FCC SAR Test Report

APPLICANT	:	**Nyle Oswind Parry Limited Liability Company**
EQUIPMENT	:	**Tablet PC**
MODEL NAME	:	**GUR78EC**
FCC ID	:	**2ABO6-1229**
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

Testing Laboratory
1190

SPORTON INTERNATIONAL INC.

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA432436-11	Rev. 01	Initial issue of report	Aug. 08, 2014
FA432436-11	Rev. 02	In section5, added the verification of the proximity sensor power reduction.	Aug. 25, 2014

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **Nyle Oswind Parry Limited Liability Company, Tablet PC, GUR78EC**, are as follows.

Equipment Class	Frequency Band	Highest SAR Summary	
		Body 1g SAR (W/kg)	Simultaneous Transmission 1g SAR (W/kg)
PCB	GSM850	1.19	1.35
	WCDMA Band V	1.19	
DTS	WLAN 2.4GHz Band	1.19	1.35
NII	WLAN 5.2GHz Band	**1.30**	1.30
	WLAN 5.3GHz Band	1.24	
	WLAN 5.5GHz Band	1.29	
	WLAN 5.8GHz Band	1.19	
Date of Testing:		05/07/2014 ~ 07/21/2014	

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 1st 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	Nyle Oswind Parry Limited Liability Company
Address	7027 Old Madison Pike, Suite 108, Huntsville, Alabama 35806

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 644545 D01 Guidance for IEEE 802 11ac v01r02
- FCC KDB 616217 D04 SAR for laptop and tablets v01r01
- FCC KDB 941225 D01 SAR test for 3G devices v02
- FCC KDB 941225 D02 HSPA and 1x Advanced v02r02
- FCC KDB 941225 D03 SAR Test Reduction GSM GPRS EDGE v01

4. Equipment Under Test (EUT)

4.1 General Information

Product Feature & Specification	
Equipment Name	Tablet PC
Model Name	GUR78EC
FCC ID	2ABO6-1229
S/N	B08C040442330051
Wireless Technology and Frequency Range	GSM850: 824.2 MHz ~ 848.8 MHz WCDMA Band V: 826.4 MHz ~ 846.6 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
Mode	• GPRS/EGPRS • RMC 12.2Kbps • HSDPA • HSUPA • DC-HSDPA • 802.11a/b/g/n/ac HT20/HT40/VHT20/VHT40/VHT80 • Bluetooth v3.0+EDR，Bluetooth v4.0-LE
Remark: 1. 5GHz WLAN operation in 5600 MHz ~ 5650 MHz is notched.	

4.2 Maximum Tune-up Limit

Band	Burst average power (dBm)	
	GSM 850	
Output Power Status	Full Power Mode	Reduced Power Mode
GPRS/EDGE (GMSK, 1 Tx slot)	33.5	26.0
GPRS/EDGE (GMSK, 2 Tx slots)	32.0	23.5
EDGE (8PSK, 1 Tx slot)	27.5	26.0
EDGE (8PSK, 2 Tx slots)	27.5	23.0

Band	average power (dBm)	
	WCDMA V	
Output Power Status	Full Power Mode	Reduced Power Mode
RMC 12.2Kbps	23.5	17.5
HSDPA Subset 1	22.5	16.5
DC-HSDPA Subset 1	22.5	16.5
HSUPA Subset 5	22.5	16.5

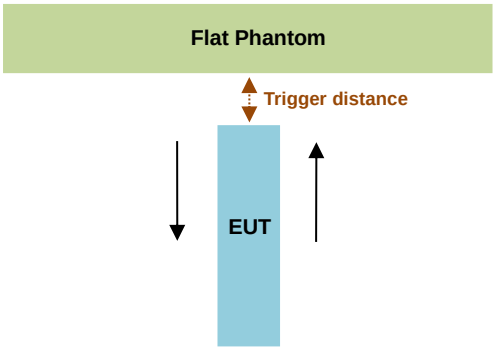
Band / Mode	Average power(dBm)			
	v3.0+EDR			v4.0-LE
	1Mbps	2Mbps	3Mbps	
2.4 GHz Bluetooth	9.5	6	6	6

Band / Mode	IEEE 802.11 average power(dBm)		
	Antenna 1	Antenna 2	Antenna 1+2
2.4GHz Band	15.5	15.5	18.5
5.2GHz Band	12.5	12.5	15.5
5.3GHz Band	13.0	11.5	15.3
5.5GHz Band	13.0	11.5	15.3
5.8GHz Band	13.0	13.0	16.0

5. *Proximity Sensor Triggering Test*

<Proximity Sensor Triggering Distance (KDB 616217 D04 section 6.2)>:

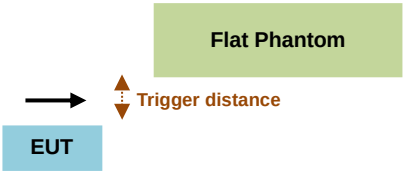
Proximity sensor triggering distance testing was performed according to the procedures outlined in KDB 616217 D04 section 6.2, and EUT moving further away from the flat phantom and EUT moving toward the flat phantom were both assessed. The details are illustrated in the exhibit “P-Sensor operational description”, and the shortest triggering distances were reported and used for SAR assessment.
In the preliminary triggering distance testing, the tissue-equivalent medium for different frequency bands were used for verification; no other frequency bands tissue-equivalent medium was found to result in shortest triggering distance than that for 1900MHz, and the tissue-equivalent medium for 1900MHz was used for formal proximity sensor triggering testing.



Proximity Sensor Trigger Distance (mm)		
Position	Bottom Slant of Edge2	Edge 2
Minimum	13	14

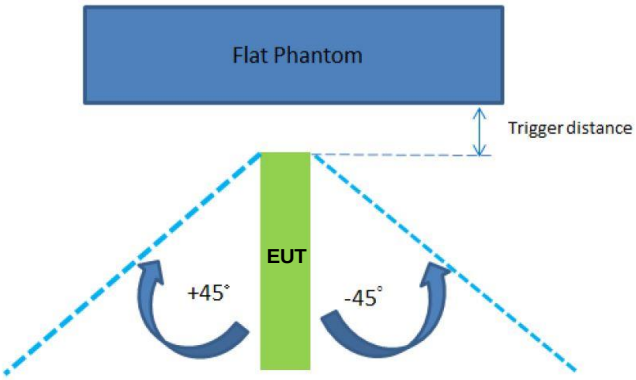
<Proximity Sensor Triggering Coverage (KDB 616217 D04 section 6.3)>:

If a sensor is spatially offset from the antenna(s), it is necessary to verify sensor triggering for conditions where the antenna is next to the user but the sensor is laterally further away to ensure sensor coverage is sufficient for reducing the power to maintain compliance. For p-sensor coverage testing, the device is moved and “along the direction of maximum antenna and sensor offset”.



<Tablet Tilt angle influences to proximity sensor triggering (KDB 616217 D04 section 6.4)>:

The influence of table tilt angles to proximity sensor triggering was determined by positioning each tablet edge that contains a transmitting antenna, perpendicular to the flat phantom, at 14 mm separation.
Rotating the tablet around the edge next to the phantom in ≤ 10° increments until the tablet is ± 45° from the vertical position at 0, and the maximum output power remains in the reduced mode.



The Sensor Trigger Distance (mm)	
Position	Edge 2
Minimum	14

Proximity sensor power reduction

Exposure Position / wireless mode	Bottom Slant of Edge 2[(1)]	Bottom Face[(1)]	Edge 2[(1)]	Edge 1	Edge 3	Edge 4
GSM850 GPRS (GMSK 1 Tx slot) - CS1	7.5 dB	7.5 dB	7.5 dB	0 dB	0 dB	0 dB
GSM850 GPRS (GMSK 2 Tx slots) - CS1	8.5 dB	8.5 dB	8.5 dB			
GSM850 EDGE (8PSK 1 Tx slot) - MCS5	1.5 dB	1.5 dB	1.5 dB			
GSM850 EDGE (8PSK 2 Tx slots) - MCS5	4.5 dB	4.5 dB	4.5 dB			
WCDMA Band V	6.0 dB	6.0 dB	6.0 dB			

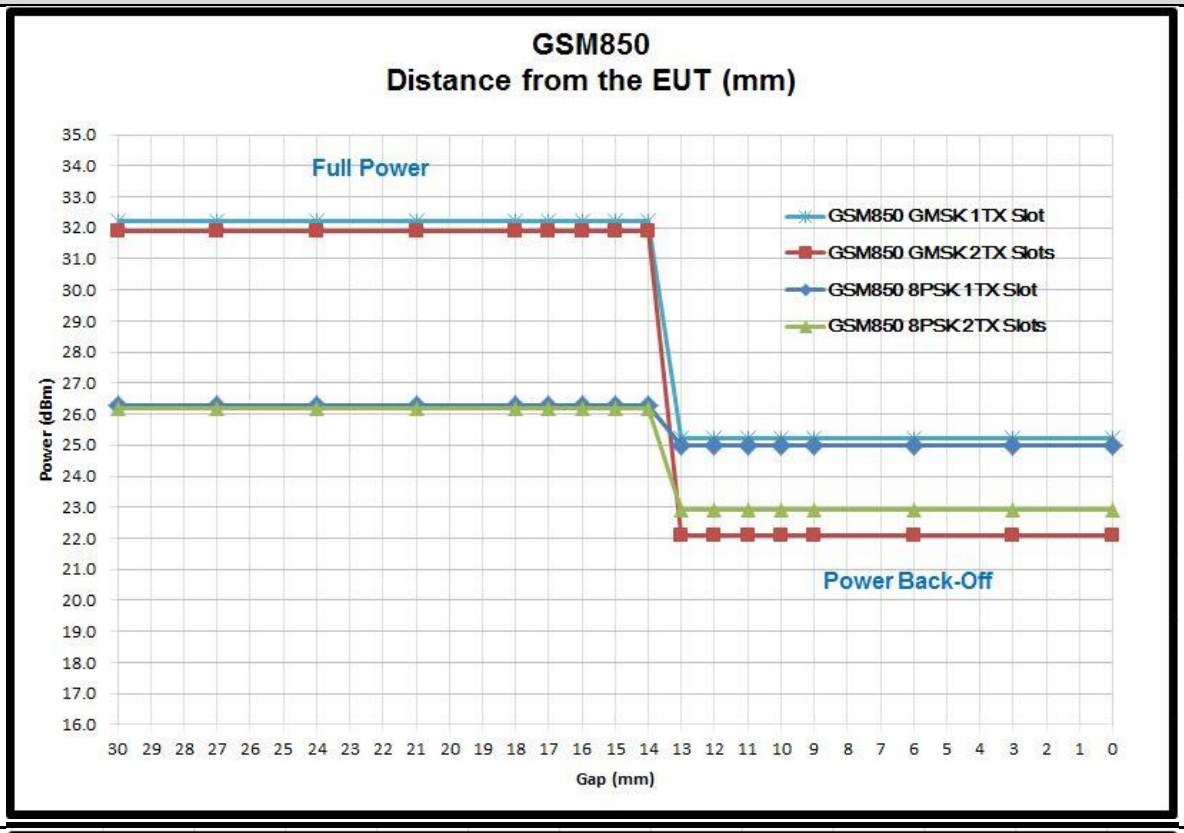
Remark:

