Variant FCC SAR Test Report

APPLICANT	:	BlackBerry Limited
EQUIPMENT	:	Smartphone
BRAND NAME	:	BlackBerry
MODEL NAME	:	RHF142LW
MARKETING NAME	:	SQC100-5
FCC ID	:	L6ARHF140LW
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

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA471526-02	Rev. 01	Remove camera to include verification of worst case found in original which can be referred to Sporton FCC SAR Test Report, Report No: FA471526, FCC ID: L6ARHF140LW and Appendix D.	Dec. 18, 2014

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **BlackBerry Limited, Smartphone, RHF142LW**, are as follows.

Equipment Class	Frequency Band	Highest SAR Summary			
		Head (Separation 0mm) 1g SAR (W/kg)	Body-worn (Separation 15mm) 1g SAR (W/kg)	Wireless Router (Separation 10mm) 1g SAR (W/kg)	Highest Simultaneous Transmission 1g SAR (W/kg)
PCE	GSM850	0.71	0.76	**1.32**	1.57
	GSM1900	1.19	0.57	1.01	
	WCDMA Band V	0.53	0.59	0.76	
	WCDMA Band II	**1.37**	0.62	0.61	
	CDMA 2000 BC0	0.43	0.54	0.80	
	CDMA 2000 BC1	0.83	0.52	1.06	
	LTE Band 13	0.53	0.59	0.94	
	LTE Band 4	0.72	0.52	1.13	
DTS	WLAN 2.4GHz Band	0.25	0.22	0.55	1.57
NII	WLAN 5.2GHz Band	0.20	1.05	1.17	1.57
	WLAN 5.3GHz Band	0.32	**1.09**		
	WLAN 5.5GHz Band	0.39	1.02		
	WLAN 5.8GHz Band	0.46	1.03	0.88	
DSS	Bluetooth	0.02	0.02	0.06	1.37
Date of Testing:		12/02/2014~12/05/2014			

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	BlackBerry Limited
Address	2300 University Street East, Waterloo, ON., CAN, N2K1A0

Manufacturer	
Company Name	FIH Mobile Limited
Address	No.4, Mingsheng St.,Tu-Cheng Dist., New Taipei City 23679, Taiwan

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 648474 D04 SAR Evaluation Considerations for Wireless Handsets v01r02
- FCC KDB 248227 D01 SAR meas for 802 11abg v01r02
- FCC KDB 941225 D01 3G SAR Procedures v03
- FCC KDB 941225 D05 SAR for LTE Devices v02r03
- FCC KDB 941225 D06 Hotspot Mode SAR v02

4. Equipment Under Test (EUT)

4.1 General Information

Product Feature & Specification	
Equipment Name	Smartphone
Brand Name	BlackBerry
Model Name	RHF142LW
Marketing Name	SQC100-5
FCC ID	L6ARHF140LW
IMEI Code	Sample for WWAN and WLAN SAR testing: 990004609808757 Sample for EVDO SAR testing: 990000810110488
Wireless Technology and Frequency Range	GSM850: 824.2 MHz ~ 848.8 MHz GSM1900: 1850.2 MHz ~ 1909.8 MHz WCDMA Band V: 826.4 MHz ~ 846.6 MHz WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz CDMA2000 BC0: 824.7 MHz ~ 848.31 MHz CDMA 2000 BC1: 1851.25 MHz ~ 1908.75 MHz LTE Band 13: 779.5 MHz ~ 784.5 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 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	• GSM/GPRS/EGPRS • RMC/AMR 12.2Kbps • HSDPA • HSUPA • DC-HSDPA • CDMA2000 : 1xRTT/1xEv-Do(Rev.0)/1xEv-Do(Rev.A) • LTE: QPSK, 16QAM • 802.11a/b/g/n HT20/HT40 • Bluetooth v3.0+HS，Bluetooth v4.0-LE
HW Version	PVT 2
SW Version	10.3.1.1031 Radio 1032 /SR 10.3.1.663
GSM / (E)GPRS Dual Transfer mode	Class A – EUT can support Packet Switched and Circuit Switched Network simultaneously.
EUT Stage	Identical Prototype

Remark:

1. 802.11n-HT40 is not supported in 2.4GHz WLAN.
2. This device supported VoIP in EGPRS, WCDMA, CDMA, LTE (e.g. 3rd party VoIP) and 2.4GHz / 5.2GHz / 5.8GHz WLAN supports Hotspot operation and WiFi Direct (Group Client / Group Owner), and 5.3GHz / 5.5GHz WLAN supports WiFi Direct (Group Client).
3. Power is reduced when simultaneously transmitting with 1x-RTT CDMA Voice in certain SVLTE conditions. And the SVLTE power reduction feature is not implemented for satisfying SAR compliance requirements. The simultaneous transmission SAR test exclusion is applied according to the reported standalone SAR tested at the maximum output power level without any power reduction on the LTE, CDMA and WLAN transmitter.
4. The GSM and UMTS cannot transmit simultaneous with CDMA.
5. While operating in body-adjacent exposure configurations during a mobile hotspot session, reduced power limits are enforced on the WCDMA B2 transmitter. More detailed information which can be referred to “operational description”.
6. While operation simultaneously with any other transmitters active, like Hotspot function, a reduced maximum power limit is enforced on the WiFi transmitter in 5.2GHz / 5.8GHz WLAN. More detailed information which can be referred to “operational description”.

4.2 Maximum Tune-up Limit

Mode		Burst average power(dBm)	
		GSM 850	GSM 1900
GSM (GMSK, 1 Tx slot)		33.50	30.50
GPRS/EDGE (GMSK, 1 Tx slot)		33.50	30.50
GPRS/EDGE (GMSK, 2 Tx slots)		31.00	29.50
GPRS/EDGE (GMSK, 3 Tx slots)		30.00	27.00
GPRS/EDGE (GMSK, 4 Tx slots)		28.00	26.50
EDGE (8PSK, 1 Tx slot)		27.50	27.00
EDGE (8PSK, 2 Tx slots)		27.50	26.00
EDGE (8PSK, 3 Tx slots)		26.00	25.00
EDGE (8PSK, 4 Tx slots)		25.00	24.00
DTM 5	GSM (GMSK, 1 Tx slot)	31.00	29.50
	GPRS (GMSK, 1 Tx slot)	31.00	29.50
DTM 9	GSM (GMSK, 1 Tx slot)	31.00	29.50
	GPRS (GMSK, 1 Tx slot)	31.00	29.50
DTM 11	GSM (GMSK, 1 Tx slot)	30.00	27.00
	GPRS (GMSK, 2 Tx slots)	30.00	27.00
DTM 5	GSM (GMSK, 1 Tx slot)	31.00	29.50
	EDGE (8PSK, 1 Tx slot)	27.50	26.00
DTM 9	GSM (GMSK, 1 Tx slot)	31.00	29.50
	EDGE (8PSK, 1 Tx slot)	27.50	26.00
DTM 11	GSM (GMSK, 1 Tx slot)	30.00	27.00
	EDGE (8PSK, 2 Tx slots)	26.00	25.00

Mode	Average power(dBm)		
	WCDMA Band V	WCDMA Band II	
Output Power Status	Full Power mode	Full Power mode	Reduced Power mode
AMR 12.2Kbps	24.50	24.50	22.50
RMC 12.2Kbps	24.50	24.50	22.50
HSDPA Subtest-1	24.00	24.00	22.00
DC-HSDPA Subtest-1	24.00	24.00	22.00
HSUPA Subtest-5	24.00	24.00	22.00

Mode	Average power(dBm)	
	CDMA BC0	CDMA BC1
1xRTT RC1 SO55	24.50	24.50
1xRTT RC3 SO55	24.50	24.50
1xRTT RC3 SO32	24.50	24.50
1xEV-DO Rev 0	24.50	24.50
1xEV-DO Rev A	24.50	24.50

LTE Band 4				
Average power(dBm)				
Modulation	BW (MHz)	RB size	Target MPR	Power
QPSK	20	≤ 18	0	24.00
QPSK	20	> 18	1	23.00
16QAM	20	≤ 18	1	23.00
16QAM	20	> 18	2	22.00
QPSK	15	≤ 16	0	24.00
QPSK	15	> 16	1	23.00
16QAM	15	≤ 16	1	23.00
16QAM	15	> 16	2	22.00
QPSK	10	≤ 12	0	24.00
QPSK	10	> 12	1	23.00
16QAM	10	≤ 12	1	23.00
16QAM	10	> 12	2	22.00
QPSK	5	≤ 8	0	24.00
QPSK	5	> 8	1	23.00
16QAM	5	≤ 8	1	23.00
16QAM	5	> 8	2	22.00
QPSK	3	≤ 4	0	24.00
QPSK	3	> 4	1	23.00
16QAM	3	≤ 4	1	23.00
16QAM	3	> 4	2	22.00
QPSK	1.4	≤ 5	0	24.00
QPSK	1.4	> 5	1	23.00
16QAM	1.4	≤ 5	1	23.00
16QAM	1.4	> 5	2	22.00

LTE Band 13				
Average power(dBm)				
Modulation	BW (MHz)	RB size	Target MPR	Power
QPSK	10	≤ 12	0	24.50
QPSK	10	> 12	1	23.50
16QAM	10	≤ 12	1	23.50
16QAM	10	> 12	2	22.50
QPSK	5	≤ 8	0	24.50
QPSK	5	> 8	1	23.50
16QAM	5	≤ 8	1	23.50
16QAM	5	> 8	2	22.50

Band / Channel		Average Power (dBm)	
		v3.0+HS	v4.0-LE
2.4GHz Bluetooth	Low	9.50	9.00
	Middle	10.00	9.00
	High	8.50	9.00

Band / Frequency (MHz)		IEEE 802.11 Average Power (dBm)		
		11b	11g	HT20
2.4GHz Band	2412	21.50	20.50	19.50
	2437	21.50	20.50	19.50
	2462	21.50	20.50	19.50

Band / Frequency (MHz)		IEEE 802.11 Full Power mode Average Power (dBm)		
		11a	HT20	HT40
5.2GHz Band	5180	17.50	17.50	
	5190			13.50
	5200			
	5220			
	5230			16.50
	5240			
5.3GHz Band		17.50	17.50	16.50
5.5GHz Band	5500	17.50	17.50	
	5510			14.50
	5520	17.50	17.50	
	5540	17.50	17.50	
	5550			16.50
	5560	17.50	17.50	
	5580	17.50	17.50	
	5600	17.50	17.50	
	5620	17.50	17.50	
	5630			16.50
	5640	17.50	17.50	
	5660	17.00	17.00	
	5670			16.50
	5680	17.00	17.00	
	5700	17.00	17.00	
5.8GHz Band	5745	15.50	15.50	
	5755			13.50
	5765	17.50	17.50	
	5785	17.50	17.50	
	5795			16.50
	5805	17.50	17.50	
	5825	17.50	17.50	

Band / Frequency (MHz)		IEEE 802.11 Reduced Power mode Average Power (dBm)		
		11a	HT20	HT40
5.2GHz Band	5180	15.5	15.5	
	5190			11.5
	5200			
	5220			
	5230			14.5
	5240			
5.8GHz Band	5745	13.5	13.5	
	5755			11.5
	5765	15.5	15.5	
	5785	15.5	15.5	
	5795			14.5
	5805	15.5	15.5	
	5825	15.5	15.5	

4.3 General LTE SAR Test and Reporting Considerations

Summarized necessary items addressed in KDB 941225 D05 v02r03	
FCC ID	L6ARHF140LW
Equipment Name	Smartphone
Operating Frequency Range of each LTE transmission band	LTE Band 13: 779.5 MHz ~ 784.5 MHz LTE Band 04: 1710.7 MHz ~ 1754.3 MHz
Channel Bandwidth	LTE Band 13: 5MHz, 10MHz LTE Band 04: 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz
UE Capability	Rel9, Cat3
uplink modulations used	QPSK, and 16QAM
LTE Voice / Data requirements	Data only
LTE MPR permanently built-in by design	Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3

Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

LTE A-MPR	In the base station simulator configuration, Network Setting value is set to NS_01 to disable A-MPR during SAR testing and the LTE SAR tests was transmitting on all TTI frames (Maximum TTI)
Spectrum plots for RB configuration	A properly configured base station simulator was used for the SAR and power measurement; therefore, spectrum plots for each RB allocation and offset configuration are not included in the SAR report.
Power reduction	Yes, Power is reduced when simultaneously transmitting with 1x-RTT CDMA Voice in certain SVLTE conditions, more detail please refer to page37. And the SVLTE power reduction feature is not implemented for satisfying SAR compliance requirements. The simultaneous transmission SAR test exclusion is applied according to the reported standalone SAR tested at the maximum output power level without any power reduction.

Transmission (H, M, L) channel numbers and frequencies in each LTE band

LTE Band 13

	Bandwidth 5 MHz		Bandwidth 10 MHz	
	Channel #	Freq.(MHz)	Channel #	Freq.(MHz)
L	23205	779.5		
M	23230	782	23230	782
H	23255	784.5		

LTE Band 4

	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	19957	1710.7	19965	1711.5	19975	1712.5	20000	1715	20025	1717.5	20050	1720
M	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5
H	20393	1754.3	20385	1753.5	20375	1752.5	20350	1750	20325	1747.5	20300	1745

5. RF Exposure Limits

5.1 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.

5.2 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.

6. Specific Absorption Rate (SAR)

6.1 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.

