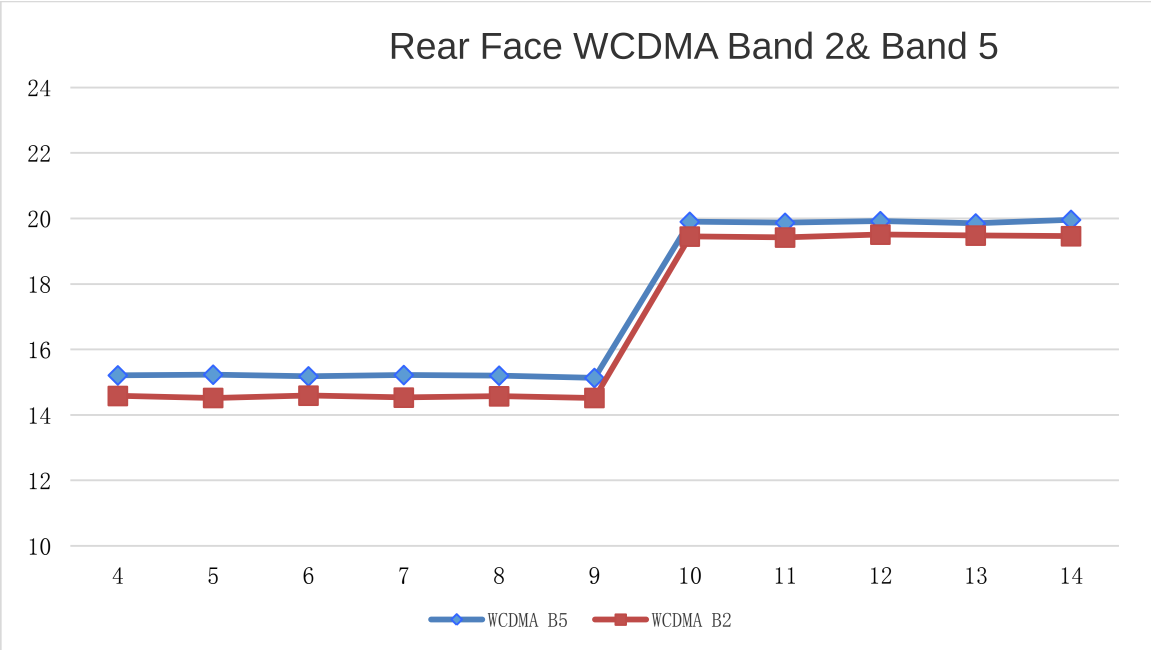
Distance to DUT vs. Output Power in dBm												
Distance(mm)		4	5	6	7	8	9	10	11	12	13	14
GSM1900	GPRS 1TX	19.11	19.07	19.08	19.18	19.14	19.12	29.58	29.52	29.54	29.53	29.61
	GPRS 2TXs	15.96	15.94	16.05	15.92	15.96	15.92	28.88	28.83	28.84	28.92	28.91
	GPRS 3TXs	14.41	14.48	14.51	14.42	14.45	14.41	27.12	27.15	27.18	27.21	27.18
	GPRS 4TXs	13.46	13.48	13.47	13.42	13.52	13.58	25.98	26.07	26.04	26.08	26.03
	EDGE 1TX	15.94	15.52	15.85	15.94	15.92	15.85	26.37	26.35	26.44	26.38	26.31
	EDGE 2TXs	13.08	13.07	13.04	13.06	13.08	13.04	25.29	25.31	25.28	25.22	25.36
	EDGE 3TXs	11.66	11.71	11.58	11.65	11.69	11.65	23.45	23.41	23.47	23.52	23.44
	EDGE 4TXs	10.83	10.85	10.86	10.78	10.84	10.82	21.97	21.92	22.03	22.05	21.94



WCDMA Band 2&Band 5

Rear, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

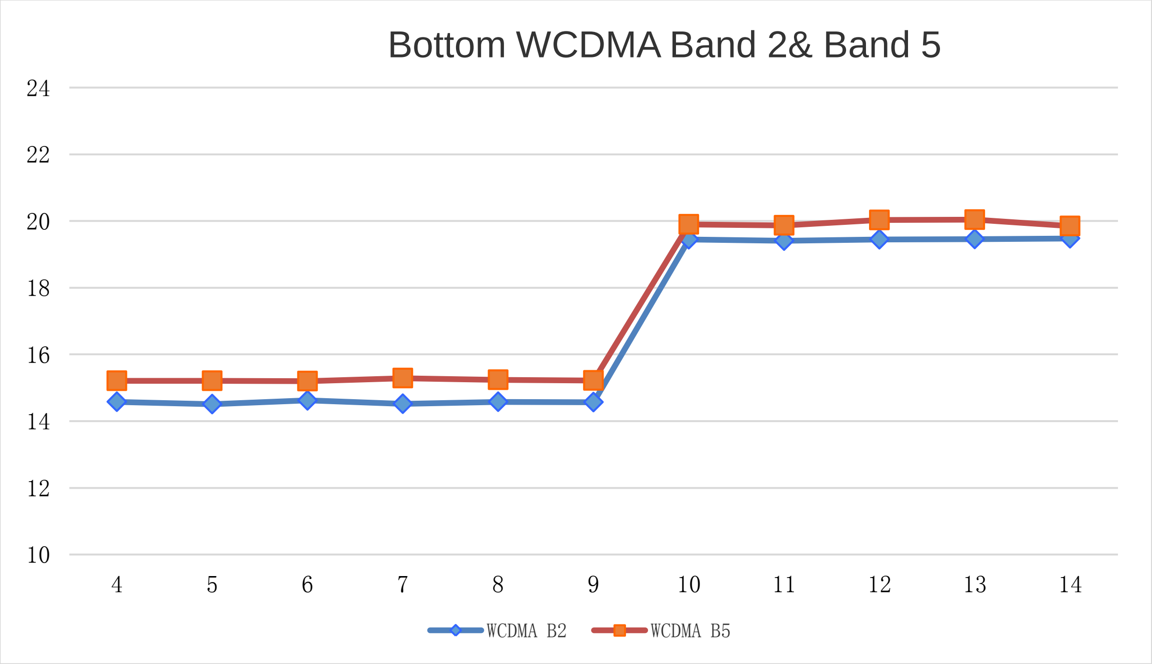
Distance to DUT vs. Output Power in dBm											
Distance(mm)	4	5	6	7	8	9	10	11	12	13	14
WCDMA B2	14.58	14.52	14.59	14.53	14.57	14.52	19.45	19.42	19.51	19.48	19.46
WCDMA B5	15.21	15.23	15.18	15.22	15.2	15.13	19.9	19.87	19.92	19.85	19.96



WCDMA Band 2&Band 5

Bottom, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

Distance to DUT vs. Output Power in dBm											
Distance(mm)	4	5	6	7	8	9	10	11	12	13	14
WCDMA B2	14.58	14.51	14.62	14.52	14.58	14.57	19.45	19.41	19.45	19.46	19.48
WCDMA B5	15.21	15.21	15.2	15.29	15.24	15.22	19.9	19.87	20.03	20.04	19.85


Bottom WCDMA Band 2& Band 5
24
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13
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WCDMA B2
WCDMA B5