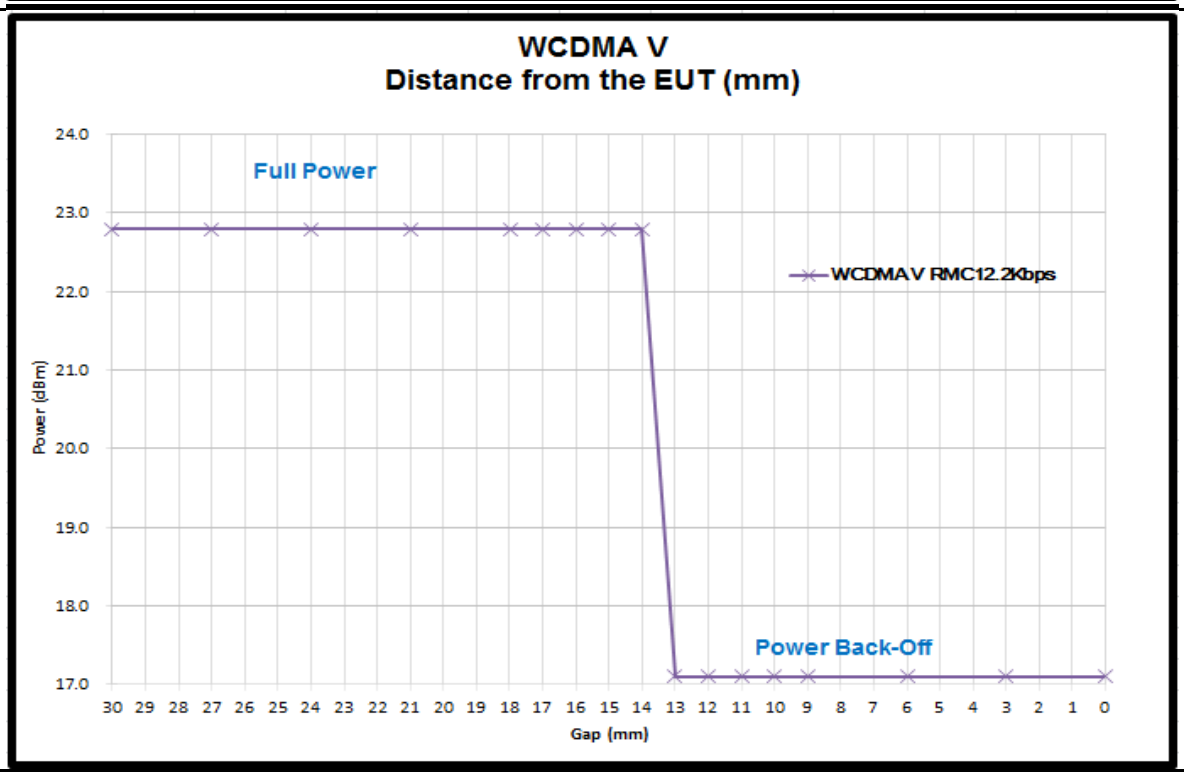
1. [(1)]: Reduced maximum limit applied by activation of proximity sensor.
2. Power reduction is not applicable for WLAN and Bluetooth.

Power Measurement during Sensor Trigger distance testing

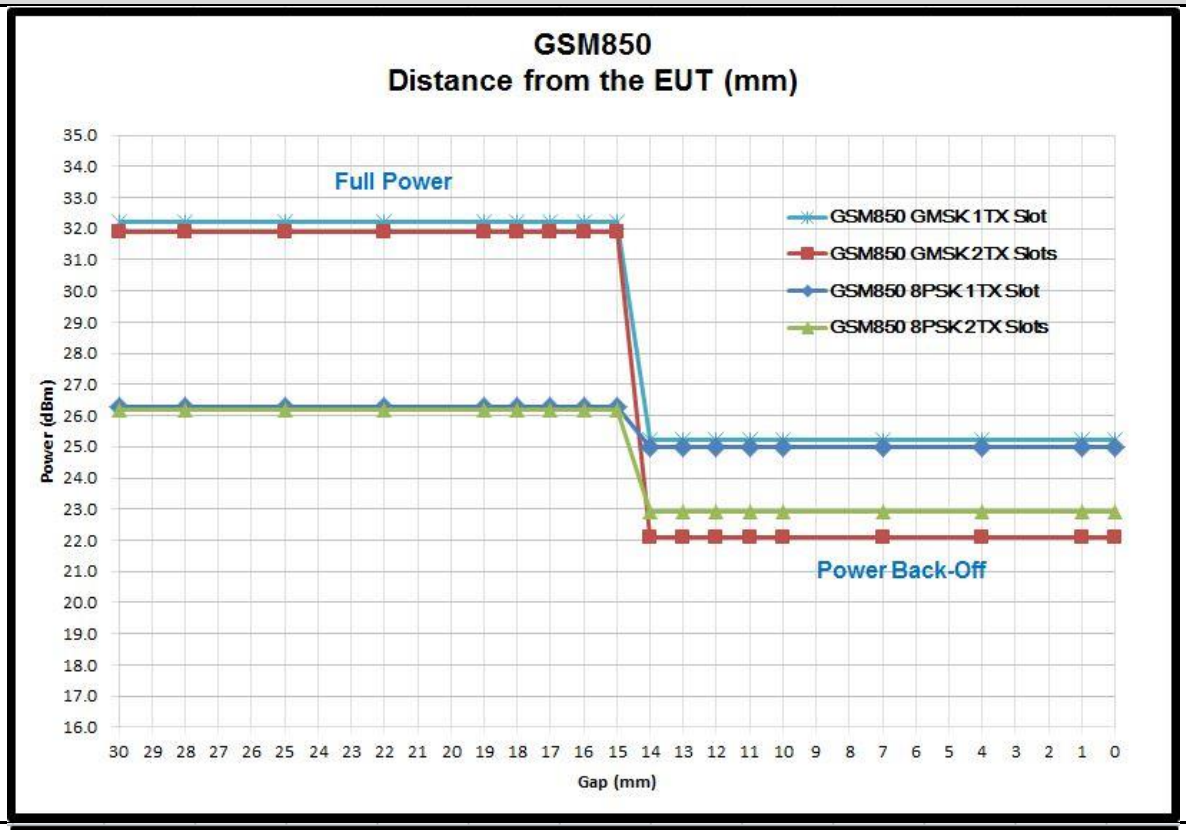
Band/Mode	CH	Measured power reduction (dBm)		Reduction Levels
		w/o power back-off	w/ power back-off	(dB)
GSM850 GPRS (GMSK 1 Tx slot)	251	32.2	25.2	7.0
GSM850 GPRS (GMSK 2 Tx slots)	251	31.9	22.1	9.8
GSM850 GPRS (8PSK 1 Tx slot)	251	26.3	25.0	1.3
GSM850 GPRS (8PSK 2 Tx slots)	251	26.2	22.9	3.3
WCDMA Band V (RMC 12.2Kbps)	4132	22.8	17.1	5.7

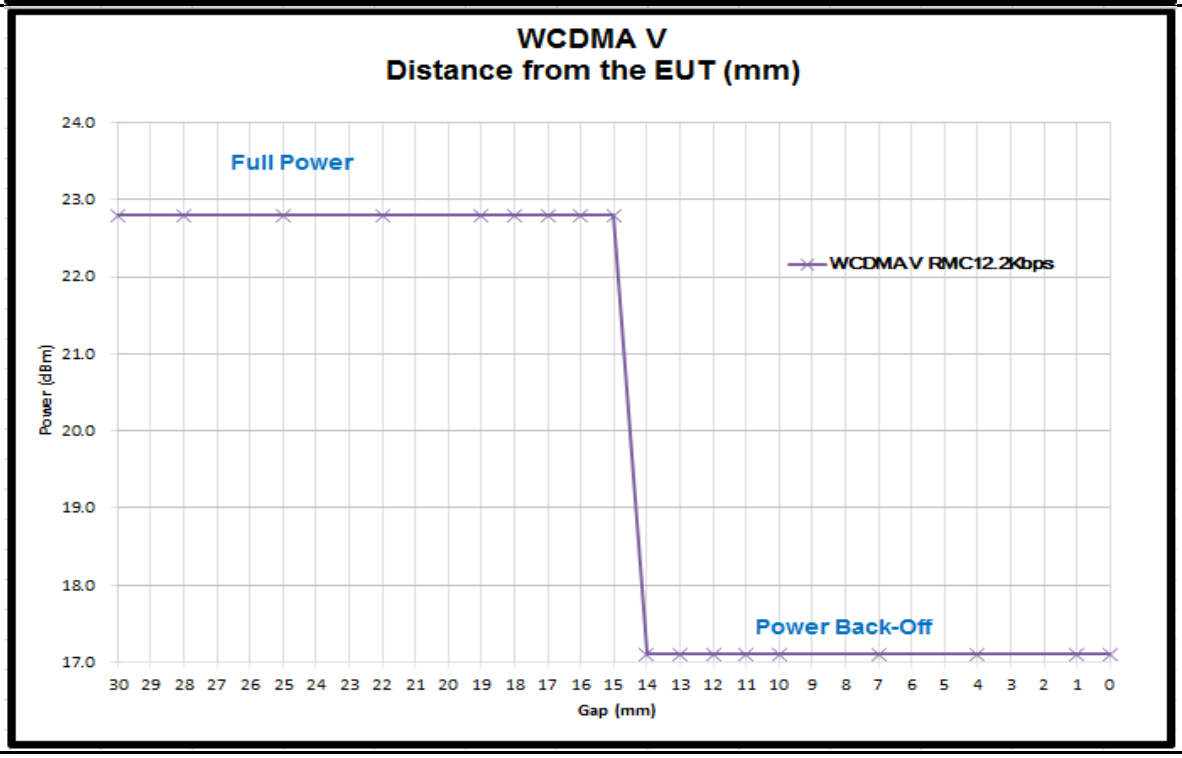
Proximity Sensor for Bottom Slant of Edge 2





Proximity Sensor for Edge 2





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:

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

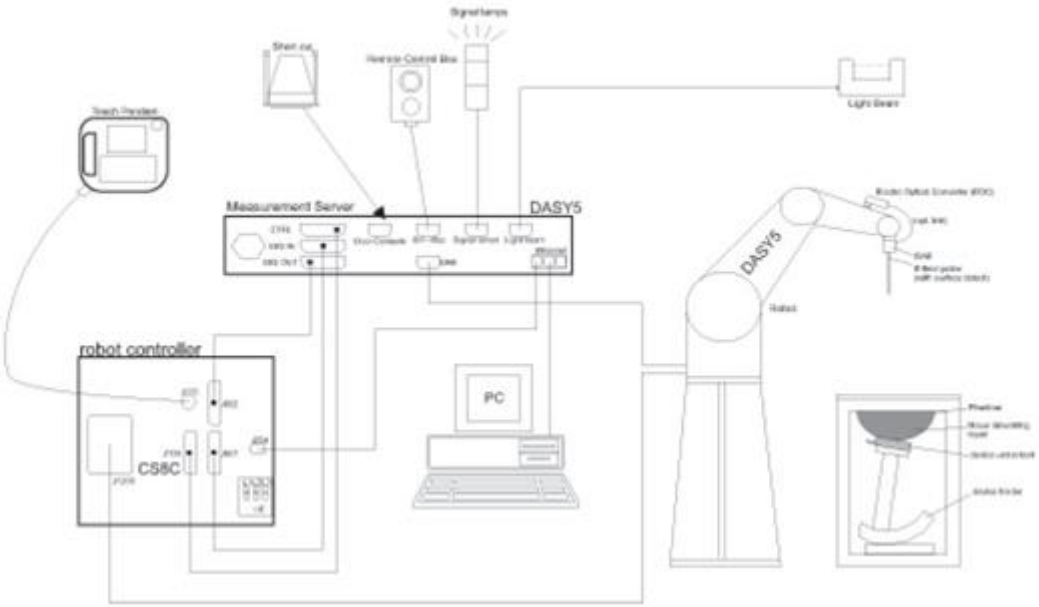
SAR is expressed in units of Watts per kilogram (W/kg)

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

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 form 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	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

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: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$	
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 *reported* SAR from the *area scan based 1-g SAR estimation* procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.