6.2 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:

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

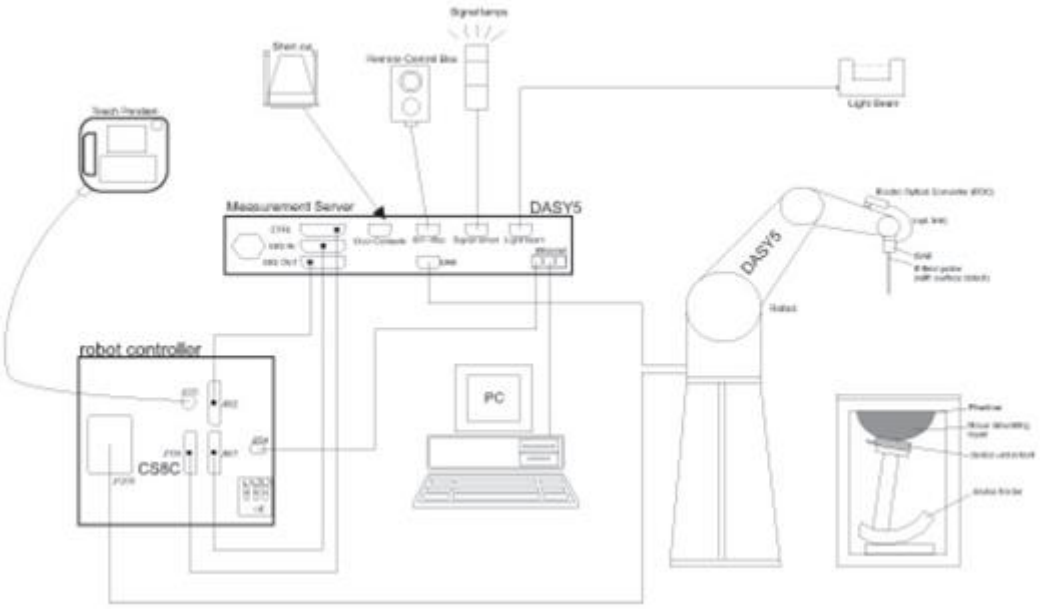
SAR is expressed in units of Watts per kilogram (W/kg)

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

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

7. 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.

8. 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

8.1 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

8.2 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.

8.3 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.	

8.4 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	≤ 1.5·$\Delta z_{Zoom}(n-1)$	
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.

8.5 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.

8.6 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.

9. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	750MHz System Validation Kit	D750V3	1078	Jun. 23, 2014	Jun. 22, 2015
SPEAG	835MHz System Validation Kit	D835V2	4d092	Jun. 23, 2014	Jun. 22, 2015
SPEAG	1750MHz System Validation Kit	D1750V2	1118	Jun. 10, 2014	Jun. 09, 2015
SPEAG	1900MHz System Validation Kit	D1900V2	5d018	Jun. 18, 2014	Jun. 17, 2015
SPEAG	2450MHz System Validation Kit	D2450V2	869	Jun. 13, 2014	Jun. 12, 2015
SPEAG	5GHz System Validation Kit	D5GHzV2	1006	Sep. 25, 2014	Sep. 24, 2015
SPEAG	Data Acquisition Electronics	DAE4	1388	Sep. 24, 2014	Sep. 23, 2015
SPEAG	Data Acquisition Electronics	DAE4	1279	Jul. 23, 2014	Jul. 22, 2015
SPEAG	Dosimetric E-Field Probe	EX3DV4	3954	Nov. 21, 2014	Nov. 20, 2015
SPEAG	Dosimetric E-Field Probe	EX3DV4	3753	Mar. 26, 2014	Mar. 25, 2015
SPEAG	Dosimetric E-Field Probe	EX3DV4	3578	Jun. 24, 2014	Jun. 23, 2015
Wisewind	Thermometer	ETP-101	TM560	Oct. 21, 2014	Oct. 20, 2015
Wisewind	Thermometer	ETP-101	TM685	Oct. 21, 2014	Oct. 20, 2015
WonDer	Thermometer	WD-5015	TM225	Oct. 21, 2014	Oct. 20, 2015
Anritsu	Radio Communication Analyzer	MT8820C	6201074414	Feb. 11, 2014	Feb. 10, 2015
Agilent	Wireless Communication Test Set	E5515C	MY50264370	Apr. 29, 2013	Apr. 28, 2015
SPEAG	Device Holder	N/A	N/A	NCR	NCR
R&S	Signal Generator	SMU200A	102502	Jul. 07, 2014	Jul. 06, 2015
SPEAG	Dielectric Probe Kit	DAKS-3.5	0004	Mar. 04, 2014	Mar. 03, 2015
Agilent	ENA Network Analyzer	E5071C	MY46101588	May. 31, 2014	May. 30, 2015
Anritsu	Power Meter	ML2495A	1036004	Aug. 09, 2014	Aug. 08, 2015
Anritsu	Power Sensor	MA2411B	1027253	Aug. 11, 2014	Aug. 10, 2015
R&S	Spectrum Analyzer	FSP 30	101329	Jun. 14, 2014	Jun. 13, 2015
Agilent	Dual Directional Coupler	778D	50422	Note1	
Woken	Attenuator 1	WK0602-XX	N/A	Note1	
PE	Attenuator 2	PE7005-10	N/A	Note1	
PE	Attenuator 3	PE7005- 3	N/A	Note1	
AR	Power Amplifier	5S1G4M2	0328767	Note1	
Mini-Circuits	Power Amplifier	ZVE-3W	162601250	Note1	
Mini-Circuits	Power Amplifier	ZHL-42W+	13440021344	Note1	

General Note:

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

10. System Verification

10.1 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
750	HSL	22.5	0.896	41.000	0.89	41.90	0.67	-2.15	±5	2014/12/3
750	MSL	22.4	0.971	54.600	0.96	55.50	1.15	-1.62	±5	2014/12/2
835	HSL	22.3	0.904	41.100	0.90	41.50	0.44	-0.96	±5	2014/12/3
835	MSL	22.4	0.993	54.700	0.97	55.20	2.37	-0.91	±5	2014/12/2
835	MSL	22.4	0.963	54.600	0.97	55.20	-0.72	-1.09	±5	2014/12/5
1750	HSL	22.5	1.400	38.900	1.37	40.10	2.19	-2.99	±5	2014/12/3
1750	MSL	22.4	1.520	52.200	1.49	53.40	2.01	-2.25	±5	2014/12/2
1900	HSL	22.5	1.430	39.200	1.40	40.00	2.14	-2.00	±5	2014/12/3
1900	MSL	22.4	1.530	52.800	1.52	53.30	0.66	-0.94	±5	2014/12/2
1900	MSL	22.3	1.530	52.900	1.52	53.30	0.66	-0.75	±5	2014/12/5
2450	HSL	22.5	1.840	38.600	1.80	39.20	2.22	-1.53	±5	2014/12/3
2450	MSL	22.5	1.920	53.200	1.95	52.70	-1.54	0.95	±5	2014/12/3
5200	HSL	22.4	4.810	35.500	4.66	36.00	3.22	-1.39	±5	2014/12/4
5200	MSL	22.4	5.270	47.600	5.30	49.00	-0.57	-2.86	±5	2014/12/5
5300	HSL	22.4	4.910	35.400	4.76	35.90	3.15	-1.39	±5	2014/12/4
5300	MSL	22.4	5.400	47.300	5.42	48.90	-0.37	-3.27	±5	2014/12/5
5600	HSL	22.4	5.220	34.700	5.07	35.50	2.96	-2.25	±5	2014/12/4
5600	MSL	22.4	5.800	46.800	5.77	48.50	0.52	-3.51	±5	2014/12/5
5800	HSL	22.4	5.410	34.400	5.27	35.30	2.66	-2.55	±5	2014/12/4
5800	MSL	22.4	6.150	46.500	6.00	48.20	2.50	-3.53	±5	2014/12/5

10.2 System Performance Check Results

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

Date	Frequency (MHz)	Tissue Type	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 1g SAR (W/kg)	Targeted 1g SAR (W/kg)	Normalized 1g SAR (W/kg)	Deviation (%)
2014/12/3	750	HSL	250	D750V3-1078	EX3DV4 - SN3578	DAE4 Sn1388	2.20	8.34	8.80	5.52
2014/12/2	750	MSL	250	D750V3-1078	EX3DV4 - SN3578	DAE4 Sn1388	2.01	8.63	8.04	-6.84
2014/12/3	835	HSL	250	D835V2-4d092	EX3DV4 - SN3578	DAE4 Sn1388	2.43	9.25	9.72	5.08
2014/12/2	835	MSL	250	D835V2-4d092	EX3DV4 - SN3578	DAE4 Sn1388	2.51	9.47	10.04	6.02
2014/12/5	835	MSL	250	D835V2-4d092	EX3DV4 - SN3753	DAE4 Sn1279	2.36	9.47	9.44	-0.32
2014/12/3	1750	HSL	250	D1750V2-1118	EX3DV4 - SN3578	DAE4 Sn1388	9.50	36.30	38.00	4.68
2014/12/2	1750	MSL	250	D1750V2-1118	EX3DV4 - SN3578	DAE4 Sn1388	8.95	37.90	35.80	-5.54
2014/12/3	1900	HSL	250	D1900V2-5d018	EX3DV4 - SN3578	DAE4 Sn1388	10.60	40.10	42.40	5.74
2014/12/2	1900	MSL	250	D1900V2-5d018	EX3DV4 - SN3578	DAE4 Sn1388	9.21	39.80	36.84	-7.44
2014/12/5	1900	MSL	250	D1900V2-5d018	EX3DV4 - SN3954	DAE4 Sn1279	9.78	39.80	39.12	-1.71
2014/12/3	2450	HSL	250	D2450V2-869	EX3DV4 - SN3578	DAE4 Sn1388	12.80	52.80	51.20	-3.03
2014/12/3	2450	MSL	250	D2450V2-869	EX3DV4 - SN3578	DAE4 Sn1388	11.79	50.30	47.16	-6.24
2014/12/4	5200	HSL	100	D5GHzV2-1006	EX3DV4 - SN3753	DAE4 Sn1279	8.72	81.10	87.20	7.52
2014/12/5	5200	MSL	100	D5GHzV2-1006	EX3DV4 - SN3753	DAE4 Sn1279	7.87	77.50	78.70	1.55
2014/12/4	5300	HSL	100	D5GHzV2-1006	EX3DV4 - SN3753	DAE4 Sn1279	8.86	86.60	88.60	2.31
2014/12/5	5300	MSL	100	D5GHzV2-1006	EX3DV4 - SN3753	DAE4 Sn1279	8.14	80.00	81.40	1.75
2014/12/4	5600	HSL	100	D5GHzV2-1006	EX3DV4 - SN3753	DAE4 Sn1279	8.94	85.80	89.40	4.20
2014/12/5	5600	MSL	100	D5GHzV2-1006	EX3DV4 - SN3753	DAE4 Sn1279	8.05	85.20	80.50	-5.52
2014/12/4	5800	HSL	100	D5GHzV2-1006	EX3DV4 - SN3753	DAE4 Sn1279	8.71	82.90	87.10	5.07
2014/12/5	5800	MSL	100	D5GHzV2-1006	EX3DV4 - SN3753	DAE4 Sn1279	8.26	78.40	82.60	5.36

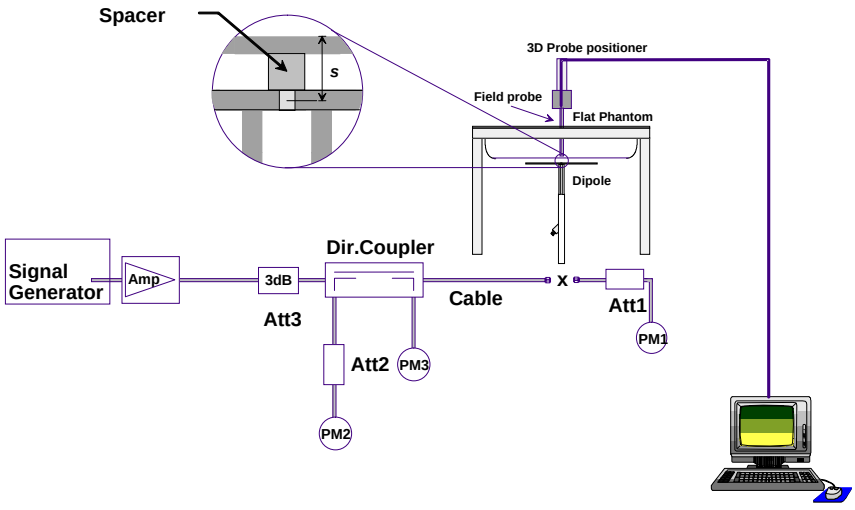


Fig 8.3.1 System Performance Check Setup

Fig 8.3.2 Setup Photo

11. RF Exposure Positions

11.1 Ear and handset reference point

Figure 9.1.1 shows the front, back, and side views of the SAM phantom. The center-of-mouth reference point is labeled “M,” the left ear reference point (ERP) is marked “LE,” and the right ERP is marked “RE.” Each ERP is 15 mm along the B-M (back-mouth) line behind the entrance-to-ear-canal (EEC) point, as shown in Figure 9.1.2 The Reference Plane is defined as passing through the two ear reference points and point M. The line N-F (neck-front), also called the reference pivoting line, is normal to the Reference Plane and perpendicular to both a line passing through RE and LE and the B-M line (see Figure 9.1.3). Both N-F and B-M lines should be marked on the exterior of the phantom shell to facilitate handset positioning. Posterior to the N-F line the ear shape is a flat surface with 6 mm thickness at each ERP, and forward of the N-F line the ear is truncated, as illustrated in Figure 9.1.2. The ear truncation is introduced to preclude the ear lobe from interfering with handset tilt, which could lead to unstable positioning at the cheek.

