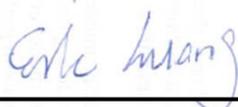


FCC SAR Test Report

APPLICANT : Hewlett Packard
EQUIPMENT : 8" Tablet
BRAND NAME : hp
MODEL NAME : HSTNH-C408MC
FCC ID : B94HHC408MC
STANDARD : FCC 47 CFR Part 2 (2.1093)
ANSI/IEEE C95.1-1992
IEEE 1528-2003

We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and had been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.



Reviewed by: Eric Huang / Deputy Manager



Approved by: Jones Tsai / Manager



SPORTON INTERNATIONAL INC.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.



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1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **Hewlett Packard, 8" Tablet, HSTNH-C408MC**, are as follows.

Equipment Class	Frequency Band	Highest SAR Summary	
		Body 1g SAR (W/kg)	Simultaneous Transmission 1g SAR (W/kg)
PCB	GSM850	1.13	1.57
	GSM1900	1.15	
	WCDMA Band V	1.11	
	WCDMA Band II	1.18	
	LTE Band 7	1.35	
DTS	WLAN 2.4GHz Band	1.43	1.57
NII	WLAN 5.2GHz Band	1.48	1.48
	WLAN 5.3GHz Band	1.45	
	WLAN 5.5GHz Band	1.39	
	WLAN 5.8GHz Band	1.28	
Date of Testing:		11/07/2014 ~ 11/10/2014	

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2003.

2. Administration Data

Testing Laboratory	
Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978

Applicant	
Company Name	Hewlett Packard
Address	1501 Page Mill Road, MS 1419 Palo Alto, CA 94304-1126

Manufacturer	
Company Name	1. Compal Electronics Inc. 2. Compal Electronics Technology (KunShan) Co. Ltd.
Address	1. No. 581 Ruiguang Rd. Neihu District Taipei City114, Taiwan 2. No.25 Third Ave., A Zone, KunShan Comprehensive Free Trade Zone, KunShan Jiangsu, China



3. Guidance Standard

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

- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- IEEE 1528-2003
- FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r03
- FCC KDB 865664 D02 SAR Reporting v01r01
- FCC KDB 447498 D01 General RF Exposure Guidance v05r02
- FCC KDB 248227 D01 SAR meas for 802 11abg v01r02
- FCC KDB 616217 D04 SAR for laptop and tablets v01r01
- FCC KDB 941225 D01 3G SAR Procedures v03
- FCC KDB 941225 D05 SAR for LTE Devices v02r03

4. Equipment Under Test (EUT)

4.1 General Information

Product Feature & Specification	
Equipment Name	8" Tablet
Brand Name	hp
Model Name	HSTNH-C408MC
FCC ID	B94HHC408MC
S/N	480197574
Integrated WWAN Module	Brand Name: Huawei Model Name: ME906E
Wireless Technology and Frequency Range	GSM850: 824.2 MHz ~ 848.8 MHz GSM1900: 1850.2 MHz ~ 1909.8 MHz WCDMA Band V: 826.4 MHz ~ 846.6 MHz WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz LTE Band 7: 2502.5 MHz ~ 2567.5 MHz WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz WLAN 5.5GHz Band: 5500 MHz ~ 5700 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz NFC : 13.56 MHz
Mode	<ul style="list-style-type: none"> • GPRS/EGPRS • RMC 12.2Kbps • HSDPA • HSUPA • DC-HSDPA • LTE: QPSK, 16QAM • 802.11a/b/g/n/ac HT20/HT40/VHT20/VHT40/VHT80 • Bluetooth v3.0+EDR , Bluetooth v4.0-LE • NFC:ASK
HW Version	GA-418
SW Version	0.00.21
EUT Stage	Identical Prototype
Remark:	
1. This device WLAN supports Tx diversity, and the WLAN and Bluetooth cannot transmit simultaneously.	

Accessory				
Battery 1	Brand Name	hp	Model Name	HSTNH-C408M-SD
	Power Rating	3.8 Vdc, 5530 mAh	Type	Li-ion,



4.2 Maximum Tune-up Limit

Band	average power (dBm)			
	GSM 850		GSM 1900	
Output Power Status	Full Power mode	Reduced Power mode	Full Power mode	Reduced Power mode
GPRS/EDGE (GMSK, 1 Tx slot)	33.50	29.00	30.50	24.00
GPRS/EDGE (GMSK, 2 Tx slots)	31.50	26.00	27.50	21.00
GPRS/EDGE (GMSK, 3 Tx slots)	29.00	24.00	26.50	19.00
GPRS/EDGE (GMSK, 4 Tx slots)	28.00	23.00	24.50	18.00
EDGE (8PSK, 1 Tx slot)	28.00	28.00	28.00	24.00
EDGE (8PSK, 2 Tx slots)	26.00	26.00	25.00	21.00
EDGE (8PSK, 3 Tx slots)	25.00	24.00	23.00	19.00
EDGE (8PSK, 4 Tx slots)	23.00	23.00	22.00	18.00

Mode	WCDMA Band V		WCDMA Band II	
	Full Power mode	Reduced Power mode	Full Power mode	Reduced Power mode
RMC 12.2Kbps	24.00	22.00	24.00	14.00
HSDPA Subtest-1	24.00	22.00	24.00	14.00
DC-HSDPA Subtest-1	24.00	22.00	24.00	14.00
HSUPA Subtest-5	24.00	22.00	24.00	14.00

LTE Band 7						
average power(dBm)						
Modulation	BW (MHz)	RB size	Full Power mode (MPR)	Full power mode	Reduced Power mode (MPR)	Reduced power mode
QPSK	20	≤ 18	0	24.00	0	12.00
QPSK	20	> 18	1	23.00	0	12.00
16QAM	20	≤ 18	1	23.00	0	12.00
16QAM	20	> 18	2	22.00	0	12.00
QPSK	15	≤ 16	0	24.00	0	12.00
QPSK	15	> 16	1	23.00	0	12.00
16QAM	15	≤ 16	1	23.00	0	12.00
16QAM	15	> 16	2	22.00	0	12.00
QPSK	10	≤ 12	0	24.00	0	12.00
QPSK	10	> 12	1	23.00	0	12.00
16QAM	10	≤ 12	1	23.00	0	12.00
16QAM	10	> 12	2	22.00	0	12.00
QPSK	5	≤ 8	0	24.00	0	12.00
QPSK	5	> 8	1	23.00	0	12.00
16QAM	5	≤ 8	1	23.00	0	12.00
16QAM	5	> 8	2	22.00	0	12.00



Mode		Average Power (dBm)
2.4GHz	802.11b	13.0
	802.11g	13.0
	802.11n-HT20	12.0
	802.11n-HT40	12.0
5GHz	802.11a	11.0
	802.11n-HT20	11.0
	802.11n-HT40	11.0
	802.11n-VHT20	11.0
	802.11n-VHT40	11.0
	802.11n-VHT80	11.0
Bluetooth v3.0+EDR		-1.0
Bluetooth v4.0+LE		0.0

4.3 General LTE SAR Test and Reporting Considerations

Summarized necessary items addressed in KDB 941225 D05 v02r03								
FCC ID	B94HHC408MC							
Equipment Name	8" Tablet							
Operating Frequency Range of each LTE transmission band	LTE Band 7: 2502.5 MHz ~ 2567.5 MHz							
Channel Bandwidth	LTE Band 7: 5MHz, 10MHz, 15MHz, 20MHz							
uplink modulations used	QPSK, and 16QAM							
LTE Voice / Data requirements	Data only							
LTE MPR permanently built-in by design	Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3							
	Modulation	Channel bandwidth / Transmission bandwidth (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	
LTE A-MPR	In the base station simulator configuration, Network Setting value is set to NS_01 to disable A-MPR during SAR testing and the LTE SAR tests was transmitting on all TTI frames (Maximum TTI)							
Spectrum plots for RB configuration	A properly configured base station simulator was used for the SAR and power measurement; therefore, spectrum plots for each RB allocation and offset configuration are not included in the SAR report.							
Power reduction applied to satisfy SAR compliance	Yes, proximity sensor.							
Transmission (H, M, L) channel numbers and frequencies in each LTE band								
LTE Band 7								
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	20775	2502.5	20800	2505	20825	2507.5	20850	2510
M	21100	2535	21100	2535	21100	2535	21100	2535
H	21425	2567.5	21400	2565	21375	2562.5	21350	2560

5. Proximity Sensor Triggering Test

Proximity sensor power reduction

Exposure Position / wireless mode	Bottom Face ⁽¹⁾	Edge 1 ⁽¹⁾	Edge 2	Edge 3	Edge 4
GSM850 GPRS (GMSK 1 Tx slot) - CS1	4.5 dB	4.5 dB	0 dB	0 dB	0 dB
GSM850 GPRS (GMSK 2 Tx slot) - CS1	5.5 dB	5.5 dB			
GSM850 GPRS (GMSK 3 Tx slot) - CS1	5.0 dB	5.0 dB			
GSM850 GPRS (GMSK 4 Tx slot) - CS1	5.0 dB	5.0 dB			
GSM850 EDGE (8PSK 1 Tx slot) - MCS5	0.0 dB	0.0 dB			
GSM850 EDGE (8PSK 2 Tx slot) - MCS5	0.0 dB	0.0 dB			
GSM850 EDGE (8PSK 3 Tx slot) - MCS5	1.0 dB	1.0 dB			
GSM850 EDGE (8PSK 4 Tx slot) - MCS5	0.0 dB	0.0 dB			
GSM1900 GPRS (GMSK 1 Tx slot) - CS1	6.5 dB	6.5 dB			
GSM1900 GPRS (GMSK 2 Tx slot) - CS1	6.5 dB	6.5 dB			
GSM1900 GPRS (GMSK 3 Tx slot) - CS1	7.5 dB	7.5 dB			
GSM1900 GPRS (GMSK 4 Tx slot) - CS1	6.5 dB	6.5 dB			
GSM1900 EDGE (8PSK 1 Tx slot) - MCS5	4.0 dB	4.0 dB			
GSM1900 EDGE (8PSK 2 Tx slot) - MCS5	4.0 dB	4.0 dB			
GSM1900 EDGE (8PSK 3 Tx slot) - MCS5	4.0 dB	4.0 dB			
GSM1900 EDGE (8PSK 4 Tx slot) - MCS5	4.0 dB	4.0 dB			
WCDMA Band V	2.0 dB	2.0 dB			
WCDMA Band II	10.0 dB	10.0 dB			
LTE Band 7	12.0 dB	12.0 dB			

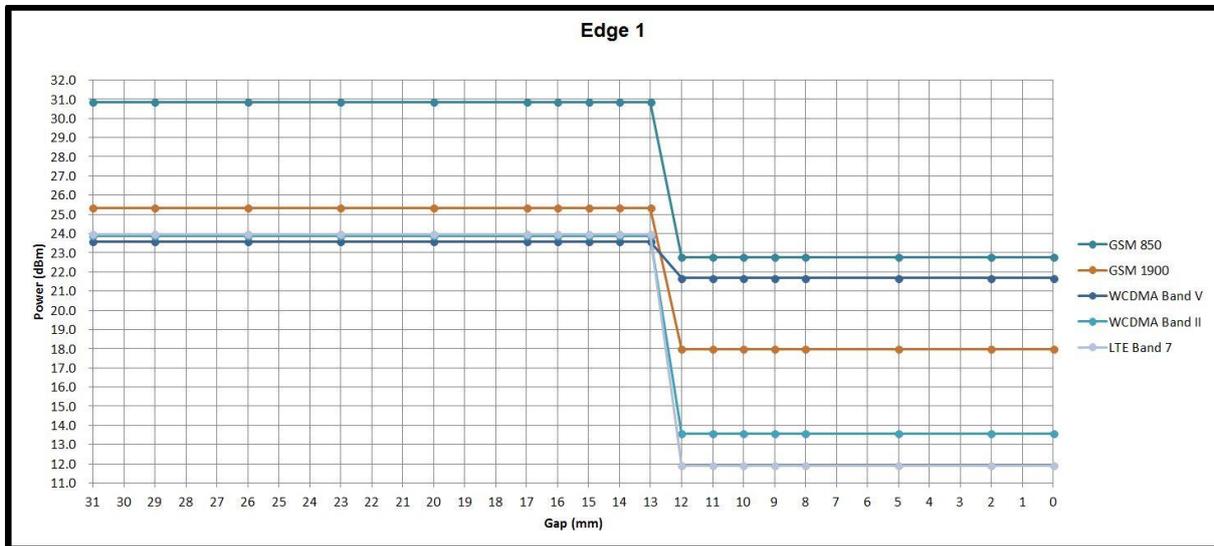
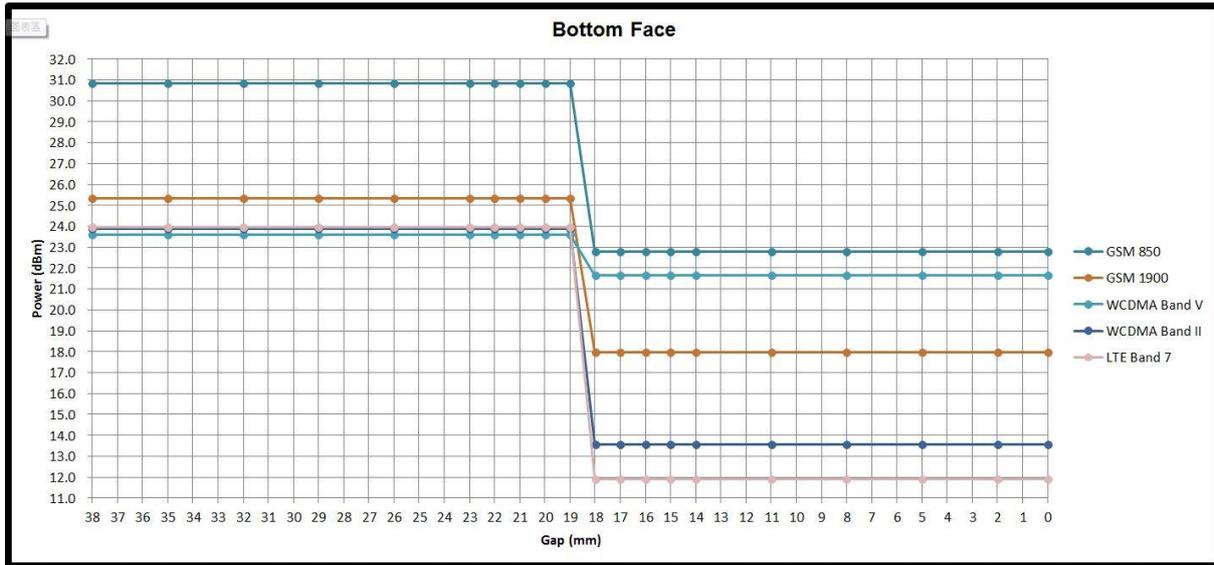
Remark:

- ⁽¹⁾: Reduced maximum limit applied by activation of proximity sensor.
- Power reduction is not applicable for WLAN and Bluetooth.
- Tests were performed in accordance with KDB 616217 D04 section 6.1, 6.2, 6.3, 6.4 and 6.5 and compliant results are shown and described in exhibit "P-Sensor operational description"
- For verification of compliance of power reduction scheme, additional SAR testing with EUT transmitting at full RF power at a conservative trigger distance was performed:
 - Bottom Face: [15 mm](#)
 - Edge1: [5 mm](#)



Power Measurement during Sensor Trigger distance testing

Band/Mode	Ch #	Measured power reduction (dBm)		Reduction Levels (dB)
		w/o power back-off	w/ power back-off	
GSM850	251	30.84	22.78	8.06
GSM1900	810	25.32	17.98	7.34
WCDMA Band V	4132	23.59	21.67	1.92
WCDMA Band II	9262	23.88	13.57	10.31
LTE Band 7	20850	23.96	11.89	12.07



6. RF Exposure Limits

6.1 Uncontrolled Environment

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

6.2 Controlled Environment

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. The exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Limits for Occupational/Controlled Exposure (W/kg)

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

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

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

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



7. Specific Absorption Rate (SAR)

7.1 Introduction

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

7.2 SAR Definition

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

$$SAR = \frac{d}{dt} \left(\frac{dW}{dm} \right) = \frac{d}{dt} \left(\frac{dW}{\rho dv} \right)$$

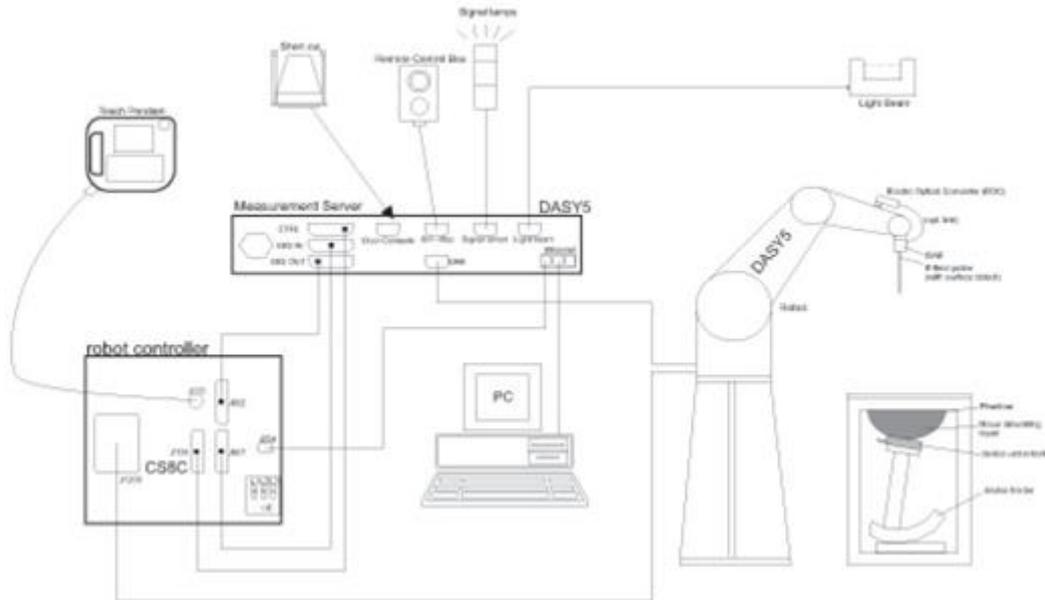
SAR is expressed in units of Watts per kilogram (W/kg)

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

Where: σ is the conductivity of the tissue, ρ is the mass density of the tissue and E is the RMS electrical field strength.