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 DASY 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	499	Mar. 24, 2014	Mar. 23, 2015
SPEAG	2450MHz System Validation Kit	D2450V2	924	Nov. 13, 2013	Nov. 12, 2014
SPEAG	5GHz System Validation Kit	D5GHzV2	1128	Jul. 24, 2013	Jul. 23, 2014
SPEAG	5GHz System Validation Kit	D5GHzV2	1040	Jun. 20, 2014	Jun. 19, 2015
SPEAG	Data Acquisition Electronics	DAE4	1338	Nov. 05, 2013	Nov. 04, 2014
SPEAG	Data Acquisition Electronics	DAE4	1425	Mar. 03, 2014	Mar. 02, 2015
SPEAG	Data Acquisition Electronics	DAE4	1279	Jan. 30, 2014	Jan. 29, 2015
SPEAG	Data Acquisition Electronics	DAE4	1399	Nov. 07, 2013	Nov. 06, 2014
SPEAG	Dosimetric E-Field Probe	EX3DV4	3935	Nov. 04, 2013	Nov. 03, 2014
SPEAG	Dosimetric E-Field Probe	EX3DV4	3954	Nov. 04, 2013	Nov. 03, 2014
SPEAG	Dosimetric E-Field Probe	EX3DV4	3955	Nov. 12, 2013	Nov. 11, 2014
Wisewind	Thermometer	ETP-101	TM560	Oct. 22, 2013	Oct. 21, 2014
Wisewind	Thermometer	ETP-101	TM685	Oct. 22, 2013	Oct. 21, 2014
H.M.IRIS	Thermometer	TH-08	TM658	Oct. 22, 2013	Oct. 21, 2014
Agilent	Wireless Communication Test Set	E5515C	MY50266977	May. 27, 2014	May. 26, 2015
SPEAG	Device Holder	N/A	N/A	NCR	NCR
Agilent	Signal Generator	E4438C	MY49070755	Oct. 08, 2013	Oct. 07, 2014
SPEAG	Dielectric Probe Kit	DAKS-3.5	0004	Mar. 04, 2014	Mar. 03, 2015
Agilent	ENA Network Analyzer	E5071C	MY46316648	Feb. 07, 2014	Feb. 06, 2015
Anritsu	Power Meter	ML2495A	1349001	Dec. 04, 2013	Dec. 03, 2014
Anritsu	Power Sensor	MA2411B	1306099	Dec. 03, 2013	Dec. 02, 2014
R&S	Spectrum Analyzer	FSP30	101067	Nov. 20, 2013	Nov. 19, 2014
Agilent	Dual Directional Coupler	778D	50422	Note 1	
Woken	Attenuator	WK0602-XX	N/A	Note 1	
PE	Attenuator	PE7005-10	N/A	Note 1	
PE	Attenuator	PE7005- 3	N/A	Note 1	
AR	Power Amplifier	5S1G4M2	0328767	Note 1	
Mini-Circuits	Power Amplifier	ZVE-3W	162601250	Note 1	
Mini-Circuits	Power Amplifier	ZHL-42W+	13440021344	Note 1	

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 (εr)
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. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
835	Body	22.5	0.946	56.664	0.97	55.20	-2.47	2.65	±5	2014/7/2
2450	Body	22.2	1.922	53.185	1.95	52.70	-1.44	0.92	±5	2014/5/7
2450	Body	22.3	2.021	53.832	1.95	52.70	3.64	2.15	±5	2014/5/9
5200	Body	22.5	5.244	47.499	5.30	49.00	-1.06	-3.06	±5	2014/5/8
5200	Body	22.5	5.310	47.781	5.30	49.00	0.19	-2.49	±5	2014/5/8
5200	Body	22.5	5.279	48.534	5.30	49.00	-0.40	-0.95	±5	2014/5/10
5200	Body	22.4	5.138	47.493	5.30	49.00	-3.06	-3.08	±5	2014/7/21
5300	Body	22.5	5.380	47.244	5.42	48.88	-0.74	-3.35	±5	2014/5/8
5300	Body	22.5	5.437	47.621	5.42	48.88	0.31	-2.58	±5	2014/5/8
5300	Body	22.5	5.418	48.319	5.42	48.88	-0.04	-1.15	±5	2014/5/10
5300	Body	22.4	5.270	47.255	5.42	48.88	-2.77	-3.32	±5	2014/7/21
5600	Body	22.5	5.773	46.756	5.77	48.47	0.05	-3.54	±5	2014/5/8
5600	Body	22.5	5.816	47.123	5.77	48.47	0.80	-2.78	±5	2014/5/8
5600	Body	22.5	5.849	47.666	5.77	48.47	1.37	-1.66	±5	2014/5/10
5600	Body	22.4	5.653	46.801	5.77	48.47	-2.03	-3.44	±5	2014/7/21
5800	Body	22.5	6.127	46.464	6.00	48.20	2.12	-3.60	±5	2014/5/8
5800	Body	22.5	6.071	46.836	6.00	48.20	1.18	-2.83	±5	2014/5/8
5800	Body	22.5	6.113	47.156	6.00	48.20	1.88	-2.17	±5	2014/5/10
5800	Body	22.4	5.991	46.521	6.00	48.20	-0.15	-3.48	±5	2014/7/21

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 SAR (W/kg)	Targeted SAR (W/kg)	Normalized SAR (W/kg)	Deviation (%)
2014/7/2	835	Body	250	D835V2-499	3955	1399	2.37	9.46	9.48	0.21
2014/5/7	2450	Body	250	D2450V2-924	3935	1338	12.40	50.20	49.6	-1.20
2014/5/9	2450	Body	250	D2450V2-924	3955	1399	13.30	50.20	53.2	5.98
2014/5/8	5200	Body	100	D5GHzV2-1128	3955	1399	7.33	73.40	73.3	-0.14
2014/5/8	5200	Body	100	D5GHzV2-1128	3954	1279	7.41	73.40	74.1	0.95
2014/5/10	5200	Body	100	D5GHzV2-1128	3954	1279	7.37	73.40	73.7	0.41
2014/7/21	5200	Body	100	D5GHzV2-1040	3954	1425	8.19	77.80	81.9	5.27
2014/5/8	5300	Body	100	D5GHzV2-1128	3955	1399	7.83	74.30	78.3	5.38
2014/5/8	5300	Body	100	D5GHzV2-1128	3954	1279	7.39	74.30	73.9	-0.54
2014/5/10	5300	Body	100	D5GHzV2-1128	3954	1279	7.36	74.30	73.6	-0.94
2014/7/21	5300	Body	100	D5GHzV2-1040	3954	1425	7.72	79.10	77.2	-2.40
2014/5/8	5600	Body	100	D5GHzV2-1128	3955	1399	7.39	77.80	73.9	-5.01
2014/5/8	5600	Body	100	D5GHzV2-1128	3954	1279	7.77	77.80	77.7	-0.13
2014/5/10	5600	Body	100	D5GHzV2-1128	3954	1279	7.82	77.80	78.2	0.51
2014/7/21	5600	Body	100	D5GHzV2-1040	3954	1425	7.93	82.70	79.3	-4.11
2014/5/8	5800	Body	100	D5GHzV2-1128	3955	1399	7.33	72.20	73.3	1.52
2014/5/8	5800	Body	100	D5GHzV2-1128	3954	1279	7.76	72.20	77.6	7.48
2014/5/10	5800	Body	100	D5GHzV2-1128	3954	1279	7.79	72.20	77.9	7.89
2014/7/21	5800	Body	100	D5GHzV2-1040	3954	1425	7.73	77.30	77.3	0.00

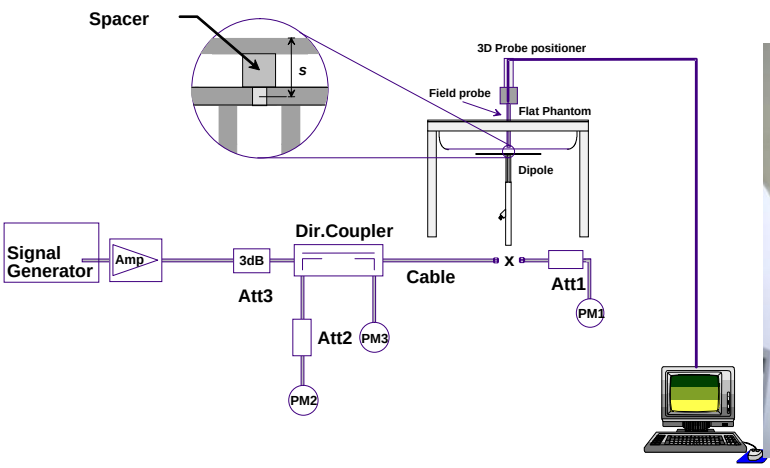


Fig 8.3.1 System Performance Check Setup

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. For Body SAR testing was following KDB 941225 D03v01, the GPRS 2Tx slots modes was selected when EUT operating without power back-off, the GPRS 2Tx slots modes was 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	251	
Frequency (MHz)	824.2	836.4	848.8		824.2	836.4	848.8	
GPRS (GMSK, 1 Tx slot)	32.4	32.2	32.1	33.5	23.4	23.2	23.1	24.5
GPRS (GMSK, 2 Tx slots)	31.7	31.9	31.7	32.0	25.7	25.9	25.7	26.0
EDGE (8PSK, 1 Tx slot)	26.4	26.3	26.2	27.5	17.4	17.3	17.2	18.5
EDGE (8PSK, 2 Tx slots)	26.3	26.2	26.1	27.5	20.3	20.2	20.1	21.5

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	251	
Frequency (MHz)	824.2	836.4	848.8		824.2	836.4	848.8	
GPRS (GMSK, 1 Tx slot)	25.3	25.2	25.0	26.0	16.3	16.2	16.0	17.0
GPRS (GMSK, 2 Tx slots)	22.0	22.1	21.9	23.5	16.0	16.1	15.9	17.5
EDGE (8PSK, 1 Tx slot)	25.0	25.0	25.1	26.0	16.0	16.0	16.1	17.0
EDGE (8PSK, 2 Tx slots)	23.0	22.9	22.9	23.0	17.0	16.9	16.9	17.0

<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} *(Note1, Note 2)*	**CM** (dB) *(Note 3)*	**MPR** (dB) *(Note 3)*
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 *(Note 4)*	15/15 *(Note 4)*	64	12/15 *(Note 4)*	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

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

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

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

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

Setup Configuration

HSUPA Setup 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-TFCI
   viii. Confirm that E-TFCI is equal to the target E-TFCI of 75 for sub-test 1, and other subtest's E-TFCI
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} *(Note1)*	β_{ec}	β_{ed} *(Note 5) (Note 6)*	β_{ed} *(SF)*	β_{ed} *(Codes)*	CM *(dB)* *(Note 2)*	MPR *(dB)* *(Note 2)*	*AG Index* *(Note 6)*	*E-TFCI*
1	11/15 *(Note 3)*	15/15 *(Note 3)*	64	11/15 *(Note 3)*	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	$\beta_{ed}1$: 47/15 $\beta_{ed}2$: 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 *(Note 4)*	15/15 *(Note 4)*	64	15/15 *(Note 4)*	30/15	24/15	134/15	4	1	1.0	0.0	21	81

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

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

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

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

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

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

Setup Configuration

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: β_c/β_d=2/15
      b). Subtest 2: β_c/β_d=12/15
      c). Subtest 3: β_c/β_d=15/8
      d). Subtest 4: β_c/β_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.		

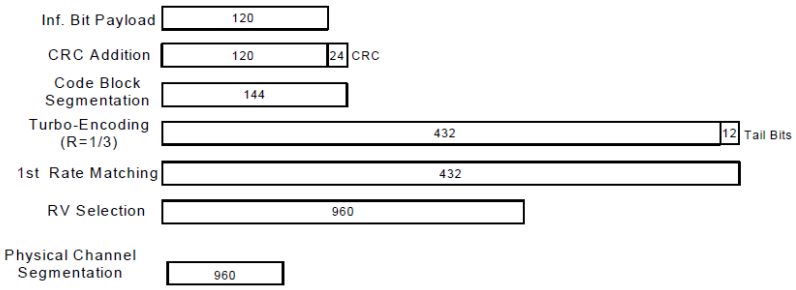


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

Setup Configuration

<WCDMA Conducted Power>

General Note:

1. Per KDB 941225 D02v02r02, RMC 12.2kbps setting is used to evaluate SAR. If HSDPA/HSUPA/DC-HSDPA output power is < 0.25dB higher than RMC, or reported SAR with RMC 12.2kbps setting is ≤ 1.2W/kg, HSDPA/HSUPA/DC-HSDPA SAR evaluation can be excluded..