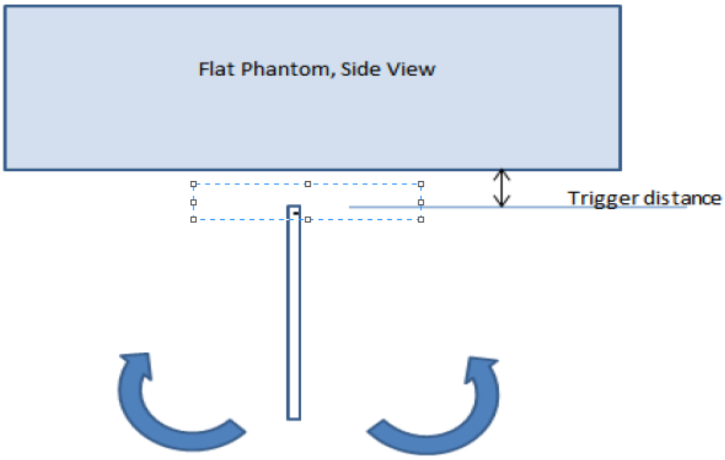
7.4.2. Proximity Sensor Coverage (KDB 616217 §6.3)

As there is no spatial offset between the antenna and the proximity sensor element, proximity sensor coverage did not need to be assessed.

7.4.3. Proximity Sensor Tilt Angle Assessment (KDB 616217 §6.4)

The DUT was positioned directly below the flat phantom at the minimum measured trigger distance with Bottom parallel to the base of the flat phantom for each band.

The EUT was rotated about Edge 1 for angles up to +/- 45°. If the output power increased during the rotation the DUT was moved 1mm toward the phantom and the rotation repeated. This procedure was repeated until the power remained reduced for all angles up to +/- 45°.



Proximity sensor tilt angle assessment (bottom) KDB 616217 §6.4

Summary of Tablet Tilt Angle Influence to Proximity Sensor Triggering for Bottom

Band (MHz)	Minimum trigger distance measured according to KDB 616217 §6.2	Minimum distance at which power reduction was maintained over +/-45°	-45°	-40°	-30°	-20°	-10°	0°	10°	20°	30°	40°	45°
GSM850	9mm	9mm	on	on	on	on	on	on	on	on	on	on	on
GSM1900	9mm	9mm	on	on	on	on	on	on	on	on	on	on	on
WCDMA B2	9mm	9mm	on	on	on	on	on	on	on	on	on	on	on
WCDMA B5	9mm	9mm	on	on	on	on	on	on	on	on	on	on	on

7.5 TEST POSITION

7.5.1 Head

Measurements were made in “cheek” and “tilt” positions on both the left hand and right hand sides of the phantom. (APPENDIX D)

7.5.2 Body

Test Position Requirements

The overall diagonal dimension of the display section of a tablet is 21.5cm>20cm,Per FCC KDB 616217,the Rear surface and edges of the tablet should be tested for SAR compliance with the Tablet touching the phantom.SAR evaluation for the front surface of tablet display screens are generally not necessary. The SAR Exclusion Threshold in KDB 447498 D01can be applied to determine SAR test exclusion for adjacent edge configurations. The closest distance from the antenna to an adjacent tablet edge is used to determine if SAR testing is required for the adjacent edges, with the adjacent edge positioned adjacent the phantom and the edge containing the antenna positioned perpendicular to the phantom.

SAR test reduction and exclusion guidance

(1)The SAR exclusion threshold for distances<50mm is defined by the following equation:

$$\frac{\text{(max. power of channel, including tune-up tolerance, mW)}}{\text{(min. test separation distance, mm)}} \cdot \sqrt{\text{Frequency (GHz)}} \leq 3.0$$

The test exclusions are applicable only when the minimum test separation distance is ≤50mm and for transmission frequencies between 100MHz and 6GHz. When the minimum test separation distance is<5mm, a distance of 5mm according to 5) in section 4.1 is applied to determine SAR test exclusion.

(2)The SAR exclusion threshold for distances>50mm is defined by the following equation, as illustrated in KDB 447498 D01 Appendix B:

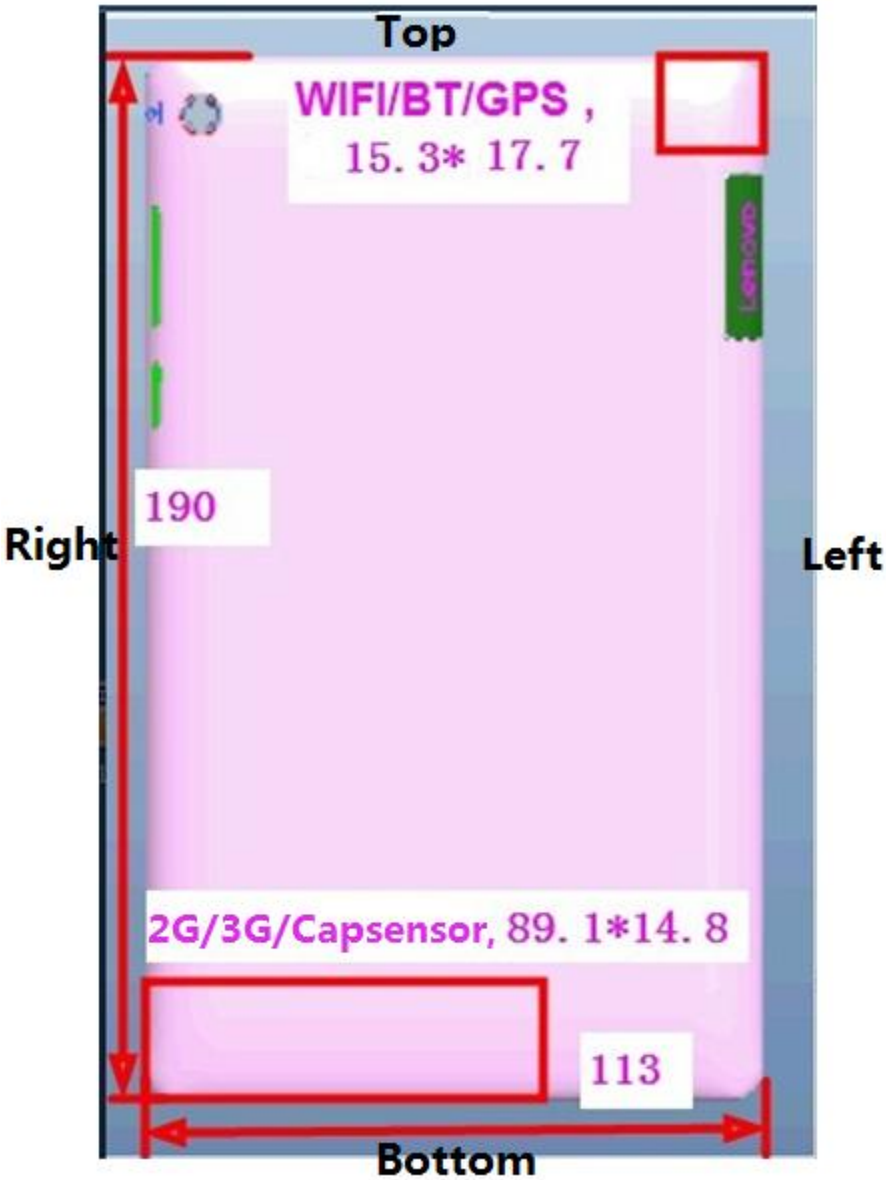
a) at 100 MHz to1500 MHz

[Power allowed at numeric Threshold at 50 mm in step 1) + (test separation distance - 50 mm) · ($f_{(MHz)}$/150)] mW

b) at >1500MHz and ≤6GHz

[Power allowed at numeric Threshold at 50 mm in step 1) + (test separation distance - 50 mm) ·10] mW

The location of the antenna inside EUT is as below.