8. System Description and Setup

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



- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running WinXP or Win7 and the DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

9. Measurement Procedures

The measurement procedures are as follows:

<Conducted power measurement>

- (a) For WWAN power measurement, use base station simulator to configure EUT WWAN transmission in conducted connection with RF cable, at maximum power in each supported wireless interface and frequency band.
- (b) Read the WWAN RF power level from the base station simulator.
- (c) For WLAN/BT power measurement, use engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power in each supported wireless interface and frequency band
- (d) Connect EUT RF port through RF cable to the power meter, and measure WLAN/BT output power

<SAR measurement>

- (a) Use base station simulator to configure EUT WWAN transmission in radiated connection, and engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power, in the highest power channel.
- (b) Place the EUT in the positions as Appendix D demonstrates.
- (c) Set scan area, grid size and other setting on the DASY software.
- (d) Measure SAR results for the highest power channel on each testing position.
- (e) Find out the largest SAR result on these testing positions of each band
- (f) Measure SAR results for other channels in worst SAR testing position if the reported SAR of highest power channel is larger than 0.8 W/kg

According to the test standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

- (a) Power reference measurement
- (b) Area scan
- (c) Zoom scan
- (d) Power drift measurement

9.1 Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the test standard. It can be conducted for 1g and 10g, as well as for user-specific masses. The DASY software includes all numerical procedures necessary to evaluate the spatial peak SAR value.

The base for the evaluation is a "cube" measurement. The measured volume must include the 1g and 10g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan.

The entire evaluation of the spatial peak values is performed within the post-processing engine (SEMCAD). The system always gives the maximum values for the 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

- (a) Extraction of the measured data (grid and values) from the Zoom Scan
- (b) Calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
- (c) Generation of a high-resolution mesh within the measured volume
- (d) Interpolation of all measured values from the measurement grid to the high-resolution grid
- (e) Extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
- (f) Calculation of the averaged SAR within masses of 1g and 10g

9.2 Power Reference Measurement

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

9.3 Area Scan

The area scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum found in the scanned area, within a range of the global maximum. The range (in dB0 is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE standard 1528 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan), if only one zoom scan follows the area scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of zoom scans has to be increased accordingly.

Area scan parameters extracted from FCC KDB 865664 D01v01r03 SAR measurement 100 MHz to 6 GHz.

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: $\Delta x_{Area}, \Delta y_{Area}$	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

9.4 Zoom Scan

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

Zoom scan parameters extracted from FCC KDB 865664 D01v01r03 SAR measurement 100 MHz to 6 GHz.

		≤ 3 GHz	> 3 GHz	
Maximum zoom scan spatial resolution: $\Delta x_{Zoom}, \Delta y_{Zoom}$		≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*	
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$	≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm	
	graded grid	$\Delta z_{Zoom}(1)$: between 1 st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z	≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm	
Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details. * When zoom scan is required and the <i>reported</i> SAR from the <i>area scan based 1-g SAR estimation</i> procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.				

9.5 Volume Scan Procedures

The volume scan is used for assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing. When all volume scan were completed, the software, SEMCAD postprocessor can combine and subsequently superpose these measurement data to calculating the multiband SAR.

9.6 Power Drift Monitoring

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In DASYS measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of EUT during SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. The software will calculate the field difference in dB. If the power drifts more than 5%, the SAR will be retested.



10. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	835MHz System Validation Kit	D835V2	4d092	Jun. 23, 2014	Jun. 22, 2015
SPEAG	1900MHz System Validation Kit	D1900V2	5d018	Jun. 18, 2014	Jun. 17, 2015
SPEAG	2450MHz System Validation Kit	D2450V2	869	Jun. 13, 2014	Jun. 12, 2015
SPEAG	2600MHz System Validation Kit	D2600V2	1058	Jun. 23, 2014	Jun. 22, 2015
SPEAG	5GHz System Validation Kit	D5GHzV2	1006	Sep. 25, 2014	Sep. 24, 2015
SPEAG	Data Acquisition Electronics	DAE3	577	Oct. 06, 2014	Oct. 05, 2015
SPEAG	Data Acquisition Electronics	DAE4	1279	Jul. 23, 2014	Jul. 22, 2015
SPEAG	Data Acquisition Electronics	DAE3	495	May. 19, 2014	May. 18, 2015
SPEAG	Data Acquisition Electronics	DAE4	913	Dec. 17, 2013	Dec. 16, 2014
SPEAG	Dosimetric E-Field Probe	EX3DV4	3931	Sep. 25, 2014	Sep. 24, 2015
SPEAG	Dosimetric E-Field Probe	EX3DV4	3753	Mar. 26, 2014	Mar. 25, 2015
SPEAG	Dosimetric E-Field Probe	EX3DV4	3925	May. 22, 2014	May. 21, 2015
SPEAG	Dosimetric E-Field Probe	ES3DV3	3296	Apr. 30, 2014	Apr. 29, 2015
Wisewind	Thermometer	ETP-101	TM560	Oct. 21, 2014	Oct. 20, 2015
Wisewind	Thermometer	ETP-101	TM685	Oct. 21, 2014	Oct. 20, 2015
Wisewind	Thermometer	HTC-1	TM642	Oct. 21, 2014	Oct. 20, 2015
WonDer	Thermometer	WD-5015	TM225	Oct. 21, 2014	Oct. 20, 2015
Anritsu	Radio Communication Analyzer	MT8820C	6201074414	Feb. 11, 2014	Feb. 10, 2015
Agilent	Wireless Communication Test Set	E5515C	MY50266977	May. 27, 2014	May. 26, 2015
SPEAG	Device Holder	N/A	N/A	NCR	NCR
R&S	Signal Generator	SMU200A	102502	Jul. 07, 2014	Jul. 06, 2015
SPEAG	Dielectric Probe Kit	DAKS-3.5	0004	Mar. 04, 2014	Mar. 03, 2015
Agilent	ENA Network Analyzer	E5071C	MY46101588	May. 31, 2014	May. 30, 2015
Anritsu	Power Meter	ML2495A	1036004	Aug. 09, 2014	Aug. 08, 2015
Anritsu	Power Sensor	MA2411B	1027253	Aug. 11, 2014	Aug. 10, 2015
R&S	Spectrum Analyzer	FSP 7	101131	Jul. 10, 2014	Jul. 09, 2015
Agilent	Dual Directional Coupler	778D	50422		Note1
Woken	Attenuator 1	WK0602-XX	N/A		Note1
PE	Attenuator 2	PE7005-10	N/A		Note1
PE	Attenuator 3	PE7005- 3	N/A		Note1
AR	Power Amplifier	5S1G4M2	0328767		Note1
Mini-Circuits	Power Amplifier	ZVE-3W	162601250		Note1
Mini-Circuits	Power Amplifier	ZHL-42W+	13440021344		Note1

General Note:

1. Prior to system verification and validation, the path loss from the signal generator to the system check source and the power meter, which includes the amplifier, cable, attenuator and directional coupler, was measured by the network analyzer. The reading of the power meter was offset by the path loss difference between the path to the power meter and the path to the system check source to monitor the actual power level fed to the system check source.



11. System Verification

11.1 Tissue Verification

The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity (σ)	Permittivity (ϵ_r)
For Head								
750	41.1	57.0	0.2	1.4	0.2	0	0.89	41.9
835	40.3	57.9	0.2	1.4	0.2	0	0.90	41.5
900	40.3	57.9	0.2	1.4	0.2	0	0.97	41.5
1800, 1900, 2000	55.2	0	0	0.3	0	44.5	1.40	40.0
2450	55.0	0	0	0	0	45.0	1.80	39.2
2600	54.8	0	0	0.1	0	45.1	1.96	39.0
For Body								
750	51.7	47.2	0	0.9	0.1	0	0.96	55.5
835	50.8	48.2	0	0.9	0.1	0	0.97	55.2
900	50.8	48.2	0	0.9	0.1	0	1.05	55.0
1800, 1900, 2000	70.2	0	0	0.4	0	29.4	1.52	53.3
2450	68.6	0	0	0	0	31.4	1.95	52.7
2600	68.1	0	0	0.1	0	31.8	2.16	52.5

Simulating Liquid for 5GHz, Manufactured by SPEAG

Ingredients	(% by weight)
Water	64~78%
Mineral oil	11~18%
Emulsifiers	9~15%
Additives and Salt	2~3%

<Tissue Dielectric Parameter Check Results>

Frequency (MHz)	Tissue Type	Liquid Temp. (°C)	Conductivity (σ)	Permittivity (ϵ_r)	Conductivity Target (σ)	Permittivity Target (ϵ_r)	Delta (σ) (%)	Delta (ϵ_r) (%)	Limit (%)	Date
835	MSL	22.7	0.998	55.867	0.97	55.20	2.89	1.21	±5	2014/11/10
1900	MSL	22.4	1.565	52.780	1.52	53.30	2.96	-0.98	±5	2014/11/10
2450	MSL	22.6	2.037	52.548	1.95	52.70	4.46	-0.29	±5	2014/11/7
2600	MSL	22.5	2.165	53.823	2.16	52.50	0.23	2.52	±5	2014/11/9
5200	MSL	22.5	5.284	47.499	5.30	49.00	-0.30	-3.06	±5	2014/11/7
5300	MSL	22.5	5.466	47.251	5.42	48.90	0.85	-3.37	±5	2014/11/8
5600	MSL	22.3	5.868	46.726	5.77	48.50	1.70	-3.66	±5	2014/11/8
5800	MSL	22.4	6.013	47.049	6.00	48.20	0.22	-2.39	±5	2014/11/9

11.2 System Performance Check Results

Comparing to the original SAR value provided by SPEAG, the verification data should be within its specification of 10 %. Below table shows the target SAR and measured SAR after normalized to 1W input power. The table below indicates the system performance check can meet the variation criterion and the plots can be referred to Appendix A of this report.

Date	Frequency (MHz)	Tissue Type	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 1g SAR (W/kg)	Targeted 1g SAR (W/kg)	Normalized 1g SAR (W/kg)	Deviation (%)
2014/11/10	835	MSL	250	D835V2-4d092	ES3DV3 - SN3296	DAE4 Sn913	2.48	9.47	9.92	4.75
2014/11/10	1900	MSL	250	D1900V2-5d018	ES3DV3 - SN3296	DAE4 Sn913	9.81	39.80	39.24	-1.41
2014/11/7	2450	MSL	250	D2450V2-869	EX3DV4 - SN3931	DAE3 Sn577	13.00	50.30	52.00	3.38
2014/11/9	2600	MSL	250	D2600V2-1058	ES3DV3 - SN3296	DAE4 Sn913	13.90	56.80	55.60	-2.11
2014/11/7	5200	MSL	100	D5GHzV2-1006	EX3DV4 - SN3925	DAE3 Sn495	7.59	77.50	75.90	-2.06
2014/11/8	5300	MSL	100	D5GHzV2-1006	EX3DV4 - SN3925	DAE3 Sn495	8.11	80.00	81.10	1.37
2014/11/8	5600	MSL	100	D5GHzV2-1006	EX3DV4 - SN3925	DAE3 Sn495	8.02	85.20	80.20	-5.87
2014/11/9	5800	MSL	100	D5GHzV2-1006	EX3DV4 - SN3753	DAE4 Sn1279	7.96	78.40	79.60	1.53

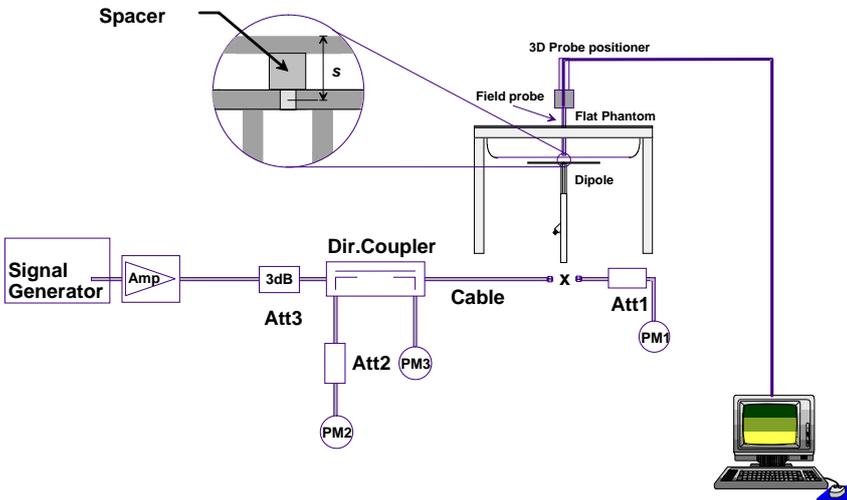


Fig 8.3.1 System Performance Check Setup



Fig 8.3.2 Setup Photo

12. RF Exposure Positions

12.1 SAR Testing for Tablet

This device can be used also in full sized tablet exposure conditions, due to its size. Per FCC KDB 616217, the back surface and edges of the tablet should be tested for SAR compliance with the tablet touching the phantom. The SAR exclusion threshold in KDB 447498 D01v05r02 can 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 against the phantom and the edge containing the antenna positioned perpendicular to the phantom.



13. Conducted RF Output Power (Unit: dBm)

<GSM Conducted Power>

General Note:

1. Per KDB 447498 D01v05r02, the maximum output power channel is used for SAR testing and for further SAR test reduction.
2. Per KDB 941225 D01v03, for Body SAR test reduction for GPRS and EDGE modes is determined by the source-based time-averaged output power including tune-up tolerance, for modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested, therefore, the GPRS 4Tx slots modes was selected when EUT operating without power back-off, the GMS850 GPRS 2Tx slots and GSM1900 GPRS 3Tx slots were selected when EUT operating with power back-off, according to the highest source-based time-averaged output power.

Full Power mode (Proximity Sensor Inactive)

Band GSM850	Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
	TX Channel	128	189		251	128	189	
Frequency (MHz)	824.2	836.4	848.8		824.2	836.4	848.8	
GPRS (GMSK, 1 Tx slot)	33.11	33.29	33.50	33.50	24.11	24.29	24.50	24.50
GPRS (GMSK, 2 Tx slots)	30.33	30.52	30.84	31.50	24.33	24.52	24.84	25.50
GPRS (GMSK, 3 Tx slots)	28.15	28.34	28.57	29.00	23.89	24.08	24.31	24.74
GPRS (GMSK, 4 Tx slots)	27.04	27.16	27.34	28.00	24.04	24.16	24.34	25.00
EDGE (8PSK, 1 Tx slot)	26.73	26.85	27.16	28.00	17.73	17.85	18.16	19.00
EDGE (8PSK, 2 Tx slots)	24.93	25.05	25.38	26.00	18.93	19.05	19.38	20.00
EDGE (8PSK, 3 Tx slots)	23.58	23.67	23.95	25.00	19.32	19.41	19.69	20.74
EDGE (8PSK, 4 Tx slots)	21.71	21.91	22.31	23.00	18.71	18.91	19.31	20.00

Band GSM1900	Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
	TX Channel	512	661		810	512	661	
Frequency (MHz)	1850.2	1880	1909.8		1850.2	1880	1909.8	
GPRS (GMSK, 1 Tx slot)	29.89	30.25	30.04	30.50	20.89	21.25	21.04	21.50
GPRS (GMSK, 2 Tx slots)	27.13	27.25	27.32	27.50	21.13	21.25	21.32	21.50
GPRS (GMSK, 3 Tx slots)	25.11	25.31	25.32	26.50	20.85	21.05	21.06	22.24
GPRS (GMSK, 4 Tx slots)	24.07	24.23	24.34	24.50	21.07	21.23	21.34	21.50
EDGE (8PSK, 1 Tx slot)	26.00	26.12	26.04	28.00	17.00	17.12	17.04	19.00
EDGE (8PSK, 2 Tx slots)	23.72	23.88	23.82	25.00	17.72	17.88	17.82	19.00
EDGE (8PSK, 3 Tx slots)	22.72	22.85	22.79	23.00	18.46	18.59	18.53	18.74
EDGE (8PSK, 4 Tx slots)	20.73	20.95	20.94	22.00	17.73	17.95	17.94	19.00



Reduced Power Mode (Proximity Sensor active)

Band GSM850	Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
	TX Channel	128	189		251	128	189	
Frequency (MHz)	824.2	836.4	848.8		824.2	836.4	848.8	
GPRS (GMSK, 1 Tx slot)	28.62	28.83	28.99	29.00	19.62	19.83	19.99	20.00
GPRS (GMSK, 2 Tx slots)	25.44	25.60	25.85	26.00	19.44	19.60	19.85	20.00
GPRS (GMSK, 3 Tx slots)	23.26	23.48	23.70	24.00	19.00	19.22	19.44	19.74
GPRS (GMSK, 4 Tx slots)	22.36	22.29	22.78	23.00	19.36	19.29	19.78	20.00
EDGE (8PSK, 1 Tx slot)	26.73	26.85	27.16	28.00	17.73	17.85	18.16	19.00
EDGE (8PSK, 2 Tx slots)	24.93	25.05	25.38	26.00	18.93	19.05	19.38	20.00
EDGE (8PSK, 3 Tx slots)	23.58	23.67	23.95	24.00	19.32	19.41	19.69	19.74
EDGE (8PSK, 4 Tx slots)	21.71	21.91	22.31	23.00	18.71	18.91	19.31	20.00

Band GSM1900	Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
	TX Channel	512	661		810	512	661	
Frequency (MHz)	1850.2	1880	1909.8		1850.2	1880	1909.8	
GPRS (GMSK, 1 Tx slot)	23.36	23.46	23.35	24.00	14.36	14.46	14.35	15.00
GPRS (GMSK, 2 Tx slots)	20.34	20.72	20.51	21.00	14.34	14.72	14.51	15.00
GPRS (GMSK, 3 Tx slots)	18.41	18.73	18.67	19.00	14.15	14.47	14.41	14.74
GPRS (GMSK, 4 Tx slots)	17.64	17.49	17.98	18.00	14.64	14.49	14.98	15.00
EDGE (8PSK, 1 Tx slot)	23.85	23.97	23.95	24.00	14.85	14.97	14.95	15.00
EDGE (8PSK, 2 Tx slots)	20.79	20.87	20.94	21.00	14.79	14.87	14.94	15.00
EDGE (8PSK, 3 Tx slots)	18.88	18.97	18.96	19.00	14.62	14.71	14.70	14.74
EDGE (8PSK, 4 Tx slots)	17.86	17.95	17.92	18.00	14.86	14.95	14.92	15.00

<WCDMA Conducted Power>

1. The following tests were conducted according to the test requirements outlines in 3GPP TS 34.121 specification.
2. The procedures in KDB 941225 D01 are applied for 3GPP Rel. 6 HSPA to configure the device in the required sub-test mode(s) to determine SAR test exclusion.
3. For DC-HSDPA, the device was configured according to the H-Set 12, Fixed Reference Channel (FRC) configuration in Table C.8.1.12 of 3GPP TS 34.121-1, with the primary and the secondary serving HS-DSCH Cell enabled during the power measurement.