Full Power Mode (Proximity Sensor Inactive)

Band		WCDMA V		
TX Channel		4132	4182	4233
Frequency (MHz)		826.4	836.4	846.6
3GPP Rel 99	RMC 12.2Kbps	22.8	22.7	22.6
3GPP Rel 6	HSDPA Subtest-1	21.7	21.8	21.6
3GPP Rel 6	HSDPA Subtest-2	21.7	21.6	21.5
3GPP Rel 6	HSDPA Subtest-3	21.3	21.4	21.2
3GPP Rel 6	HSDPA Subtest-4	21.2	21.3	21.1
3GPP Rel 8	DC-HSDPA Subtest-1	21.6	21.8	21.5
3GPP Rel 8	DC-HSDPA Subtest-2	21.6	21.5	21.5
3GPP Rel 8	DC-HSDPA Subtest-3	21.2	21.3	21.1
3GPP Rel 8	DC-HSDPA Subtest-4	21.1	21.3	21.0
3GPP Rel 6	HSUPA Subtest-1	21.6	21.7	21.8
3GPP Rel 6	HSUPA Subtest-2	20.4	20.4	20.5
3GPP Rel 6	HSUPA Subtest-3	20.8	20.3	20.7
3GPP Rel 6	HSUPA Subtest-4	20.9	20.6	21.0
3GPP Rel 6	HSUPA Subtest-5	22.0	22.0	21.8

Reduced Power Mode (Proximity Sensor active)

Band		WCDMA V		
TX Channel		4132	4182	4233
Frequency (MHz)		826.4	836.4	846.6
3GPP Rel 99	RMC 12.2Kbps	17.1	17.0	16.9
3GPP Rel 6	HSDPA Subtest-1	15.8	15.6	15.5
3GPP Rel 6	HSDPA Subtest-2	15.7	15.6	15.3
3GPP Rel 6	HSDPA Subtest-3	15.3	15.2	15.1
3GPP Rel 6	HSDPA Subtest-4	15.2	15.1	15.0
3GPP Rel 8	DC-HSDPA Subtest-1	15.8	15.6	15.5
3GPP Rel 8	DC-HSDPA Subtest-2	15.7	15.6	15.3
3GPP Rel 8	DC-HSDPA Subtest-3	15.3	15.2	15.0
3GPP Rel 8	DC-HSDPA Subtest-4	15.2	15.1	15.0
3GPP Rel 6	HSUPA Subtest-1	15.5	15.2	15.1
3GPP Rel 6	HSUPA Subtest-2	14.1	13.9	13.8
3GPP Rel 6	HSUPA Subtest-3	15.1	14.9	14.8
3GPP Rel 6	HSUPA Subtest-4	14.0	13.8	13.7
3GPP Rel 6	HSUPA Subtest-5	15.7	15.5	15.3

<2.4GHz WLAN Conducted Power>

General Note:

1. For SAR testing was performed on single antenna RF power in SISO mode is larger or equal to the single antenna RF power in MIMO mode, and for RF exposure assessment of MIMO mode simultaneous transmission exclusion analysis was performed with SAR test results of each antenna in SISO mode.
2. For 2.4GHz WLAN SAR testing, highest average RF output power channel for the lowest data rate for 802.11b were selected for SAR evaluation. 802.11g/n HT20/VHT20 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.
3. The measured power of antenna 1 and antenna 2 is summed to a total power.

<Total Power of Antenna 1+2>

WLAN 2.4GHz 802.11b Average Power (dBm)					
Power vs. Channel					
Channel	Frequency (MHz)	Data Rate	2Mbps	5.5Mbps	11Mbps
		1Mbps			
CH 1	2412	18.3	18.3	18.2	18.2
CH 6	2437	18.2			
CH 11	2462	18.2			

WLAN 2.4GHz 802.11g Average Power (dBm)									
Power vs. Channel									
Channel	Frequency (MHz)	Data Rate	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
		6Mbps							
CH 1	2412	17.2	17.8	17.8	17.8	17.9	17.8	17.8	17.9
CH 6	2437	18.1							
CH 11	2462	17.3							

WLAN 2.4GHz 802.11n-HT20 Average Power (dBm)									
Power vs. Channel									
Channel	Frequency (MHz)	MCS Index	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
		MCS0							
CH 1	2412	16.2	17.9	17.9	17.9	17.8	17.9	17.7	17.8
CH 6	2437	18.2							
CH 11	2462	17.3							

WLAN 2.4GHz 802.11ac-VHT20 Average Power (dBm)										
Power vs. Channel										
Channel	Frequency (MHz)	MCS Index	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
		MCS0								
CH 1	2412	16.5	17.9	17.8	17.8	17.8	17.9	17.8	17.9	17.9
CH 6	2437	18.2								
CH 11	2462	17.3								

<Antenna 1>

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	15.1	15.2	15.2	15.1
CH 6	2437	15.3			
CH 11	2462	15.2			

WLAN 2.4GHz 802.11g Average Power (dBm)									
Power vs. Channel									
Channel	Frequency (MHz)	Data Rate	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
		6Mbps							
CH 1	2412	14.2	14.9	14.9	14.7	14.9	14.8	14.8	14.9
CH 6	2437	15.0							
CH 11	2462	14.2							

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	13.1	14.8	14.9	14.8	14.8	14.9	14.7	14.9
CH 6	2437	15.0							
CH 11	2462	14.2							

WLAN 2.4GHz 802.11ac-VHT20 Average Power (dBm)										
Power vs. Channel			Power vs. MCS Index							
Channel	Frequency (MHz)	MCS Index	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
		MCS0								
CH 1	2412	13.7	14.9	14.8	14.7	14.7	14.9	14.8	14.9	14.9
CH 6	2437	15.2								
CH 11	2462	14.2								

<Antenna 2>

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	15.4	15.3	15.1	15.3
CH 6	2437	15.1			
CH 11	2462	15.2			

WLAN 2.4GHz 802.11g Average Power (dBm)									
Power vs. Channel									
Channel	Frequency (MHz)	Data Rate	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
		6Mbps							
CH 1	2412	14.2	14.7	14.7	14.9	14.9	14.8	14.7	14.8
CH 6	2437	15.1							
CH 11	2462	14.3							

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	13.3	14.9	14.9	14.9	14.7	14.8	14.7	14.7
CH 6	2437	15.3							
CH 11	2462	14.3							

WLAN 2.4GHz 802.11ac-VHT20 Average Power (dBm)										
Power vs. Channel			Power vs. MCS Index							
Channel	Frequency (MHz)	MCS Index	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
		MCS0								
CH 1	2412	13.2	14.9	14.7	14.8	14.9	14.8	14.7	14.9	14.9
CH 6	2437	15.1								
CH 11	2462	14.3								

<5GHz WLAN Conducted Power>

General Note:

1. For SAR testing was performed on single antenna RF power in SISO mode is larger or equal to the single antenna RF power in MIMO mode, and for RF exposure assessment of MIMO mode simultaneous transmission exclusion analysis was performed with SAR test results of each antenna in SISO mode.
2. For 5GHz WLAN SAR testing, highest average RF output power channel for the lowest data rate for 802.11a were selected for SAR evaluation. 802.11n HT20/VHT20/VHT40 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 802.11a mode.
3. Per April 2013 TCB Workshop notes, full SAR tests for SISO IEEE 802.11ac configurations were not required because the average output power was not more than 0.25 dB higher than IEEE 802.11a mode. IEEE 802.11ac was evaluated for the highest IEEE 802.11a position in each 5 GHz band and exposure condition.
4. The measured power of antenna 1 and antenna 2 is summed to a total power.

<Total Power of Antenna 1+2>

WLAN 5GHz 802.11a Average Power (dBm)									
Power vs. Channel									
Channel	Frequency (MHz)	Data Rate	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
		6Mbps							
CH 36	5180	15.5	15.4	15.4	15.4	15.4	15.3	15.3	15.2
CH 40	5200	15.5							
CH 44	5220	15.5							
CH 48	5240	15.3							
CH 52	5260	15.2	15.1	15.1	15.1	15.1	15.2	15.1	15.1
CH 56	5280	15.2							
CH 60	5300	15.2							
CH 64	5320	15.3							
CH 100	5500	15.1	15.2	15.2	15.1	15.2	15.1	15.1	15.1
CH 104	5520	15.1							
CH 108	5540	15.2							
CH 112	5560	15.2							
CH 116	5580	15.3							
CH 132	5660	15.3							
CH 136	5680	15.3							
CH 140	5700	15.3							
CH 144	5720	15.3							
CH 149	5745	15.9	15.9	15.8	15.8	15.8	15.8	15.8	15.8
CH 153	5765	15.9							
CH 157	5785	15.8							
CH 161	5805	16.0							
CH 165	5825	15.9							

WLAN 5GHz 802.11a Average Power (dBm)									
Power vs. Channel									
Channel	Frequency (MHz)	Data Rate	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
		6Mbps							
CH 36	5180	15.4	15.3	15.3	15.2	15.3	15.2	15.2	15.3
CH 40	5200	15.4							
CH 44	5220	15.4							
CH 48	5240	15.2							
CH 52	5260	15.2	15.1	15.0	14.9	14.9	14.9	14.8	15.0
CH 56	5280	15.2							
CH 60	5300	15.2							
CH 64	5320	15.2							
CH 100	5500	15.1	15.2	15.1	15.1	15.1	15.1	15.1	15.1
CH 104	5520	15.1							
CH 108	5540	15.2							
CH 112	5560	15.2							
CH 116	5580	15.3							
CH 132	5660	15.3							
CH 136	5680	15.3							
CH 140	5700	15.3							
CH 144	5720	15.3							
CH 149	5745	15.8	15.7	15.9	15.9	15.7	15.6	15.7	15.8
CH 153	5765	15.7							
CH 157	5785	15.7							
CH 161	5805	16.0							
CH 165	5825	16.0							

WLAN 5GHz 802.11n-HT40 Average Power (dBm)									
Power vs. Channel									
Channel	Frequency (MHz)	MCS Index	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
		MCS0							
CH 38	5190	15.1	15.1	15.1	15.0	14.9	15.1	15.0	15.0
CH 46	5230	15.3							
CH 54	5270	15.2	15.0	14.9	15.0	14.8	15.0	14.9	15.0
CH 62	5310	15.2							
CH 102	5510	14.7	15.0	14.9	15.0	14.8	15.0	14.9	15.0
CH 110	5550	15.2							
CH 134	5670	15.2							
CH 142	5710	14.8							
CH 151	5755	15.0	15.5	15.5	15.6	15.5	15.5	15.4	15.4
CH 159	5795	15.8							

WLAN 5GHz 802.11ac-VHT20 Average Power (dBm)										
Power vs. Channel										
Channel	Frequency (MHz)	MCS Index	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
		MCS0								
CH 36	5180	15.5	15.4	15.4	15.3	15.2	15.2	15.3	15.3	15.1
CH 40	5200	15.4								
CH 44	5220	15.3								
CH 48	5240	15.2								
CH 52	5260	15.1	12.8	12.7	12.9	12.8	12.6	12.8	12.9	12.7
CH 56	5280	15.2								
CH 60	5300	15.2								
CH 64	5320	15.2								
CH 100	5500	15.0	15.2	15.3	15.2	15.1	15.2	15.1	15.2	15.0
CH 104	5520	15.1								
CH 108	5540	15.2								
CH 112	5560	15.2								
CH 116	5580	15.3								
CH 132	5660	15.3								
CH 136	5680	15.3								
CH 140	5700	15.3								
CH 144	5720	15.2								
CH 149	5745	15.8	15.7	15.8	15.7	15.6	15.7	15.6	15.7	15.7
CH 153	5765	16.0								
CH 157	5785	16.0								
CH 161	5805	15.9								
CH 165	5825	15.9								

WLAN 5GHz 802.11ac-VHT40 Average Power (dBm)										
Power vs. Channel										
Channel	Frequency (MHz)	MCS Index	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
		MCS0									
CH 38	5190	15.1	15.2	15.2	15.1	15.2	15.1	15.2	15.2	15.2	15.2
CH 46	5230	15.3									
CH 54	5270	15.2	15.1	15.1	15.1	15.0	15.1	15.0	15.0	15.0	15.0
CH 62	5310	14.7									
CH 102	5510	13.9	15.0	15.0	15.0	14.9	15.0	15.1	15.0	14.8	14.9
CH 110	5550	15.1									
CH 134	5670	15.1									
CH 142	5710	14.9									
CH 151	5755	14.8	15.4	15.6	15.5	15.4	15.5	15.4	15.4	15.3	15.3
CH 159	5795	15.7									