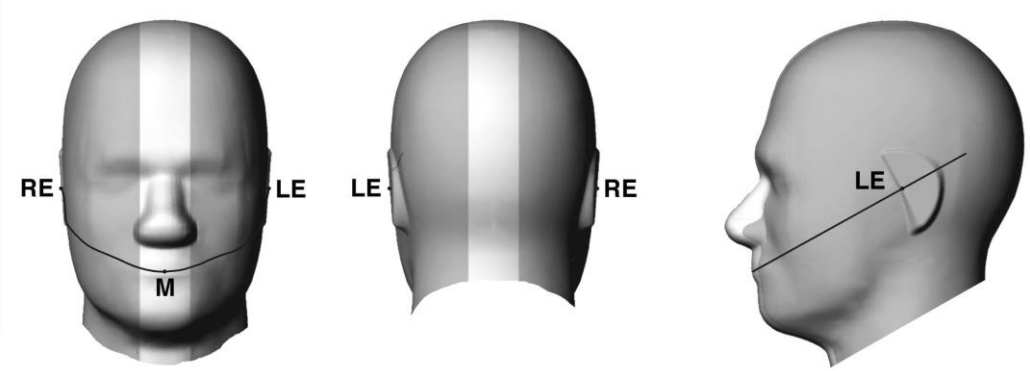


Fig 9.1.1 Front, back, and side views of SAM twin phantom

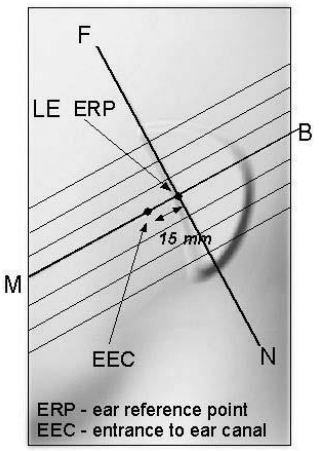


Fig 9.1.2 Close-up side view of phantom showing the ear region.

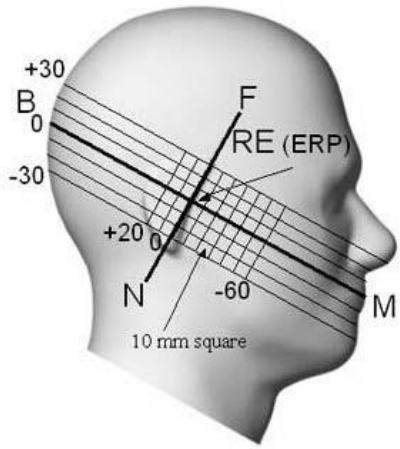


Fig 9.1.3 Side view of the phantom showing relevant markings and seven cross-sectional plane locations

11.2 Definition of the cheek position

1. Ready the handset for talk operation, if necessary. For example, for handsets with a cover piece (flip cover), open the cover. If the handset can transmit with the cover closed, both configurations must be tested.
2. Define two imaginary lines on the handset—the vertical centerline and the horizontal line. The vertical centerline passes through two points on the front side of the handset—the midpoint of the width wt of the handset at the level of the acoustic output (point A in Figure 9.2.1 and Figure 9.2.2), and the midpoint of the width wb of the bottom of the handset (point B). The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output (see Figure 9.2.1). The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output; however, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centerline is not necessarily parallel to the front face of the handset (see Figure 9.2.2), especially for clamshell handsets, handsets with flip covers, and other irregularly-shaped handsets.
3. Position the handset close to the surface of the phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Figure 9.2.3), such that the plane defined by the vertical centerline and the horizontal line of the handset is approximately parallel to the sagittal plane of the phantom.
4. Translate the handset towards the phantom along the line passing through RE and LE until handset point A touches the pinna at the ERP.
5. While maintaining the handset in this plane, rotate it around the LE-RE line until the vertical centerline is in the plane normal to the plane containing B-M and N-F lines, i.e., the Reference Plane.
6. Rotate the handset around the vertical centerline until the handset (horizontal line) is parallel to the N-F line.
7. While maintaining the vertical centerline in the Reference Plane, keeping point A on the line passing through RE and LE, and maintaining the handset contact with the pinna, rotate the handset about the N-F line until any point on the handset is in contact with a phantom point below the pinna on the cheek. See Figure 9.2.3. The actual rotation angles should be documented in the test report.

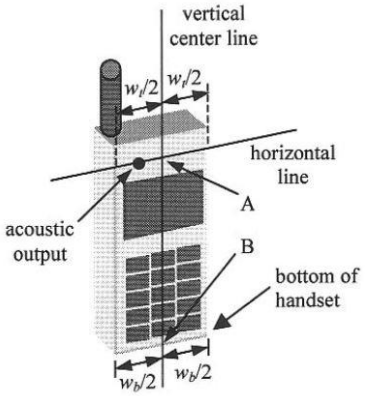


Fig 9.2.1 Handset vertical and horizontal reference lines—"fixed case

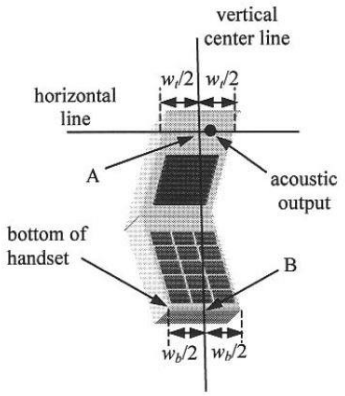


Fig 9.2.2 Handset vertical and horizontal reference lines—"clam-shell case"

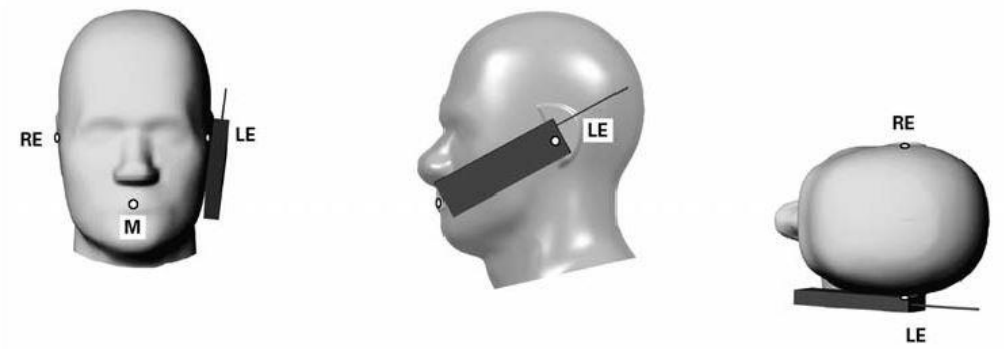


Fig 9.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

11.3 Definition of the tilt position

1. Ready the handset for talk operation, if necessary. For example, for handsets with a cover piece (flip cover), open the cover. If the handset can transmit with the cover closed, both configurations must be tested.
2. While maintaining the orientation of the handset, move the handset away from the pinna along the line passing through RE and LE far enough to allow a rotation of the handset away from the cheek by 15°.
3. Rotate the handset around the horizontal line by 15°.
4. While maintaining the orientation of the handset, move the handset towards the phantom on the line passing through RE and LE until any part of the handset touches the ear. The tilt position is obtained when the contact point is on the pinna. See Figure 9.3.1. If contact occurs at any location other than the pinna, e.g., the antenna at the back of the phantom head, the angle of the handset should be reduced. In this case, the tilt position is obtained if any point on the handset is in contact with the pinna and a second point

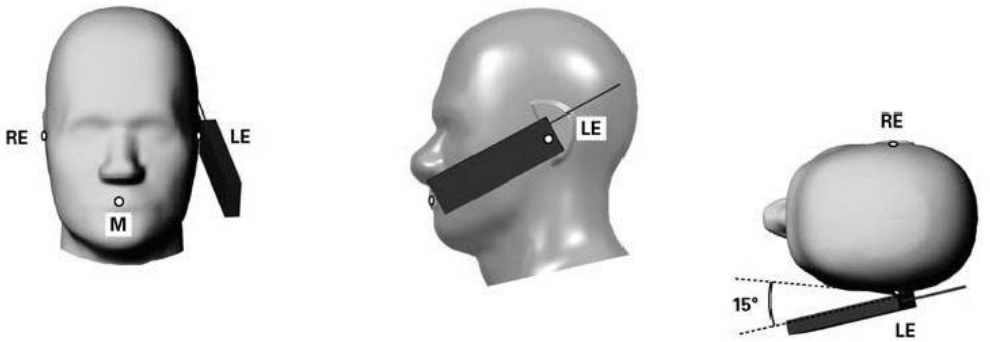


Fig 9.3.1 Tilt position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which define the Reference Plane for handset positioning, are indicated.

11.4 Body Worn Accessory

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 9.4). Per KDB 648474 D04v01r02, body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB 447498 D01v05r02 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for body-worn accessory, measured without a headset connected to the handset is < 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a handset attached to the handset.

Accessories for body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components and those that do contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are test with the device with each accessory. If multiple accessories share an identical metallic component (i.e. the same metallic belt-chip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

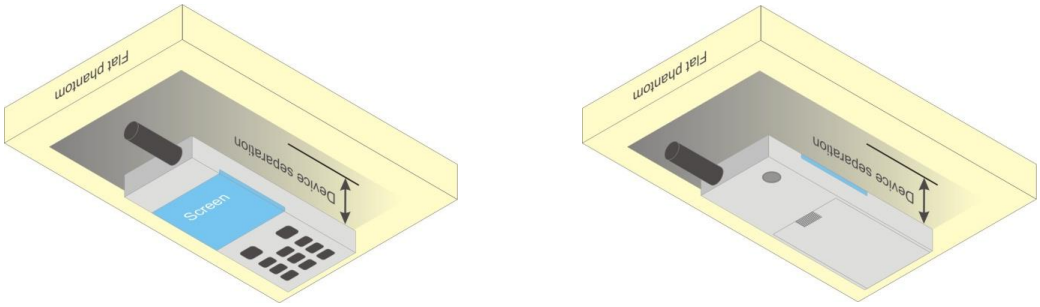


Fig 9.4 Body Worn Position

11.5 Wireless Router

Some battery-operated handsets have the capability to transmit and receive user through simultaneous transmission of WIFI simultaneously with a separate licensed transmitter. The FCC has provided guidance in FCC HDB Publication 941225 D06 v02 where SAR test considerations for handsets (L x W ≥ 9 cm x 5 cm) are based on a composite test separation distance of 10mm from the front, back and edges of the device containing transmitting antennas within 2.5cm of their edges, determined form general mixed use conditions for this type of devices. Since the hotspot SAR results may overlap with the body-worn accessory SAR requirements, the more conservative configurations can be considered, thus excluding some body-worn accessory SAR tests.

When the user enables the personal wireless router functions for the handset, actual operations include simultaneous transmission of both the WIFI transmitter and another licensed transmitter. Both transmitters often do not transmit at the same transmitting frequency and thus cannot be evaluated for SAR under actual use conditions due to the limitations of the SAR assessment probes. Therefore, SAR must be evaluated for each frequency transmission and mode separately and spatially summed with the WIFI transmitter according to FCC KDB Publication 447498 D01v05r02 publication procedures. The “Portable Hotspot” feature on the handset was NOT activated during SAR assessments, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal at a time.

12. Conducted RF Output Power (Unit: dBm)

<GSM Conducted Power>

General Note:

1. For DTM multi-slot class mode, the device was linked with base station simulator (Agilent E5515C) and transmit maximum power on maximum number of TX slots, i.e. one CS timeslot, and additional PS timeslots (1 for DTM class 5 and 9, 2 for DTM class 11) in one TDMA frame.
2. Agilent E5515C was used to setup the device operated under DTM mode for power measurement and SAR testing. For conducted power, the power of the burst for voice and the power of the bursts for data was reported separately in the table above, and the frame-average power is derived below to determine SAR testing.

   *DTM frame average power (dBm) = 10*log [∑(power of each slot, in mW)/8]*
3. Per KDB 447498 D01v05r02, the maximum output power channel is used for SAR testing and for further SAR test reduction.
4. Per KDB 941225 D01v03, considering the possibility of e.g. 3rd party VoIP operation for Head and body-worn SAR test reduction for GSM and GPRS and EDGE modes is determined by the source-based time-averaged output power including tune-up tolerance. The mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested. Therefore, the EUT was set in GPRS (3Tx slots) for GSM850 and GPRS (4Tx slots) for GSM1900.
5. Per KDB 941225 D01v03, for Hotspot SAR test reduction for GPRS and EDGE modes is determined by the source-based time-averaged output power including tune-up tolerance, for modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested, therefore, the EUT was set in GPRS (3Tx slots) for GSM850 and GPRS (4Tx slots) for GSM1900.