Note: 1.The unit is mm.

Mode	Rear Side	Left Side	Right Side	Top Side	Bottom Side
GSM850/1900	YES	YES	YES	NO	YES
WCDMA Band 2/5	YES	YES	YES	NO	YES
2.4GWiFi	YES	YES	NO	YES	NO

8. POWER TEST RESULT

8.1CONDUCTED POWER MEASUREMENTS OF GSM850

GSM850 （Capsensor On)		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	22.50	21.95	21.91	21.85	13.31	12.76	12.72	12.66
	2 Tx Slot	19.00	18.89	18.85	18.83	12.87	12.76	12.72	12.70
	3 Tx Slot	17.50	17.21	17.19	17.16	13.08	12.79	12.77	12.74
	4 Tx Slot	16.50	16.33	16.32	16.30	13.32	13.15	**13.14**	13.12
EDGE (8PSK)	1 Tx Slot	16.50	16.42	16.40	16.13	7.31	7.23	7.21	6.94
	2 Tx Slot	14.00	13.57	13.66	13.50	7.87	7.44	7.53	7.37
	3 Tx Slot	13.00	12.57	12.50	12.45	8.58	8.15	8.08	8.03
	4 Tx Slot	12.00	11.46	11.44	11.40	8.82	8.28	8.26	8.22

GSM850 （Capsensor Off)		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
GSM (CS)		32.50	32.28	32.30	32.25	23.31	23.09	23.11	23.06
GPRS/ EDGE (GMSK)	1 Tx Slot	32.50	32.32	32.35	32.22	23.31	23.13	23.16	23.03
	2 Tx Slot	32.00	31.58	31.54	31.52	25.87	25.45	25.41	25.39
	3 Tx Slot	30.00	29.82	29.80	29.77	25.58	25.40	25.38	25.35
	4 Tx Slot	29.00	28.94	28.93	28.91	25.82	25.76	**25.75**	25.73
EDGE (8PSK)	1 Tx Slot	27.50	27.26	27.28	26.97	18.31	18.07	18.09	17.78
	2 Tx Slot	26.50	26.13	26.22	26.06	20.37	20.00	20.09	19.93
	3 Tx Slot	24.50	24.43	24.36	24.31	20.08	20.01	19.94	19.89
	4 Tx Slot	23.00	22.97	22.95	22.91	19.82	19.79	19.77	19.73

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 4Tx mode was selected for SAR testing according to the highest frame –averaged output power table.

8.2CONDUCTED POWER MEASUREMENTS OF GSM1900

GSM1900 (Capsensor On)		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	19.50	19.11	19.07	18.86	10.31	9.92	9.88	9.67
	2 Tx Slots	16.00	15.96	15.94	15.76	9.87	9.83	9.81	9.63
	3 Tx Slots	15.00	14.41	14.44	14.37	10.58	9.99	10.02	9.95
	4 Tx Slots	14.00	13.76	13.86	13.82	10.82	10.58	**10.68**	10.64
EDGE (8PSK)	1 Tx Slot	16.00	15.94	15.98	15.78	6.81	6.75	6.79	3.59
	2 Tx Slots	13.50	13.08	13.15	12.86	7.37	6.95	7.02	6.73
	3 Tx Slots	12.00	11.66	11.72	11.54	7.58	7.24	7.30	7.12
	4 Tx Slots	11.00	10.83	10.88	10.64	7.82	7.65	7.70	7.46

GSM1900 (Capsensor Off)		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
GSM (CS)		30.00	29.54	29.56	29.36	20.81	20.35	20.37	20.17
GPRS /EDGE (GMSK)	1 Tx Slot	30.00	29.58	29.60	29.33	20.81	20.39	20.41	20.14
	2 Tx Slots	29.00	28.88	28.86	28.68	22.87	22.75	22.73	22.55
	3 Tx Slots	27.50	27.12	27.15	27.08	23.08	22.70	22.73	22.66
	4 Tx Slots	26.50	26.28	26.38	26.34	23.32	23.10	**23.20**	23.16
EDGE (8PSK)	1 Tx Slot	27.00	26.37	26.41	26.21	17.81	17.18	17.22	17.02
	2 Tx Slots	25.50	25.29	25.36	25.07	19.37	19.16	19.23	18.94
	3 Tx Slots	24.00	23.45	23.51	23.33	19.58	19.03	19.09	18.91
	4 Tx Slots	22.50	21.97	22.02	21.78	19.32	18.79	18.84	18.60

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 4Tx mode was selected for SAR testing according to the highest frame –averaged output power table.

8.3CONDUCTED POWER MEASUREMENTS OF WCDMA1900 Band 2

WCDMA1900 (Band 2)（Capsensor On)		Tune-up	SAR Conducted Power (dBm)		
			9262CH	9400CH	9538CH
			1852.4	1880	1907.6
WCDMA	12.2kbps RMC	**15.00**	14.58	14.47	14.42
	64kbps RMC	**15.00**	14.59	14.46	14.38
	144kbps RMC	**15.00**	14.58	14.44	14.36
	384kbps RMC	**15.00**	14.58	14.42	14.33
HSDPA	Subtest 1	**14.50**	14.48	14.28	13.90
	Subtest 2	**14.50**	14.46	14.30	13.84
	Subtest 3	**14.50**	14.03	13.74	13.34
	Subtest 4	**14.50**	13.99	13.73	13.37
HSUPA	Subtest 1	**13.50**	13.41	13.15	13.42
	Subtest 2	**13.50**	13.45	13.21	12.75
	Subtest 3	**13.50**	12.96	12.68	12.31
	Subtest 4	**13.50**	13.42	13.21	12.81
	Subtest 5	**13.50**	13.42	13.22	12.78

WCDMA1900 (Band 2)（Capsensor Off)		Tune-up	SAR Conducted Power (dBm)		
			9262CH	9400CH	9538CH
			1852.4	1880	1907.6
WCDMA	12.2kbps RMC	**22.50**	22.30	22.32	22.27
	64kbps RMC	**22.50**	22.24	22.29	22.18
	144kbps RMC	**22.50**	22.23	22.23	22.15
	384kbps RMC	**22.50**	22.23	22.24	22.17
HSDPA	Subtest 1	**21.50**	21.42	21.18	21.16
	Subtest 2	**21.50**	21.41	21.20	21.14
	Subtest 3	**21.50**	20.93	20.64	20.24
	Subtest 4	**21.50**	20.89	20.63	20.27
HSUPA	Subtest 1	**21.50**	21.41	21.15	21.42
	Subtest 2	**21.50**	21.45	21.21	20.75
	Subtest 3	**21.50**	20.96	20.68	20.31
	Subtest 4	**21.50**	21.42	21.21	20.81
	Subtest 5	**21.50**	21.42	21.22	20.78

Note:
1) The conducted power of WCDMA 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 WCDMA850 Band 5