WLAN 5GHz 802.11ac-VHT80 Average Power (dBm)											
Power vs. Channel											
Channel	Frequency (MHz)	MCS Index	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
		MCS0									
CH 42	5210	15.5	15.2	15.3	15.2	15.2	15.2	15.1	15.2	15.1	15.1
CH 58	5290	15.2	15.0	15.0	15.0	14.9	15.0	14.9	14.9	14.8	14.8
CH 106	5530	15.2	15.2	15.1	15.0	15.0	15.1	15.0	15.0	15.0	15.0
CH 138	5690	15.1									
CH 155	5775	15.9	15.7	15.8	15.6	15.5	15.7	15.7	15.6	15.5	15.6

<Antenna 1>

WLAN 5GHz 802.11a Average Power (dBm)									
Power vs. Channel			Power vs. Data Rate						
Channel	Frequency (MHz)	Data Rate	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
		6Mbps							
CH 36	5180	12.5	12.4	12.4	12.4	12.4	12.3	12.2	12.2
CH 40	5200	12.5							
CH 44	5220	12.5							
CH 48	5240	12.4							
CH 52	5260	12.7	12.7	12.7	12.7	12.8	12.8	12.7	12.8
CH 56	5280	12.7							
CH 60	5300	12.8							
CH 64	5320	12.9							
CH 100	5500	12.8	12.9	12.9	12.8	12.9	12.9	12.8	12.8
CH 104	5520	12.8							
CH 108	5540	12.8							
CH 112	5560	12.8							
CH 116	5580	13.0							
CH 132	5660	13.0							
CH 136	5680	13.0							
CH 140	5700	13.0							
CH 144	5720	12.9							
CH 149	5745	12.7	12.9	12.7	12.8	12.7	12.9	12.8	12.8
CH 153	5765	12.7							
CH 157	5785	12.6							
CH 161	5805	13.0							
CH 165	5825	13.0							

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	12.5	12.4	12.4	12.4	12.4	12.4	12.4	12.4
CH 40	5200	12.5							
CH 44	5220	12.5							
CH 48	5240	12.4							
CH 52	5260	12.7	12.7	12.6	12.5	12.6	12.4	12.3	12.6
CH 56	5280	12.7							
CH 60	5300	12.8							
CH 64	5320	12.8							
CH 100	5500	12.6	12.8	12.7	12.8	12.9	12.8	0.0	12.7
CH 104	5520	12.6							
CH 108	5540	12.7							
CH 112	5560	12.8							
CH 116	5580	13.0							
CH 132	5660	13.0							
CH 136	5680	13.0							
CH 140	5700	13.0							
CH 144	5720	12.9							
CH 149	5745	12.6	12.6	12.8	12.9	12.7	12.6	12.7	12.7
CH 153	5765	12.5							
CH 157	5785	12.5							
CH 161	5805	13.0							
CH 165	5825	13.0							

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	12.1	12.0	11.9	11.8	11.7	12.0	11.8	11.9
CH 46	5230	12.1							
CH 54	5270	13.0	12.8	12.6	12.8	12.5	12.8	12.6	12.8
CH 62	5310	13.0							
CH 102	5510	12.5	12.8	12.7	12.8	12.6	12.8	12.8	12.9
CH 110	5550	13.0							
CH 134	5670	13.0							
CH 142	5710	12.5							
CH 151	5755	11.7	12.7	12.8	12.9	12.7	12.8	12.6	12.5
CH 159	5795	13.0							

WLAN 5GHz 802.11ac-VHT20 Average Power (dBm)										
Power vs. Channel			Power vs. MCS Index							
Channel	Frequency (MHz)	MCS Index	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
		MCS0								
CH 36	5180	12.5	12.4	12.3	12.1	12.2	12.1	12.4	12.3	12.1
CH 40	5200	12.5								
CH 44	5220	12.4								
CH 48	5240	12.4								
CH 52	5260	12.6	12.6	12.5	12.7	12.6	12.4	12.6	12.7	12.5
CH 56	5280	12.7								
CH 60	5300	12.8								
CH 64	5320	12.8								
CH 100	5500	12.6	12.9	12.9	12.8	12.7	12.8	12.7	12.8	12.7
CH 104	5520	12.6								
CH 108	5540	12.7								
CH 112	5560	12.8								
CH 116	5580	13.0								
CH 132	5660	13.0								
CH 136	5680	13.0								
CH 140	5700	13.0								
CH 144	5720	12.9								
CH 149	5745	12.6	12.7	12.8	12.7	12.6	12.7	12.6	12.7	12.6
CH 153	5765	13.0								
CH 157	5785	13.0								
CH 161	5805	13.0								
CH 165	5825	13.0								

WLAN 5GHz 802.11ac-VHT40 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 38	5190	12.2	12.1	12.0	11.9	12.0	11.8	12.1	12.0	12.1	12.0
CH 46	5230	12.0									
CH 54	5270	13.0	12.8	12.8	12.8	12.7	12.8	12.7	12.7	12.7	12.6
CH 62	5310	12.5									
CH 102	5510	11.5	12.8	12.6	12.8	12.7	12.8	12.9	12.7	12.6	12.7
CH 110	5550	13.0									
CH 134	5670	13.0									
CH 142	5710	12.5									
CH 151	5755	11.5	12.5	12.7	12.7	12.6	12.6	12.5	12.6	12.5	12.4
CH 159	5795	12.8									

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	12.5	12.3	12.4	12.3	12.3	12.3	12.2	12.3	12.2	12.2
CH 58	5290	12.7	12.5	12.6	12.5	12.4	12.5	12.5	12.5	12.3	12.4
CH 106	5530	12.7	12.9	12.8	12.6	12.7	12.8	12.6	12.7	12.7	12.6
CH 138	5690	13.0									
CH 155	5775	12.7	12.5	12.6	12.4	12.3	12.5	12.6	12.4	12.3	12.4

<Antenna 2>

WLAN 5GHz 802.11a Average Power (dBm)									
Power vs. Channel			Power vs. Data Rate						
Channel	Frequency (MHz)	Data Rate	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
		6Mbps							
CH 36	5180	12.5	12.3	12.4	12.3	12.3	12.3	12.4	12.2
CH 40	5200	12.5							
CH 44	5220	12.4							
CH 48	5240	12.1							
CH 52	5260	11.5	11.3	11.4	11.3	11.2	11.4	11.3	11.2
CH 56	5280	11.5							
CH 60	5300	11.5							
CH 64	5320	11.5							
CH 100	5500	11.2	11.3	11.4	11.2	11.4	11.2	11.2	11.3
CH 104	5520	11.3							
CH 108	5540	11.4							
CH 112	5560	11.5							
CH 116	5580	11.5							
CH 132	5660	11.5							
CH 136	5680	11.5							
CH 140	5700	11.5							
CH 144	5720	11.5							
CH 149	5745	13.0	12.8	12.9	12.7	12.8	12.6	12.7	12.8
CH 153	5765	13.0							
CH 157	5785	13.0							
CH 161	5805	12.9							
CH 165	5825	12.8							

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	12.3	12.1	12.2	12.0	12.1	12.0	12.0	12.2
CH 40	5200	12.2							
CH 44	5220	12.2							
CH 48	5240	12.0							
CH 52	5260	11.5	11.4	11.3	11.2	11.0	11.4	11.3	11.2
CH 56	5280	11.5							
CH 60	5300	11.5							
CH 64	5320	11.5							
CH 100	5500	11.4	11.4	11.3	11.2	11.1	11.3	11.4	11.3
CH 104	5520	11.5							
CH 108	5540	11.5							
CH 112	5560	11.5							
CH 116	5580	11.5							
CH 132	5660	11.5							
CH 136	5680	11.5							
CH 140	5700	11.5							
CH 144	5720	11.5							
CH 149	5745	13.0	12.8	12.9	12.8	12.7	12.6	12.7	12.8
CH 153	5765	12.9							
CH 157	5785	12.9							
CH 161	5805	12.9							
CH 165	5825	12.9							

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	12.1	12.2	12.2	12.2	12.1	12.2	12.2	12.1
CH 46	5230	12.5							
CH 54	5270	11.2	11.0	11.0	11.0	10.9	11.0	11.0	11.0
CH 62	5310	11.2							
CH 102	5510	10.6	10.9	10.9	10.9	10.8	10.9	10.8	10.9
CH 110	5550	11.1							
CH 134	5670	11.1							
CH 142	5710	11.0							
CH 151	5755	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2
CH 159	5795	12.5							

WLAN 5GHz 802.11ac-VHT20 Average Power (dBm)										
Power vs. Channel			Power vs. MCS Index							
Channel	Frequency (MHz)	MCS Index	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
		MCS0								
CH 36	5180	12.4	12.3	12.4	12.4	12.2	12.3	12.2	12.2	12.1
CH 40	5200	12.3								
CH 44	5220	12.2								
CH 48	5240	12.0								
CH 52	5260	11.5	11.4	11.4	11.3	11.2	11.3	11.2	11.3	11.2
CH 56	5280	11.5								
CH 60	5300	11.5								
CH 64	5320	11.5								
CH 100	5500	11.3	11.4	11.5	11.4	11.3	11.4	11.4	11.4	11.2
CH 104	5520	11.5								
CH 108	5540	11.5								
CH 112	5560	11.5								
CH 116	5580	11.5								
CH 132	5660	11.5								
CH 136	5680	11.5								
CH 140	5700	11.5								
CH 144	5720	12.0								
CH 149	5745	13.0	12.7	12.7	12.7	12.6	12.7	12.6	12.6	12.7
CH 153	5765	13.0								
CH 157	5785	13.0								
CH 161	5805	12.8								
CH 165	5825	12.7								

WLAN 5GHz 802.11ac-VHT40 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 38	5190	12.0	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3
CH 46	5230	12.5									
CH 54	5270	11.3	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2
CH 62	5310	10.7									
CH 102	5510	10.2	11.1	11.2	11.1	11.0	11.1	11.0	11.1	10.9	11.0
CH 110	5550	11.0									
CH 134	5670	11.0									
CH 142	5710	11.1									
CH 151	5755	12.1	12.3	12.4	12.3	12.2	12.3	12.2	12.2	12.1	12.2
CH 159	5795	12.5									

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	12.5	12.1	12.1	12.1	12.0	12.1	12.0	12.0	12.0	12.0
CH 58	5290	11.5	11.3	11.3	11.3	11.2	11.3	11.2	11.2	11.2	11.1
CH 106	5530	11.5	11.3	11.3	11.3	11.2	11.3	11.2	11.2	11.1	11.2
CH 138	5690	11.0									
CH 155	5775	13.0	12.8	12.9	12.8	12.7	12.8	12.8	12.7	12.6	12.7

14. Bluetooth Exclusions Applied

Mode Band	Average power(dBm)	
	Bluetooth v3.0+EDR	Bluetooth v4.0+LE
2.4GHz Bluetooth	9.5	6.0

Note:

1. 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

Bluetooth Max Power (dBm)	Separation Distance (mm)	Frequency (GHz)	exclusion thresholds
9.5	< 5	2.48	2.83

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 2.83 which is <= 3, SAR testing is not required.

15. Exposure Position Conditions

<Distance from the antenna to the edge>

General Note:

1. The detail antenna locations please refer to setup photo.
2. This device overall diagonal dimension is 272mm, and according to KDB 616217 D04v01r01, if the diagonal is greater than 200mm, SAR evaluation for the front surface of tablet display screens are generally not necessary.