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	
GSM (GMSK, 1 Tx slot)		32.05	32.07	32.02	33.50	23.05	23.07	23.02	24.50
GPRS (GMSK, 1 Tx slot)		32.07	32.08	32.04	33.50	23.07	23.08	23.04	24.50
GPRS (GMSK, 2 Tx slots)		29.01	29.05	29.00	31.00	23.01	23.05	23.00	25.00
GPRS (GMSK, 3 Tx slots)		28.64	28.68	28.10	30.00	24.38	24.42	23.84	25.74
GPRS (GMSK, 4 Tx slots)		26.32	26.32	26.01	28.00	23.32	23.32	23.01	25.00
EDGE (8PSK, 1 Tx slot)		25.62	25.58	25.51	27.50	16.62	16.58	16.51	18.50
EDGE (8PSK, 2 Tx slots)		25.64	25.59	25.52	27.50	19.64	19.59	19.52	21.50
EDGE (8PSK, 3 Tx slots)		24.11	24.05	24.04	26.00	19.85	19.79	19.78	21.74
EDGE (8PSK, 4 Tx slots)		23.07	23.08	23.01	25.00	20.07	20.08	20.01	22.00
DTM 5 (2Tx slots)	GSM (GMSK, 1 Tx slot)	29.10	29.08	29.15	31.00	23.07	23.06	23.10	24.98
	GPRS (GMSK, 1 Tx slot)	29.09	29.09	29.10	31.00				
DTM 9 (2Tx slots)	GSM (GMSK, 1 Tx slot)	29.15	29.18	29.18	31.00	23.12	23.14	23.15	24.98
	GPRS (GMSK, 1 Tx slot)	29.13	29.14	29.17	31.00				
DTM 11 (3Tx slots)	GSM (GMSK, 1 Tx slot)	28.59	28.61	28.56	30.00	24.37	24.40	24.33	25.74
	GPRS (GMSK, 2 Tx slots)	28.65	28.68	28.61	30.00				
DTM 5 (2Tx slots)	GSM (GMSK, 1 Tx slot)	29.14	29.14	29.17	31.00	21.69	21.68	21.70	23.57
	EDGE (8PSK, 1 Tx slot)	25.55	25.53	25.53	27.50				
DTM 9 (2Tx slots)	GSM (GMSK, 1 Tx slot)	29.11	29.11	29.07	31.00	21.68	21.66	21.67	23.57
	EDGE (8PSK, 1 Tx slot)	25.60	25.55	25.65	27.50				
DTM 11 (3Tx slots)	GSM (GMSK, 1 Tx slot)	28.74	28.72	28.79	30.00	22.00	21.98	22.04	23.51
	EDGE (8PSK, 2 Tx slots)	24.15	24.12	24.17	26.00				

Band GSM1900		Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
TX Channel		512	661	810		512	661	810	
Frequency (MHz)		1850.2	1880	1909.8		1850.2	1880	1909.8	
GSM (GMSK, 1 Tx slot)		29.21	29.46	29.51	30.50	20.21	20.46	20.51	21.50
GPRS (GMSK, 1 Tx slot)		29.20	29.50	29.65	30.50	20.20	20.50	20.65	21.50
GPRS (GMSK, 2 Tx slots)		27.81	28.10	28.16	29.50	21.81	22.10	22.16	23.50
GPRS (GMSK, 3 Tx slots)		25.40	25.53	25.71	27.00	21.14	21.27	21.45	22.74
GPRS (GMSK, 4 Tx slots)		24.88	24.92	25.15	26.50	21.88	21.92	22.15	23.50
EDGE (8PSK, 1 Tx slot)		25.01	25.12	25.29	27.00	16.01	16.12	16.29	18.00
EDGE (8PSK, 2 Tx slots)		24.48	24.63	24.81	26.00	18.48	18.63	18.81	20.00
EDGE (8PSK, 3 Tx slots)		23.47	23.60	23.78	25.00	19.21	19.34	19.52	20.74
EDGE (8PSK, 4 Tx slots)		22.43	22.58	22.79	24.00	19.43	19.58	19.79	21.00
DTM 5 (2Tx slots)	GSM (GMSK, 1 Tx slot)	27.83	27.78	27.78	29.50	21.80	21.77	21.78	23.48
	GPRS (GMSK, 1 Tx slot)	27.81	27.80	27.82	29.50				
DTM 9 (2Tx slots)	GSM (GMSK, 1 Tx slot)	27.85	27.80	27.81	29.50	21.80	21.76	21.77	23.48
	GPRS (GMSK, 1 Tx slot)	27.79	27.76	27.77	29.50				
DTM 11 (3Tx slots)	GSM (GMSK, 1 Tx slot)	25.42	25.47	25.37	27.00	21.15	21.20	21.16	22.74
	GPRS (GMSK, 2 Tx slots)	25.41	25.46	25.45	27.00				
DTM 5 (2Tx slots)	GSM (GMSK, 1 Tx slot)	27.85	27.81	27.80	29.50	20.45	20.41	20.41	22.07
	EDGE (8PSK, 1 Tx slot)	24.45	24.40	24.41	26.00				
DTM 9 (2Tx slots)	GSM (GMSK, 1 Tx slot)	27.82	27.84	27.87	29.50	20.43	20.43	20.46	22.07
	EDGE (8PSK, 1 Tx slot)	24.44	24.40	24.44	26.00				
DTM 11 (3Tx slots)	GSM (GMSK, 1 Tx slot)	25.46	25.49	25.41	27.00	19.97	19.99	19.92	21.51
	EDGE (8PSK, 2 Tx slots)	23.45	23.46	23.40	25.00				

<WCDMA Conducted Power>

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

A summary of these settings are illustrated below:

HSDPA Setup Configuration:

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

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

Sub-test	β_c	β_d	β_d *(SF)*	β_c/β_d	β_{HS} *(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	β_{ed}1: 47/15 β_{ed}2: 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 (Note 4)	15/15 (Note 4)	64	15/15 (Note 4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c.
Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.
Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 10/15 and β_d = 15/15.
Note 4: For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 14/15 and β_d = 15/15.
Note 5: In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g.
Note 6: β_{ed} can not be set directly, it is set by Absolute Grant Value.

Setup Configuration

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	Proces ses	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.		

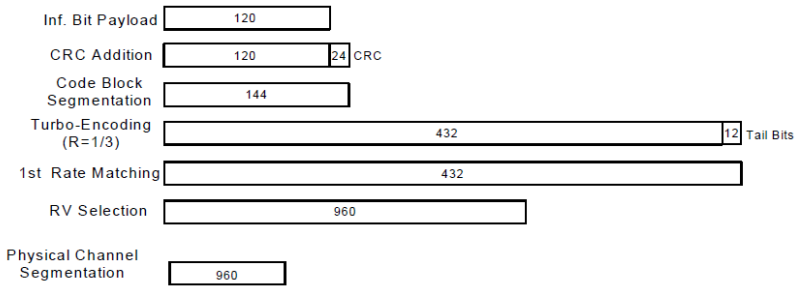


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

Setup Configuration

HSPA+ 3GPP release 7 (uplink category 7) 16QAM, 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 = 5.2E:HSPA+:UL with 16QAM
   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, C11.1.4, quoted from the TS 34.121-1 s5.2E
   iii. Set Channel Parms
   iv. Set Cell Power = -86 dBm
   v. Set Channel Type = HSPA
   vi. Set UE Target Power =21 dBm
   vii. Power Ctrl Mode= All Up Bits
   viii. Set Manual Uplink DPCH Bc/Bd = Manual
   ix. Set Manual Uplink DPCH Bc and Bd=15,15(for 34.121-1 v8.10.0 table C11.1.4 sub-test 1)
   x. Set HSPA Conn DL Channel Levels
   xi. Set HS-SCCH Configs
   xii. Set RB Test Mode Setup
   xiii. Set Common HSUPA Parameters
   xiv. Set Serving Grant
   xv. Confirm that E-TFCI is equal to the target E-TFCI of 105 for sub-test 1, and other subtest's E-TFCI
d. The transmitted maximum output power was recorded.

Table C.11.1.4: β values for transmitter characteristics tests with HS-DPCCH and E-DCH with 16QAM

Sub-test	β_c (Note3)	β_d	β_{HS} (Note1)	β_{ec}	β_{ed} (2xSF2) (Note 4)	β_{ed} (2xSF4) (Note 4)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 4)	E-TFCI (Note 5)	E-TFCI (boost)
1	1	0	30/15	30/15	β_{ed}1: 30/15 β_{ed}2: 30/15	β_{ed}3: 24/15 β_{ed}4: 24/15	3.5	2.5	14	105	105

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c.
Note 2: CM = 3.5 and the MPR is based on the relative CM difference, MPR = MAX(CM-1,0).
Note 3: DPDCH is not configured, therefore the β_c is set to 1 and β_d = 0 by default.
Note 4: β_{ed} can not be set directly; it is set by Absolute Grant Value.
Note 5: All the sub-tests require the UE to transmit 2SF2+2SF4 16QAM EDCH and they apply for UE using E-DPDCH category 7. E-DCH TTI is set to 2ms TTI and E-DCH table index = 2. To support these E-DCH configurations DPDCH is not allocated. The UE is signaled to use the extrapolation algorithm.

Setup Configuration

<WCDMA Conducted Power>

General Note:

1. Per KDB 941225 D01v03, SAR for Head / Hotspot / Body-worn exposure is measured using a 12.2 kbps RMC with TPC bits configured to all "1's".
2. Per KDB 941225 D01v03, RMC 12.2kbps setting is used to evaluate SAR. If the maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA / DC-HSDPA is ≤ ¼ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA / DC-HSDPA to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA.

<Full power mode>

Band			WCDMA V			WCDMA II		
TX Channel			4132	4182	4233	9262	9400	9538
Rx Channel			4357	4407	4458	9662	9800	9938
Frequency (MHz)			826.4	836.4	846.6	1852.4	1880	1907.6
MPR (dB)	3GPP Rel 99	AMR 12.2Kbps	22.88	22.90	22.81	23.67	23.70	23.45
	3GPP Rel 99	RMC 12.2Kbps	22.91	22.92	22.85	23.66	23.64	23.33
0	3GPP Rel 6	HSDPA Subtest-1	22.32	22.07	22.17	22.74	22.55	22.34
0	3GPP Rel 6	HSDPA Subtest-2	22.20	22.09	22.08	22.70	22.52	22.39
0.5	3GPP Rel 6	HSDPA Subtest-3	21.68	21.58	21.65	22.17	21.89	21.96
0.5	3GPP Rel 6	HSDPA Subtest-4	21.51	21.56	21.61	22.19	22.02	21.80
0	3GPP Rel 8	DC-HSDPA Subtest-1	22.12	22.00	22.16	22.59	22.40	22.39
0	3GPP Rel 8	DC-HSDPA Subtest-2	22.10	22.02	22.04	22.60	22.49	22.26
0.5	3GPP Rel 8	DC-HSDPA Subtest-3	21.68	21.54	21.52	22.16	22.00	21.92
0.5	3GPP Rel 8	DC-HSDPA Subtest-4	21.56	21.50	21.51	22.13	21.94	21.84
0	3GPP Rel 6	HSUPA Subtest-1	22.15	22.13	22.01	22.12	22.16	22.01
2	3GPP Rel 6	HSUPA Subtest-2	21.21	21.01	21.00	21.43	21.57	21.40
1	3GPP Rel 6	HSUPA Subtest-3	21.21	21.00	21.02	21.26	21.16	21.11
2	3GPP Rel 6	HSUPA Subtest-4	21.70	21.01	21.02	21.84	21.54	21.28
0	3GPP Rel 6	HSUPA Subtest-5	22.29	22.24	22.02	22.66	22.74	22.31

<Reduced power mode>

Band			WCDMA II		
TX Channel			9262	9400	9538
Rx Channel			9662	9800	9938
Frequency (MHz)			1852.4	1880	1907.6
MPR (dB)	3GPP Rel 99	AMR 12.2Kbps	22.44	22.45	22.14
	3GPP Rel 99	RMC 12.2Kbps	22.49	22.48	22.24
0	3GPP Rel 6	HSDPA Subtest-1	21.48	21.53	21.40
0	3GPP Rel 6	HSDPA Subtest-2	21.57	21.63	21.45
0.5	3GPP Rel 6	HSDPA Subtest-3	21.10	21.02	20.91
0.5	3GPP Rel 6	HSDPA Subtest-4	21.06	21.12	21.06
0	3GPP Rel 8	DC-HSDPA Subtest-1	21.49	21.52	21.48
0	3GPP Rel 8	DC-HSDPA Subtest-2	22.12	22.19	22.02
0.5	3GPP Rel 8	DC-HSDPA Subtest-3	21.58	21.51	21.34
0.5	3GPP Rel 8	DC-HSDPA Subtest-4	21.75	21.73	21.68
0	3GPP Rel 6	HSUPA Subtest-1	21.11	21.03	20.97
2	3GPP Rel 6	HSUPA Subtest-2	21.45	21.50	21.48
1	3GPP Rel 6	HSUPA Subtest-3	20.30	20.25	19.91
2	3GPP Rel 6	HSUPA Subtest-4	19.94	20.01	19.66
0	3GPP Rel 6	HSUPA Subtest-5	21.42	21.52	21.34

<CDMA2000 Conducted Power>

General Note:

1. Per KDB 941225 D01v03, SAR for head exposure is measured in RC3 with the handset configured to transmit at full rate in SO55.
2. Per KDB 941225 D01v03, in Hotspot mode EUT is treated as data device and SAR is tested with Ev-Do Rev 0 (RTAP 153.6kbps) as the primary mode.
3. Per KDB 941225 D01v03, for Body-worn accessory SAR is measured in RC3 with the handset configured in TDSO/SO32 to transmit at full rate on FCH only with all other code channels disabled. The body-worn accessory procedures in KDB Publication 447498 are applied. The 3G SAR test reduction procedure is applied to the multiple code channel configuration (FCH+SCH), with FCH only as the primary mode.