WCDMA 850(Band 5)（Capsensor On)		Tune-up	SAR Conducted Power (dBm)		
			4132CH	4182CH	4233CH
			826.4	836.4	846.6
WCDMA	12.2kbps RMC	**15.50**	15.16	15.08	15.21
	64kbps RMC	**15.50**	15.13	15.09	15.19
	144kbps RMC	**15.50**	15.15	15.08	15.20
	384kbps RMC	**15.50**	15.17	15.08	15.19
HSDPA	Subtest 1	**15.00**	14.82	14.71	14.85
	Subtest 2	**15.00**	14.76	14.69	14.80
	Subtest 3	**15.00**	14.35	14.21	14.36
	Subtest 4	**15.00**	14.32	14.19	14.33
HSUPA	Subtest 1	**14.00**	13.76	13.68	13.84
	Subtest 2	**14.00**	13.80	13.72	13.85
	Subtest 3	**14.00**	13.36	13.22	13.37
	Subtest 4	**14.00**	13.82	13.72	13.88
	Subtest 5	**14.00**	13.82	13.69	13.84

WCDMA 850(Band 5)（Capsensor Off)		Tune-up	SAR Conducted Power (dBm)		
			4132CH	4182CH	4233CH
			826.4	836.4	846.6
WCDMA	12.2kbps RMC	**23.00**	22.71	22.73	22.69
	64kbps RMC	**23.00**	22.68	22.72	22.64
	144kbps RMC	**23.00**	22.70	22.69	22.65
	384kbps RMC	**23.00**	22.72	22.70	22.64
HSDPA	Subtest 1	**22.00**	21.82	21.71	21.85
	Subtest 2	**22.00**	21.76	21.69	21.80
	Subtest 3	**22.00**	21.35	21.21	21.36
	Subtest 4	**22.00**	21.32	21.19	21.33
HSUPA	Subtest 1	**22.00**	21.76	21.68	21.84
	Subtest 2	**22.00**	21.80	21.72	21.85
	Subtest 3	**22.00**	21.36	21.22	21.37
	Subtest 4	**22.00**	21.82	21.72	21.88
	Subtest 5	**22.00**	21.82	21.69	21.84

Note:
1) The conducted power of WCDMA 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.

8.5 CONDUCTED POWER MEASUREMENTS OF WiFi 2.4G

Mode	Tune-up	Channel	Frequency	SAR Conducted Power (dBm)	Power Setting
802.11b	15.5	1	2412	15.14	15.5
		6	2437	15.29	15.5
		11	2462	15.23	16.0
802.11g	14.5	1	2412	14.27	15.0
		6	2437	14.25	14.5
		11	2462	14.18	15.0
802.11n HT20	14.5	1	2412	13.98	14.5
		6	2437	14.18	14.5
		11	2462	14.09	15.0
802.11n HT40	14.5	3	2422	14.17	15.0
		6	2437	14.03	14.5
		9	2452	13.12	15.5

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.

8.6 CONDUCTED POWER MEASUREMENTS OF BT

BT MHz	Tune Up	Average Conducted Power (dBm)	
		DH5	3DH5
CH0	2.5	1.649	0.997
CH39		1.821	1.779
CH78		2.217	2.203

BT MHz	Tune Up	Average Conducted Power (dBm)		
		CH0	CH19	CH39
BT (4.0)	-2	-2.85	-2.654	-2.406

Note:
1) The conducted power of BT is measured with RMS detector.

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 KDB648474 D04v01r03, SAR is evaluated without a headset connected to the device. When the standalone reported Body SAR is ⩽1.2 W/kg, no additional SAR evaluations using a headset are required.
5) 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 KDB648474 D04v01r03, Body accessory testing is typically associated with voice operations. Therefore, GSM voice was evaluated for Body SAR.
2) 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.

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 7.3.3 for more information.
3. Justification for test configurations for WLAN per KDB Publication 248227 for 5GHZ WIFI single transmission chain operations, the initial test configuration was selected according to the transmission mode with the highest maximum allowed power. Other transmission mode were not investigated since the highest reported SAR for initial test configuration adjusted by the ratio of maximum output powers is less than1.2W/kg. See Section 7.3.3 for more information.

9.1 SAR MEASUREMENT RESULT OF HEAD

SAR test results of GSM&WCDMA

Test No.	Band	Mode	CH	Test Position	Battery	Sample	Maximum Tune-up (dBm)	Measured	Drift(dB)	SAR Value (W/kg)1-g	Reported SAR
T01	GSM850	GSM	190	Right Cheek	1	1	32.5	32.3	0.05	0.188	**0.197**
T02	GSM850	GSM	190	Right Tilted	1	1	32.5	32.3	0.03	0.148	0.155
T03	GSM850	GSM	190	Left Cheek	1	1	32.5	32.3	0.02	0.116	0.121
T04	GSM850	GSM	190	Left Tilted	1	1	32.5	32.3	-0.01	0.079	0.083
T05	GSM850	GSM	190	Right Cheek	2	2	32.5	32.3	0.02	0.179	0.187
T06	GSM1900	GSM	661	Right Cheek	1	1	30	29.56	-0.03	0.062	**0.069**
T07	GSM1900	GSM	661	Right Tilted	1	1	30	29.56	0.02	0.053	0.059
T08	GSM1900	GSM	661	Left Cheek	1	1	30	29.56	-0.03	0.029	0.032
T09	GSM1900	GSM	661	Left Tilted	1	1	30	29.56	0.04	0.029	0.032
T10	GSM1900	GSM	661	Right Cheek	2	2	30	29.56	-0.04	0.059	0.065
T11	WCDMA B2	RMC 12.2K	9400	Right Cheek	1	1	22.5	22.32	-0.02	0.104	**0.108**
T12	WCDMA B2	RMC 12.2K	9400	Right Tilted	1	1	22.5	22.32	0.04	0.086	0.090
T13	WCDMA B2	RMC 12.2K	9400	Left Cheek	1	1	22.5	22.32	-0.08	0.053	0.055
T14	WCDMA B2	RMC 12.2K	9400	Left Tilted	1	1	22.5	22.32	0.02	0.067	0.070
T15	WCDMA B2	RMC 12.2K	9400	Right Cheek	2	2	22.5	22.32	0.01	0.099	0.103
T16	WCDMA B5	RMC 12.2K	4182	Right Cheek	1	1	23	22.73	-0.04	0.133	**0.142**
T17	WCDMA B5	RMC 12.2K	4182	Right Tilted	1	1	23	22.73	0.01	0.114	0.121
T18	WCDMA B5	RMC 12.2K	4182	Left Cheek	1	1	23	22.73	-0.02	0.088	0.094
T19	WCDMA B5	RMC 12.2K	4182	Left Tilted	1	1	23	22.73	-0.05	0.055	0.059
T20	WCDMA B5	RMC 12.2K	4182	Right Cheek	2	2	23	22.73	0.06	0.046	0.049

Head SAR test results of WIFI

Test No.	Band	CH	Test Position	Battery	Sample	Power Setting	Tune up	Measured	Drift(dB)	Peak SAR of Area scan (W/kg)1-g	SAR Value (W/kg)1-g	Reported SAR
T21	802.11b	6	Right Cheek	1	1	15.5	15.5	15.29	-0.03	0.256	0.328	**0.344**
T22	802.11b	6	Right Tilted	1	1	15.5	15.5	15.29	-0.05	0.241	-	0.253
T23	802.11b	6	Left Cheek	1	1	15.5	15.5	15.29	0.03	0.174	-	0.183
T24	802.11b	6	Left Tilted	1	1	15.5	15.5	15.29	-0.04	0.188	-	0.197
T25	802.11b	6	Right Cheek	2	2	15.5	15.5	15.29	-0.05	0.258	-	0.268