Exposure Position	Bottom Face	Edge1	Edge2	Edge3	Edge4
WLAN Antenna1 to the Edge distance (mm)	< 5 mm	< 5 mm	163 mm	138 mm	49 mm
WLAN Antenna2 to the Edge distance (mm)	< 5 mm	116 mm	216 mm	21 mm	< 5 mm
WWAN Antenna to the Edge distance (mm)	< 5 mm	28 mm	< 5 mm	43 mm	216.4 mm

<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*)] ·[$\sqrt{f(GHz)}$] ≤ 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	WCDMA Band V	802.11b Ant 1	802.11b Ant 2	802.11a Ant 1	802.11a Ant 2
	Calculated Frequency	848MHz	846MHz	2462MHz	2462MHz	5825MHz	5825MHz
	Maximum power (dBm)	26.0	23.5	15.5	15.5	13	13
	Maximum rated power(mW)	398	224	35	35	20	20
Bottom Face	Separation distance(mm)	< 5.0		< 5.0	< 5.0	< 5.0	< 5.0
	exclusion threshold	73	41	11	11	10	10
	Testing required?	Yes	Yes	Yes	Yes	Yes	Yes
Edge 1	Separation distance(mm)	28.0		< 5.0	116.0	< 5.0	116.0
	exclusion threshold	13	7	11	756	10	722
	Testing required?	Yes	Yes	Yes	No	Yes	No
Edge 2	Separation distance(mm)	< 5.0		163.0	216.0	163.0	216.0
	exclusion threshold	73	41	1226	1756	1192	1722
	Testing required?	Yes	Yes	No	No	No	No
Edge 3	Separation distance(mm)	43.0		138.0	21.0	138.0	21.0
	exclusion threshold	9	5	976	3	942	2
	Testing required?	Yes	Yes	No	No	No	No
Edge 4	Separation distance(mm)	216.4		49.0	< 5.0	49.0	< 5.0
	exclusion threshold	1104	1102	1	11	1	10
	Testing required?	No	No	No	Yes	No	Yes

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 WWAN/WLAN: Reported SAR(W/kg)= Measured SAR(W/kg)*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. During the SAR testing, the additional separation between EUT and the phantom surface introduced by the protrusion is <5mm, and the reported SAR with the protrusions in place is < 1.2 W/kg, additional consideration of test setup is not required. Detailed information is included in the test setup photo exhibit.
4. Single antenna RF power in SISO mode is larger or equal to the single antenna RF power in MIMO mode, and for RF exposure assessment of MIMO mode simultaneous transmission exclusion analysis was performed with SAR test results of each antenna in SISO mode.
5. 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; 13mm for Bottom - Slant of Edge 2, 14mm for Edge 2

GSM Note:

1. Justification for reduced test configuration s per KDB 941225 D03v01, the source-based time-averaged output power was evaluated for all multi-slot operations. The multi-slot configuration with the highest frame averaged output power was evaluated for SAR Measurement.

UMTS Note:

1. Per KDB 941225 D02v02r02, RMC 12.2kbps setting is used to evaluate SAR. If HSDPA/HSUPA output power is < 0.25dB higher than RMC12.2Kbps, or reported SAR with RMC 12.2kbps setting is ≤ 1.2W/kg, HSDPA/HSUPA SAR evaluation can be excluded.

16.1 Body SAR

<GSM SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Power Reduction	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 (2 Tx slots)	Bottom-slant of Edge 2	1.3cm	189	836.4	OFF	31.9	32.0	1.023	-0.04	1.050	1.074
	GSM850	GPRS (2 Tx slots)	Bottom-slant of Edge 2	1.3cm	128	824.2	OFF	31.7	32.0	1.072	-0.03	0.962	1.031
	GSM850	GPRS (2 Tx slots)	Bottom-slant of Edge 2	1.3cm	251	848.8	OFF	31.7	32.0	1.072	-0.01	0.957	1.025
	GSM850	GPRS (2 Tx slots)	Edge 1	0cm	189	836.4	OFF	31.9	32.0	1.023	-0.08	0.253	0.259
	GSM850	GPRS (2 Tx slots)	Edge 2	1.4cm	189	836.4	OFF	31.9	32.0	1.023	0.01	1.010	1.034
	GSM850	GPRS (2 Tx slots)	Edge 2	1.4cm	128	824.2	OFF	31.7	32.0	1.072	-0.03	0.913	0.978
01	GSM850	GPRS (2 Tx slots)	Edge 2	1.4cm	251	848.8	OFF	31.7	32.0	1.072	-0.04	1.110	**1.189**
	GSM850	GPRS (2 Tx slots)	Edge 3	0cm	189	836.4	OFF	31.9	32.0	1.023	-0.07	0.522	0.534
	GSM850	GPRS (2 Tx slots)	Bottom-slant of Edge 2	0cm	189	836.4	ON	22.1	23.5	1.380	-0.06	0.656	0.906
	GSM850	GPRS (2 Tx slots)	Bottom-slant of Edge 2	0cm	128	824.2	ON	22.0	23.5	1.413	0.04	0.581	0.821
	GSM850	GPRS (2 Tx slots)	Bottom-slant of Edge 2	0cm	251	848.8	ON	21.9	23.5	1.445	0.01	0.756	1.093
	GSM850	GPRS (2 Tx slots)	Edge 2	0cm	189	836.4	ON	22.1	23.5	1.380	0.05	0.496	0.685
	GSM850	GPRS (2 Tx slots)	Bottom Face	0cm	189	836.4	ON	22.1	23.5	1.380	-0.08	0.541	0.747

<WCDMA SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Power Reduction	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-slant of Edge 2	1.3cm	4132	826.4	OFF	22.8	23.5	1.175	0.07	0.649	0.763
	WCDMA V	RMC 12.2Kbps	Edge 1	0cm	4132	826.4	OFF	22.8	23.5	1.175	-0.07	0.107	0.126
	WCDMA V	RMC 12.2Kbps	Edge 2	1.4cm	4132	826.4	OFF	22.8	23.5	1.175	0.03	0.668	0.785
	WCDMA V	RMC 12.2Kbps	Edge 3	0cm	4132	826.4	OFF	22.8	23.5	1.175	-0.03	0.271	0.318
	WCDMA V	RMC 12.2Kbps	Bottom-slant of Edge 2	0cm	4132	826.4	ON	17.1	17.5	1.096	-0.18	1.050	1.151
	WCDMA V	RMC 12.2Kbps	Bottom-slant of Edge 2	0cm	4182	836.4	ON	17.0	17.5	1.122	0	1.050	1.178
02	WCDMA V	RMC 12.2Kbps	Bottom-slant of Edge 2	0cm	4233	846.6	ON	16.9	17.5	1.148	-0.08	1.040	**1.194**
	WCDMA V	RMC 12.2Kbps	Edge 2	0cm	4132	826.4	ON	17.1	17.5	1.096	0.15	0.911	0.999
	WCDMA V	RMC 12.2Kbps	Edge 2	0cm	4182	836.4	ON	17.0	17.5	1.122	0.13	0.928	1.041
	WCDMA V	RMC 12.2Kbps	Edge 2	0cm	4233	846.6	ON	16.9	17.5	1.148	0.09	0.927	1.064
	WCDMA V	RMC 12.2Kbps	Bottom Face	0cm	4132	826.4	ON	17.1	17.5	1.096	-0.06	0.863	0.946
	WCDMA V	RMC 12.2Kbps	Bottom Face	0cm	4182	836.4	ON	17.0	17.5	1.122	-0.01	0.849	0.953
	WCDMA V	RMC 12.2Kbps	Bottom Face	0cm	4233	846.6	ON	16.9	17.5	1.148	0.01	0.864	0.992

<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	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WLAN2.4GHz	802.11b 1Mbps	Bottom Face	0cm	Ant 1	6	2437	15.30	15.50	1.047	0.06	1.020	1.068
	WLAN2.4GHz	802.11b 1Mbps	Bottom Face	0cm	Ant 1	1	2412	15.10	15.50	1.096	0.03	0.866	0.950
	WLAN2.4GHz	802.11b 1Mbps	Bottom Face	0cm	Ant 1	11	2462	15.20	15.50	1.072	-0.06	0.714	0.765
03	WLAN2.4GHz	802.11b 1Mbps	Bottom-slant of Edge 1	0cm	Ant 1	6	2437	15.30	15.50	1.047	-0.07	1.140	**1.194**
	WLAN2.4GHz	802.11b 1Mbps	Bottom-slant of Edge 1	0cm	Ant 1	1	2412	15.10	15.50	1.096	-0.06	0.988	1.083
	WLAN2.4GHz	802.11b 1Mbps	Bottom-slant of Edge 1	0cm	Ant 1	11	2462	15.20	15.50	1.072	-0.07	0.931	0.998
	WLAN2.4GHz	802.11b 1Mbps	Edge 1	0cm	Ant 1	6	2437	15.30	15.50	1.047	0.01	1.040	1.089
	WLAN2.4GHz	802.11b 1Mbps	Edge 1	0cm	Ant 1	1	2412	15.10	15.50	1.096	-0.1	0.657	0.720
	WLAN2.4GHz	802.11b 1Mbps	Edge 1	0cm	Ant 1	11	2462	15.20	15.50	1.072	0.06	0.650	0.696
	WLAN2.4GHz	802.11b 1Mbps	Bottom Face	0cm	Ant 2	1	2412	15.40	15.50	1.023	0.07	0.511	0.523
	WLAN2.4GHz	802.11b 1Mbps	Bottom-slant of Edge 4	0cm	Ant 2	1	2412	15.40	15.50	1.023	-0.09	0.558	0.571
	WLAN2.4GHz	802.11b 1Mbps	Edge 4	0cm	Ant 2	1	2412	15.40	15.50	1.023	-0.13	0.244	0.250
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Ant 1	40	5200	12.50	12.50	1.000	-0.06	0.579	0.579
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom Face	0cm	Ant 1	42	5210	12.50	12.50	1.000	-0.19	0.421	0.421
	WLAN5GHz	802.11a 6Mbps	Bottom-slant of Edge 1	0cm	Ant 1	40	5200	12.50	12.50	1.000	-0.04	0.536	0.536
	WLAN5GHz	802.11a 6Mbps	Edge 1	0cm	Ant 1	40	5200	12.50	12.50	1.000	-0.04	0.544	0.544
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Ant 2	40	5200	12.50	12.50	1.000	-0.05	0.770	0.770
	WLAN5GHz	802.11a 6Mbps	Bottom-slant of Edge 4	0cm	Ant 2	40	5200	12.50	12.50	1.000	-0.05	1.230	1.230
04	WLAN5GHz	802.11a 6Mbps	Bottom-slant of Edge 4	0cm	Ant 2	44	5220	12.40	12.50	1.023	-0.09	1.270	**1.300**
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom-slant of Edge 4	0cm	Ant 2	42	5210	12.50	12.50	1.000	-0.17	1.030	1.030
	WLAN5GHz	802.11a 6Mbps	Edge 4	0cm	Ant 2	40	5200	12.50	12.50	1.000	-0.11	0.911	0.911
	WLAN5GHz	802.11a 6Mbps	Edge 4	0cm	Ant 2	44	5220	12.40	12.50	1.023	-0.01	0.977	1.000