Band	CDMA2000 BC0			CDMA2000 BC1		
TX Channel	1013	384	777	25	600	1175
Frequency (MHz)	824.7	836.52	848.31	1851.25	1880	1908.75
1xRTT RC1 SO55	23.44	23.47	23.28	24.13	24.14	23.72
1xRTT RC3 SO55	23.42	23.43	23.27	24.14	24.16	23.68
1xRTT RC3 SO32(+ F-SCH)	23.44	23.48	23.28	24.12	24.13	23.70
1xRTT RC3 SO32(+SCH)	23.45	23.46	23.26	24.15	24.15	23.72
1xEVDO RTAP 153.6Kbps	23.44	23.46	23.28	24.12	24.10	23.69
1xEVDO RETAP 4096Bits	23.42	23.47	23.30	24.11	24.09	23.71

<LTE Conducted Power>

General Note:

1. Anritsu MT8820C base station simulator was used to setup the connection with EUT; the frequency band, channel bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.
2. Per KDB 941225 D05v02r03, when a properly configured base station simulator is used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration is not required.
3. Per KDB 941225 D05v02r03, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
4. Per KDB 941225 D05v02r03, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05v02r03, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
6. Per KDB 941225 D05v02r03, 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r03, 16QAM SAR testing is not required.
7. Per KDB 941225 D05v02r03, Smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r03, smaller bandwidth SAR testing is not required.

<LTE Band 13>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune up Limit (dBm)	MPR (dB)
Channel					23230			
Frequency (MHz)					782			
10	QPSK	1	0		23.37		24.5	0
10	QPSK	1	24		23.22			
10	QPSK	1	49		23.35			
10	QPSK	25	0		22.72		23.5	1
10	QPSK	25	12		22.65			
10	QPSK	25	24		22.69			
10	QPSK	50	0		22.51			
10	16QAM	1	0		22.83		23.5	1
10	16QAM	1	24		22.67			
10	16QAM	1	49		22.76			
10	16QAM	25	0		21.78		22.5	2
10	16QAM	25	12		21.63			
10	16QAM	25	24		21.75			
10	16QAM	50	0		21.52			
Channel				23205	23230	23255	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				779.5	782	784.5		
5	QPSK	1	0	23.14	23.28	23.21	24.5	0
5	QPSK	1	12	23.02	23.07	22.97		
5	QPSK	1	24	23.21	23.24	23.12		
5	QPSK	12	0	22.53	22.57	22.52	23.5	1
5	QPSK	12	6	22.43	22.44	22.45		
5	QPSK	12	11	22.50	22.61	22.63		
5	QPSK	25	0	22.23	22.34	22.32		
5	16QAM	1	0	22.54	22.58	22.64	23.5	1
5	16QAM	1	12	22.37	22.44	22.56		
5	16QAM	1	24	22.59	22.56	22.35		
5	16QAM	12	0	21.66	21.65	21.60	22.5	2
5	16QAM	12	6	21.40	21.48	21.44		
5	16QAM	12	11	21.47	21.63	21.62		
5	16QAM	25	0	21.37	21.44	21.43		

<LTE Band 4>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune up Limit (dBm)	MPR (dB)
Channel				20050	20175	20300		
Frequency (MHz)				1720	1732.5	1745		
20	QPSK	1	0	23.08	22.91	23.10	24	0
20	QPSK	1	49	22.61	22.81	22.88		
20	QPSK	1	99	22.56	22.72	22.73		
20	QPSK	50	0	21.71	21.84	21.99	23	1
20	QPSK	50	24	21.63	21.87	21.89		
20	QPSK	50	49	21.69	21.86	21.94		
20	QPSK	100	0	21.73	21.82	22.08		
20	16QAM	1	0	21.96	21.97	22.09	23	1
20	16QAM	1	49	21.64	21.82	21.88		
20	16QAM	1	99	21.58	21.90	21.74		
20	16QAM	50	0	20.79	20.85	21.01	22	2
20	16QAM	50	24	20.76	20.82	21.18		
20	16QAM	50	49	20.66	20.90	21.04		
20	16QAM	100	0	20.71	20.80	21.06		
Channel				20025	20175	20325	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				1717.5	1732.5	1747.5		
15	QPSK	1	0	23.06	22.82	23.02	24	0
15	QPSK	1	37	22.79	22.69	23.01		
15	QPSK	1	74	22.58	22.73	22.70		
15	QPSK	36	0	21.79	21.79	22.26	23	1
15	QPSK	36	18	21.80	21.85	22.09		
15	QPSK	36	37	21.61	21.87	22.02		
15	QPSK	75	0	21.72	21.76	21.92		
15	16QAM	1	0	21.98	21.85	22.12	23	1
15	16QAM	1	37	21.79	21.89	22.01		
15	16QAM	1	74	21.70	21.80	21.76		
15	16QAM	36	0	20.87	20.74	21.16	22	2
15	16QAM	36	18	20.89	20.84	21.06		
15	16QAM	36	37	20.74	20.88	21.10		
15	16QAM	75	0	20.65	20.86	21.04		
Channel				20000	20175	20350	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				1715	1732.5	1750		
10	QPSK	1	0	22.93	22.81	23.05	24	0
10	QPSK	1	24	22.84	22.72	23.01		
10	QPSK	1	49	22.69	22.72	22.72		
10	QPSK	25	0	21.90	21.92	22.06	23	1
10	QPSK	25	12	21.92	21.78	22.13		
10	QPSK	25	24	21.86	21.89	21.91		
10	QPSK	50	0	21.71	21.89	21.98		
10	16QAM	1	0	22.00	21.93	22.11	23	1
10	16QAM	1	24	21.90	21.80	22.06		
10	16QAM	1	49	21.66	21.82	21.72		
10	16QAM	25	0	20.87	20.90	21.05	22	2
10	16QAM	25	12	20.93	20.76	21.03		
10	16QAM	25	24	20.88	20.82	20.90		
10	16QAM	50	0	20.82	20.86	21.02		

Channel				19975	20175	20375	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				1712.5	1732.5	1752.5		
5	QPSK	1	0	22.89	22.81	22.99	24	0
5	QPSK	1	12	22.90	22.75	22.85		
5	QPSK	1	24	22.93	22.79	22.71		
5	QPSK	12	0	21.90	21.86	22.07	23	1
5	QPSK	12	6	21.86	21.91	21.92		
5	QPSK	12	11	21.78	21.91	21.83		
5	QPSK	25	0	21.80	21.84	21.93		
5	16QAM	1	0	22.02	21.82	22.04	23	1
5	16QAM	1	12	21.85	21.87	21.91		
5	16QAM	1	24	21.96	21.78	21.75		
5	16QAM	12	0	20.91	20.85	21.04	22	2
5	16QAM	12	6	20.90	20.84	21.01		
5	16QAM	12	11	20.88	20.87	20.94		
5	16QAM	25	0	20.98	20.86	21.01		
Channel				19965	20175	20385	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				1711.5	1732.5	1753.5		
3	QPSK	1	0	22.91	22.80	22.92	24	0
3	QPSK	1	7	22.81	22.84	22.79		
3	QPSK	1	14	22.90	22.83	22.77		
3	QPSK	8	0	21.99	21.87	21.98	23	1
3	QPSK	8	4	21.88	21.83	21.87		
3	QPSK	8	7	21.94	21.83	21.82		
3	QPSK	15	0	21.95	21.83	21.88		
3	16QAM	1	0	21.89	21.88	21.90	23	1
3	16QAM	1	7	21.88	21.90	21.87		
3	16QAM	1	14	21.82	21.82	21.66		
3	16QAM	8	0	20.94	20.75	20.89	22	2
3	16QAM	8	4	20.90	20.83	20.81		
3	16QAM	8	7	20.80	20.77	20.88		
3	16QAM	15	0	20.91	20.93	20.96		
Channel				19957	20175	20393	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				1710.7	1732.5	1754.3		
1.4	QPSK	1	0	22.92	22.79	22.81	24	0
1.4	QPSK	1	2	22.92	22.74	22.83		
1.4	QPSK	1	5	22.93	22.75	22.77		
1.4	QPSK	3	0	22.91	22.83	22.81		
1.4	QPSK	3	1	22.95	22.79	22.82		
1.4	QPSK	3	2	22.96	22.84	22.68		
1.4	QPSK	6	0	22.04	21.90	21.91	23	1
1.4	16QAM	1	0	22.05	21.85	21.93	23	1
1.4	16QAM	1	2	22.01	21.83	21.79		
1.4	16QAM	1	5	21.95	21.76	21.78		
1.4	16QAM	3	0	21.94	21.93	21.93		
1.4	16QAM	3	1	21.97	21.84	21.80		
1.4	16QAM	3	2	21.97	21.80	21.89		
1.4	16QAM	6	0	21.02	20.92	20.91	22	2

<SVLTE Power verification>

1. SVLTE operation

This device is capable of simultaneous voice and LTE (SVLTE) calls, whit he voice call supported by a CDMA 1x-RTT transmitter and the data connection supported by a separate LTE transmitter. A LTE power reduction scheme is applied during a LTE connection operating simultaneously with 1x-RTT voice calls. The maximum transmit power of LTE is limited depending on the CDMA 1x voice transmit power level. When CDMA 1x voice is operating at a certain range of high power levels, the maximum LTE transmit power is limited. When CDMA 1x voice transmit power is below a certain threshold transmit power level, LTE can transmit at the maximum power. Target levels of power reduction and CDMA voice threshold levels are provided in below table

SVLTE Power Reduction Scheme		
Mode	1x-RTT (dBm)	LTE Max. output power (dBm)
CDAM BC0 with LTE B13	Tx pwr < 17.5	23.5
	17.5 < Tx pwr < 19	22.5
	19 < Tx pwr < 20.5	21.5
	20.5 < Tx pwr < 22	20.5
	22 < Tx pwr < 23.5	19.5
	23.5 < Tx pwr	19.5

SVLTE Power Reduction Scheme		
Mode	1x-RTT (dBm)	LTE Max. output power (dBm)
CDAM BC0 with LTE B4	Tx pwr < 17.5	23.0
	17.5 < Tx pwr < 19	22.0
	19 < Tx pwr < 20.5	21.0
	20.5 < Tx pwr < 22	20.0
	22 < Tx pwr < 23.5	19.0
	23.5 < Tx pwr	19.0

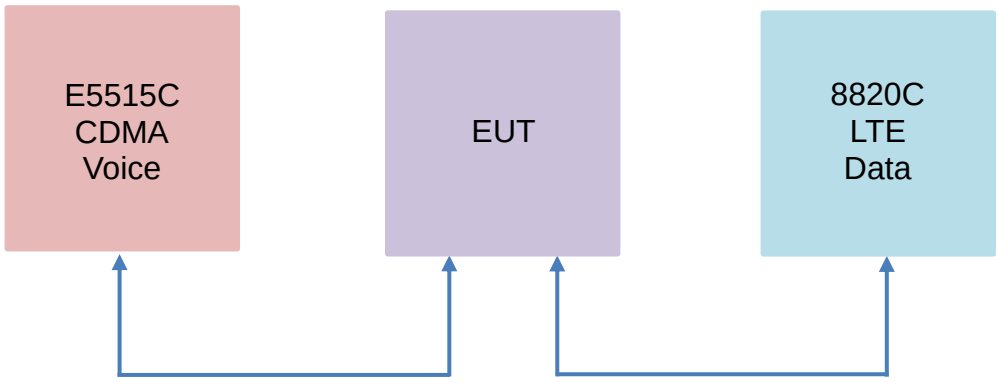
SVLTE Power Reduction Scheme		
Mode	1x-RTT (dBm)	LTE Max. output power (dBm)
CDAM BC1 with LTE B13	Tx pwr < 17.5	23.5
	17.5 < Tx pwr < 19	22.5
	19 < Tx pwr < 20.5	21.5
	20.5 < Tx pwr < 22	20.5
	22 < Tx pwr < 23.5	19.5
	23.5 < Tx pwr	19.5

SVLTE Power Reduction Scheme		
Mode	1x-RTT (dBm)	LTE Max. output power (dBm)
CDAM BC1 with LTE B4	Tx pwr < 17.5	23.0
	17.5 < Tx pwr < 19	22.0
	19 < Tx pwr < 20.5	21.0
	20.5 < Tx pwr < 22	20.0
	22 < Tx pwr < 23.5	19.0
	23.5 < Tx pwr	19.0

2. Output Power Verification

Per KDB 941225 D05v02r03 section4.4, output powers were measured in SVLTE mode the determine that the power reduction mechanism was operating reliably and consistently. The power reduction was investigated by simultaneously connecting the device to both LTE and CDMA base station simulators. LTE output powers were measured through conducted RF connections by first connecting the device in a LTE data call and subsequently a CDMA 1x-RTT call. CDMA powers were controlled by configuring the CDMA base station simulator to active bits. The LTE output power was monitored while changing the cell output power level. The power reduction targets and threshold level described in above table were confirmed. Please see results in below table.

SVLTE verification setup



CDMA BC0		LTE Conducted Power (dBm)	
Channel 384	1x-RTT Level	LTE Band 4 1RB,0RB offset Channel 20175	LTE Band 13 1RB,0RB offset Channel 23230
	17.5	22.69	23.36
	18.5	21.86	22.21
	19.5	20.77	21.38
	20.5	19.96	20.21
	21.5	19.82	20.49
	22.5	18.73	19.13
	23.5	18.86	19.48

CDMA BC1		LTE Conducted Power (dBm)	
Channel 600	1x-RTT Level	LTE Band 13 1RB, 0RB offset Channel 23230	LTE Band 4 1RB,0RB offset Channel 20175
	17.5	22.86	23.38
	18.5	21.75	22.40
	19.5	20.82	21.28
	20.5	19.65	20.16
	21.5	19.88	20.39
	22.5	18.74	19.12
	23.5	18.90	19.43

<2.4GHz Bluetooth>

General Note:

1. For 2.4GHz Bluetooth SAR testing was selected 1Mbps, due to its highest average power.
2. The duty factor is selected theoretical 83.3% perform Bluetooth SAR testing.