A summary of these settings are illustrated below:

HSDPA Setup Configuration:

- a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.
- b. The RF path losses were compensated into the measurements.
- c. A call was established between EUT and Base Station with following setting:
 - i. Set Gain Factors (β_c and β_d) and parameters were set according to each
 - ii. Specific sub-test in the following table, C10.1.4, quoted from the TS 34.121
 - iii. Set RMC 12.2Kbps + HSDPA mode.
 - iv. Set Cell Power = -86 dBm
 - v. Set HS-DSCH Configuration Type to FRC (H-set 1, QPSK)
 - vi. Select HSDPA Uplink Parameters
 - vii. Set Delta ACK, Delta NACK and Delta CQI = 8
 - viii. Set Ack-Nack Repetition Factor to 3
 - ix. Set CQI Feedback Cycle (k) to 4 ms
 - x. Set CQI Repetition Factor to 2
 - xi. Power Ctrl Mode = All Up bits
- d. The transmitted maximum output power was recorded.

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

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

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

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

Note 3: CM = 1 for $\beta_c/\beta_d = 12/15, \beta_{HS}/\beta_c = 24/15$. For all other combinations of DPCCH, DPDCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

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

Setup Configuration

HSUPA Setup Configuration:

- a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.
- b. The RF path losses were compensated into the measurements.
- c. A call was established between EUT and Base Station with following setting * :
 - i. Call Configs = 5.2B, 5.9B, 5.10B, and 5.13.2B with QPSK
 - ii. Set the Gain Factors (β_c and β_d) and parameters (AG Index) were set according to each specific sub-test in the following table, C11.1.3, quoted from the TS 34.121
 - iii. Set Cell Power = -86 dBm
 - iv. Set Channel Type = 12.2k + HSPA
 - v. Set UE Target Power
 - vi. Power Ctrl Mode= Alternating bits
 - vii. Set and observe the E-TFCl
 - viii. Confirm that E-TFCl is equal to the target E-TFCl of 75 for sub-test 1, and other subtest's E-TFCl
- d. The transmitted maximum output power was recorded.

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

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note 1)	β_{ec}	β_{ed} (Note 5) (Note 6)	β_{ed} (SF)	β_{ed} (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 6)	E-TFCl
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/25	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	$\beta_{ed1}: 47/15$ $\beta_{ed2}: 47/15$	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 (Note 4)	15/15 (Note 4)	64	15/15 (Note 4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

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

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

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

Setup Configuration

DC-HSDPA 3GPP release 8 Setup Configuration:

- a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration below
- b. The RF path losses were compensated into the measurements.
- c. A call was established between EUT and Base Station with following setting:
 - i. Set RMC 12.2Kbps + HSDPA mode.
 - ii. Set Cell Power = -25 dBm
 - iii. Set HS-DSCH Configuration Type to FRC (H-set 12, QPSK)
 - iv. Select HSDPA Uplink Parameters
 - v. Set Gain Factors (β_c and β_d) and parameters were set according to each Specific sub-test in the following table, C10.1.4, quoted from the TS 34.121
 - a). Subtest 1: $\beta_c/\beta_d=2/15$
 - b). Subtest 2: $\beta_c/\beta_d=12/15$
 - c). Subtest 3: $\beta_c/\beta_d=15/8$
 - d). Subtest 4: $\beta_c/\beta_d=15/4$
 - vi. Set Delta ACK, Delta NACK and Delta CQI = 8
 - vii. Set Ack-Nack Repetition Factor to 3
 - viii. Set CQI Feedback Cycle (k) to 4 ms
 - ix. Set CQI Repetition Factor to 2
 - x. Power Ctrl Mode = All Up bits
- d. The transmitted maximum output power was recorded.

The following tests were conducted according to the test requirements outlines in 3GPP TS 34.121 specification. A summary of these settings are illustrated below:

C.8.1.12 Fixed Reference Channel Definition H-Set 12

Table C.8.1.12: Fixed Reference Channel H-Set 12

Parameter	Unit	Value
Nominal Avg. Inf. Bit Rate	kbps	60
Inter-TTI Distance	TTI's	1
Number of HARQ Processes	Processes	6
Information Bit Payload (N_{INF})	Bits	120
Number Code Blocks	Blocks	1
Binary Channel Bits Per TTI	Bits	960
Total Available SML's in UE	SML's	19200
Number of SML's per HARQ Proc.	SML's	3200
Coding Rate		0.15
Number of Physical Channel Codes	Codes	1
Modulation		QPSK
Note 1: The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table. Note 2: Maximum number of transmission is limited to 1, i.e., retransmission is not allowed. The redundancy and constellation version 0 shall be used.		

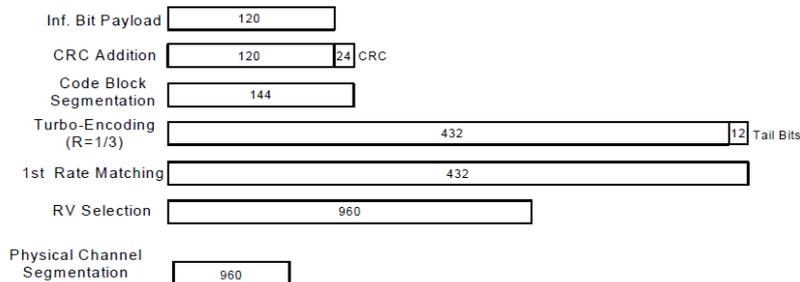


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

Setup Configuration



<WCDMA Conducted Power>

General Note:

1. Per KDB 941225 D01v03, SAR for Body exposure is measured using a 12.2 kbps RMC with TPC bits configured to all "1's".
2. Per KDB 941225 D01v03, RMC 12.2kbps setting is used to evaluate SAR. If the maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA / DC-HSDPA is $\leq \frac{1}{4}$ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA / DC-HSDPA to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA.

Full Power mode (Proximity Sensor Inactive)

Band			WCDMA V			WCDMA II		
TX Channel			4132	4182	4233	9262	9400	9538
Frequency (MHz)			826.4	836.4	846.6	1852.4	1880	1907.6
MPR (dB)	3GPP Rel 99	RMC 12.2Kbps	23.59	23.43	23.37	23.88	23.67	23.48
0	3GPP Rel 6	HSDPA Subtest-1	22.63	22.48	22.49	22.78	22.74	22.50
0	3GPP Rel 6	HSDPA Subtest-2	22.62	22.40	22.45	22.76	22.73	22.49
0.5	3GPP Rel 6	HSDPA Subtest-3	22.18	22.09	22.10	22.30	22.26	22.13
0.5	3GPP Rel 6	HSDPA Subtest-4	22.16	22.02	22.05	22.28	22.26	22.11
0	3GPP Rel 8	DC-HSDPA Subtest-1	22.62	22.47	22.48	22.77	22.73	22.49
0	3GPP Rel 8	DC-HSDPA Subtest-2	22.60	22.40	22.44	22.76	22.71	22.48
0.5	3GPP Rel 8	DC-HSDPA Subtest-3	22.17	22.08	22.08	22.29	22.25	22.12
0.5	3GPP Rel 8	DC-HSDPA Subtest-4	22.16	22.02	22.01	22.26	22.24	22.09
0	3GPP Rel 6	HSUPA Subtest-1	22.31	22.35	22.01	22.33	22.01	22.39
2	3GPP Rel 6	HSUPA Subtest-2	21.04	21.08	20.79	21.88	21.69	21.90
1	3GPP Rel 6	HSUPA Subtest-3	21.25	21.31	21.07	21.59	21.34	21.63
2	3GPP Rel 6	HSUPA Subtest-4	21.41	21.47	21.03	21.96	21.85	22.00
0	3GPP Rel 6	HSUPA Subtest-5	22.61	22.51	22.44	22.81	22.70	22.45

Reduced Power Mode (Proximity Sensor active)

Band			WCDMA V			WCDMA II		
TX Channel			4132	4182	4233	9262	9400	9538
Frequency (MHz)			826.4	836.4	846.6	1852.4	1880	1907.6
MPR (dB)	3GPP Rel 99	RMC 12.2Kbps	21.67	21.56	21.54	13.57	13.42	13.02
0	3GPP Rel 6	HSDPA Subtest-1	20.74	20.59	20.60	12.44	12.40	12.16
0	3GPP Rel 6	HSDPA Subtest-2	20.73	20.51	20.56	12.42	12.39	12.15
0.5	3GPP Rel 6	HSDPA Subtest-3	20.29	20.20	20.21	11.96	11.92	11.79
0.5	3GPP Rel 6	HSDPA Subtest-4	20.27	20.13	20.16	11.94	11.92	11.77
0	3GPP Rel 8	DC-HSDPA Subtest-1	20.73	20.58	20.59	12.43	12.39	12.15
0	3GPP Rel 8	DC-HSDPA Subtest-2	20.71	20.51	20.55	12.42	12.37	12.14
0.5	3GPP Rel 8	DC-HSDPA Subtest-3	20.28	20.19	20.19	11.95	11.91	11.78
0.5	3GPP Rel 8	DC-HSDPA Subtest-4	20.27	20.13	20.12	11.92	11.90	11.75
0	3GPP Rel 6	HSUPA Subtest-1	20.42	20.46	20.12	12.09	12.07	12.05
2	3GPP Rel 6	HSUPA Subtest-2	19.15	19.19	18.90	11.54	11.35	11.56
1	3GPP Rel 6	HSUPA Subtest-3	19.36	19.42	19.18	11.25	11.00	11.29
2	3GPP Rel 6	HSUPA Subtest-4	19.52	19.58	19.14	11.62	11.51	11.66
0	3GPP Rel 6	HSUPA Subtest-5	20.72	20.62	20.55	12.47	12.36	12.11



<LTE Conducted Power>

General Note:

1. Anritsu MT8820C base station simulator was used to setup the connection with EUT; the frequency band, channel bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.
2. Per KDB 941225 D05v02r03, when a properly configured base station simulator is used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration is not required.
3. Per KDB 941225 D05v02r03, start with the largest channel bandwidth and measure SAR for QPSK with 1 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.
4. Per KDB 941225 D05v02r03, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05v02r03, For QPSK with 100% RB allocation, SAR is not required when the highest 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 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.
6. Per KDB 941225 D05v02r03, 16QAM output power for each RB allocation configuration is $>$ not $\frac{1}{2}$ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r03, 16QAM SAR testing is not required.
7. Per KDB 941225 D05v02r03, Smaller bandwidth output power for each RB allocation configuration is $>$ not $\frac{1}{2}$ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r03, smaller bandwidth SAR testing is not required.



Maximum Average RF Power (Proximity Sensor Inactive)

<LTE Band 7>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune up Limit (dBm)	MPR (dB)
Channel				20850	21100	21350		
Frequency (MHz)				2510	2535	2560		
20	QPSK	1	0	23.96	23.91	23.90	24	0
20	QPSK	1	49	23.75	23.71	23.54		
20	QPSK	1	99	23.63	23.58	23.54		
20	QPSK	50	0	22.46	22.37	22.30	23	1
20	QPSK	50	24	22.41	22.26	22.26		
20	QPSK	50	49	22.27	22.24	22.29		
20	QPSK	100	0	22.38	22.21	22.20		
20	16QAM	1	0	22.78	22.35	22.43	23	1
20	16QAM	1	49	22.84	22.53	22.37		
20	16QAM	1	99	22.58	22.64	22.49		
20	16QAM	50	0	21.36	21.61	21.50	22	2
20	16QAM	50	24	21.35	21.56	21.33		
20	16QAM	50	49	21.28	21.51	21.43		
20	16QAM	100	0	21.38	21.50	21.33		
Channel				20825	21100	21375		
Frequency (MHz)				2507.5	2535	2562.5		
15	QPSK	1	0	23.72	23.37	23.39	24	0
15	QPSK	1	37	23.71	23.60	23.46		
15	QPSK	1	74	23.71	23.65	23.55		
15	QPSK	36	0	22.49	22.19	22.26	23	1
15	QPSK	36	18	22.48	22.26	22.11		
15	QPSK	36	37	22.48	22.21	22.06		
15	QPSK	75	0	22.35	22.11	21.96		
15	16QAM	1	0	22.74	22.38	22.38	23	1
15	16QAM	1	37	22.74	22.53	22.42		
15	16QAM	1	74	22.70	22.67	22.45		
15	16QAM	36	0	21.38	21.13	20.95	22	2
15	16QAM	36	18	21.46	21.16	21.13		
15	16QAM	36	37	21.50	21.20	21.25		
15	16QAM	75	0	21.34	21.07	20.90		
Channel				20800	21100	21400		
Frequency (MHz)				2505	2535	2565		
10	QPSK	1	0	23.75	23.40	23.36	24	0
10	QPSK	1	24	23.69	23.52	23.48		
10	QPSK	1	49	23.69	23.54	23.53		
10	QPSK	25	0	22.71	22.26	22.28	23	1
10	QPSK	25	12	22.63	22.35	22.25		
10	QPSK	25	24	22.52	22.28	22.23		
10	QPSK	50	0	22.43	22.11	22.10		
10	16QAM	1	0	22.82	22.42	22.32	23	1
10	16QAM	1	24	22.79	22.51	22.50		
10	16QAM	1	49	22.80	22.55	22.44		
10	16QAM	25	0	21.62	21.18	21.20	22	2
10	16QAM	25	12	21.54	21.22	21.25		
10	16QAM	25	24	21.48	21.22	21.24		
10	16QAM	50	0	21.29	21.02	21.05		



Channel				20775	21100	21425	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				2502.5	2535	2567.5		
5	QPSK	1	0	23.65	23.45	23.45	24	0
5	QPSK	1	12	23.65	23.49	23.48		
5	QPSK	1	24	23.61	23.54	23.49		
5	QPSK	12	0	22.84	22.45	22.42	23	1
5	QPSK	12	6	22.81	22.50	22.41		
5	QPSK	12	11	22.84	22.49	22.43		
5	QPSK	25	0	22.66	22.31	22.26		
5	16QAM	1	0	22.82	22.44	22.41	23	1
5	16QAM	1	12	22.83	22.53	22.49		
5	16QAM	1	24	22.77	22.50	22.47		
5	16QAM	12	0	21.75	21.48	21.54	22	2
5	16QAM	12	6	21.83	21.50	21.52		
5	16QAM	12	11	21.79	21.53	21.45		
5	16QAM	25	0	21.60	21.26	21.27		



Reduced Average RF Power (Proximity Sensor active)