9.2 SAR MEASUREMENT RESULT OF BODY

SAR test results of GSM&WCDMA

Test No.	Band	Mode	CH	Test Position	Capsensor	Dist. (cm)	Battery	Sample	Tune up	Measured	Drift(dB)	SAR Value (W/kg)1-g	Reported SAR
T40	GSM850	GPRS 4TX	190	Rear Face	On	0	1	1	16.5	16.32	0.02	0.148	0.154
T41	GSM850	GPRS 4TX	190	Rear Face	Off	0.8	1	1	29	28.93	0.05	1.19	1.209
T42	GSM850	GPRS 4TX	190	Left Side	Off	0	1	1	29	28.93	0.03	0.262	0.266
T43	GSM850	GPRS 4TX	190	Right Side	Off	0	1	1	29	28.93	-0.02	0.408	0.415
T44	GSM850	GPRS 4TX	190	Bottom Side	On	0	1	1	16.5	16.32	0.06	0.092	0.096
T45	GSM850	GPRS 4TX	190	Bottom Side	Off	0.8	1	1	29	28.93	-0.05	0.331	0.336
T46	GSM850	GPRS 4TX	128	Rear Face	Off	0.8	1	1	29	28.94	-0.01	1.33	**1.349**
T47	GSM850	GPRS 4TX	251	Rear Face	Off	0.8	1	1	29	28.91	0.01	1.11	1.133
T48	GSM850	GPRS 4TX	128	Rear Face	Off	0.8	2	2	29	28.94	-0.03	0.805	0.816
T49	GSM850	GPRS 4TX	190	Rear Face	Off(1st repeated)	0.8	1	1	29	28.93	-0.02	1.08	1.098
T50	GSM850	GPRS 4TX	128	Rear Face	Off(1st repeated)	0.8	1	1	29	28.94	0.07	1.3	1.318
T51	GSM850	GPRS 4TX	251	Rear Face	Off(1st repeated)	0.8	1	1	29	28.91	-0.04	1.02	1.041
T52	GSM850	GPRS 4TX	128	Rear Face	Off(1st repeated)	0.8	2	2	29	28.94	0.04	0.773	0.784
T53	GSM1900	GPRS 4TX	661	Rear Face	On	0	1	1	14	13.86	0.05	0.229	0.237
T54	GSM1900	GPRS 4TX	661	Rear Face	Off	0.8	1	1	26.5	26.38	-0.03	0.634	0.652
T55	GSM1900	GPRS 4TX	661	Left Side	Off	0	1	1	26.5	26.38	0.01	0.196	0.201
T56	GSM1900	GPRS 4TX	661	Right Side	Off	0	1	1	26.5	26.38	0.06	0.543	0.558
T57	GSM1900	GPRS 4TX	661	Bottom Side	On	0	1	1	14	13.86	0.02	0.227	0.234
T58	GSM1900	GPRS 4TX	661	Bottom Side	Off	0.8	1	1	26.5	26.38	-0.04	0.854	0.878
T59	GSM1900	GPRS 4TX	512	Bottom Side	Off	0.8	1	1	26.5	26.28	-0.08	0.67	0.705
T60	GSM1900	GPRS 4TX	810	Bottom Side	Off	0.8	1	1	26.5	26.34	-0.04	1.27	**1.318**
T61	GSM1900	GPRS 4TX	810	Bottom Side	Off	0.8	2	2	26.5	26.34	-0.08	0.791	0.821
T62	GSM1900	GPRS 4TX	661	Bottom Side	Off(1st repeated)	0.8	1	1	26.5	26.38	0.03	0.832	0.855
T63	GSM1900	GPRS 4TX	810	Bottom Side	Off(1st repeated)	0.8	1	1	26.5	26.34	-0.09	1.19	1.235
T64	WCDMA B2	RMC 12.2K	9400	Rear Face	On	0	1	1	15	14.47	0.04	0.802	0.906
T65	WCDMA B2	RMC 12.2K	9400	Rear Face	Off	0.8	1	1	22.5	22.32	0.03	0.821	0.856
T66	WCDMA B2	RMC 12.2K	9400	Left Side	Off	0	1	1	22.5	22.32	-0.05	0.183	0.191
T67	WCDMA B2	RMC 12.2K	9400	Right Side	Off	0	1	1	22.5	22.32	-0.02	0.527	0.549