Plot No.	Band	Mode	Test Position	Gap (cm)	Antenna	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)
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Ant 1	64	5320	12.90	13.00	1.023	-0.03	0.553	0.566
	WLAN5GHz	802.11a 6Mbps	Bottom-slant of Edge 1	0cm	Ant 1	64	5320	12.90	13.00	1.023	-0.08	0.565	0.578
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom-slant of Edge 1	0cm	Ant 1	58	5290	12.70	13.00	1.072	-0.09	0.496	0.531
	WLAN5GHz	802.11a 6Mbps	Edge 1	0cm	Ant 1	64	5320	12.90	13.00	1.023	-0.08	0.555	0.568
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Ant 2	60	5300	11.50	11.50	1.000	-0.14	0.741	0.741
05	WLAN5GHz	802.11a 6Mbps	Bottom-slant of Edge 4	0cm	Ant 2	60	5300	11.50	11.50	1.000	-0.06	1.240	**1.240**
	WLAN5GHz	802.11a 6Mbps	Bottom-slant of Edge 4	0cm	Ant 2	56	5280	11.50	11.50	1.000	-0.08	1.140	1.140
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom-slant of Edge 4	0cm	Ant 2	58	5290	11.50	11.50	1.000	-0.16	1.230	1.230
	WLAN5GHz	802.11a 6Mbps	Edge 4	0cm	Ant 2	60	5300	11.50	11.50	1.000	-0.14	1.030	1.030
	WLAN5GHz	802.11a 6Mbps	Edge 4	0cm	Ant 2	56	5280	11.50	11.50	1.000	-0.17	0.965	0.965
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Ant 1	140	5700	13.00	13.00	1.000	0	0.504	0.504
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Ant 1	108	5540	12.80	13.00	1.047	-0.07	0.406	0.425
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Ant 1	116	5580	13.00	13.00	1.000	-0.09	0.490	0.490
	WLAN5GHz	802.11a 6Mbps	Bottom-slant of Edge 1	0cm	Ant 1	140	5700	13.00	13.00	1.000	0.04	0.518	0.518
	WLAN5GHz	802.11a 6Mbps	Bottom-slant of Edge 1	0cm	Ant 1	108	5540	12.80	13.00	1.047	0.03	0.406	0.425
	WLAN5GHz	802.11a 6Mbps	Bottom-slant of Edge 1	0cm	Ant 1	116	5580	13.00	13.00	1.000	0.06	0.462	0.462
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom-slant of Edge 1	0cm	Ant 1	138	5690	13.00	13.00	1.000	-0.18	0.414	0.414
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom-slant of Edge 1	0cm	Ant 1	106	5530	12.70	13.00	1.072	-0.04	0.438	0.469
	WLAN5GHz	802.11a 6Mbps	Edge 1	0cm	Ant 1	140	5700	13.00	13.00	1.000	-0.12	0.318	0.318
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Ant 2	140	5700	11.5	11.5	1.000	-0.1	0.807	0.807
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Ant 2	108	5540	11.4	11.5	1.023	-0.06	0.897	0.918
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Ant 2	116	5580	11.5	11.5	1.000	-0.13	0.868	0.868
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Ant 2	120	5600	11.5	11.5	1.000	-0.11	0.835	0.835
	WLAN5GHz	802.11a 6Mbps	Bottom-slant of Edge 4	0cm	Ant 2	140	5700	11.5	11.5	1.000	-0.13	1.060	1.060
	WLAN5GHz	802.11a 6Mbps	Bottom-slant of Edge 4	0cm	Ant 2	108	5540	11.4	11.5	1.023	-0.05	1.260	1.289
06	WLAN5GHz	802.11a 6Mbps	Bottom-slant of Edge 4	0cm	Ant 2	116	5580	11.5	11.5	1.000	-0.09	1.290	**1.290**
	WLAN5GHz	802.11a 6Mbps	Bottom-slant of Edge 4	0cm	Ant 2	120	5600	11.5	11.5	1.000	-0.08	1.190	1.190
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom-slant of Edge 4	0cm	Ant 2	106	5530	11.5	11.5	1.000	-0.1	1.230	1.230
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom-slant of Edge 4	0cm	Ant 2	138	5690	11.0	11.5	1.122	0	0.702	0.788
	WLAN5GHz	802.11a 6Mbps	Edge 4	0cm	Ant 2	140	5700	11.5	11.5	1.000	-0.1	0.729	0.729
	WLAN5GHz	802.11a 6Mbps	Edge 4	0cm	Ant 2	108	5540	11.4	11.5	1.023	-0.17	0.872	0.892
	WLAN5GHz	802.11a 6Mbps	Edge 4	0cm	Ant 2	116	5580	11.5	11.5	1.000	-0.08	0.851	0.851
	WLAN5GHz	802.11a 6Mbps	Edge 4	0cm	Ant 2	120	5600	11.5	11.5	1.000	-0.17	0.831	0.831
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Ant 1	161	5805	13.00	13.00	1.000	-0.02	0.780	0.780
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Ant 1	153	5765	12.70	13.00	1.072	0.11	0.467	0.500
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Ant 1	157	5785	12.60	13.00	1.096	-0.18	0.630	0.691
	WLAN5GHz	802.11a 6Mbps	Bottom-slant of Edge 1	0cm	Ant 1	161	5805	13.00	13.00	1.000	0.1	0.850	0.850
	WLAN5GHz	802.11a 6Mbps	Bottom-slant of Edge 1	0cm	Ant 1	153	5765	12.70	13.00	1.072	0.06	0.606	0.649
	WLAN5GHz	802.11a 6Mbps	Bottom-slant of Edge 1	0cm	Ant 1	157	5785	12.60	13.00	1.096	0.04	0.630	0.691
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom-slant of Edge 1	0cm	Ant 1	155	5775	12.70	13.00	1.072	-0.1	0.424	0.454
	WLAN5GHz	802.11a 6Mbps	Edge 1	0cm	Ant 1	161	5805	13.00	13.00	1.000	-0.04	0.364	0.364
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Ant 2	149	5745	13.00	13.00	1.000	-0.13	0.816	0.816
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Ant 2	157	5785	13.00	13.00	1.000	-0.16	0.804	0.804
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Ant 2	161	5805	12.90	13.00	1.023	-0.09	0.797	0.816
	WLAN5GHz	802.11a 6Mbps	Bottom-slant of Edge 4	0cm	Ant 2	149	5745	13.00	13.00	1.000	-0.18	1.170	1.170
07	WLAN5GHz	802.11a 6Mbps	Bottom-slant of Edge 4	0cm	Ant 2	157	5785	13.00	13.00	1.000	-0.07	1.190	**1.190**
	WLAN5GHz	802.11a 6Mbps	Bottom-slant of Edge 4	0cm	Ant 2	161	5805	12.90	13.00	1.023	0.01	1.160	1.187
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom-slant of Edge 4	0cm	Ant 2	155	5775	13.00	13.00	1.000	-0.11	1.160	1.160
	WLAN5GHz	802.11a 6Mbps	Edge 4	0cm	Ant 2	149	5745	13.00	13.00	1.000	0	0.791	0.791
	WLAN5GHz	802.11a 6Mbps	Edge 4	0cm	Ant 2	157	5785	13.00	13.00	1.000	-0.05	0.796	0.796
	WLAN5GHz	802.11a 6Mbps	Edge 4	0cm	Ant 2	161	5805	12.90	13.00	1.023	-0.05	0.784	0.802

16.2 Repeated SAR Measurement

No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Power Reduction	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 (2 Tx slots)	Edge 2	1.4cm	251	848.8	OFF	31.7	32	1.072	-0.04	1.110	-	1.189
2nd	GSM850	GPRS (2 Tx slots)	Edge 2	1.4cm	251	848.8	OFF	31.7	32	1.072	0.02	1.050	1.06	1.125

No.	Band	Mode	Test Position	Gap (cm)	Antenna	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	WLAN2.4GHz	802.11b 1Mbps	Bottom-slant of Edge 1	0cm	Ant 1	6	2437	15.30	15.50	1.047	-0.07	1.140	-	1.194
2nd	WLAN2.4GHz	802.11b 1Mbps	Bottom-slant of Edge 1	0cm	Ant 1	6	2437	15.30	15.50	1.047	0.04	1.130	1.01	1.183
1st	WLAN5GHz	802.11a 6Mbps	Bottom-slant of Edge 4	0cm	Ant 2	44	5220	12.40	12.50	1.023	-0.09	1.270	-	1.300
2nd	WLAN5GHz	802.11a 6Mbps	Bottom-slant of Edge 4	0cm	Ant 2	44	5220	12.40	12.50	1.023	-0.13	1.210	1.05	1.238
1st	WLAN5GHz	802.11a 6Mbps	Bottom-slant of Edge 4	0cm	Ant 2	60	5300	11.50	11.50	1.000	-0.06	1.240	-	1.240
2nd	WLAN5GHz	802.11a 6Mbps	Bottom-slant of Edge 4	0cm	Ant 2	60	5300	11.50	11.50	1.000	-0.09	1.160	1.07	1.160
1st	WLAN5GHz	802.11a 6Mbps	Bottom-slant of Edge 4	0cm	Ant 2	116	5580	11.50	11.50	1.000	-0.09	1.290	-	1.290
2nd	WLAN5GHz	802.11a 6Mbps	Bottom-slant of Edge 4	0cm	Ant 2	116	5580	11.50	11.50	1.000	0.09	1.270	1.02	1.270
1st	WLAN5GHz	802.11a 6Mbps	Bottom-slant of Edge 4	0cm	Ant 2	157	5785	13.00	13.00	1.000	-0.07	1.190	-	1.190
2nd	WLAN5GHz	802.11a 6Mbps	Bottom-slant of Edge 4	0cm	Ant 2	157	5785	13.00	13.00	1.000	-0.16	1.170	1.02	1.170

General Note:

1. Per KDB 865664 D01v01r03, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg
2. 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.
3. The ratio is the difference in percentage between original and repeated *measured SAR*.
4. All measurement SAR result is scaled-up to account for tune-up tolerance and is compliant.

17. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations	Supported
1.	WWAN + Bluetooth	Yes
2.	WWAN + WLAN Antenna 1 + WLAN Antenna 2	Yes
3.	WLAN Antenna 1 + WLAN Antenna 2	Yes

General Note:

1. WLAN and Bluetooth share the same antenna, and cannot transmit simultaneously.
2. This device does not supported SISO mode operation.
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 worst case WLAN reported SAR for each configuration was used for SAR summation, regardless of whether the WLAN channel has WiFi Direct and Hotspot capability. Therefore, the following summations represent the absolute worst cases for simultaneous transmission with WLAN.
5. The Scaled SAR summation is calculated based on the same configuration and test position.
6. Per KDB 447498 D01v05r02, simultaneous transmission SAR is compliant if,
   i) Scalar SAR summation < 1.6W/kg.
   ii) SPLSR = (SAR1 + SAR2)^1.5 / (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 ≤ 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.
7. For simultaneous transmission analysis, Bluetooth SAR is estimated per KDB 447498 D01v05r02 based on the formula below.
   i) (*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)]·[$\sqrt{}$f(GHz)/*x*] W/kg for *test separation distances* ≤ 50 mm; where *x* = 7.5 for 1-g SAR, and *x* = 18.75 for 10-g SAR.
   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 Position
	Separation Distance	5 mm
9.5 dBm	Estimated SAR (W/kg)	0.378 W/kg

17.1 Body Exposure Conditions

WWAN Band		Exposure Position	1	2	3	1+2+3 Summed SAR (W/kg)	SPLSR	Case No
			WWAN	2.4GHz WLAN Ant 1	2.4GHz WLAN Ant 2			
			SAR (W/kg)	SAR (W/kg)	SAR (W/kg)			
GSM	GSM850	Bottom Face at 0 cm	0.747	1.068	0.523	**2.34**	0.02	Case 1
		Bottom Face - Slant of Edge1 at 0 cm		1.194		**1.19**		
		Bottom Face - Slant of Edge4 at 0 cm			0.571	**0.57**		
		Edge1 at 0cm	0.259	1.089		**1.35**		
		Edge4 at 0cm			0.250	**0.25**		
		Bottom - Slant of Edge 2 at 1.3cm	1.074			**1.07**		
		Bottom - Slant of Edge 2 at 0cm	1.093			**1.09**		
		Edge2 at 1.4cm	1.189			**1.19**		
		Edge2 at 0cm	0.685			**0.69**		
		Edge3 at 0cm	0.534			**0.53**		
WCMDA	Band V	Bottom Face at 0 cm	0.992	1.068	0.523	**2.58**	0.02	Case 2
		Bottom Face - Slant of Edge1 at 0 cm		1.194		**1.19**		
		Bottom Face - Slant of Edge4 at 0 cm			0.571	**0.57**		
		Edge1 at 0cm	0.126	1.089		**1.22**		
		Edge4 at 0cm			0.250	**0.25**		
		Bottom - Slant of Edge 2 at 1.3cm	0.763			**0.76**		
		Bottom - Slant of Edge 2 at 0cm	1.194			**1.19**		
		Edge2 at 1.4cm	0.785			**0.79**		
		Edge2 at 0cm	1.064			**1.06**		
		Edge3 at 0cm	0.318			**0.32**		