<LTE Band 7>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune up Limit (dBm)	MPR (dB)
Channel				20850	21100	21350		
Frequency (MHz)				2510	2535	2560		
20	QPSK	1	0	11.89	11.74	11.72	12	0
20	QPSK	1	49	11.83	11.68	11.65		
20	QPSK	1	99	11.70	11.65	11.66		
20	QPSK	50	0	11.72	11.56	11.61	12	0
20	QPSK	50	24	11.63	11.51	11.58		
20	QPSK	50	49	11.62	11.53	11.48		
20	QPSK	100	0	11.60	11.47	11.47		
20	16QAM	1	0	11.78	11.58	11.67	12	0
20	16QAM	1	49	11.74	11.60	11.62		
20	16QAM	1	99	11.41	11.65	11.56		
20	16QAM	50	0	11.59	11.48	11.52	12	0
20	16QAM	50	24	11.61	11.33	11.54		
20	16QAM	50	49	11.30	11.51	11.46		
20	16QAM	100	0	11.47	11.27	11.51		
Channel				20825	21100	21375	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				2507.5	2535	2562.5		
15	QPSK	1	0	11.54	11.52	11.75	12	0
15	QPSK	1	37	11.49	11.38	11.74		
15	QPSK	1	74	11.34	11.47	11.50		
15	QPSK	36	0	11.58	11.39	11.70	12	0
15	QPSK	36	18	11.50	11.39	11.72		
15	QPSK	36	37	11.38	11.50	11.66		
15	QPSK	75	0	11.54	11.45	11.57		
15	16QAM	1	0	11.68	11.74	11.58	12	0
15	16QAM	1	37	11.66	11.60	11.54		
15	16QAM	1	74	11.58	11.63	11.46		
15	16QAM	36	0	11.60	11.49	11.49	12	0
15	16QAM	36	18	11.57	11.25	11.43		
15	16QAM	36	37	11.43	11.53	11.37		
15	16QAM	75	0	11.42	11.25	11.36		
Channel				20800	21100	21400	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				2505	2535	2565		
10	QPSK	1	0	11.69	11.68	11.68	12	0
10	QPSK	1	24	11.53	11.52	11.72		
10	QPSK	1	49	11.51	11.39	11.68		
10	QPSK	25	0	11.43	11.42	11.64	12	0
10	QPSK	25	12	11.42	11.42	11.63		
10	QPSK	25	24	11.48	11.43	11.63		
10	QPSK	50	0	11.53	11.41	11.66		
10	16QAM	1	0	11.75	11.65	11.75	12	0
10	16QAM	1	24	11.69	11.64	11.74		
10	16QAM	1	49	11.70	11.66	11.65		
10	16QAM	25	0	11.66	11.47	11.63	12	0
10	16QAM	25	12	11.66	11.48	11.62		
10	16QAM	25	24	11.67	11.47	11.60		
10	16QAM	50	0	11.36	11.54	11.58		



Channel				20775	21100	21425	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				2502.5	2535	2567.5		
5	QPSK	1	0	11.66	11.57	11.61	12	0
5	QPSK	1	12	11.56	11.53	11.60		
5	QPSK	1	24	11.56	11.54	11.58		
5	QPSK	12	0	11.36	11.49	11.55	12	0
5	QPSK	12	6	11.46	11.50	11.53		
5	QPSK	12	11	11.57	11.44	11.52		
5	QPSK	25	0	11.53	11.43	11.49		
5	16QAM	1	0	11.64	11.67	11.64	12	0
5	16QAM	1	12	11.63	11.65	11.62		
5	16QAM	1	24	11.61	11.64	11.60		
5	16QAM	12	0	11.56	11.61	11.58	12	0
5	16QAM	12	6	11.56	11.58	11.54		
5	16QAM	12	11	11.55	11.57	11.52		
5	16QAM	25	0	11.55	11.52	11.51		



<WLAN Conducted Power>

General Note:

1. For IEEE802.11a/b/g SAR testing, highest average RF output power channel for the lowest data rate for 802.11a/b were selected for SAR evaluation. 802.11g were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of 802.11b mode.
2. For IEEE802.11n/ac, SAR testing can be conducted on channel with the highest output power when taking into consideration tune-up tolerance for same test configuration that was identified during SAR evaluations for IEEE802.11a/b/g (as applicable) provided bandwidth and test position are the same.
3. For IEEE802.11n/ac with multiple channel BW configurations, highest channel BW configuration with highest output power limit shall be tested.
4. Testing of lower BW configurations is not required when the maximum average output of the default test channels in each lower BW configuration is less than 1/4dB higher than the default test channel in the highest BW configuration.

<2.4GHZ WLAN>

WLAN 2.4GHz 802.11b Average Power (dBm)					
Power vs. Channel			Power vs. Data Rate		
Channel	Frequency (MHz)	Data Rate	2Mbps	5.5Mbps	11Mbps
		1Mbps			
CH 1	2412	12.79	12.70	12.77	12.79
CH 6	2437	12.81			
CH 11	2462	12.58			

WLAN 2.4GHz 802.11g Average Power (dBm)									
Power vs. Channel			Power vs. Data Rate						
Channel	Frequency (MHz)	Data Rate	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
		6Mbps							
CH 1	2412	12.90	12.84	12.89	12.79	12.73	12.86	12.82	12.89
CH 6	2437	12.78							
CH 11	2462	12.71							

WLAN 2.4GHz 802.11n-HT20 Average Power (dBm)									
Power vs. Channel			Power vs. MCS Index						
Channel	Frequency (MHz)	MCS Index	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
		MCS0							
CH 1	2412	11.67	11.58	11.70	11.68	11.67	11.70	11.69	11.70
CH 6	2437	11.72							
CH 11	2462	11.50							

WLAN 2.4GHz 802.11n-HT40 Average Power (dBm)									
Power vs. Channel			Power vs. MCS Index						
Channel	Frequency (MHz)	MCS Index	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
		MCS0							
CH 3	2422	11.75	11.73	11.73	11.68	11.70	11.74	11.72	11.71
CH 6	2437	11.69							
CH 9	2452	11.59							



<5GHz WLAN >

WLAN 5GHz 802.11a Average Power (dBm)									
Power vs. Channel			Power vs. Data Rate						
Channel	Frequency (MHz)	Data Rate 6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
CH 36	5180	10.63	10.70	10.75	10.78	10.78	10.80	10.79	10.78
CH 40	5200	10.51							
CH 44	5220	10.81							
CH 48	5240	10.73							
CH 52	5260	10.74	10.73	10.81	10.78	10.72	10.81	10.79	10.83
CH 56	5280	10.51							
CH 60	5300	10.71							
CH 64	5320	10.84							
CH 100	5500	10.67	10.88	10.84	10.89	10.91	10.85	10.77	10.82
CH 104	5520	10.52							
CH 108	5540	10.99							
CH 112	5560	10.61							
CH 116	5580	10.83							
CH 120	5600	10.72							
CH 124	5620	10.65							
CH 128	5640	10.74							
CH 132	5660	10.76							
CH 136	5680	10.54							
CH 140	5700	10.50	10.98	10.97	10.97	10.98	10.97	10.69	10.55
CH 144	5720	10.81							
CH 149	5745	10.99							
CH 153	5765	10.95							
CH 157	5785	10.95							
CH 161	5805	10.98							
CH 165	5825	10.65							



WLAN 5GHz 802.11n-HT20 Average Power (dBm)									
Power vs. Channel			Power vs. MCS Index						
Channel	Frequency (MHz)	MCS Index	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
		MCS0							
CH 36	5180	10.60	10.77	10.75	10.77	10.77	10.77	10.74	10.78
CH 40	5200	10.81							
CH 44	5220	10.69							
CH 48	5240	10.61							
CH 52	5260	10.85	10.84	10.86	10.92	10.92	10.92	10.92	10.93
CH 56	5280	10.96							
CH 60	5300	10.80							
CH 64	5320	10.69							
CH 100	5500	10.78							
CH 104	5520	10.85	10.82	10.73	10.87	10.87	10.86	10.83	10.84
CH 108	5540	10.93							
CH 112	5560	10.60							
CH 116	5580	10.60							
CH 120	5600	10.87							
CH 124	5620	10.81							
CH 128	5640	10.96							
CH 132	5660	10.92							
CH 136	5680	10.71							
CH 140	5700	10.65							
CH 144	5720	10.92	10.97	10.90	10.97	10.96	10.64	10.67	10.63
CH 149	5745	10.98							
CH 153	5765	10.70							
CH 157	5785	10.95							
CH 161	5805	10.48							
CH 165	5825	10.64							

WLAN 5GHz 802.11n-HT40 Average Power (dBm)									
Power vs. Channel			Power vs. MCS Index						
Channel	Frequency (MHz)	MCS Index	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
		MCS0							
CH 38	5190	10.54	10.60	10.63	10.64	10.63	10.64	10.60	10.53
CH 46	5230	10.66							
CH 54	5270	10.81	10.70	10.78	10.80	10.79	10.76	10.78	10.80
CH 62	5310	10.61							
CH 102	5510	10.78	10.88	10.91	10.90	10.89	10.58	10.67	10.77
CH 110	5550	10.92							
CH 126	5630	10.54							
CH 134	5670	10.59							
CH 142	5710	10.53							
CH 151	5755	10.89	10.74	10.82	10.88	10.87	10.76	10.88	10.88
CH 159	5795	10.64							



WLAN 5GHz 802.11ac-VHT20 Average Power (dBm)										
Power vs. Channel			Power vs. MCS Index							
Channel	Frequency (MHz)	MCS Index MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
CH 36	5180	10.93	10.92	10.90	10.91	10.92	10.91	10.90	10.92	10.91
CH 40	5200	10.64								
CH 44	5220	10.83								
CH 48	5240	10.82								
CH 52	5260	10.56	10.64	10.68	10.66	10.67	10.67	10.64	10.61	10.62
CH 56	5280	10.72								
CH 60	5300	10.59								
CH 64	5320	10.55								
CH 100	5500	10.64								
CH 104	5520	10.74								
CH 108	5540	10.62	10.95	10.94	10.93	10.96	10.94	10.93	10.94	10.93
CH 112	5560	10.75								
CH 116	5580	10.66								
CH 120	5600	10.99								
CH 124	5620	10.97								
CH 128	5640	10.56								
CH 132	5660	10.91								
CH 136	5680	10.79								
CH 140	5700	10.97								
CH 144	5720	10.90								
CH 149	5745	10.68	10.73	10.74	10.72	10.72	10.73	10.73	10.74	10.71
CH 153	5765	10.82								
CH 157	5785	10.76								
CH 161	5805	10.58								
CH 165	5825	10.53								

WLAN 5GHz 802.11ac-VHT40 Average Power (dBm)											
Power vs. Channel			Power vs. MCS Index								
Channel	Frequency (MHz)	MCS Index MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
CH 38	5190	10.60	10.51	10.58	10.50	10.59	10.58	10.58	10.52	10.57	10.58
CH 46	5230	10.55									
CH 54	5270	10.67									
CH 62	5310	10.72	10.61	10.71	10.53	10.70	10.69	10.70	10.54	10.62	10.60
CH 102	5510	10.94									
CH 110	5550	10.49									
CH 126	5630	10.58									
CH 134	5670	10.41									
CH 142	5710	10.26	10.93	10.92	10.80	10.87	10.90	10.89	10.92	10.90	10.91
CH 151	5755	10.54									
CH 159	5795	10.72									
CH 159	5795	10.72									
CH 151	5755	10.54	10.68	10.65	10.53	10.61	10.67	10.69	10.62	10.69	10.65
CH 159	5795	10.72									

WLAN 5GHz 802.11ac-VHT80 Average Power (dBm)											
Power vs. Channel			Power vs. MCS Index								
Channel	Frequency (MHz)	MCS Index	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
		MCS0									
CH 42	5210	10.98	10.97	10.96	10.96	10.97	10.95	10.90	10.91	10.95	10.96
CH 58	5290	10.69	10.66	10.67	10.62	10.66	10.66	10.65	10.64	10.60	10.64
CH 106	5530	10.60	10.53	10.56	10.52	10.59	10.58	10.56	10.53	10.50	10.54
CH 122	5610	10.53									
CH 138	5690	10.43									
CH 155	5775	10.57									

14. Bluetooth Exclusions Applied

Mode Band	Average power(dBm)	
	Bluetooth v3.0+EDR	Bluetooth v4.0+LE
2.4GHz Bluetooth	-1.0	0.0

Note:

- Per KDB 447498 D01v05r02, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

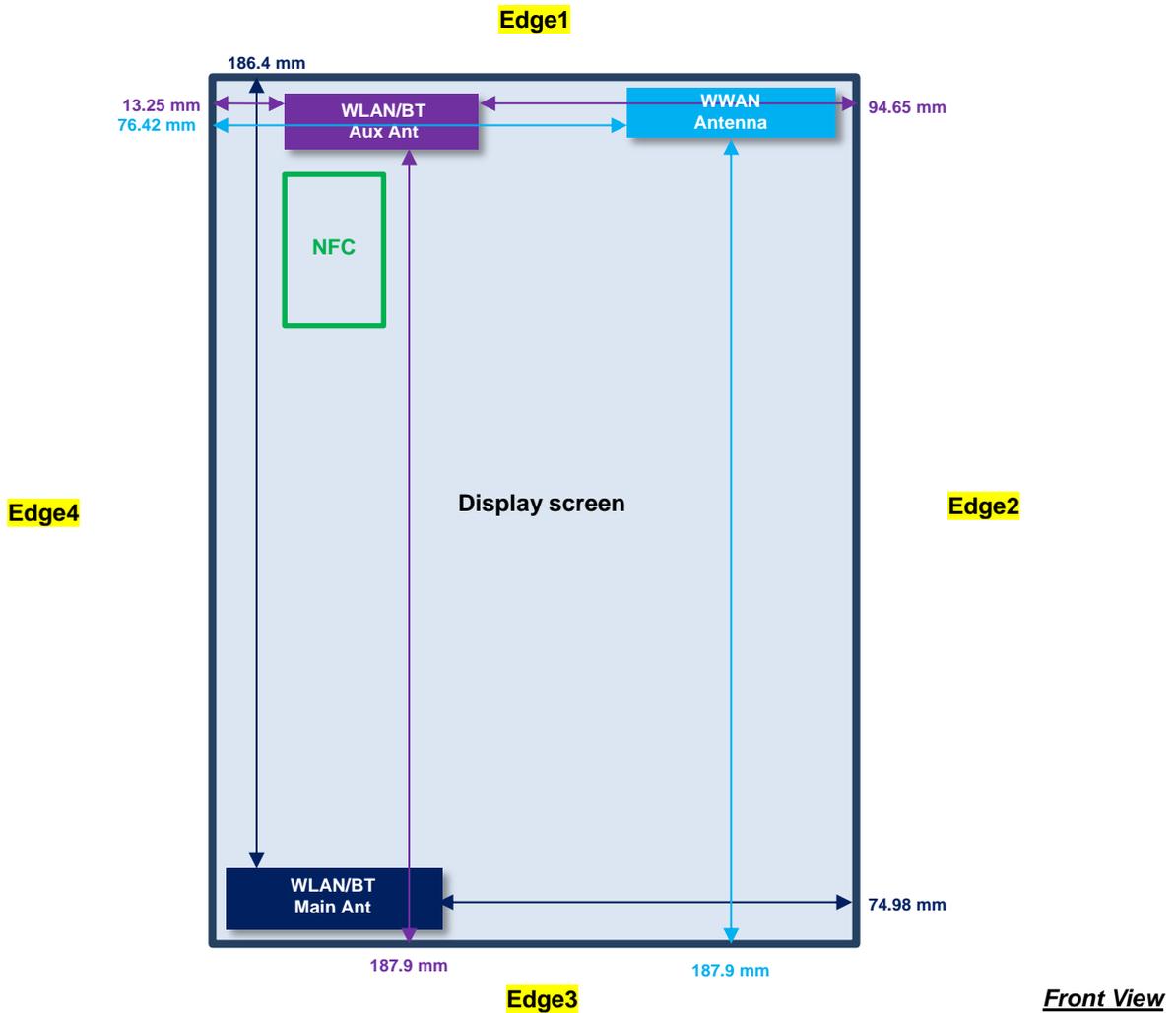
$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$$
 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR
 - f(GHz) is the RF channel transmit frequency in GHz
 - Power and distance are rounded to the nearest mW and mm before calculation
 - The result is rounded to one decimal place for comparison

Bluetooth Max Power (dBm)	Separation Distance (mm)	Frequency (GHz)	exclusion thresholds
0.0	< 5	2.48	0.31

Note:

Per KDB 447498 D01v05r02, when the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion. The test exclusion threshold is 0.31 which is ≤ 3 , SAR testing is not required.