Mode	Channel	Frequency (MHz)	Average power (dBm)		
			1Mbps	2Mbps	3Mbps
v3.0 with HS	CH 00	2402	7.89	5.22	5.23
	CH 39	2441	9.95	7.30	7.25
	CH 78	2480	6.83	3.42	3.45

Mode	Channel	Frequency (MHz)	Average power (dBm)
			GFSK
v4.0 with LE	CH 00	2402	6.22
	CH 19	2440	8.57
	CH 39	2480	4.97

<Full Power Mode WLAN Conducted Power>

General Note:

1. 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 were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of 802.11b mode.
2. For 5 GHz 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/HT40 modes 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.

<2.4GHz WLAN>

WLAN 2.4GHz 802.11b Average Power (dBm)					
Power vs. Channel			Power vs. Data Rate		
Channel	Frequency (MHz)	Data Rate	2Mbps	5.5Mbps	11Mbps
		1Mbps			
CH 1	2412	20.06	20.81	20.81	20.84
CH 6	2437	20.85			
CH 11	2462	19.98			

WLAN 2.4GHz 802.11g Average Power (dBm)									
Power vs. Channel			Power vs. Data Rate						
Channel	Frequency (MHz)	Data Rate	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
		6Mbps							
CH 1	2412	19.01	19.69	18.96	19.08	18.13	18.17	18.26	18.20
CH 6	2437	19.72							
CH 11	2462	18.70							

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	18.04	18.71	18.08	18.05	17.09	17.18	16.33	16.32
CH 6	2437	18.74							
CH 11	2462	17.73							

<5GHz WLAN>

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	16.00	16.06	16.04	15.10	15.13	15.09	15.20	15.12
CH 40	5200	15.93							
CH 44	5220	15.94							
CH 48	5240	16.07							
CH 52	5260	16.00	15.97	15.96	14.99	15.10	15.07	15.29	15.15
CH 56	5280	15.98							
CH 60	5300	16.10							
CH 64	5320	16.12							
CH 100	5500	16.46	16.42	16.40	15.54	15.53	15.28	15.48	15.35
CH 104	5520	16.44							
CH 108	5540	16.33							
CH 112	5560	16.28							
CH 116	5580	15.78							
CH 120	5600	15.86							
CH 124	5620	15.83							
CH 128	5640	15.79							
CH 132	5660	15.13							
CH 136	5680	15.11							
CH 140	5700	15.16							
CH 149	5745	14.31	16.40	16.38	15.51	15.58	15.33	15.51	15.42
CH 153	5765	16.29							
CH 157	5785	16.43							
CH 161	5805	16.38							
CH 165	5825	16.07							

WLAN 5GHz 802.11n-HT20 Average Power (dBm)									
Power vs. Channel			Power vs. MCS Index						
Channel	Frequency (MHz)	Data Rate / 6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
CH 36	5180	15.90	15.92	15.03	15.03	14.05	14.02	14.02	14.04
CH 40	5200	15.79							
CH 44	5220	15.86							
CH 48	5240	15.93							
CH 52	5260	15.90	16.01	15.10	15.04	14.10	14.10	14.07	14.09
CH 56	5280	15.83							
CH 60	5300	15.97							
CH 64	5320	16.03							
CH 100	5500	16.40	16.37	15.43	15.40	14.38	14.29	14.31	14.32
CH 104	5520	16.11							
CH 108	5540	16.17							
CH 112	5560	16.09							
CH 116	5580	16.28							
CH 120	5600	15.80							
CH 124	5620	16.04							
CH 128	5640	16.08							
CH 132	5660	15.97							
CH 136	5680	16.04							
CH 140	5700	15.06							
CH 149	5745	14.25	16.31	15.35	15.33	14.31	14.25	14.26	14.28
CH 153	5765	16.23							
CH 157	5785	16.33							
CH 161	5805	16.26							
CH 165	5825	15.95							

WLAN 5GHz 802.11n-HT40 Average Power (dBm)									
Power vs. Channel			Power vs. MCS Index						
Channel	Frequency (MHz)	MCS Index / MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 38	5190	12.98	15.35	14.56	14.67	14.74	14.85	14.79	14.77
CH 46	5230	15.38							
CH 54	5270	15.28	15.30	14.52	14.65	14.70	14.83	14.76	14.70
CH 62	5310	15.38							
CH 102	5510	14.29	15.16	14.76	14.78	14.78	14.84	14.75	14.68
CH 110	5550	16.08							
CH 126	5630	15.34							
CH 134	5670	14.61							
CH 151	5755	12.53	14.23	13.88	13.82	13.80	13.89	13.78	13.72
CH 159	5795	15.11							

<Reduced Power Mode WLAN Conducted Power>

General Note:

1. 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 were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of 802.11b mode.
2. For 5 GHz 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/HT40 modes 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.

<5GHz WLAN>

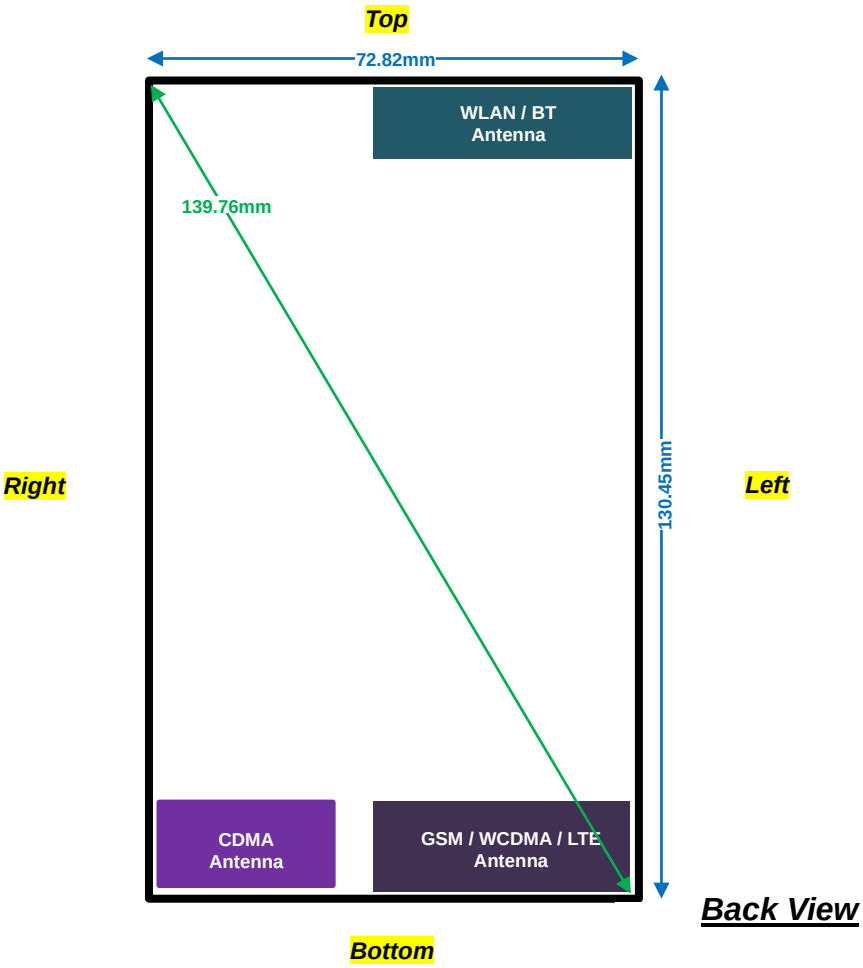
WLAN 5GHz 802.11a Average Power (dBm)									
Power vs. Channel			Power vs. Data Rate						
Channel	Frequency (MHz)	Data Rate 6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
CH 36	5180	14.42	14.35	14.37	13.44	13.42	13.40	13.55	13.49
CH 40	5200	14.31							
CH 44	5220	14.34							
CH 48	5240	14.46							
CH 149	5745	12.33	14.11	14.05	13.22	13.32	13.26	13.36	13.29
CH 153	5765	14.23							
CH 157	5785	14.14							
CH 161	5805	14.19							
CH 165	5825	13.66							

WLAN 5GHz 802.11n-HT20 Average Power (dBm)									
Power vs. Channel			Power vs. MCS Index						
Channel	Frequency (MHz)	Data Rate 6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
CH 36	5180	14.27	14.27	13.32	13.33	12.45	12.46	12.44	12.46
CH 40	5200	13.81							
CH 44	5220	14.29							
CH 48	5240	14.32							
CH 149	5745	12.24	14.06	13.18	13.15	12.22	12.10	12.15	12.19
CH 153	5765	14.11							
CH 157	5785	14.01							
CH 161	5805	13.87							
CH 165	5825	13.50							

WLAN 5GHz 802.11n-HT40 Average Power (dBm)									
Power vs. Channel			Power vs. MCS Index						
Channel	Frequency (MHz)	MCS Index MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 38	5190	11.40	13.92	12.93	13.01	12.99	13.03	12.92	12.87
CH 46	5230	13.95							
CH 151	5755	10.78	12.12	11.86	11.81	11.74	11.88	11.79	11.71
CH 159	5795	13.21							

13. Antenna Location

<Mobile Phone>



14. SAR Test Results

General Note:

1. Per KDB 447498 D01v05r02, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
   a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
   b. For SAR testing of WLAN signal with non-100% duty cycle, the measured SAR is scaled-up by the duty cycle scaling factor which is equal to "1/(duty cycle)"
   c. For WWAN: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
   d. For WLAN: Reported SAR(W/kg)= Measured SAR(W/kg)* Duty Cycle scaling factor * Tune-up scaling factor
2. Per KDB 447498 D01v05r02, for each exposure position, testing of other required channels within the operating mode of a frequency band is not required when the *reported* 1-g or 10-g SAR for the mid-band or highest output power channel is:
   - ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
   - ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
   - ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
3. Per KDB 648474 D04v01r02, when the reported SAR for a body-worn accessory measured without a headset connected to the handset is ≤ 1.2 W/kg, SAR testing with a headset connected to the handset is not required.
4. This device 2.4GHz / 5.2GHz / 5.8GHz WLAN supports Hotspot operation and WiFi Direct (Group Client / Group Owner), and 5.3GHz / 5.5GHz WLAN supports WiFi Direct (Group Client).
5. While operating in body-adjacent exposure configurations during a mobile hotspot session, reduced power limits are enforced on the WCDMA B2 transmitter. More detailed information which can be referred to “operational description”.
6. While operation simultaneously with any other transmitters active, like Hotspot function, a reduced maximum power limit is enforced on the WiFi transmitter in 5.2GHz / 5.8GHz WLAN. More detailed information which can be referred to “operational description”.
7. During SAR testing the WLAN transmission was verified using a spectrum analyzer.

GSM Note:

1. Per KDB 941225 D01v03, considering the possibility of e.g. 3rd party VoIP operation for Head and body-worn SAR test reduction for GSM and GPRS and EDGE modes is determined by the source-based time-averaged output power including tune-up tolerance. The mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested. Therefore, the EUT was set in GPRS (3Tx slots) for GSM850 and GPRS (4Tx slots) for GSM1900.
2. Per KDB 941225 D01v03, for Hotspot SAR test reduction for GPRS and EDGE modes is determined by the source-based time-averaged output power including tune-up tolerance, for modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested, therefore, the EUT was set in GPRS (3Tx slots) for GSM850 and GPRS (4Tx slots) for GSM1900.

WCDMA Note:

1. Per KDB 941225 D01v03, SAR for head / Hotspot / Body-worn exposure is measured using a 12.2 kbps RMC with TPC bits configured to all “1’s”.
2. Per KDB 941225 D01v03, RMC 12.2kbps setting is used to evaluate SAR. If the maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA / DC-HSDPA is ≤ ¼ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA / DC-HSDPA to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA.

CDMA Note:

1. Per KDB 941225 D01v03, SAR for head exposure is measured in RC3 with the handset configured to transmit at full rate in SO55.
2. Per KDB 941225 D01v03, in Hotspot mode EUT is treated as data device and SAR is tested with Ev-Do Rev 0 (RTAP 153.6kbps) as the primary mode.
3. Per KDB 941225 D01v03, for Body-worn accessory SAR is measured in RC3 with the handset configured in TDSO/SO32 to transmit at full rate on FCH only with all other code channels disabled. The body-worn accessory procedures in KDB Publication 447498 are applied. The 3G SAR test reduction procedure is applied to the multiple code channel configuration (FCH+SCH), with FCH only as the primary mode.

LTE Note:

1. Per KDB 941225 D05v02r03, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
2. Per KDB 941225 D05v02r03, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
3. Per KDB 941225 D05v02r03, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
4. Per KDB 941225 D05v02r03, 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r03, 16QAM SAR testing is not required.
5. Per KDB 941225 D05v02r03, Smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r03, smaller bandwidth SAR testing is not required.