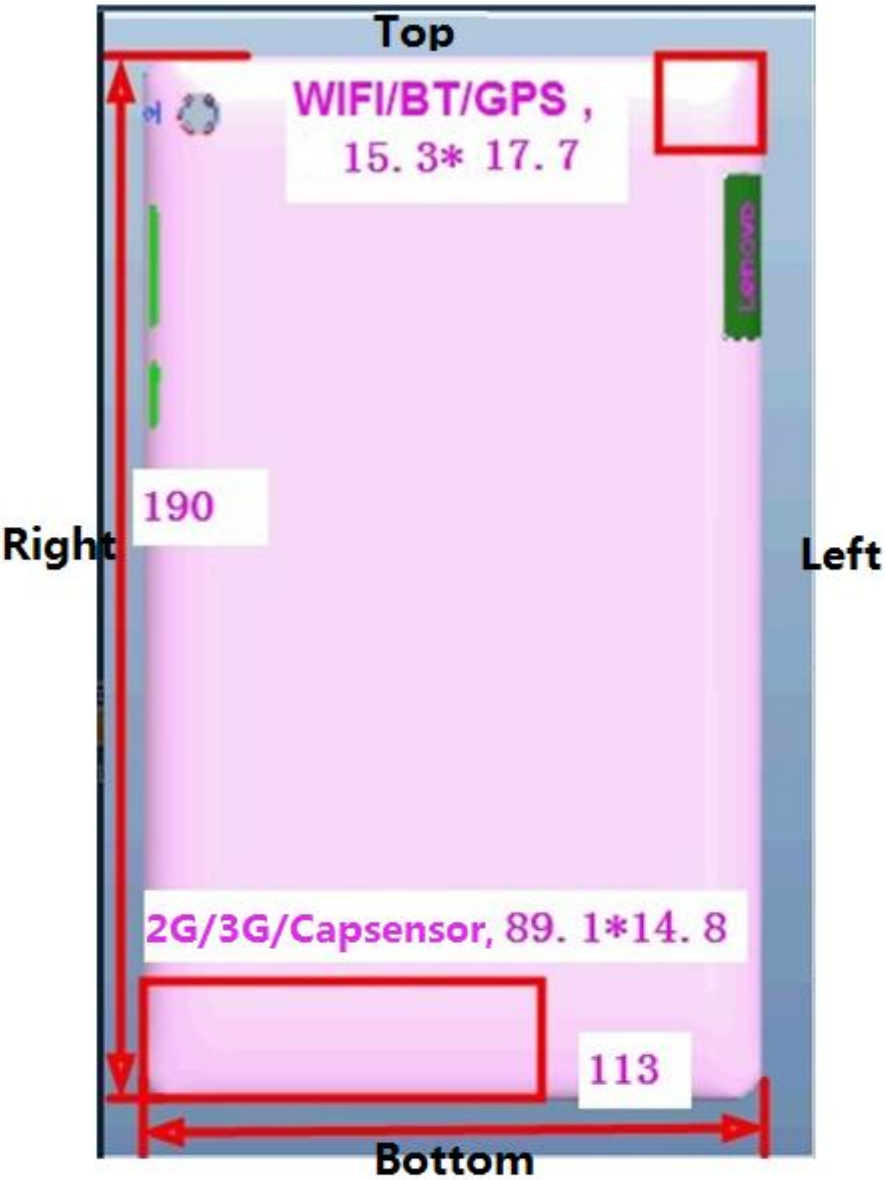
T68	WCDMA B2	RMC 12.2K	9400	Bottom Side	On	0	1	1	15	14.47	0.06	0.816	0.922
T69	WCDMA B2	RMC 12.2K	9400	Bottom Side	Off	0.8	1	1	22.5	22.32	-0.05	0.989	1.031
T70	WCDMA B2	RMC 12.2K	9262	Rear Face	On	0	1	1	15	14.47	0.01	0.803	0.907
T71	WCDMA B2	RMC 12.2K	9538	Rear Face	On	0	1	1	15	14.47	0.02	0.879	0.993
T72	WCDMA B2	RMC 12.2K	9262	Rear Face	Off	0.8	1	1	22.5	22.30	-0.03	0.643	0.673
T73	WCDMA B2	RMC 12.2K	9538	Rear Face	Off	0.8	1	1	22.5	22.32	-0.05	0.678	0.707
T74	WCDMA B2	RMC 12.2K	9262	Bottom Side	On	0	1	1	15	14.47	0.03	0.69	0.780
T75	WCDMA B2	RMC 12.2K	9538	Bottom Side	On	0	1	1	15	14.47	0.06	0.742	0.838
T76	WCDMA B2	RMC 12.2K	9262	Bottom Side	Off	0.8	1	1	22.5	22.30	0.09	0.816	0.854
T77	WCDMA B2	RMC 12.2K	9538	Bottom Side	Off	0.8	1	1	22.5	22.27	0.05	1.03	1.086
T78	WCDMA B2	RMC 12.2K	9538	Bottom Side	Off	0.8	2	2	22.5	22.27	-0.06	1.18	**1.244**
T79	WCDMA B2	RMC 12.2K	9400	Rear Face	On(1st repeated)	0	1	1	15	14.47	-0.07	0.798	0.902
T80	WCDMA B2	RMC 12.2K	9262	Rear Face	On(1st repeated)	0	1	1	15	14.47	0.05	0.788	0.890
T81	WCDMA B2	RMC 12.2K	9538	Rear Face	On(1st repeated)	0	1	1	15	14.47	-0.04	0.803	0.907
T82	WCDMA B2	RMC 12.2K	9400	Rear Face	Off(1st repeated)	0.8	1	1	22.5	22.32	-0.03	0.815	0.849
T83	WCDMA B2	RMC 12.2K	9400	Bottom Side	On(1st repeated)	0	1	1	15	14.47	0.01	0.77	0.870
T84	WCDMA B2	RMC 12.2K	9400	Bottom Side	Off(1st repeated)	0.8	1	1	22.5	22.32	-0.04	0.995	1.037
T85	WCDMA B2	RMC 12.2K	9262	Bottom Side	Off(1st repeated)	0.8	1	1	22.5	22.30	0.02	0.827	0.866
T86	WCDMA B2	RMC 12.2K	9538	Bottom Side	Off(1st repeated)	0.8	1	1	22.5	22.27	-0.08	1.02	1.075
T87	WCDMA B2	RMC 12.2K	9538	Bottom Side	Off(1st repeated)	0.8	2	2	22.5	22.27	-0.04	1.15	1.213
T88	WCDMA B5	RMC 12.2K	4182	Rear Face	On	0	1	1	15.5	15.08	0.03	0.328	0.361
T89	WCDMA B5	RMC 12.2K	4182	Rear Face	Off	0.8	1	1	23	22.73	-0.02	0.705	0.750
T90	WCDMA B5	RMC 12.2K	4182	Left Side	Off	0	1	1	23	22.73	0.04	0.154	0.164
T91	WCDMA B5	RMC 12.2K	4182	Right Side	Off	0	1	1	23	22.73	-0.03	0.302	0.321
T92	WCDMA B5	RMC 12.2K	4182	Bottom Side	On	0	1	1	15.5	15.08	-0.05	0.175	0.193
T93	WCDMA B5	RMC 12.2K	4182	Bottom Side	Off	0.8	1	1	23	22.73	0.01	0.218	0.232
T94	WCDMA B5	RMC 12.2K	4182	Rear Face	Off	0.8	2	2	23	22.73	0.03	0.815	**0.867**
T95	WCDMA B5	RMC 12.2K	4132	Rear Face	Off	0.8	2	2	23	22.71	0.05	0.653	0.698
T96	WCDMA B5	RMC 12.2K	4233	Rear Face	Off	0.8	2	2	23	22.69	-0.06	0.791	0.850
T97	WCDMA B5	RMC 12.2K	4182	Rear Face	Off(1st repeated)	0.8	2	2	23	22.73	0.05	0.808	0.860

SAR test results of WIFI

Test No.	Band	CH	Test Position	Dist. (cm)	Battery	Sample	Power Setting	Tune up	Measured	Drift (dB)	Peak SAR of Area scan (W/kg)1-g	SAR Value (W/kg)1-g	Reported SAR
T101	802.11b	6	Rear Face	0	1	1	15.5	15.5	15.29	0.03	0.8	0.74	**0.777**
T102	802.11b	6	Left Side	0	1	1	15.5	15.5	15.29	0.04	0.336	-	0.353
T104	802.11b	6	Top Side	0	1	1	15.5	15.5	15.29	-0.05	0.343	-	0.360
T105	802.11b	6	Rear Face	0	2	2	15.5	15.5	15.29	0.03	0.612	0.605	0.635

10. MULTIPLE TRANSMITTER EVALUATION

The following tables list information which is relevant for the decision if a simultaneous transmit evaluation is necessary according to FCC KDB 447498D01 General RF Exposure Guidance v06
The location of the antennas is shown as below picture:



Note: 1.The unit is mm.

10.1 STAND-ALONE SAR TEST EXCLUSION

Per FCC KDB 447498D01v06, the 1-g SAR and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance,mm)][√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where:

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

Standalone SAR test exclusion for BT

Mode	Position	P_{max} (dBm)*	P_{max} (mW)	Distance (mm)	f (GHz)	Calculation Result	SAR Exclusion threshold	SAR test exclusion
BT	Body-Worn	2.5	1.78	5	2.480	0.56	3	Yes

Note:

1)* - maximum possible output power declared by manufacturer

2) Held to ear configurations are not applicable to Bluetooth for this device.

When standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:

(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] •

[√ f(GHz)/x] W/kg for test separation distances⩽50 mm,where x = 7.5 for 1-g SAR and x = 18.75 for 10-g SAR.