15. Antenna Location





<SAR test exclusion table>

General Note:

1. The below table, when the distance is < 50 mm exclusion threshold is "Ratio", when the distance is > 50 mm exclusion threshold is "mW"
2. Maximum power is the source-based time-average power and represents the maximum RF output power among production units
3. Per KDB 447498 D01v05r02, for larger devices, the test separation distance of adjacent edge configuration is determined by the closest separation between the antenna and the user.
4. Per KDB 447498 D01v05r02, standalone SAR test exclusion threshold is applied; If the test separation distance is < 5mm, 5mm is used to determine SAR exclusion threshold.
5. Per KDB 447498 D01v05r02, the 1-g 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
 - 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
6. Per KDB 447498 D01v05r02, at 100 MHz to 6 GHz and for *test separation distances* > 50 mm, the SAR test exclusion threshold is determined according to the following
 - a) [Threshold at 50 mm in step 1) + (test separation distance - 50 mm)·(f(MHz)/150)] mW, at 100 MHz to 1500 MHz
 - b) [Threshold at 50 mm in step 1) + (test separation distance - 50 mm)·10] mW at > 1500 MHz and ≤ 6 GHz

Exposure Position	Wireless Interface	GPRS 850 Class 10	GPRS 1900 Class 11	WCDMA Band V	WCDMA Band II	LTE Band 7	802.11b Main Ant	802.11b Aux Ant	802.11a Main Ant	802.11a Aux Ant
	Calculated Frequency	848MHz	1909MHz	846MHz	1907MHz	1914MHz	2462MHz	2462MHz	5825MHz	5825MHz
	Maximum power (dBm)	25.5	22.24	24.0	24.0	24.0	13.0	13.0	11.0	11.0
	Maximum rated power(mW)	355	167	251	251	251	20	20	13	13
Bottom Face	Separation distance(mm)	5					5	5	5	5
	exclusion threshold	65	46	46	69	69	6	6	6	6
	Testing required?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Edge 1	Separation distance(mm)	5					186.40	5	186.40	5
	exclusion threshold	65	46	46	69	69	1460	6	1426	6
	Testing required?	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes
Edge 2	Separation distance(mm)	5					74.98	94.65	74.98	94.65
	exclusion threshold	65	46	46	69	69	345	542	312	509
	Testing required?	Yes	Yes	Yes	Yes	Yes	No	No	No	No
Edge 3	Separation distance(mm)	187.9					5	187.90	5	187.90
	exclusion threshold	942	1488	941	1488	1487	6	1475	6	1441
	Testing required?	No	No	No	No	No	Yes	No	Yes	No
Edge 4	Separation distance(mm)	76.42					5	13.25	5	13.25
	exclusion threshold	312	373	312	373	373	6	2	6	2
	Testing required?	Yes	No	No	No	No	Yes	No	Yes	No



16. SAR Test Results

General Note:

1. Per KDB 447498 D01v05r02, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
 - a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
 - b. For SAR testing of WLAN signal with non-100% duty cycle, the measured SAR is scaled-up by the duty cycle scaling factor which is equal to "1/(duty cycle)"
 - c. For WWAN: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
 - d. For WLAN: Reported SAR(W/kg)= Measured SAR(W/kg)* Duty Cycle scaling factor * Tune-up scaling factor
2. Per KDB 447498 D01v05r02, for each exposure position, testing of other required channels within the operating mode of a frequency band is not required when the *reported* 1-g or 10-g SAR for the mid-band or highest output power channel is:
 - ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
 - ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
 - ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
3. For the exposure positions that proximity sensor power reduction is applied for SAR compliance, additional SAR testing with EUT transmitting full power in normal mode was performed; 1.5cm for bottom face, 0.5cm for edge1
4. Per KDB 941225 D01v03, for Body SAR test reduction for GPRS and EDGE modes is determined by the source-based time-averaged output power including tune-up tolerance, for modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested, therefore, the GPRS 4Tx slots modes was selected when EUT operating without power back-off, the GMS850 GPRS 2Tx slots and GSM1900 GPRS 3Tx slots were selected when EUT operating with power back-off, according to the highest source-based time-averaged output power.
5. Per KDB 941225 D01v03, SAR for Body exposure is measured using a 12.2 kbps RMC with TPC bits configured to all "1's".
6. Per KDB 941225 D01v03, RMC 12.2kbps setting is used to evaluate SAR. If the maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA / DC-HSDPA is $\leq \frac{1}{4}$ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA / DC-HSDPA to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA.
7. Per KDB 941225 D05v02r03, 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.
8. Per KDB 941225 D05v02r03, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
9. Per KDB 941225 D05v02r03, 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 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.
10. Per KDB 941225 D05v02r03, 16QAM output power for each RB allocation configuration is $>$ not $\frac{1}{2}$ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r03, 16QAM SAR testing is not required.
11. Per KDB 941225 D05v02r03, Smaller bandwidth output power for each RB allocation configuration is $>$ not $\frac{1}{2}$ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r03, smaller bandwidth SAR testing is not required.
12. During SAR testing the WLAN transmission was verified using a spectrum analyzer.



16.1 Body SAR

<GSM SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	GSM850	GPRS (4 Tx slots)	Bottom Face	0cm	ON	251	848.8	22.78	23.00	1.052	-0.13	1.010	1.062
	GSM850	GPRS (4 Tx slots)	Bottom Face	0cm	ON	128	824.2	22.36	23.00	1.159	-0.08	0.947	1.097
1	GSM850	GPRS (4 Tx slots)	Bottom Face	0cm	ON	189	836.4	22.29	23.00	1.178	-0.05	0.958	1.128
	GSM850	GPRS (4 Tx slots)	Edge 1	0cm	ON	251	848.8	22.78	23.00	1.052	0.09	0.161	0.169
	GSM850	GPRS (2 Tx slots)	Bottom Face	1.5cm	OFF	251	848.8	30.84	31.50	1.164	0.02	0.264	0.307
	GSM850	GPRS (2 Tx slots)	Edge 1	0.5cm	OFF	251	848.8	30.84	31.50	1.164	-0.13	0.312	0.363
	GSM850	GPRS (2 Tx slots)	Edge 2	0cm	OFF	251	848.8	30.84	31.50	1.164	-0.04	0.383	0.446
	GSM850	GPRS (2 Tx slots)	Edge 4	0cm	OFF	251	848.8	30.84	31.50	1.164	0.19	0.389	0.453
	GSM1900	GPRS (4 Tx slots)	Bottom Face	0cm	ON	810	1909.8	17.98	18.00	1.005	0	1.050	1.055
	GSM1900	GPRS (4 Tx slots)	Bottom Face	0cm	ON	512	1850.2	17.64	18.00	1.086	0.1	0.929	1.009
2	GSM1900	GPRS (4 Tx slots)	Bottom Face	0cm	ON	661	1880	17.49	18.00	1.125	0.02	1.020	1.147
	GSM1900	GPRS (4 Tx slots)	Edge 1	0cm	ON	810	1909.8	17.98	18.00	1.005	0.09	0.138	0.139
	GSM1900	GPRS (3 Tx slots)	Bottom Face	1.5cm	OFF	810	1909.8	25.32	26.50	1.312	-0.01	0.387	0.508
	GSM1900	GPRS (3 Tx slots)	Edge 1	0.5cm	OFF	810	1909.8	25.32	26.50	1.312	-0.04	0.233	0.306
	GSM1900	GPRS (3 Tx slots)	Edge 2	0cm	OFF	810	1909.8	25.32	26.50	1.312	-0.12	0.294	0.386

<WCDMA SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WCDMA V	RMC 12.2Kbps	Bottom Face	0cm	ON	4132	826.4	21.67	22.00	1.079	0.1	0.870	0.939
3	WCDMA V	RMC 12.2Kbps	Bottom Face	0cm	ON	4182	836.4	21.56	22.00	1.107	-0.09	0.999	1.106
	WCDMA V	RMC 12.2Kbps	Bottom Face	0cm	ON	4233	846.6	21.54	22.00	1.112	-0.02	0.932	1.036
	WCDMA V	RMC 12.2Kbps	Edge 1	0cm	ON	4132	826.4	21.67	22.00	1.079	0.07	0.071	0.077
	WCDMA V	RMC 12.2Kbps	Bottom Face	1.5cm	OFF	4132	826.4	23.59	24.00	1.099	0.05	0.257	0.282
	WCDMA V	RMC 12.2Kbps	Edge 1	0.5cm	OFF	4132	826.4	23.59	24.00	1.099	0.01	0.354	0.389
	WCDMA V	RMC 12.2Kbps	Edge 2	0cm	OFF	4132	826.4	23.59	24.00	1.099	0.04	0.487	0.535
	WCDMA II	RMC 12.2Kbps	Bottom Face	0cm	ON	9262	1852.4	13.57	14.00	1.104	-0.01	0.981	1.083
4	WCDMA II	RMC 12.2Kbps	Bottom Face	0cm	ON	9400	1880	13.42	14.00	1.143	0.02	1.030	1.177
	WCDMA II	RMC 12.2Kbps	Bottom Face	0cm	ON	9538	1907.6	13.02	14.00	1.253	0.05	0.658	0.825
	WCDMA II	RMC 12.2Kbps	Edge 1	0cm	ON	9262	1852.4	13.57	14.00	1.104	-0.14	0.114	0.126
	WCDMA II	RMC 12.2Kbps	Bottom Face	1.5cm	OFF	9262	1852.4	23.88	24.00	1.028	0.07	0.522	0.537
	WCDMA II	RMC 12.2Kbps	Edge 1	0.5cm	OFF	9262	1852.4	23.88	24.00	1.028	-0.18	0.327	0.336
	WCDMA II	RMC 12.2Kbps	Edge 2	0cm	OFF	9262	1852.4	23.88	24.00	1.028	-0.02	0.489	0.503



<LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (cm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	LTE Band 7	20M	QPSK	1RB	0offset	Bottom Face	0cm	ON	20850	2510	11.89	12.00	1.026	-0.04	0.919	0.943
	LTE Band 7	20M	QPSK	1RB	0offset	Bottom Face	0cm	ON	21100	2535	11.74	12.00	1.062	0.03	0.618	0.656
	LTE Band 7	20M	QPSK	1RB	0offset	Bottom Face	0cm	ON	21350	2560	11.72	12.00	1.067	0.05	0.589	0.628
	LTE Band 7	20M	QPSK	50RB	0offset	Bottom Face	0cm	ON	20850	2510	11.72	12.00	1.067	0.04	0.785	0.837
	LTE Band 7	20M	QPSK	50RB	0offset	Bottom Face	0cm	ON	21100	2535	11.56	12.00	1.107	0.03	0.599	0.663
	LTE Band 7	20M	QPSK	50RB	0offset	Bottom Face	0cm	ON	21350	2560	11.61	12.00	1.094	0.07	0.655	0.717
	LTE Band 7	20M	QPSK	100RB	0offset	Bottom Face	0cm	ON	20850	2510	11.60	12.00	1.096	0.01	0.740	0.811
	LTE Band 7	20M	QPSK	1RB	0offset	Edge 1	0cm	ON	20850	2510	11.89	12.00	1.026	-0.05	0.294	0.302
	LTE Band 7	20M	QPSK	50RB	0offset	Edge 1	0cm	ON	20850	2510	11.72	12.00	1.067	-0.02	0.281	0.300
	LTE Band 7	20M	QPSK	1RB	0offset	Bottom Face	1.5cm	OFF	20850	2510	23.96	24.00	1.009	-0.02	1.230	1.241
	LTE Band 7	20M	QPSK	1RB	0offset	Bottom Face	1.5cm	OFF	21100	2535	23.91	24.00	1.021	0.04	1.240	1.266
	LTE Band 7	20M	QPSK	1RB	0offset	Bottom Face	1.5cm	OFF	21350	2560	23.90	24.00	1.023	-0.02	1.220	1.248
	LTE Band 7	20M	QPSK	50RB	0offset	Bottom Face	1.5cm	OFF	20850	2510	22.46	23.00	1.132	-0.04	0.913	1.034
	LTE Band 7	20M	QPSK	50RB	0offset	Bottom Face	1.5cm	OFF	21100	2535	22.37	23.00	1.156	-0.02	0.910	1.052
	LTE Band 7	20M	QPSK	50RB	0offset	Bottom Face	1.5cm	OFF	21350	2560	22.30	23.00	1.175	0	0.919	1.080
	LTE Band 7	20M	QPSK	100RB	0offset	Bottom Face	1.5cm	OFF	20850	2510	22.38	23.00	1.153	-0.01	0.886	1.022
5	LTE Band 7	20M	QPSK	1RB	0offset	Edge 1	0.5cm	OFF	20850	2510	23.96	24.00	1.009	0.09	1.340	1.352
	LTE Band 7	20M	QPSK	1RB	0offset	Edge 1	0.5cm	OFF	21100	2535	23.91	24.00	1.021	-0.08	1.110	1.133
	LTE Band 7	20M	QPSK	1RB	0offset	Edge 1	0.5cm	OFF	21350	2560	23.90	24.00	1.023	-0.06	1.180	1.207
	LTE Band 7	20M	QPSK	50RB	0offset	Edge 1	0.5cm	OFF	20850	2510	22.46	23.00	1.132	-0.03	0.879	0.995
	LTE Band 7	20M	QPSK	50RB	0offset	Edge 1	0.5cm	OFF	21100	2535	22.37	23.00	1.156	-0.14	0.644	0.745
	LTE Band 7	20M	QPSK	50RB	0offset	Edge 1	0.5cm	OFF	21350	2560	22.30	23.00	1.175	0.06	0.869	1.021
	LTE Band 7	20M	QPSK	100RB	0offset	Edge 1	0.5cm	OFF	20850	2510	22.38	23.00	1.153	-0.18	0.759	0.875
	LTE Band 7	20M	QPSK	1RB	0offset	Edge 2	0cm	OFF	20850	2510	23.96	24.00	1.009	-0.06	0.498	0.503
	LTE Band 7	20M	QPSK	50RB	0offset	Edge 2	0cm	OFF	20850	2510	22.46	23.00	1.132	-0.12	0.340	0.385

<WLAN SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	Antenna	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WLAN2.4GHz	802.11b 1Mbps	Bottom Face	0cm	Main	6	2437	12.81	13.00	1.044	97.63	1.024	-0.06	1.340	1.432
	WLAN2.4GHz	802.11b 1Mbps	Bottom Face	0cm	Main	1	2412	12.79	13.00	1.049	97.63	1.024	-0.05	1.140	1.224
	WLAN2.4GHz	802.11b 1Mbps	Bottom Face	0cm	Main	11	2462	12.58	13.00	1.100	97.63	1.024	0.03	1.060	1.195
	WLAN2.4GHz	802.11n-HT40 MCS0	Bottom Face	0cm	Main	3	2422	11.75	12.00	1.059	76.19	1.313	-0.13	0.826	1.149
	WLAN2.4GHz	802.11n-HT40 MCS0	Bottom Face	0cm	Main	6	2437	11.69	12.00	1.074	76.19	1.313	-0.09	0.840	1.184
	WLAN2.4GHz	802.11n-HT40 MCS0	Bottom Face	0cm	Main	9	2452	11.59	12.00	1.099	76.19	1.313	-0.11	0.883	1.274
	WLAN2.4GHz	802.11b 1Mbps	Edge 3	0cm	Main	6	2437	12.81	13.00	1.044	97.63	1.024	0.11	0.079	0.084
	WLAN2.4GHz	802.11b 1Mbps	Edge 4	0cm	Main	6	2437	12.81	13.00	1.044	97.63	1.024	0.03	0.033	0.035
	WLAN2.4GHz	802.11b 1Mbps	Bottom Face	0cm	Aux	6	2437	12.81	13.00	1.044	97.63	1.024	-0.03	0.889	0.950
	WLAN2.4GHz	802.11b 1Mbps	Bottom Face	0cm	Aux	1	2412	12.79	13.00	1.049	97.63	1.024	-0.09	0.872	0.936
	WLAN2.4GHz	802.11b 1Mbps	Bottom Face	0cm	Aux	11	2462	12.58	13.00	1.100	97.63	1.024	-0.02	0.946	1.066
	WLAN2.4GHz	802.11n-HT40 MCS0	Bottom Face	0cm	Aux	3	2422	11.75	12.00	1.059	76.19	1.313	-0.1	0.710	0.987
	WLAN2.4GHz	802.11n-HT40 MCS0	Bottom Face	0cm	Aux	6	2437	11.69	12.00	1.074	76.19	1.313	-0.12	0.733	1.033
	WLAN2.4GHz	802.11n-HT40 MCS0	Bottom Face	0cm	Aux	9	2452	11.59	12.00	1.099	76.19	1.313	-0.03	0.738	1.065
	WLAN2.4GHz	802.11b 1Mbps	Edge 1	0cm	Aux	6	2437	12.81	13.00	1.044	97.63	1.024	-0.02	0.048	0.051