WWAN Band		Exposure Position	1	4	1+4 Summed SAR (W/kg)	SPLSR	Case No
			WWAN	Bluetooth Ant 1			
			SAR (W/kg)	Estimated SAR (W/kg)			
GSM	GSM850	Bottom Face at 0 cm	0.747	0.378	**1.13**		
		Bottom Face - Slant of Edge1 at 0 cm		0.378	**0.38**		
		Bottom Face - Slant of Edge4 at 0 cm		0.378	**0.38**		
		Edge1 at 0cm	0.259	0.378	**0.64**		
		Edge4 at 0cm		0.378	**0.38**		
		Bottom - Slant of Edge 2 at 1.3cm	1.074	0.378	**1.45**		
		Bottom - Slant of Edge 2 at 0cm	1.093	0.378	**1.47**		
		Edge2 at 1.4cm	1.189	0.378	**1.57**		
		Edge2 at 0cm	0.685	0.378	**1.06**		
		Edge3 at 0cm	0.534	0.378	**0.91**		
WCMDA	Band V	Bottom Face at 0 cm	0.992	0.378	**1.37**		
		Bottom Face - Slant of Edge1 at 0 cm		0.378	**0.38**		
		Bottom Face - Slant of Edge4 at 0 cm		0.378	**0.38**		
		Edge1 at 0cm	0.126	0.378	**0.50**		
		Edge4 at 0cm		0.378	**0.38**		
		Bottom - Slant of Edge 2 at 1.3cm	0.763	0.378	**1.14**		
		Bottom - Slant of Edge 2 at 0cm	1.194	0.378	**1.57**		
		Edge2 at 1.4cm	0.785	0.378	**1.16**		
		Edge2 at 0cm	1.064	0.378	**1.44**		
		Edge3 at 0cm	0.318	0.378	**0.70**		

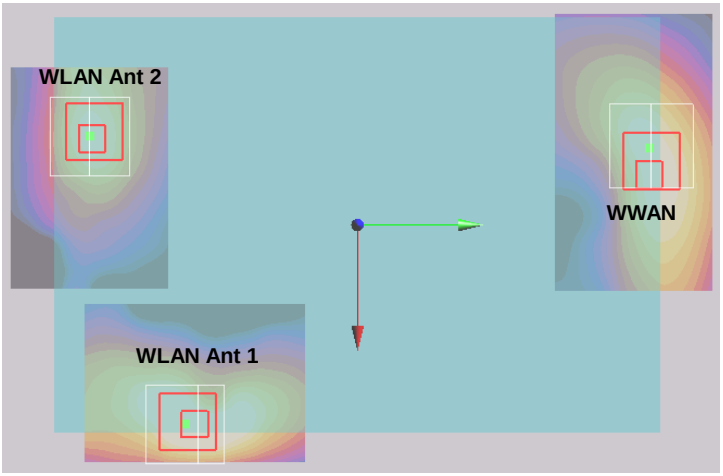
WWAN Band		Exposure Position	1	2		3		1+2+3 Summed SAR (W/kg)	SPLSR	Case No
			WWAN	5.2GHz / 5.3GHz / 5.5GHz /5.8GHz WLAN Ant 1		5.2GHz / 5.3GHz / 5.5GHz /5.8GHz WLAN Ant 2				
			SAR (W/kg)	Band	SAR (W/kg)	Band	SAR (W/kg)			
GSM	GSM850	Bottom Face at 0 cm	0.747	5.8GHz WLAN	0.780	5.5GHz WLAN	0.918	**2.45**	0.02	Case 3
		Bottom Face - Slant of Edge1 at 0 cm		5.8GHz WLAN	0.850			**0.85**		
		Bottom Face - Slant of Edge4 at 0 cm				5.2GHz WLAN	1.300	**1.30**		
		Edge1 at 0cm	0.259	5.3GHz WLAN	0.568			**0.83**		
		Edge4 at 0cm				5.3GHz WLAN	1.030	**1.03**		
		Bottom - Slant of Edge 2 at 1.3cm	1.074					**1.07**		
		Bottom - Slant of Edge 2 at 0cm	1.093					**1.09**		
		Edge2 at 1.4cm	1.189					**1.19**		
		Edge2 at 0cm	0.685					**0.69**		
		Edge3 at 0cm	0.534					**0.53**		
WCMDA	Band V	Bottom Face at 0 cm	0.992	5.8GHz WLAN	0.780	WLAN5GHz	0.918	**2.69**	0.02	Case 4
		Bottom Face - Slant of Edge1 at 0 cm		5.8GHz WLAN	0.850			**0.85**		
		Bottom Face - Slant of Edge4 at 0 cm				WLAN5GHz	1.300	**1.30**		
		Edge1 at 0cm	0.126	5.3GHz WLAN	0.568			**0.69**		
		Edge4 at 0cm				WLAN5GHz	1.030	**1.03**		
		Bottom - Slant of Edge 2 at 1.3cm	0.763					**0.76**		
		Bottom - Slant of Edge 2 at 0cm	1.194					**1.19**		
		Edge2 at 1.4cm	0.785					**0.79**		
		Edge2 at 0cm	1.064					**1.06**		
		Edge3 at 0cm	0.318					**0.32**		

17.2 SPLSR Evaluation and Analysis

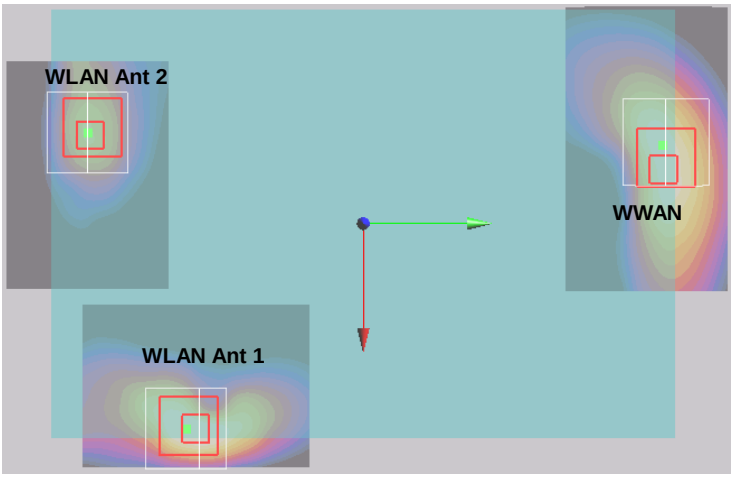
General Note:

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

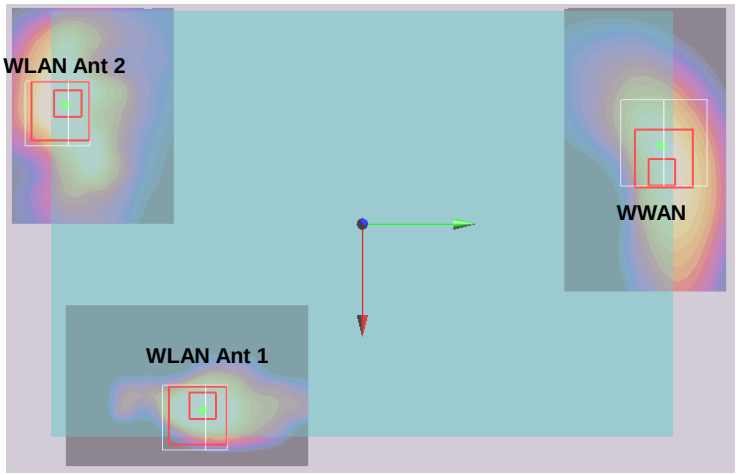
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 01	GSM850	Bottom Face	0.747	0	-0.014	0.112	-0.176	194.5	1.82	0.01	Not required
	2.4GHz WLAN Ant 1		1.068	0	0.0756	-0.0606	-0.18				
	GSM850		0.747	0	-0.014	0.112	-0.176	214.9	1.27	0.01	Not required
	2.4GHz WLAN Ant 2		0.523	0	-0.0336	-0.102	-0.178				
	2.4GHz WLAN Ant 1		1.068	0	0.0756	-0.0606	-0.18	116.8	1.59	0.02	Not required
	2.4GHz WLAN Ant 2		0.523	0	-0.0336	-0.102	-0.178				



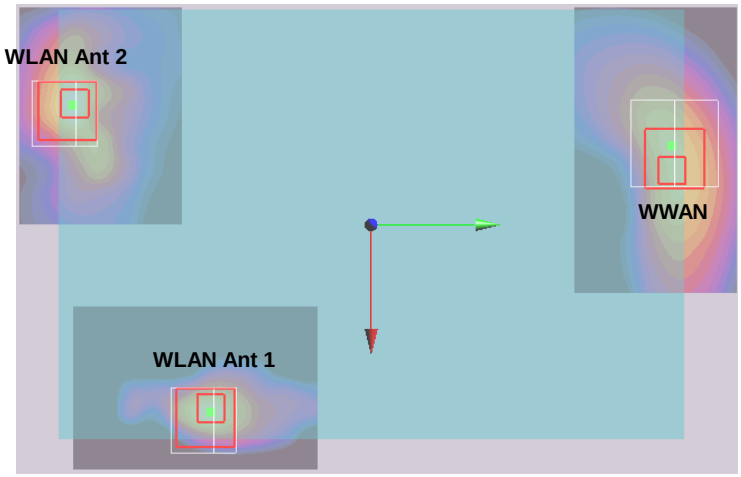
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 02	WCDMA V	Bottom Face	0.992	0	-0.022	0.112	-0.177	198.3	2.06	0.01	Not required
	2.4GHz WLAN Ant 1		1.068	0	0.0756	-0.0606	-0.18				
	WCDMA V		0.992	0	-0.022	0.112	-0.177	214.3	1.52	0.01	Not required
	2.4GHz WLAN Ant 2		0.523	0	-0.0336	-0.102	-0.178				
	2.4GHz WLAN Ant 1		1.068	0	0.0756	-0.0606	-0.18	116.8	1.59	0.02	Not required
	2.4GHz WLAN Ant 2		0.523	0	-0.0336	-0.102	-0.178				



	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 03	GSM850	Bottom Face	0.747	0	-0.014	0.112	-0.176	188.8	1.53	0.01	Not required
	5.8GHz WLAN Ant 1		0.780	0	0.068	-0.058	-0.179				
	GSM850		0.747	0	-0.014	0.112	-0.176	223.2	1.67	0.01	Not required
	5.5GHz WLAN Ant 2		0.918	0	-0.045	-0.109	-0.175				
	5.8GHz WLAN Ant 1		0.780	0	0.068	-0.058	-0.179	124.0	1.70	0.02	Not required
	5.5GHz WLAN Ant 2		0.918	0	-0.045	-0.109	-0.175				



Case 04	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
	WCDMA V	Bottom Face	0.992	0	-0.022	0.112	-0.177	192.4	1.77	0.01	Not required
	5.8GHz WLAN Ant 1		0.780	0	0.068	-0.058	-0.179				
	WCDMA V		0.992	0	-0.022	0.112	-0.177	222.2	1.91	0.01	Not required
	5.5GHz WLAN Ant 2		0.918	0	-0.045	-0.109	-0.175				
	5.8GHz WLAN Ant 1		0.780	0	0.068	-0.058	-0.179	124.0	1.70	0.02	Not required
	5.5GHz WLAN Ant 2		0.918	0	-0.045	-0.109	-0.175				



Test Engineer： Aaron Chen, Tom Jiang, Nick Yu, Lawrence Chen, Frank Wu, Iran Wang, and San Lin

18. Uncertainty Assessment

The component of uncertainly may generally be categorized according to the methods used to evaluate them. The evaluation of uncertainly by the statistical analysis of a series of observations is termed a Type An 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 18.1. 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 18.2. 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 18.3. 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

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[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 v02, “SAR Measurement Procedures for 3G Devices – CDMA 2000 / Ev-Do / WCDMA / HSDPA / HSPA”, October 2007

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[10] FCC KDB 616217 D04 v01r01, “SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers”, May 2013

[11] FCC KDB 644545 D01 v01r02, "Guidance for IEEE 802.11ac and Pre-ac Device Emission Testing", Oct 2013.

[12] FCC KDB 865664 D01 v01r03, "SAR Measurement Requirements for 100 MHz to 6 GHz", Feb 2014.

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