When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion

Estimated SAR calculation

Mode	Position	P_{max} (dBm)*	P_{max} (mW)	Distance (mm)	f (GHz)	X	Estimated SAR (W/Kg)*
BT	Rear	2.5	1.78	5	2.480	7.5	0.075
	Left	2.5	1.78	5	2.480	7.5	0.075
	Top	2.5	1.78	5	2.480	7.5	0.075
	Right	-	-	97.7	-	-	0.4
	Bottom	-	-	172.3	-	-	0.4
GSM 850	Top	-	-	175.2	-	-	0.4
GSM 1900	Top	-	-	175.2	-	-	0.4
WCDMA Band 2/5	Top	-	-	175.2	-	-	0.4
WiFi 2.4G	Right	-	-	97.7	-	-	0.4
	Bottom	-	-	172.3	-	-	0.4

Note: * - maximum possible output power declared by manufacturer

10.2 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	Head	Body
1	GSM (Voice) + WiFi 2.4G	Yes	Yes
2	GPRS/EDGE (DATA) + WiFi 2.4G	N/A	Yes
3	GSM(Voice) +BT	N/A	Yes
4	GPRS/EDGE(DATA)+BT	N/A	N/A
5	UMTS(Voice)+WiFi 2.4G	Yes	Yes
6	UMTS(DATA)+WiFi 2.4G	N/A	Yes
7	UMTS(Voice)+BT	N/A	Yes
8	UMTS(DATA)+BT	N/A	Yes

Note:
i) 2G&3G share the same antenna and can’t transmit simultaneously.
ii) The device does not support DTM function.
iii) Held to ear configurations are not applicable to Bluetooth and therefore were not considered for simultaneous transmission.
iv) Wi-Fi and Bluetooth share the same antenna and can’t transmit simultaneously.

10.3 SAR SUMMATION SCENARIO

a) ABOUT 2.4G WIFI AND BT ANTENNA

WiFi antenna and BT antenna cannot transmit simultaneously.

b) About 2.4G WiFi/BT and GSM/WCDMA antenna

Test Position / Reported SAR_{1g}	Head				Body						
	Right Cheek	Right Tilted	Left Cheek	Left Tilted	Rear (0cm)	Rear (0.8cm)	Left (0cm)	Right (0cm)	Top (0cm)	Bottom (0cm)	Bottom (0.8cm)
GSM850	0.197	0.155	0.121	0.083	0.154	1.349	0.266	0.415	0.400	0.096	0.336
GSM1900	0.069	0.059	0.032	0.032	0.237	0.652	0.201	0.558	0.400	0.234	1.318
WCDMA B2	0.108	0.090	0.055	0.070	0.993	0.856	0.191	0.549	0.400	0.922	1.244
WCDMA B5	0.142	0.121	0.094	0.059	0.361	0.867	0.164	0.321	0.400	0.193	0.232
2.4G WiFi	0.344	0.253	0.183	0.197	0.777	-	0.353	0.400	0.360	0.400	-
BT	-	-	-	-	0.075	-	0.075	0.400	0.075	0.400	-
MAX∑SAR1g	0.541	0.408	0.304	0.280	**1.770**	1.349	0.619	0.958	0.760	1.322	1.318

MAX. $\sum SAR_{1g}$=1.770W/Kg>1.6 W/Kg, so the SAR to peak location separation ratio should be considered.

10.4 SIMULTANEOUS TRANSMISSION CONLCUSION

According to KDB447498 D01v06, When the sum of SAR is larger than limit, SAR test exclusion is determined by the SAR to peak location separation ratio(SPLSR).When the SAR to peak location ratio for each pair of antennas is ≤0.04， simultaneous SAR evaluation is not required.

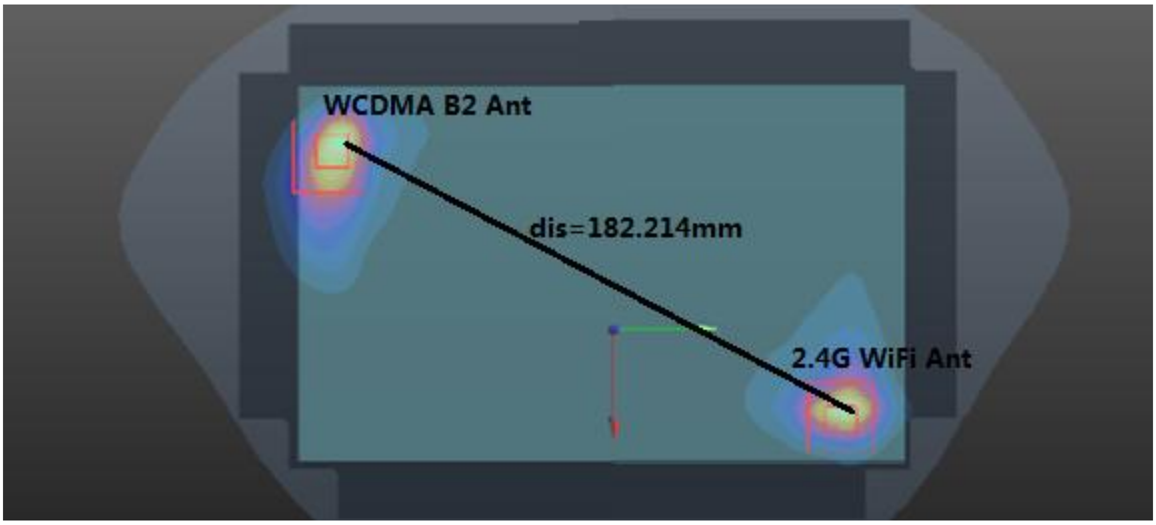
When SAR is measured for both antennas in the pair the peak location separation distance is computed by the following fomula:

$$\text{Distance}_{Tx1\text{-}Tx2} = R_i = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2 + (z_1 - z_2)^2}$$

$$\text{SPLS Ratio} = (SAR_1 + SAR_2)^{1.5}/R_i$$

When standalone test exclusion applies, SAR is estimated; the peak location is assumed to be at the feed-point or geometric center of the antenna. Due to curvatures on the SAM phantom, when SAR is estimated for one of the antennas in an antenna pair, the measured peak SAR location should be translated onto the test device to determine the peak location separation for the antenna pair. The ERP location on the phantom is aligned with the ERP location on the handset, with 6mm separation in the z coordinate due to the ear spacer. A measured peak location can be translated onto the handset, with respect to the ERP location, by ignoring the 6 mm offset in the z coordinate. The assumed peak location of the antenna with estimated SAR can also be determined with respect to the ERP location on the handset. The peak location separation distance is estimated by the x and y coordinated of the peaks, referenced to the ERP location. While flat phantoms are not expected to have these issues, the same peak translation approach should be applied to determine peak location separation.

1) The sum of aggregate 1g SAR was above 1.6 W/Kg for Body Rear side configuration with WCDMA Band2 and WiFi 2.4G.
The Peak SAR location is as below:



The Peak SAR location is as below:

Mode	Peak SAR	X	Y	Z
	mW/g	m	m	m
WCDMA Band2	1.02	-0.057	-0.083	-0.203
2.4G WiFi	0.799	0.032	0.076	-0.203

The SAR to peak location ratio calculation is as below:

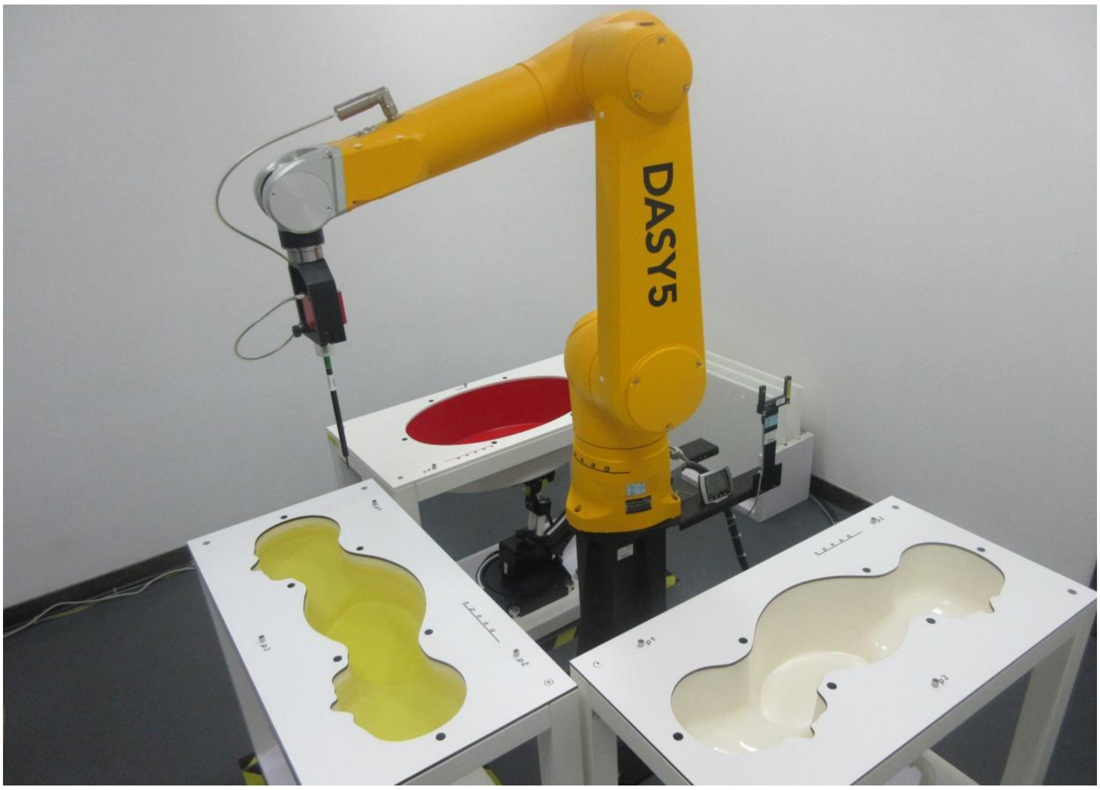
Test Position	SAR1(W/Kg)	SAR2 (W/Kg)	Ri(mm)	SPLSR	Ratio Limit	Simultaneous SAR
Rear	0.993	0.777	182.214	0.0097	0.04	Not Required

The above numeral summed SAR results and SPLSR analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit and therefore simultaneous transmission SAR with Volume Scans is not required per KDB 447498 D01v06.

APPENDIX

1. Test Layout

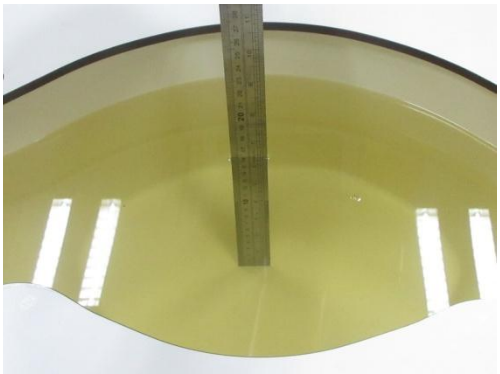
Specific Absorption Rate Test Layout



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

Body(B835MHz) Head(H835MHz)

Body(B1700MHz~B2700MHz) Head(H1700MHz~H2700MHz)



Appendix A. SAR Plots of System Verification

The plots for system verification with largest deviation for each SAR system combination are shown as follows.

Appendix B. SAR Plots of SAR Measurement

The SAR plots for highest measured SAR in each exposure configuration, wireless mode and frequency band combination are shown as follows.

Appendix C. Calibration Certificate for Probe and Dipole

The SPEAG calibration certificates are shown as follows.

Appendix D. Photographs of the Test Set-Up

Photo 1: Rear Face _0mm	Photo 2: Rear Face_8mm

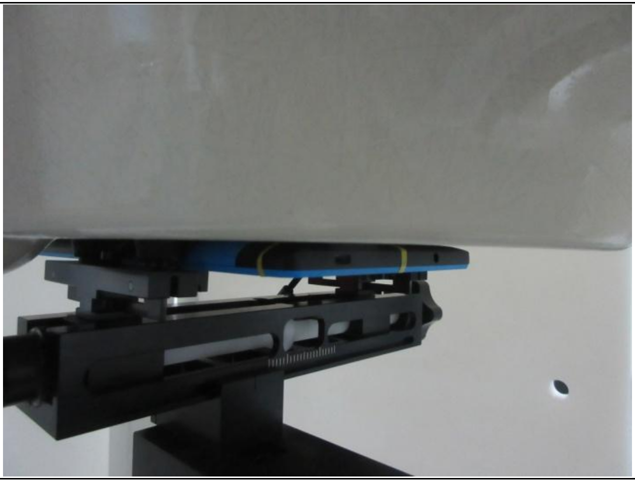
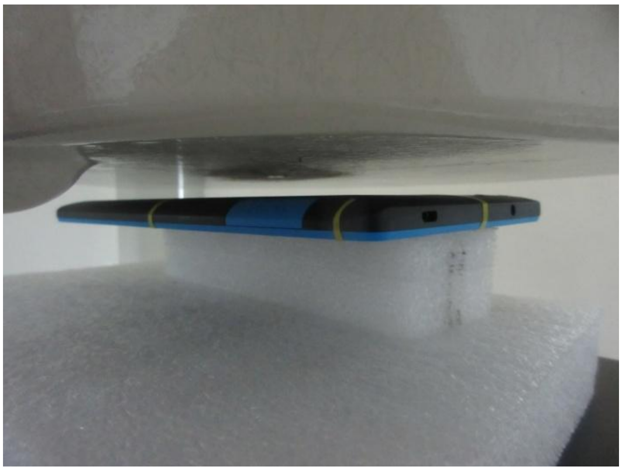

	

Photo 3: Left Side_0mm	Photo 4: Right Side_0mm
	
Photo 5: Top Side_0mm	Photo 6: Bottom Side_0mm
	

Photo 7: Bottom Side_8mm	
	
Photo 8: Right Cheek	Photo 9: Right Tilted

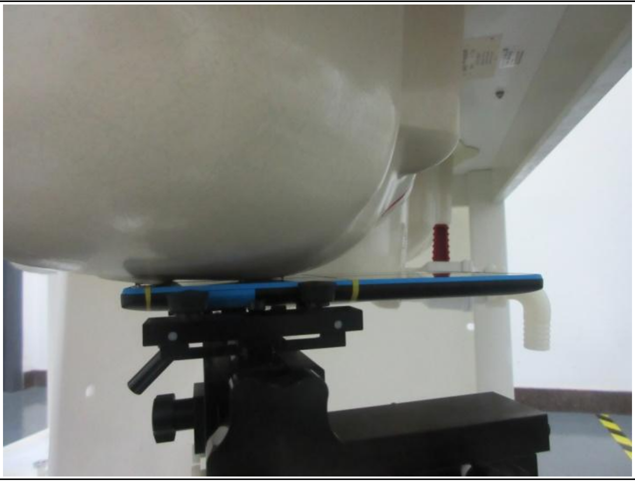



Photo 10: Left Cheek	Photo 11: Left Tilted