Plot No.	Band	Mode	Test Position	Gap (cm)	Antenna	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Main	44	5220	10.81	11.00	1.044	87.26	1.146	0.09	1.170	1.400
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Main	36	5180	10.63	11.00	1.088	87.26	1.146	-0.09	1.190	1.484
	WLAN5GHz	802.11n-HT40 MCS0	Bottom Face	0cm	Main	46	5230	10.66	11.00	1.081	76.19	1.313	0.06	1.010	1.434
	WLAN5GHz	802.11n-HT40 MCS0	Bottom Face	0cm	Main	38	5190	10.54	11.00	1.111	76.19	1.313	0.09	0.987	1.440
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom Face	0cm	Main	42	5210	10.98	11.00	1.006	55.26	1.810	0.08	0.711	1.294
	WLAN5GHz	802.11a 6Mbps	Edge 3	0cm	Main	44	5220	10.81	11.00	1.044	87.26	1.146	0.09	0.064	0.077
	WLAN5GHz	802.11a 6Mbps	Edge 4	0cm	Main	44	5220	10.81	11.00	1.044	87.26	1.146	-0.01	0.059	0.071
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Aux	44	5220	10.81	11.00	1.044	87.26	1.146	-0.02	0.658	0.787
	WLAN5GHz	802.11n-HT40 MCS0	Bottom Face	0cm	Aux	46	5230	10.66	11.00	1.081	76.19	1.313	-0.03	0.600	0.852
	WLAN5GHz	802.11n-HT40 MCS0	Bottom Face	0cm	Aux	38	5190	10.54	11.00	1.111	76.19	1.313	0.16	0.632	0.922
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom Face	0cm	Aux	42	5210	10.98	11.00	1.006	55.26	1.810	0.06	0.456	0.830
	WLAN5GHz	802.11a 6Mbps	Edge 1	0cm	Aux	44	5220	10.81	11.00	1.044	87.26	1.146	-0.08	0.053	0.063
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Main	64	5320	10.84	11.00	1.037	87.26	1.146	0.12	1.220	1.450
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Main	52	5260	10.74	11.00	1.061	87.26	1.146	0.17	1.130	1.374
	WLAN5GHz	802.11n-HT40 MCS0	Bottom Face	0cm	Main	54	5270	10.81	11.00	1.044	76.19	1.313	-0.02	1.010	1.385
	WLAN5GHz	802.11n-HT40 MCS0	Bottom Face	0cm	Main	62	5310	10.61	11.00	1.094	76.19	1.313	0.06	0.953	1.369
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom Face	0cm	Main	58	5290	10.69	11.00	1.075	55.26	1.810	0.12	0.698	1.358
	WLAN5GHz	802.11a 6Mbps	Edge 3	0cm	Main	64	5320	10.84	11.00	1.037	87.26	1.146	-0.11	0.094	0.112
	WLAN5GHz	802.11a 6Mbps	Edge 4	0cm	Main	64	5320	10.84	11.00	1.037	87.26	1.146	0.02	0.014	0.017
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Aux	64	5320	10.84	11.00	1.037	87.26	1.146	-0.16	0.764	0.908
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Aux	52	5260	10.74	11.00	1.061	87.26	1.146	0.09	0.671	0.816
	WLAN5GHz	802.11n-HT40 MCS0	Bottom Face	0cm	Aux	54	5270	10.81	11.00	1.044	76.19	1.313	-0.13	0.648	0.889
	WLAN5GHz	802.11n-HT40 MCS0	Bottom Face	0cm	Aux	62	5310	10.61	11.00	1.094	76.19	1.313	0.01	0.541	0.777
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom Face	0cm	Aux	58	5290	10.69	11.00	1.075	55.26	1.810	0.03	0.409	0.796
	WLAN5GHz	802.11a 6Mbps	Edge 1	0cm	Aux	64	5320	10.84	11.00	1.037	87.26	1.146	-0.19	0.052	0.062
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Main	108	5540	10.99	11.00	1.002	87.26	1.146	0.02	1.210	1.389
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Main	116	5580	10.83	11.00	1.039	87.26	1.146	0.18	1.040	1.239
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Main	128	5640	10.74	11.00	1.061	87.26	1.146	0.01	1.060	1.289
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Main	144	5720	10.81	11.00	1.045	87.26	1.146	0.03	1.120	1.342
	WLAN5GHz	802.11n-HT40 MCS0	Bottom Face	0cm	Main	110	5550	10.92	11.00	1.018	76.19	1.313	0.07	1.010	1.350
	WLAN5GHz	802.11n-HT40 MCS0	Bottom Face	0cm	Main	102	5510	10.78	11.00	1.052	76.19	1.313	0.16	0.765	1.056
	WLAN5GHz	802.11n-HT40 MCS0	Bottom Face	0cm	Main	126	5630	10.54	11.00	1.112	76.19	1.313	0.05	0.805	1.175
	WLAN5GHz	802.11n-HT40 MCS0	Bottom Face	0cm	Main	134	5670	10.59	11.00	1.099	76.19	1.313	0.03	0.918	1.324
	WLAN5GHz	802.11n-HT40 MCS0	Bottom Face	0cm	Main	142	5710	10.53	11.00	1.115	76.19	1.313	0.05	0.847	1.240
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom Face	0cm	Main	106	5530	10.60	11.00	1.098	55.26	1.810	0.04	0.622	1.236
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom Face	0cm	Main	122	5610	10.53	11.00	1.115	55.26	1.810	0.04	0.579	1.169
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom Face	0cm	Main	138	5690	10.43	11.00	1.140	55.26	1.810	0.05	0.602	1.242
	WLAN5GHz	802.11a 6Mbps	Edge 3	0cm	Main	108	5540	10.99	11.00	1.002	87.26	1.146	-0.06	0.076	0.087
	WLAN5GHz	802.11a 6Mbps	Edge 4	0cm	Main	108	5540	10.99	11.00	1.002	87.26	1.146	0.02	0.015	0.017
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Aux	108	5540	10.99	11.00	1.002	87.26	1.146	0.15	0.610	0.700
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Aux	116	5580	10.83	11.00	1.039	87.26	1.146	-0.05	0.525	0.625
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Aux	128	5640	10.74	11.00	1.061	87.26	1.146	0.01	0.544	0.662
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Aux	144	5720	10.81	11.00	1.045	87.26	1.146	0.03	0.715	0.856
	WLAN5GHz	802.11n-HT40 MCS0	Bottom Face	0cm	Aux	110	5550	10.92	11.00	1.018	76.19	1.313	0.16	0.535	0.715
	WLAN5GHz	802.11n-HT40 MCS0	Bottom Face	0cm	Aux	102	5510	10.78	11.00	1.052	76.19	1.313	0.03	0.514	0.710
	WLAN5GHz	802.11n-HT40 MCS0	Bottom Face	0cm	Aux	126	5630	10.54	11.00	1.112	76.19	1.313	0.04	0.438	0.639
	WLAN5GHz	802.11n-HT40 MCS0	Bottom Face	0cm	Aux	134	5670	10.59	11.00	1.099	76.19	1.313	0.12	0.471	0.679
	WLAN5GHz	802.11n-HT40 MCS0	Bottom Face	0cm	Aux	142	5710	10.53	11.00	1.115	76.19	1.313	0.09	0.532	0.779
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom Face	0cm	Aux	106	5530	10.60	11.00	1.098	55.26	1.810	0.14	0.311	0.618
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom Face	0cm	Aux	122	5610	10.53	11.00	1.115	55.26	1.810	0.06	0.319	0.644
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom Face	0cm	Aux	138	5690	10.43	11.00	1.140	55.26	1.810	0.02	0.359	0.741
	WLAN5GHz	802.11a 6Mbps	Edge 1	0cm	Aux	108	5540	10.99	11.00	1.002	87.26	1.146	-0.03	0.048	0.055



Plot No.	Band	Mode	Test Position	Gap (cm)	Antenna	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Main	149	5745	10.99	11.00	1.002	87.26	1.146	0.16	1.040	1.194
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Main	157	5785	10.95	11.00	1.011	87.26	1.146	0.06	1.100	1.275
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Main	161	5805	10.98	11.00	1.004	87.26	1.146	0.03	1.110	1.277
	WLAN5GHz	802.11n-HT40 MCS0	Bottom Face	0cm	Main	151	5755	10.89	11.00	1.025	76.19	1.313	-0.17	0.829	1.116
	WLAN5GHz	802.11n-HT40 MCS0	Bottom Face	0cm	Main	159	5795	10.64	11.00	1.086	76.19	1.313	-0.16	0.878	1.252
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom Face	0cm	Main	155	5775	10.57	11.00	1.105	55.26	1.810	0.07	0.532	1.064
	WLAN5GHz	802.11a 6Mbps	Edge 3	0cm	Main	149	5745	10.99	11.00	1.002	87.26	1.146	-0.02	0.076	0.087
	WLAN5GHz	802.11a 6Mbps	Edge 4	0cm	Main	149	5745	10.99	11.00	1.002	87.26	1.146	-0.06	0.031	0.036
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Aux	149	5745	10.99	11.00	1.002	87.26	1.146	0.07	0.823	0.945
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Aux	157	5785	10.95	11.00	1.011	87.26	1.146	-0.03	0.892	1.034
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Aux	161	5805	10.98	11.00	1.004	87.26	1.146	-0.05	0.951	1.094
	WLAN5GHz	802.11n-HT40 MCS0	Bottom Face	0cm	Aux	151	5755	10.89	11.00	1.025	76.19	1.313	0.12	0.656	0.883
	WLAN5GHz	802.11n-HT40 MCS0	Bottom Face	0cm	Aux	159	5795	10.64	11.00	1.086	76.19	1.313	0.03	0.722	1.030
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom Face	0cm	Aux	155	5775	10.57	11.00	1.105	55.26	1.810	-0.04	0.444	0.888
	WLAN5GHz	802.11a 6Mbps	Edge 1	0cm	Aux	149	5745	10.99	11.00	1.002	87.26	1.146	-0.07	0.087	0.100

16.2 Repeated SAR Measurement

No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (cm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Ratio	Reported 1g SAR (W/kg)
1st	GSM850	-	-	-	-	GPRS (4 Tx slots)	Bottom Face	0cm	ON	251	848.8	22.78	23.00	1.052	-0.13	1.010	-	1.062
2nd	GSM850	-	-	-	-	GPRS (4 Tx slots)	Bottom Face	0cm	ON	251	848.8	22.78	23.00	1.052	-0.04	0.962	1.05	1.012
1st	GSM1900	-	-	-	-	GPRS (4 Tx slots)	Bottom Face	0cm	ON	810	1909.8	17.98	18.00	1.005	0	1.050	-	1.055
2nd	GSM1900	-	-	-	-	GPRS (4 Tx slots)	Bottom Face	0cm	ON	810	1909.8	17.98	18.00	1.005	-0.06	1.030	1.02	1.035
1st	LTE Band 7	20M	QPSK	1	0	-	Edge 1	0.5cm	OFF	20850	2510	23.96	24.00	1.009	0.09	1.340	-	1.352
2nd	LTE Band 7	20M	QPSK	1	0	-	Edge 1	0.5cm	OFF	20850	2510	23.96	24.00	1.009	-0.19	1.230	1.09	1.241

No.	Band	Mode	Test Position	Gap (cm)	Antenna	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Ratio	Reported 1g SAR (W/kg)
1st	WLAN2.4GHz	802.11b 1Mbps	Bottom Face	0cm	Main	6	2437	12.81	13.00	1.044	97.63	1.024	-0.06	1.340	-	1.432
2nd	WLAN2.4GHz	802.11b 1Mbps	Bottom Face	0cm	Main	6	2437	12.81	13.00	1.044	97.63	1.024	-0.16	1.220	1.10	1.304
1st	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Main	36	5180	10.63	11.00	1.088	87.26	1.146	-0.09	1.190	-	1.484
2nd	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Main	36	5180	10.63	11.00	1.088	87.26	1.146	0.06	1.180	1.01	1.472
1st	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Main	64	5320	10.84	11.00	1.037	87.26	1.146	0.12	1.220	-	1.450
2nd	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Main	64	5320	10.84	11.00	1.037	87.26	1.146	0.17	1.100	1.11	1.307
1st	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Main	108	5540	10.99	11.00	1.002	87.26	1.146	0.02	1.210	-	1.389
2nd	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Main	108	5540	10.99	11.00	1.002	87.26	1.146	0.04	1.180	1.03	1.355
1st	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Main	161	5805	10.98	11.00	1.004	87.26	1.146	0.03	1.110	-	1.277
2nd	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Main	161	5805	10.98	11.00	1.004	87.26	1.146	0.1	1.080	1.03	1.243

General Note:

- Per KDB 865664 D01v01r03, for each frequency band, repeated SAR measurement is required only when the measured SAR is $\geq 0.8W/kg$
- Per KDB 865664 D01v01r03, if the ratio among the repeated measurement is ≤ 1.2 and the measured SAR $< 1.45W/kg$, only one repeated measurement is required.
- The ratio is the difference in percentage between original and repeated *measured SAR*.
- All measurement SAR result is scaled-up to account for tune-up tolerance and is compliant.

17. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations	Tablet	Note
		Body	
1.	GPRS/EDGE(Data) + WLAN2.4GHz(data)	Yes	2.4GHz Hotspot
2.	WCDMA(Data) + WLAN2.4GHz(data)	Yes	2.4GHz Hotspot
3.	LTE(Data) + WLAN2.4GHz(data)	Yes	2.4GHz Hotspot
4.	GPRS/EDGE(Data) + Bluetooth(data)	Yes	
5.	WCDMA(Data) + Bluetooth(data)	Yes	
6.	LTE(Data) + Bluetooth(data)	Yes	
7.	GPRS/EDGE(data) + WLAN5GHz(data)	No	
8.	WCDMA(data) + WLAN5GHz(data)	No	
9.	LTE(data) + WLAN5GHz(data)	No	

General Note:

1. For simultaneous transmission analysis for exposure position of edge 1 0.5cm and bottom face 1.5cm, WLAN SAR tested at 0mm separation is worse and the test data is used for conservative SAR summation.
2. WLAN and Bluetooth share the same antenna, and cannot transmit simultaneously.
3. EUT will choose either WLAN 2.4GHz or WLAN 5GHz according to the network signal condition; therefore, 2.4GHz WLAN and 5GHz WLAN will not operate simultaneously at any moment.
4. The Scaled SAR summation is calculated based on the same configuration and test position.
5. Per KDB 447498 D01v05r02, simultaneous transmission SAR is compliant if,
 - i) Scalar SAR summation < 1.6W/kg.
 - ii) $SPLSR = (SAR1 + SAR2)^{1.5} / (\text{min. separation distance, mm})$, and the peak separation distance is determined from the square root of $[(x1-x2)^2 + (y1-y2)^2 + (z1-z2)^2]$, where (x1, y1, z1) and (x2, y2, z2) are the coordinates of the extrapolated peak SAR locations in the zoom scan.
 - iii) If $SPLSR \leq 0.04$, simultaneously transmission SAR measurement is not necessary.
 - iv) Simultaneously transmission SAR measurement, and the reported multi-band SAR < 1.6W/kg.
 - v) The SPLSR calculated results please refer to section 17.2.
6. For simultaneous transmission analysis, Bluetooth SAR is estimated per KDB 447498 D01v05r02 based on the formula below.
 - i) $(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm}) \cdot [\sqrt{f(\text{GHz})/x}] \text{ W/kg}$ for test separation distances $\leq 50 \text{ mm}$; where $x = 7.5$ for 1-g SAR, and $x = 18.75$ for 10-g SAR.
 - ii) When the minimum separation distance is < 5mm, the distance is used 5mm to determine SAR test exclusion.
 - iii) 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the test separation distances is > 50 mm.
 - iv) Bluetooth estimated SAR is conservatively determined by 5mm separation, for all applicable exposure positions.

Bluetooth Max Power	Exposure Position	All Positions
0 dBm	Estimated SAR (W/kg)	0.042 W/kg



17.1 Body Exposure Conditions

WWAN Band		Exposure Position	1	2	1+2 Summed SAR (W/kg)	SPLSR	Case No
			WWAN	2.4GHz WLAN Main Ant			
			SAR (W/kg)	SAR (W/kg)			
GSM	GSM850	Bottom Face at 1.5 cm	0.307	1.432	1.74	0.03	Case 1
		Edge1 at 0.5 cm	0.363		0.36		
		Bottom Face at 0cm	1.128	1.432	2.56	0.02	Case 2
		Edge1 at 0cm	0.169		0.17		
		Edge2 at 0cm	0.446		0.45		
		Edge4 at 0cm	0.453	0.035	0.49		
	GSM1900	Bottom Face at 1.5 cm	0.508	1.432	1.94	0.01	Case 3
		Edge1 at 0.5 cm	0.306		0.31		
		Bottom Face at 0cm	1.147	1.432	2.58	0.02	Case 4
		Edge1 at 0cm	0.139		0.14		
Edge2 at 0cm		0.386		0.39			
WCDMA	Band V	Bottom Face at 1.5 cm	0.282	1.432	1.71	0.01	Case 5
		Edge1 at 0.5 cm	0.389		0.39		
		Bottom Face at 0cm	1.106	1.432	2.54	0.02	Case 6
		Edge1 at 0cm	0.077		0.08		
		Edge2 at 0cm	0.535		0.54		
	Band II	Bottom Face at 1.5 cm	0.537	1.432	1.97	0.01	Case 7
		Edge1 at 0.5 cm	0.336		0.34		
		Bottom Face at 0cm	1.177	1.432	2.61	0.02	Case 8
		Edge1 at 0cm	0.126		0.13		
		Edge2 at 0cm	0.503		0.50		
LTE	Band 7	Bottom Face at 1.5 cm	1.266	1.432	2.70	0.02	Case 9
		Edge1 at 0.5 cm	1.352		1.35		
		Bottom Face at 0cm	0.943	1.432	2.38	0.02	Case 10
		Edge1 at 0cm	0.302		0.30		
		Edge2 at 0cm	0.503		0.50		

WWAN Band		Exposure Position	1	3	1+3 Summed SAR (W/kg)	SPLSR	Case No	
			WWAN SAR (W/kg)	2.4GHz WLAN Aux Ant SAR (W/kg)				
GSM	GSM850	Bottom Face at 1.5 cm	0.307	1.066	1.37			
		Edge1 at 0.5 cm	0.363	0.051	0.41			
		Bottom Face at 0cm	1.128	1.066	2.19	0.04	Case 11	
		Edge1 at 0cm	0.169	0.051	0.22			
		Edge2 at 0cm	0.446		0.45			
		Edge4 at 0cm	0.453		0.45			
		GSM1900	Bottom Face at 1.5 cm	0.508	1.066	1.57		
			Edge1 at 0.5 cm	0.306	0.051	0.36		
			Bottom Face at 0cm	1.147	1.066	2.21	0.04	Case 12
			Edge1 at 0cm	0.139	0.051	0.19		
	Edge2 at 0cm		0.386		0.39			
WCDMA	Band V	Bottom Face at 1.5 cm	0.282	1.066	1.35			
		Edge1 at 0.5 cm	0.389	0.051	0.44			
		Bottom Face at 0cm	1.106	1.066	2.17	0.04	Case 13	
		Edge1 at 0cm	0.077	0.051	0.13			
		Edge2 at 0cm	0.535		0.54			
		Band II	Bottom Face at 1.5 cm	0.537	1.066	1.60	0.02	Case 14
			Edge1 at 0.5 cm	0.336	0.051	0.39		
			Bottom Face at 0cm	1.177	1.066	2.24	0.04	Case 15
			Edge1 at 0cm	0.126	0.051	0.18		
			Edge2 at 0cm	0.503		0.50		
LTE	Band 7	Bottom Face at 1.5 cm	1.266	1.066	2.33	0.04	Case 16	
		Edge1 at 0.5 cm	1.352	0.051	1.40			
		Bottom Face at 0cm	0.943	1.066	2.01	0.03	Case 17	
		Edge1 at 0cm	0.302	0.051	0.35			
		Edge2 at 0cm	0.503		0.50			



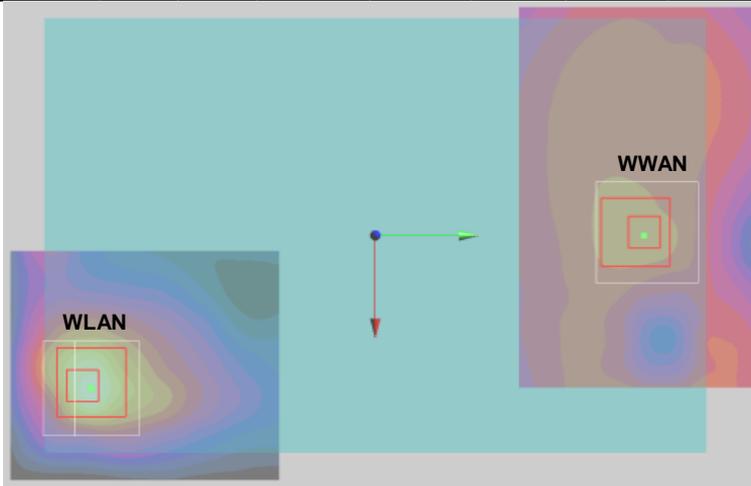
WWAN Band		Exposure Position	1	4	1+4 Summed SAR (W/kg)	SPLSR	Case No	
			WWAN SAR (W/kg)	2.4GHz Bluetooth Estimated SAR (W/kg)				
GSM	GSM850	Bottom Face at 1.5 cm	0.307	0.042	0.35			
		Edge1 at 0.5 cm	0.363	0.042	0.41			
		Bottom Face at 0cm	1.128	0.042	1.17			
		Edge1 at 0cm	0.169	0.042	0.21			
		Edge2 at 0cm	0.446	0.042	0.49			
		Edge4 at 0cm	0.453	0.042	0.50			
		GSM1900	Bottom Face at 1.5 cm	0.508	0.042	0.55		
			Edge1 at 0.5 cm	0.306	0.042	0.35		
			Bottom Face at 0cm	1.147	0.042	1.19		
			Edge1 at 0cm	0.139	0.042	0.18		
	Edge2 at 0cm		0.386	0.042	0.43			
WCDMA	Band V	Bottom Face at 1.5 cm	0.282	0.042	0.32			
		Edge1 at 0.5 cm	0.389	0.042	0.43			
		Bottom Face at 0cm	1.106	0.042	1.15			
		Edge1 at 0cm	0.077	0.042	0.12			
		Edge2 at 0cm	0.535	0.042	0.58			
		Band II	Bottom Face at 1.5 cm	0.537	0.042	0.58		
			Edge1 at 0.5 cm	0.336	0.042	0.38		
			Bottom Face at 0cm	1.177	0.042	1.22		
			Edge1 at 0cm	0.126	0.042	0.17		
			Edge2 at 0cm	0.503	0.042	0.55		
LTE	Band 7	Bottom Face at 1.5 cm	1.266	0.042	1.31			
		Edge1 at 0.5 cm	1.352	0.042	1.39			
		Bottom Face at 0cm	0.943	0.042	0.99			
		Edge1 at 0cm	0.302	0.042	0.34			
		Edge2 at 0cm	0.503	0.042	0.55			

17.2 SPLSR Evaluation and Analysis

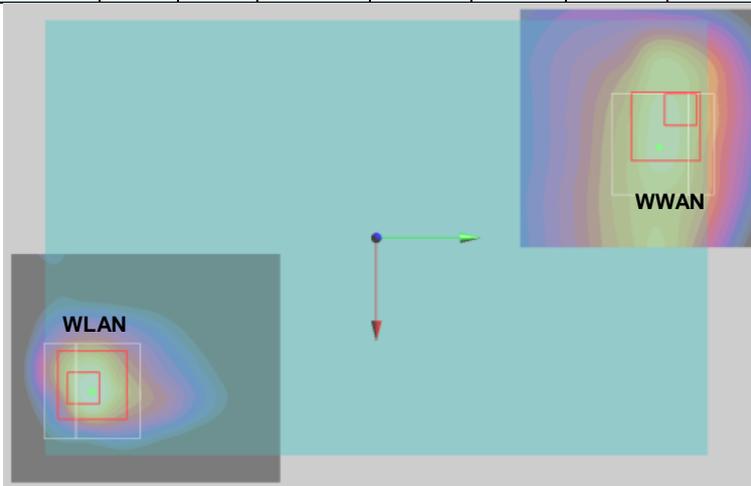
General Note:

- SPLSR = $(SAR_1 + SAR_2)^{1.5} / (\text{min. separation distance, mm})$. If $SPLSR \leq 0.04$, simultaneously transmission SAR measurement is not necessary

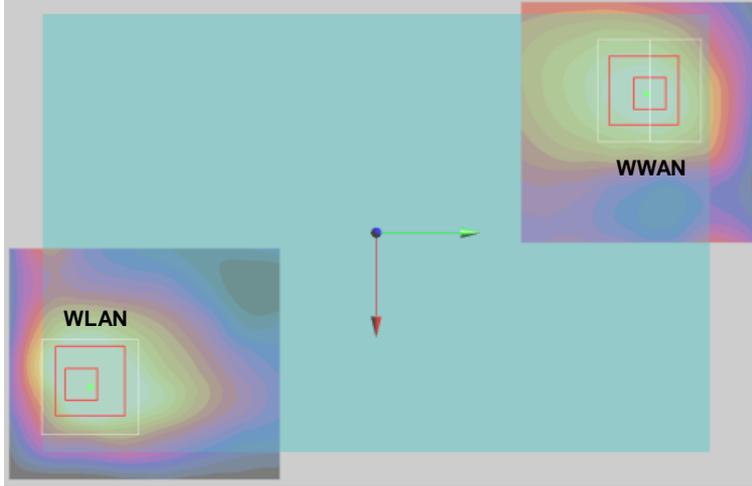
Case 1	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
	GSM850				X	Y	Z				
	2.4GHz_Main	Bottom Face	0.307	1.5	-0.044	0.099	-0.176	85.2	1.74	0.03	Not required
			1.432	0	0.0398	0.0838	-0.177				



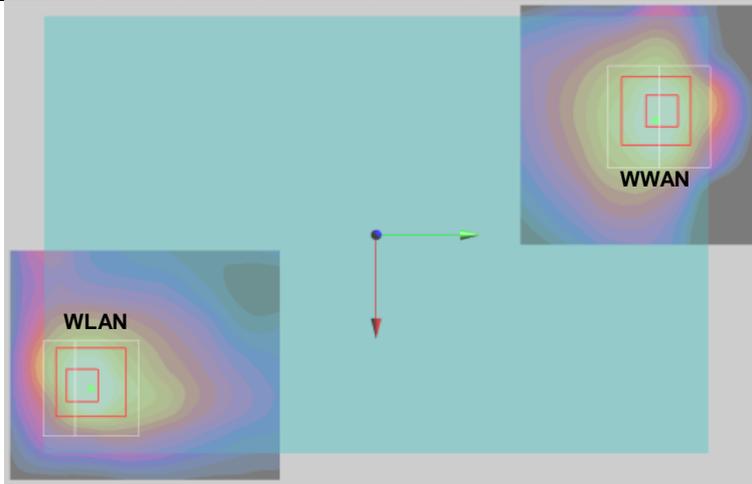
Case 2	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
	GSM850				X	Y	Z				
	2.4GHz_Main	Bottom Face	1.128	0	-0.0455	0.0975	-0.175	213.0	2.56	0.02	Not required
			1.432	0	0.0482	-0.0938	-0.177				



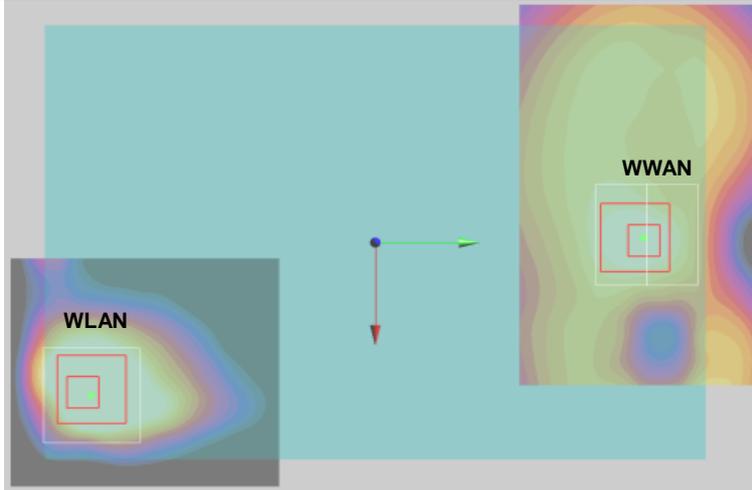
Case 3	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
	2.4GHz_Main				X	Y	Z				
	GSM1900	Bottom Face	0.508	1.5	-0.0445	0.085	-0.178	201.4	1.94	0.01	Not required
	2.4GHz_Main		1.432	0	0.0482	-0.0938	-0.177				



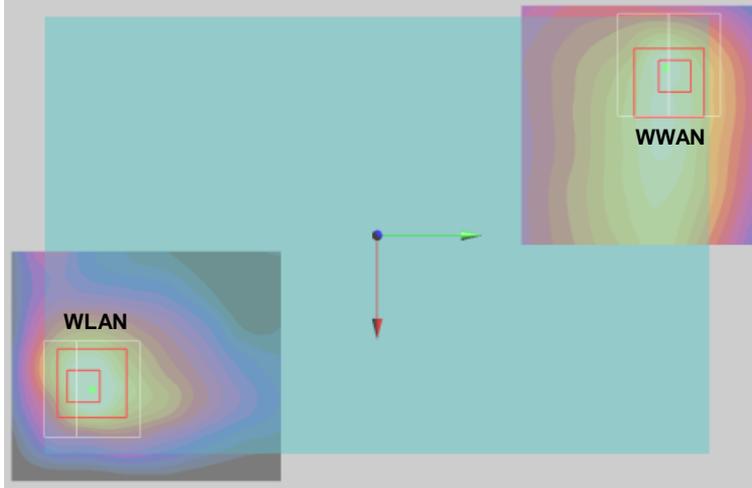
Case 4	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
	2.4GHz_Main				X	Y	Z				
	GSM1900	Bottom Face	1.147	0	-0.037	0.088	-0.176	200.8	2.58	0.02	Not required
	2.4GHz_Main		1.432	0	0.0482	-0.0938	-0.177				



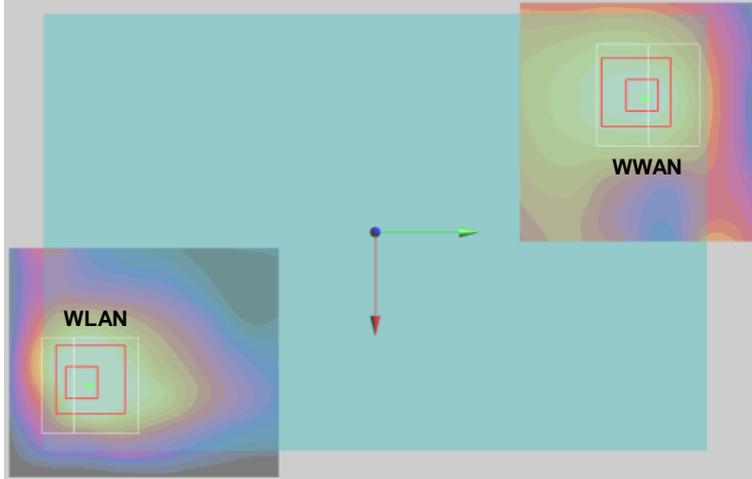
Case 5	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
	WCDMA V				X	Y	Z				
	2.4GHz_Main	Bottom Face	0.282	1.5	-0.0025	0.085	-0.179	185.9	1.71	0.01	Not required
			1.432	0	0.0482	-0.0938	-0.177				



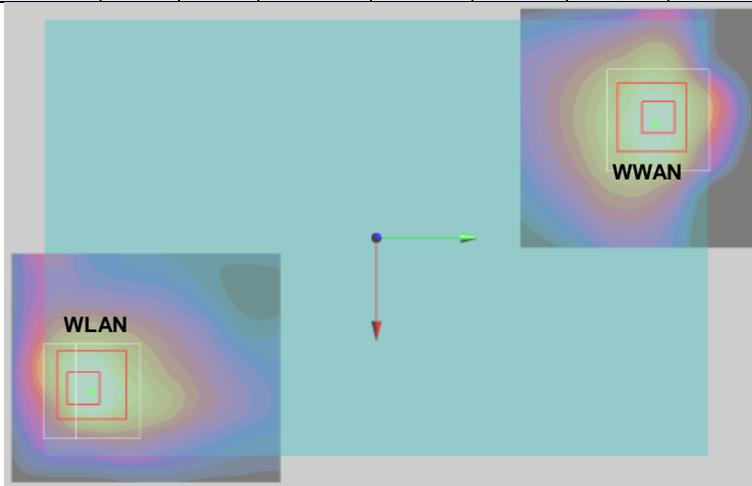
Case 6	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
	WCDMA V				X	Y	Z				
	2.4GHz_Main	Bottom Face	1.106	0	-0.0535	0.091	-0.176	210.9	2.54	0.02	Not required
			1.432	0	0.0482	-0.0938	-0.177				



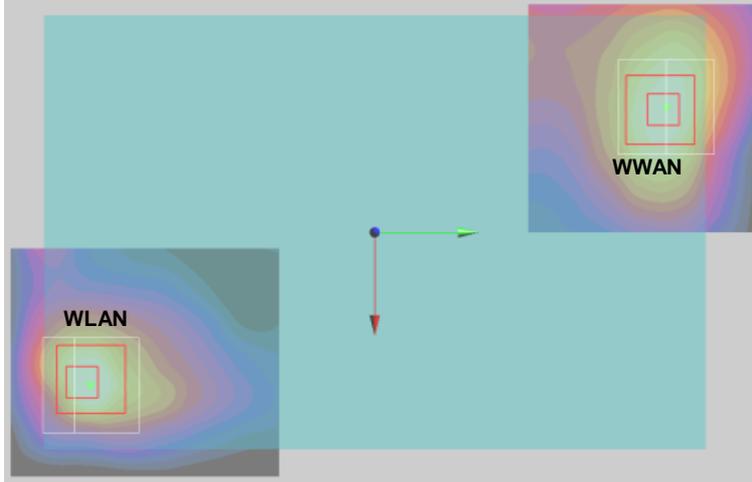
Case 7	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
					X	Y	Z				
	WCDMA II	Bottom Face	0.537	1.5	-0.043	0.085	-0.178	200.7	1.97	0.01	Not required
	2.4GHz_Main		1.432	0	0.0482	-0.0938	-0.177				



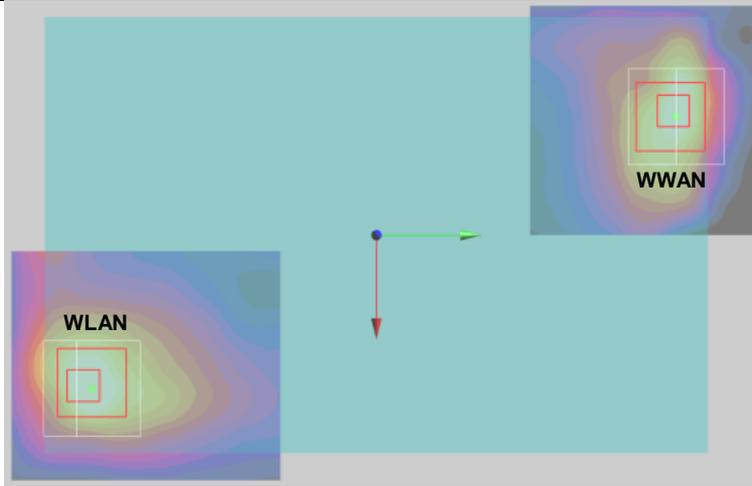
Case 8	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
					X	Y	Z				
	WCDMA II	Bottom Face	1.177	0	-0.037	0.088	-0.175	200.8	2.61	0.02	Not required
	2.4GHz_Main		1.432	0	0.0482	-0.0938	-0.177				



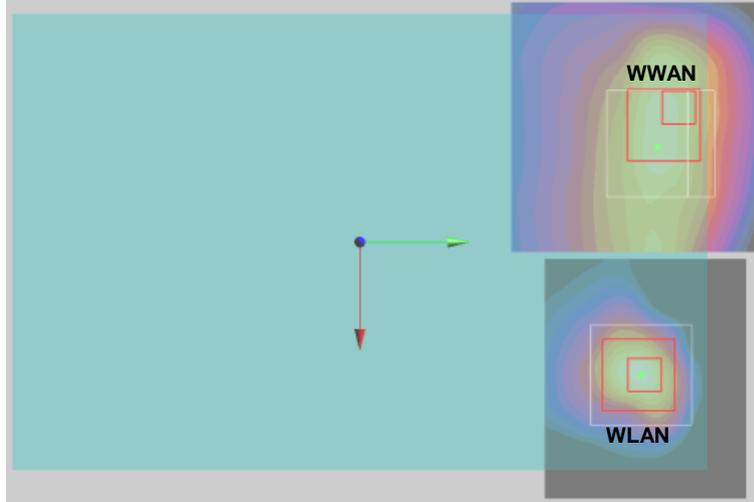
Case 9	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
	LTE Band 7				X	Y	Z				
	2.4GHz_Main	Bottom Face	1.266	1.5	-0.0396	0.0912	-0.178	204.8	2.70	0.02	Not required
			1.432	0	0.0482	-0.0938	-0.177				



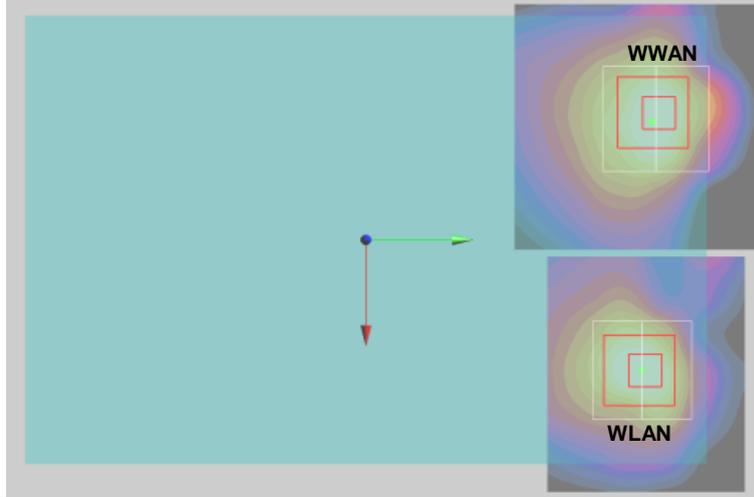
Case 10	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
	LTE Band 7				X	Y	Z				
	2.4GHz_Main	Bottom Face	0.943	0	-0.0422	0.0936	-0.174	208.1	2.38	0.02	Not required
			1.432	0	0.0482	-0.0938	-0.177				



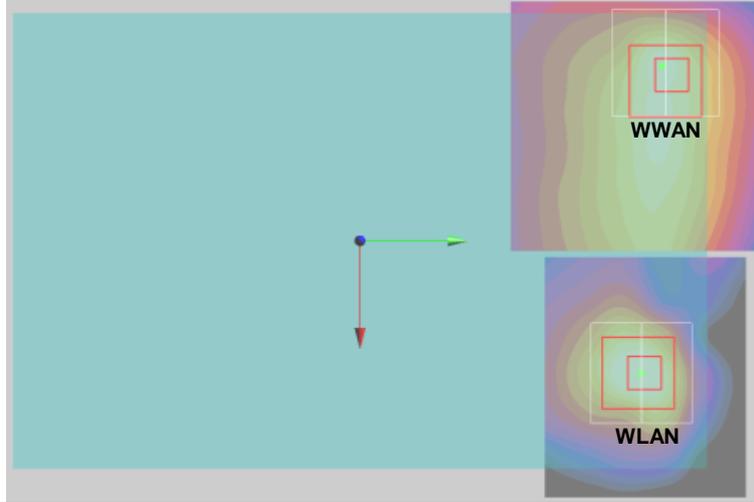
Case	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
					X	Y	Z				
11	GSM850	Bottom Face	1.128	0	-0.0455	0.0975	-0.175	86.4	2.19	0.04	Not required
	2.4GHz_Aux		1.066	0	0.0398	0.0838	-0.177				



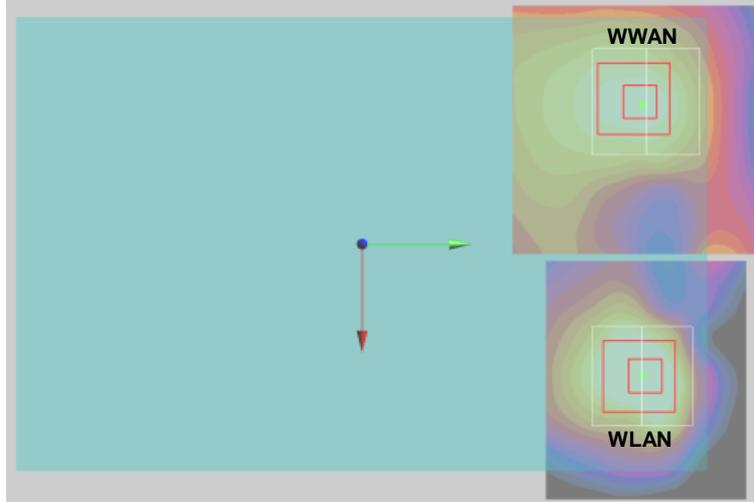
Case	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
					X	Y	Z				
12	GSM1900	Bottom Face	1.147	0	-0.037	0.088	-0.176	76.9	2.21	0.04	Not required
	2.4GHz_Aux		1.066	0	0.0398	0.0838	-0.177				



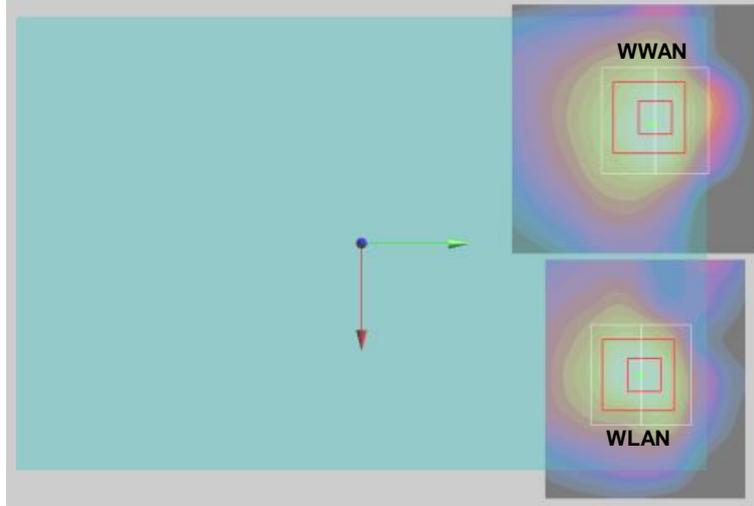
Case 13	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
					X	Y	Z				
	WCDMA V	Bottom Face	1.106	0	-0.037	0.088	-0.175	76.9	2.17	0.04	Not required
	2.4GHz_Aux		1.066	0	0.0398	0.0838	-0.177				



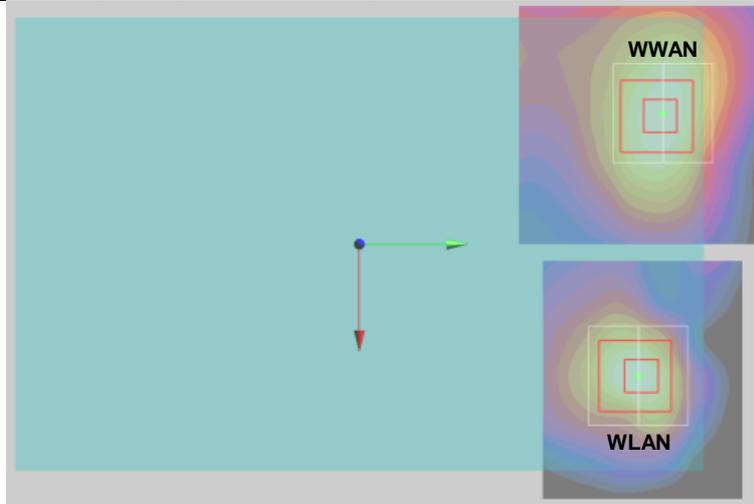
Case 14	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
					X	Y	Z				
	WCDMA II	Bottom Face	0.537	1.5	-0.043	0.085	-0.178	82.8	1.60	0.02	Not required
	2.4GHz_Aux		1.066	0	0.0398	0.0838	-0.177				



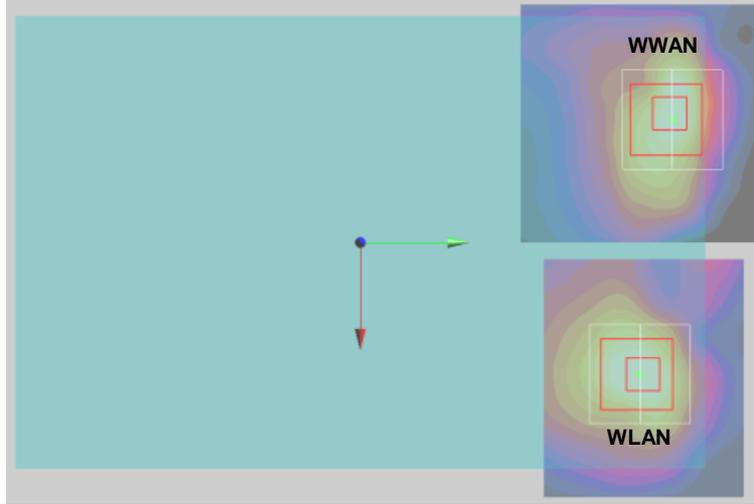
Case 15	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
	WCDMA II				X	Y	Z				
	2.4GHz_Aux	Bottom Face	1.177	0	-0.037	0.088	-0.175	76.9	2.24	0.04	Not required
			1.066	0	0.0398	0.0838	-0.177				



Case 16	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
	LTE Band 7				X	Y	Z				
	2.4GHz_Aux	Bottom Face	1.266	1.5	-0.0396	0.0912	-0.178	79.8	2.33	0.04	Not required
			1.066	0	0.0398	0.0838	-0.177				



Case 17	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
					X	Y	Z				
	LTE Band 7	Bottom Face	0.943	0	-0.0422	0.0936	-0.174	82.6	2.01	0.03	Not required
	2.4GHz_Aux		1.066	0	0.0398	0.0838	-0.177				



Test Engineer : Mood Huang, Tom Jiang and Domo Hsiao

18. Uncertainty Assessment

The component of uncertainty may generally be categorized according to the methods used to evaluate them. The evaluation of uncertainty by the statistical analysis of a series of observations is termed a Type A evaluation of uncertainty. The evaluation of uncertainty by means other than the statistical analysis of a series of observation is termed a Type B evaluation of uncertainty. Each component of uncertainty, however evaluated, is represented by an estimated standard deviation, termed standard uncertainty, which is determined by the positive square root of the estimated variance.

A Type A evaluation of standard uncertainty may be based on any valid statistical method for treating data. This includes calculating the standard deviation of the mean of a series of independent observations; using the method of least squares to fit a curve to the data in order to estimate the parameter of the curve and their standard deviations; or carrying out an analysis of variance in order to identify and quantify random effects in certain kinds of measurement.

A type B evaluation of standard uncertainty is typically based on scientific judgment using all of the relevant information available. These may include previous measurement data, experience, and knowledge of the behavior and properties of relevant materials and instruments, manufacture’s specification, data provided in calibration reports and uncertainties assigned to reference data taken from handbooks. Broadly speaking, the uncertainty is either obtained from an outdoor source or obtained from an assumed distribution, such as the normal distribution, rectangular or triangular distributions indicated in table below.

Uncertainty Distributions	Normal	Rectangular	Triangular	U-Shape
Multi-plying Factor ^(a)	1/k ^(b)	1/√3	1/√6	1/√2

(a) standard uncertainty is determined as the product of the multiplying factor and the estimated range of variations in the measured quantity

(b) κ is the coverage factor

Table 16.1. Standard Uncertainty for Assumed Distribution

The combined standard uncertainty of the measurement result represents the estimated standard deviation of the result. It is obtained by combining the individual standard uncertainties of both Type A and Type B evaluation using the usual “root-sum-squares” (RSS) methods of combining standard deviations by taking the positive square root of the estimated variances.

Expanded uncertainty is a measure of uncertainty that defines an interval about the measurement result within which the measured value is confidently believed to lie. It is obtained by multiplying the combined standard uncertainty by a coverage factor. Typically, the coverage factor ranges from 2 to 3. Using a coverage factor allows the true value of a measured quantity to be specified with a defined probability within the specified uncertainty range. For purpose of this document, a coverage factor two is used, which corresponds to confidence interval of about 95 %. The DASY uncertainty Budget is shown in the following tables.



Error Description	Uncertainty Value (±%)	Probability Distribution	Divisor	Ci (1g)	Ci (10g)	Standard Uncertainty (1g)	Standard Uncertainty (10g)
Measurement System							
Probe Calibration	6.0	Normal	1	1	1	± 6.0 %	± 6.0 %
Axial Isotropy	4.7	Rectangular	√3	0.7	0.7	± 1.9 %	± 1.9 %
Hemispherical Isotropy	9.6	Rectangular	√3	0.7	0.7	± 3.9 %	± 3.9 %
Boundary Effects	1.0	Rectangular	√3	1	1	± 0.6 %	± 0.6 %
Linearity	4.7	Rectangular	√3	1	1	± 2.7 %	± 2.7 %
System Detection Limits	1.0	Rectangular	√3	1	1	± 0.6 %	± 0.6 %
Readout Electronics	0.3	Normal	1	1	1	± 0.3 %	± 0.3 %
Response Time	0.8	Rectangular	√3	1	1	± 0.5 %	± 0.5 %
Integration Time	2.6	Rectangular	√3	1	1	± 1.5 %	± 1.5 %
RF Ambient Noise	3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %
RF Ambient Reflections	3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %
Probe Positioner	0.4	Rectangular	√3	1	1	± 0.2 %	± 0.2 %
Probe Positioning	2.9	Rectangular	√3	1	1	± 1.7 %	± 1.7 %
Max. SAR Eval.	1.0	Rectangular	√3	1	1	± 0.6 %	± 0.6 %
Test Sample Related							
Device Positioning	2.9	Normal	1	1	1	± 2.9 %	± 2.9 %
Device Holder	3.6	Normal	1	1	1	± 3.6 %	± 3.6 %
Power Drift	5.0	Rectangular	√3	1	1	± 2.9 %	± 2.9 %
Phantom and Setup							
Phantom Uncertainty	4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %
Liquid Conductivity (Target)	5.0	Rectangular	√3	0.64	0.43	± 1.8 %	± 1.2 %
Liquid Conductivity (Meas.)	2.5	Normal	1	0.64	0.43	± 1.6 %	± 1.1 %
Liquid Permittivity (Target)	5.0	Rectangular	√3	0.6	0.49	± 1.7 %	± 1.4 %
Liquid Permittivity (Meas.)	2.5	Normal	1	0.6	0.49	± 1.5 %	± 1.2 %
Combined Standard Uncertainty						± 11.0 %	± 10.8 %
Coverage Factor for 95 %						K=2	
Expanded Uncertainty						± 22.0 %	± 21.5 %

Table 16.2. Uncertainty Budget for frequency range 300 MHz to 3 GHz

Error Description	Uncertainty Value (±%)	Probability Distribution	Divisor	Ci (1g)	Ci (10g)	Standard Uncertainty (1g)	Standard Uncertainty (10g)
Measurement System							
Probe Calibration	6.55	Normal	1	1	1	± 6.55 %	± 6.55 %
Axial Isotropy	4.7	Rectangular	√3	0.7	0.7	± 1.9 %	± 1.9 %
Hemispherical Isotropy	9.6	Rectangular	√3	0.7	0.7	± 3.9 %	± 3.9 %
Boundary Effects	2.0	Rectangular	√3	1	1	± 1.2 %	± 1.2 %
Linearity	4.7	Rectangular	√3	1	1	± 2.7 %	± 2.7 %
System Detection Limits	1.0	Rectangular	√3	1	1	± 0.6 %	± 0.6 %
Readout Electronics	0.3	Normal	1	1	1	± 0.3 %	± 0.3 %
Response Time	0.8	Rectangular	√3	1	1	± 0.5 %	± 0.5 %
Integration Time	2.6	Rectangular	√3	1	1	± 1.5 %	± 1.5 %
RF Ambient Noise	3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %
RF Ambient Reflections	3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %
Probe Positioner	0.8	Rectangular	√3	1	1	± 0.5 %	± 0.5 %
Probe Positioning	9.9	Rectangular	√3	1	1	± 5.7 %	± 5.7 %
Max. SAR Eval.	4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %
Test Sample Related							
Device Positioning	2.9	Normal	1	1	1	± 2.9 %	± 2.9 %
Device Holder	3.6	Normal	1	1	1	± 3.6 %	± 3.6 %
Power Drift	5.0	Rectangular	√3	1	1	± 2.9 %	± 2.9 %
Phantom and Setup							
Phantom Uncertainty	4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %
Liquid Conductivity (Target)	5.0	Rectangular	√3	0.64	0.43	± 1.8 %	± 1.2 %
Liquid Conductivity (Meas.)	2.5	Normal	1	0.64	0.43	± 1.6 %	± 1.1 %
Liquid Permittivity (Target)	5.0	Rectangular	√3	0.6	0.49	± 1.7 %	± 1.4 %
Liquid Permittivity (Meas.)	2.5	Normal	1	0.6	0.49	± 1.5 %	± 1.2 %
Combined Standard Uncertainty						± 12.8 %	± 12.6 %
Coverage Factor for 95 %						K=2	
Expanded Uncertainty						± 25.6 %	± 25.2 %

Table 16.3. Uncertainty Budget for frequency range 3 GHz to 6 GHz



19. References

- [1] FCC 47 CFR Part 2 "Frequency Allocations and Radio Treaty Matters; General Rules and Regulations"
- [2] ANSI/IEEE Std. C95.1-1992, "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz", September 1992
- [3] IEEE Std. 1528-2003, "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- [4] SPEAG DASY System Handbook
- [5] FCC KDB 248227 D01 v01r02, "SAR Measurement Procedures for 802.11 a/b/g Transmitters", May 2007
- [6] FCC KDB 447498 D01 v05r02, "Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies", Feb 2014
- [7] FCC KDB 941225 D01 v03, "3G SAR MEAUREMENT PROCEDURES", Oct 2014
- [8] FCC KDB 941225 D05 v02r03, "SAR Evaluation Considerations for LTE Devices", Dec 2013
- [9] FCC KDB 616217 D04 v01r01, "SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers", May 2013
- [10] FCC KDB 865664 D01 v01r03, "SAR Measurement Requirements for 100 MHz to 6 GHz", Feb 2014.
- [11] FCC KDB 865664 D02 v01r01, "RF Exposure Compliance Reporting and Documentation Considerations" May 2013.