14.1 Head SAR

<GSM SAR>

Plot No.	Band	Mode	Test Position	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)
01	GSM850	GPRS (3 Tx slots)	Left Cheek	128	824.2	28.64	30.00	1.368	0.07	0.518	**0.708**
	GSM1900	GPRS (4 Tx slots)	Left Cheek	810	1909.8	25.15	26.50	1.365	0.189	0.837	1.142
	GSM1900	GPRS (4 Tx slots)	Left Cheek	512	1850.2	24.88	26.50	1.452	-0.039	0.806	1.170
02	GSM1900	GPRS (4 Tx slots)	Left Cheek	661	1880	24.92	26.50	1.439	0.069	0.828	**1.191**

<WCDMA SAR>

Plot No.	Band	Mode	Test Position	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)
03	WCDMA V	RMC 12.2Kbps	Left Cheek	4182	836.4	22.92	24.50	1.439	0.105	0.370	**0.532**
04	WCDMA II	RMC 12.2Kbps	Left Cheek	9400	1880	23.64	24.50	1.219	0.012	1.120	**1.365**
	WCDMA II	RMC 12.2Kbps	Left Cheek	9262	1852.4	23.66	24.50	1.213	0.111	1.020	1.238
	WCDMA II	RMC 12.2Kbps	Left Cheek	9538	1907.6	23.33	24.50	1.309	0.004	1.020	1.335

<CDMA SAR>

Plot No.	Band	Mode	Test Position	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)
05	CDMA2000 BC0	1xRTT RC3 SO55	Right Cheek	777	848.31	23.27	24.50	1.327	0.03	0.326	**0.433**
06	CDMA2000 BC1	1xRTT RC3 SO55	Right Cheek	25	1851.25	24.14	24.50	1.086	0.027	0.760	**0.826**
	CDMA2000 BC1	1xRTT RC3 SO55	Right Cheek	600	1880	24.16	24.50	1.081	0.017	0.671	0.726
	CDMA2000 BC1	1xRTT RC3 SO55	Right Cheek	1175	1908.75	23.68	24.50	1.208	-0.023	0.562	0.679

<LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	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)
07	LTE Band 13	10M	QPSK	1RB	0offset	Left Cheek	23230	782	23.37	24.50	1.297	0.068	0.408	**0.529**
	LTE Band 13	10M	QPSK	25RB	0offset	Left Cheek	23230	782	22.72	23.50	1.197	0.099	0.298	0.357
08	LTE Band 4	20M	QPSK	1RB	0offset	Left Cheek	20050	1720	23.08	24.00	1.236	0.028	0.582	**0.719**
	LTE Band 4	20M	QPSK	50RB	0offset	Left Cheek	20300	1745	21.99	23.00	1.262	-0.02	0.519	0.655

<WLAN SAR>

Plot No.	Band	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
09	WLAN2.4GHz	802.11b 1Mbps	Left Tilted	6	2437	20.85	21.50	1.161	100	1.000	0.148	0.219	**0.254**
10	WLAN5GHz	802.11a 6Mbps	Left Cheek	48	5240	16.07	17.50	1.389	96.55	1.036	0.022	0.141	**0.203**
11	WLAN5GHz	802.11a 6Mbps	Right Cheek	64	5320	16.12	17.50	1.373	96.55	1.036	-0.108	0.223	**0.317**
12	WLAN5GHz	802.11a 6Mbps	Right Cheek	100	5500	16.46	17.50	1.270	96.55	1.036	0.069	0.299	**0.393**
13	WLAN5GHz	802.11a 6Mbps	Right Cheek	157	5785	16.43	17.50	1.279	96.55	1.036	-0.029	0.346	**0.458**

<Bluetooth SAR>

Plot No.	Band	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
14	Bluetooth	1Mbps	Left Tilted	39	2441	9.95	10.00	1.012	100	1.000	0.153	0.024	**0.024**

14.2 Hotspot SAR

<GSM SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	GSM850	GPRS (3 Tx slots)	Left Side	1cm	189	836.4	28.68	30.00	1.355	0.042	0.843	1.142
	GSM850	GPRS (3 Tx slots)	Left Side	1cm	128	824.2	28.64	30.00	1.368	-0.057	0.846	1.157
15	GSM850	GPRS (3 Tx slots)	Left Side	1cm	251	848.8	28.10	30.00	1.549	-0.013	0.854	**1.323**
	GSM1900	GPRS (4 Tx slots)	Back	1cm	810	1909.8	25.15	26.50	1.365	-0.02	0.707	0.965
16	GSM1900	GPRS (4 Tx slots)	Back	1cm	512	1850.2	24.88	26.50	1.452	0.026	0.698	**1.014**
	GSM1900	GPRS (4 Tx slots)	Back	1cm	661	1880	24.92	26.50	1.439	0.039	0.678	0.976

<WCDMA SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
17	WCDMA V	RMC 12.2Kbps	Left Side	1cm	-	4182	836.4	22.92	24.50	1.439	-0.009	0.525	**0.755**
18	WCDMA II	RMC 12.2Kbps	Back	1cm	On	9262	1852.4	22.49	22.50	1.002	-0.021	0.604	**0.605**

<CDMA SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	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)
19	CDMA2000 BC0	RTAP 153.6Kbps	Back	1cm	777	848.31	23.28	24.50	1.324	-0.01	0.601	**0.796**
	CDMA2000 BC1	RTAP 153.6Kbps	Back	1cm	1175	1908.75	23.69	24.50	1.205	-0.011	0.854	1.029
20	CDMA2000 BC1	RTAP 153.6Kbps	Back	1cm	25	1851.25	24.12	24.50	1.091	-0.055	0.975	**1.064**
	CDMA2000 BC1	RTAP 153.6Kbps	Back	1cm	600	1880	24.10	24.50	1.096	-0.02	0.959	1.052

<LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (cm)	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)
21	LTE Band 13	10M	QPSK	1RB	0offset	Back	1cm	23230	782	23.37	24.50	1.297	-0.043	0.728	**0.944**
	LTE Band 13	10M	QPSK	25RB	0offset	Back	1cm	23230	782	22.72	23.50	1.197	-0.026	0.579	0.693
	LTE Band 4	20M	QPSK	1RB	0offset	Back	1cm	20300	1745	23.10	24.00	1.230	-0.045	0.843	1.037
22	LTE Band 4	20M	QPSK	1RB	0offset	Back	1cm	20050	1720	23.08	24.00	1.236	-0.032	0.913	**1.128**
	LTE Band 4	20M	QPSK	1RB	0offset	Back	1cm	20175	1732.5	22.91	24.00	1.285	-0.024	0.765	0.983
	LTE Band 4	20M	QPSK	50RB	0offset	Back	1cm	20300	1745	21.99	23.00	1.262	0.024	0.708	0.893
	LTE Band 4	20M	QPSK	50RB	0offset	Back	1cm	20050	1720	21.71	23.00	1.346	0.002	0.614	0.826
	LTE Band 4	20M	QPSK	50RB	24offset	Back	1cm	20175	1732.5	21.87	23.00	1.297	-0.029	0.634	0.822
	LTE Band 4	20M	QPSK	100RB	0offset	Back	1cm	20300	1745	22.08	23.00	1.236	-0.042	0.698	0.863

<WLAN SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
23	WLAN2.4GHz	802.11b 1Mbps	Back	1cm	-	6	2437	20.85	21.50	1.161	100	1.000	0.012	0.477	**0.554**
24	WLAN5GHz	802.11a 6Mbps	Back	1cm	On	36	5180	14.42	15.50	1.282	96.55	1.036	-0.068	0.878	**1.166**
	WLAN5GHz	802.11a 6Mbps	Back	1cm	On	48	5240	14.46	15.50	1.270	96.55	1.036	-0.013	0.802	1.055
25	WLAN5GHz	802.11a 6Mbps	Back	1cm	On	153	5765	14.23	15.50	1.340	96.55	1.036	0.009	0.633	**0.879**
	WLAN5GHz	802.11a 6Mbps	Back	1cm	On	157	5785	14.14	15.50	1.367	96.55	1.036	-0.033	0.566	0.802
	WLAN5GHz	802.11a 6Mbps	Back	1cm	On	161	5805	14.19	15.50	1.352	96.55	1.036	-0.065	0.544	0.762

<Bluetooth SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
26	Bluetooth	1Mbps	Back	1cm	39	2441	9.95	10.00	1.012	100	1.000	-0.089	0.055	**0.056**

14.3 Body Worn Accessory SAR

<GSM SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	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)
27	GSM850	GPRS (3 Tx slots)	Back	1.5cm	128	824.2	28.64	30.00	1.368	-0.013	0.558	**0.763**
28	GSM1900	GPRS (4 Tx slots)	Back	1.5cm	810	1909.8	25.15	26.50	1.365	-0.028	0.418	**0.570**

<WCDMA SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	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)
29	WCDMA V	RMC 12.2Kbps	Back	1.5cm	4182	836.4	22.92	24.50	1.439	0.031	0.411	**0.591**
30	WCDMA II	RMC 12.2Kbps	Back	1.5cm	9262	1852.4	23.66	24.50	1.213	-0.053	0.509	**0.618**

<CDMA SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	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)
31	CDMA2000 BC0	1xRTT RC3 SO32	Back	1.5cm	777	848.31	23.28	24.50	1.324	-0.014	0.411	**0.544**
32	CDMA2000 BC1	1xRTT RC3 SO32	Back	1.5cm	25	1851.25	24.12	24.50	1.091	0.011	0.477	**0.521**

<LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (cm)	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)
33	LTE Band 13	10M	QPSK	1RB	0offset	Back	1.5cm	23230	782	23.37	24.50	1.297	0.014	0.458	**0.594**
	LTE Band 13	10M	QPSK	25RB	0offset	Back	1.5cm	23230	782	22.72	23.50	1.197	0.054	0.357	0.427
34	LTE Band 4	20M	QPSK	1RB	0offset	Back	1.5cm	20300	1745	23.10	24.00	1.230	0.024	0.426	**0.524**
	LTE Band 4	20M	QPSK	50RB	0offset	Back	1.5cm	20300	1745	21.99	23.00	1.262	-0.008	0.350	0.442

<WLAN SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
35	WLAN2.4GHz	802.11b 1Mbps	Back	1.5cm	6	2437	20.85	21.50	1.161	100	1.000	0.06	0.185	**0.215**
36	WLAN5GHz	802.11a 6Mbps	Back	1.5cm	36	5180	16.00	17.50	1.412	96.55	1.036	-0.086	0.716	**1.047**
	WLAN5GHz	802.11a 6Mbps	Back	1.5cm	48	5240	16.07	17.50	1.389	96.55	1.036	-0.092	0.680	0.979
	WLAN5GHz	802.11a 6Mbps	Back	1.5cm	52	5260	16.00	17.50	1.412	96.55	1.036	-0.041	0.692	1.012
37	WLAN5GHz	802.11a 6Mbps	Back	1.5cm	64	5320	16.12	17.50	1.373	96.55	1.036	-0.099	0.763	**1.086**
38	WLAN5GHz	802.11a 6Mbps	Back	1.5cm	112	5560	16.28	17.50	1.324	96.55	1.036	0.019	0.745	**1.022**
	WLAN5GHz	802.11a 6Mbps	Back	1.5cm	100	5500	16.46	17.50	1.270	96.55	1.036	0.021	0.534	0.703
	WLAN5GHz	802.11a 6Mbps	Back	1.5cm	120	5600	15.86	17.50	1.458	96.55	1.036	-0.017	0.675	1.020
	WLAN5GHz	802.11a 6Mbps	Back	1.5cm	140	5700	15.16	17.00	1.527	96.55	1.036	-0.045	0.616	0.974
37	WLAN5GHz	802.11a 6Mbps	Back	1.5cm	153	5765	16.29	17.50	1.321	96.55	1.036	-0.043	0.751	**1.028**
	WLAN5GHz	802.11a 6Mbps	Back	1.5cm	157	5785	16.43	17.50	1.279	96.55	1.036	-0.042	0.611	0.809
	WLAN5GHz	802.11a 6Mbps	Back	1.5cm	161	5805	16.38	17.50	1.294	96.55	1.036	-0.012	0.572	0.767

<Bluetooth SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
40	Bluetooth	1Mbps	Back	1.5cm	39	2441	9.95	10.00	1.012	100	1.000	-0.026	0.021	**0.021**

14.4 Repeated SAR Measurement

No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (cm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Ratio	Reported 1g SAR (W/kg)
1st	WCDMA II	-	-	-	-	RMC 12.2Kbps	Left Cheek	-	-	9400	1880	23.64	24.50	1.219	-	1.000	0.012	1.120	-	1.365
2nd	WCDMA II	-	-	-	-	RMC 12.2Kbps	Left Cheek	-	-	9400	1880	23.64	24.50	1.219	-	1.000	0.097	1.110	1.01	1.353
1st	GSM850	-	-	-	-	GPRS (3 Tx slots)	Left Side	1cm	-	251	848.8	28.10	30.00	1.549	-	1.000	-0.013	0.854	-	1.323
2nd	GSM850	-	-	-	-	GPRS (3 Tx slots)	Left Side	1cm	-	251	848.8	28.10	30.00	1.549	-	1.000	-0.047	0.833	1.03	1.290
1st	LTE Band 4	20M	QPSK	1RB	0offset		Back	1cm	-	20050	1720	23.08	24.00	1.236	-	1.000	-0.032	0.913	-	1.128
2nd	LTE Band 4	20M	QPSK	1RB	0offset		Back	1cm	-	20050	1720	23.08	24.00	1.236	-	1.000	0.061	0.854	1.07	1.055
1st	WLAN5GHz	-	-	-	-	802.11a 6Mbps	Back	1cm	On	36	5180	14.42	15.50	1.282	96.55	1.036	-0.068	0.878	-	1.166
2nd	WLAN5GHz	-	-	-	-	802.11a 6Mbps	Back	1cm	On	36	5180	14.42	15.50	1.282	96.55	1.036	0.023	0.821	1.07	1.091

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.

15. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations	Portable Handset			Note
		Head	Body-worn	Hotspot	
1.	GSM(Voice) + WLAN2.4GHz(data)	Yes	Yes		
2.	WCDMA(Voice) + WLAN2.4GHz(data)	Yes	Yes		
3.	CDMA(Voice) + WLAN2.4GHz(data)	Yes	Yes		
4.	GSM(Voice) + Bluetooth(data)	Yes	Yes		
5.	WCDMA((Voice) + Bluetooth(data)	Yes	Yes		
6.	CDMA((Voice) + Bluetooth(data)	Yes	Yes		
7.	GSM(Voice) + WLAN5GHz(data)	Yes	Yes		
8.	WCDMA((Voice) + WLAN5GHz(data)	Yes	Yes		
9.	CDMA((Voice) + WLAN5GHz(data)	Yes	Yes		
10.	CDMA(Voice) + LTE(data) + WLAN2.4GHz(data	Yes	Yes		SVLTE + 2.4GHz Hotspot
11.	CDMA(Voice) + LTE(data) + Bluetooth(data)	Yes	Yes		SVLTE + Bluetooth Tethering
12.	CDMA(Voice) + LTE(data) + WLAN5GHz(data)	Yes	Yes		SVLTE + 5GHz Hotspot
13.	GPRS/EDGE(Data) + WLAN2.4GHz(data)	Yes	Yes	Yes	2.4GHz Hotspot
14.	WCDMA(Data) + WLAN2.4GHz(data)	Yes	Yes	Yes	
15.	CDMA(Data) + WLAN2.4GHz(data)	Yes	Yes	Yes	
16.	LTE(Data) + WLAN2.4GHz(data)	Yes	Yes	Yes	
17.	GPRS/EDGE(Data) + Bluetooth(data)	Yes	Yes	Yes	Bluetooth Tethering
18.	WCDMA(Data) + Bluetooth(data)	Yes	Yes	Yes	
19.	CDMA(Data) + Bluetooth(data)	Yes	Yes	Yes	
20.	LTE(Data) + Bluetooth(data)	Yes	Yes	Yes	
21.	GPRS/EDGE(data) + WLAN5GHz(data)	Yes	Yes	Yes	5GHz Hotspot
22.	WCDMA(data) + WLAN5GHz(data)	Yes	Yes	Yes	
23.	CDMA(data) + WLAN5 GHz(data)	Yes	Yes	Yes	
24.	LTE(data) + WLAN5GHz(data)	Yes	Yes	Yes	

General Note:

1. This device supported VoIP in EGPRS, WCDMA, CDMA, LTE (e.g. 3rd party VoIP).
2. This device 2.4GHz / 5.2GHz / 5.8GHz WLAN supports Hotspot operation and WiFi Direct (Group Client / Group Owner), and 5.3GHz / 5.5GHz WLAN supports WiFi Direct (Group Client).
3. WLAN and Bluetooth share the same antenna, and cannot transmit simultaneously.
4. 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.
5. The worst case 2.4GHz / 5GHz WLAN reported SAR for each configuration was used for SAR summation, Therefore, the following summations represent the absolute worst cases for simultaneous transmission with the WLAN.
6. The Scaled SAR summation is calculated based on the same configuration and test position.
7. 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 15.4.

15.1 Head Exposure Conditions

WWAN Band		Exposure Position	1 WWAN SAR (W/kg)	2 2.4GHz WLAN SAR (W/kg)	3 2.4GHz Bluetooth SAR (W/kg)	1+2 Summed SAR (W/kg)	1+3 Summed SAR (W/kg)	SPLSR	Case No
GSM	GSM850	Left Cheek	0.708			**0.71**	**0.71**		
		Left Tilted		0.254	0.024	**0.25**	**0.02**		
	GSM1900	Left Cheek	1.191			**1.19**	**1.19**		
		Left Tilted		0.254	0.024	**0.25**	**0.02**		
WCDMA	Band V	Left Cheek	0.532			**0.53**	**0.53**		
		Left Tilted		0.254	0.024	**0.25**	**0.02**		
	Band II	Left Cheek	1.365			**1.37**	**1.37**		
		Left Tilted		0.254	0.024	**0.25**	**0.02**		
CDMA	BC0	Right Cheek	0.433			**0.43**	**0.43**		
		Left Tilted		0.254	0.024	**0.25**	**0.02**		
	BC1	Right Cheek	0.826			**0.83**	**0.83**		
		Left Tilted		0.254	0.024	**0.25**	**0.02**		
LTE	Band 13	Left Cheek	0.529			**0.53**	**0.53**		
		Left Tilted		0.254	0.024	**0.25**	**0.02**		
	Band 4	Left Cheek	0.719			**0.72**	**0.72**		
		Left Tilted		0.254	0.024	**0.25**	**0.02**		

WWAN Band		Exposure Position	1 WWAN SAR (W/kg)	2 5.2GHz / 5.3GHz / 5.5GHz / 5.8GHz WLAN Band	2 5.2GHz / 5.3GHz / 5.5GHz / 5.8GHz WLAN SAR (W/kg)	1+2 Summed SAR (W/kg)	SPLSR	Case No
GSM	GSM850	Right Cheek		5.8GHz	0.458	**0.46**		
		Left Cheek	0.708	5.2GHz	0.203	**0.91**		
	GSM1900	Right Cheek		5.8GHz	0.458	**0.46**		
		Left Cheek	1.191	5.2GHz	0.203	**1.39**		
WCDMA	Band V	Right Cheek		5.8GHz	0.458	**0.46**		
		Left Cheek	0.532	5.2GHz	0.203	**0.74**		
	Band II	Right Cheek		5.8GHz	0.458	**0.46**		
		Left Cheek	1.365	5.2GHz	0.203	**1.57**		
CDMA	BC0	Right Cheek	0.433	5.8GHz	0.458	**0.89**		
		Left Cheek		5.2GHz	0.203	**0.20**		
	BC1	Right Cheek	0.826	5.8GHz	0.458	**1.28**		
		Left Cheek		5.2GHz	0.203	**0.20**		
LTE	Band 13	Right Cheek		5.8GHz	0.458	**0.46**		
		Left Cheek	0.529	5.2GHz	0.203	**0.73**		
	Band 4	Right Cheek		5.8GHz	0.458	**0.46**		
		Left Cheek	0.719	5.2GHz	0.203	**0.92**		

WWAN Band		Exposure Position	1	2	3	4	5	1+2+4 Summed SAR (W/kg)	1+3+4 Summed SAR (W/kg)	1+2+5 Summed SAR (W/kg)	1+3+5 Summed SAR (W/kg)	SPLSR	Case No
			LTE WWAN	CDMA2000 BC0	CDMA2000 BC1	2.4GHz WLAN	2.4GHz Bluetooth						
			SAR (W/kg)	SAR (W/kg)	SAR (W/kg)	SAR (W/kg)	SAR (W/kg)						
LTE	Band 13	Right Cheek		0.433	0.826			**0.43**	**0.83**	**0.43**	**0.83**		
		Left Cheek	0.529					**0.53**	**0.53**	**0.53**	**0.53**		
		Left Tilted				0.254	0.024	**0.25**	**0.25**	**0.02**	**0.02**		
	Band 4	Right Cheek		0.433	0.826			**0.43**	**0.83**	**0.43**	**0.83**		
		Left Cheek	0.719					**0.72**	**0.72**	**0.72**	**0.72**		
		Left Tilted				0.254	0.024	**0.25**	**0.25**	**0.02**	**0.02**		

WWAN Band		Exposure Position	1	2	3	4		1+2+4 Summed SAR (W/kg)	1+3+4 Summed SAR (W/kg)	SPLSR	Case No
			LTE	CDMA2000 BC0	CDMA2000 BC1	5.2GHz / 5.3GHz / 5.5GHz / 5.8GHz WLAN					
			SAR (W/kg)	SAR (W/kg)	SAR (W/kg)	Band	SAR (W/kg)				
LTE	Band 13	Right Cheek		0.433	0.826	5.8GHz	0.458	**0.89**	**1.28**		
		Left Cheek	0.529			5.2GHz	0.203	**0.73**	**0.73**		
	Band 4	Right Cheek		0.433	0.826	5.8GHz	0.458	**0.89**	**1.28**		
		Left Cheek	0.719			5.2GHz	0.203	**0.92**	**0.92**		

15.2 Hotspot Exposure Conditions

WWAN Band		Exposure Position	1	2	3	1+2 Summed SAR (W/kg)	1+3 Summed SAR (W/kg)	SPLSR	Case No
			WWAN	2.4GHz WLAN	2.4GHz Bluetooth				
			SAR (W/kg)	SAR (W/kg)	SAR (W/kg)				
GSM	GSM850	Back		0.554	0.056	**0.55**	**0.06**		
		Left side	1.323			**1.32**	**1.32**		
	GSM1900	Back	1.014	0.554	0.056	**1.57**	**1.07**		
WCDMA	Band V	Back		0.554	0.056	**0.55**	**0.06**		
		Left side	0.755			**0.76**	**0.76**		
	Band II	Back	0.605	0.554	0.056	**1.16**	**0.66**		
CDMA	BC0	Back	0.796	0.554	0.056	**1.35**	**0.85**		
	BC1	Back	1.064	0.554	0.056	**1.62**	**1.12**	0.02	Case 1
LTE	Band 13	Back	0.944	0.554	0.056	**1.50**	**1.00**		
	Band 4	Back	1.128	0.554	0.056	**1.68**	**1.18**	0.02	Case 2

WWAN Band		Exposure Position	1	2		1+2 Summed SAR (W/kg)	SPLSR	Case No
			WWAN	5.2GHz / 5.8GHz WLAN				
			SAR (W/kg)	Band	SAR (W/kg)			
GSM	GSM850	Back		5.2GHz	1.166	**1.17**		
		Left side	1.323			**1.32**		
	GSM1900	Back	1.014	5.2GHz	1.166	**2.18**	0.03	Case 3
WCDMA	Band V	Back		5.2GHz	1.166	**1.17**		
		Left side	0.755			**0.76**		
	Band II	Back	0.605	5.2GHz	1.166	**1.77**	0.02	Case 4
CDMA	BC0	Back	0.796	5.2GHz	1.166	**1.96**	0.03	Case 5
	BC1	Back	1.064	5.2GHz	1.166	**2.23**	0.03	Case 6
LTE	Band 13	Back	0.944	5.2GHz	1.166	**2.11**	0.03	Case 7
	Band 4	Back	1.128	5.2GHz	1.166	**2.29**	0.04	Case 8

15.3 Body-Worn Accessory Exposure Conditions

WWAN Band		Exposure Position	1	2	3	1+2 Summed SAR (W/kg)	1+3 Summed SAR (W/kg)	SPLSR	Case No
			WWAN	2.4GHz WLAN	2.4GHz Bluetooth				
			SAR (W/kg)	SAR (W/kg)	SAR (W/kg)				
GSM	GSM850	Back	0.763	0.215	0.021	**0.98**	**0.78**		
	GSM1900	Back	0.570	0.215	0.021	**0.79**	**0.59**		
WCDMA	Band V	Back	0.591	0.215	0.021	**0.81**	**0.61**		
	Band II	Back	0.618	0.215	0.021	**0.83**	**0.64**		
CDMA	BC0	Back	0.544	0.215	0.021	**0.76**	**0.57**		
	BC1	Back	0.521	0.215	0.021	**0.74**	**0.54**		
LTE	Band 13	Back	0.594	0.215	0.021	**0.81**	**0.62**		
	Band 4	Back	0.524	0.215	0.021	**0.74**	**0.55**		

WWAN Band		Exposure Position	1	2		1+2 Summed SAR (W/kg)	SPLSR	Case No
			WWAN	5.2GHz / 5.3GHz / 5.5GHz / 5.8GHz WLAN				
			SAR (W/kg)	Band	SAR (W/kg)			
GSM	GSM850	Back	0.763	5.3G	1.086	**1.85**	0.03	Case 9
	GSM1900	Back	0.570	5.3G	1.086	**1.66**	0.03	Case 10
WCDMA	Band V	Back	0.591	5.3G	1.086	**1.68**	0.03	Case 11
	Band II	Back	0.618	5.3G	1.086	**1.70**	0.03	Case 12
CDMA	BC0	Back	0.544	5.3G	1.086	**1.63**	0.02	Case 13
	BC1	Back	0.521	5.3G	1.086	**1.61**	0.02	Case 14
LTE	Band 13	Back	0.594	5.3G	1.086	**1.68**	0.02	Case 15
	Band 4	Back	0.524	5.3G	1.086	**1.61**	0.02	Case 16

WWAN Band		Exposure Position	1	2	3	4	5	1+2+4 Summed SAR (W/kg)	1+3+4 Summed SAR (W/kg)	1+2+5 Summed SAR (W/kg)	1+3+5 Summed SAR (W/kg)	SPLSR	Case No
			LTE WWAN	CDMA2000 BC0	CDMA2000 BC1	2.4GHz WLAN	2.4GHz Bluetooth						
			SAR (W/kg)	SAR (W/kg)	SAR (W/kg)	SAR (W/kg)	SAR (W/kg)						
LTE	Band 13	Back	0.594	0.544	0.521	0.215	0.021	**1.35**	**1.33**	**1.16**	**1.14**		
	Band 4	Back	0.524	0.544	0.521	0.215	0.021	**1.28**	**1.26**	**1.09**	**1.07**		

WWAN Band		Exposure Position	1	3	4		1+2+4 Summed SAR (W/kg)	SPLSR	Case No
			LTE WWAN	CDMA2000 BC1	5.2GHz / 5.3GHz / 5.5GHz / 5.8GHz WLAN				
			SAR (W/kg)	SAR (W/kg)	Band	SAR (W/kg)			
LTE	Band 13	Back	0.594	0.521	5.3G	1.086	**2.22**	0.04	Case 17
	Band 4	Back	0.524	0.521	5.3G	1.086	**2.15**	0.03	Case 19

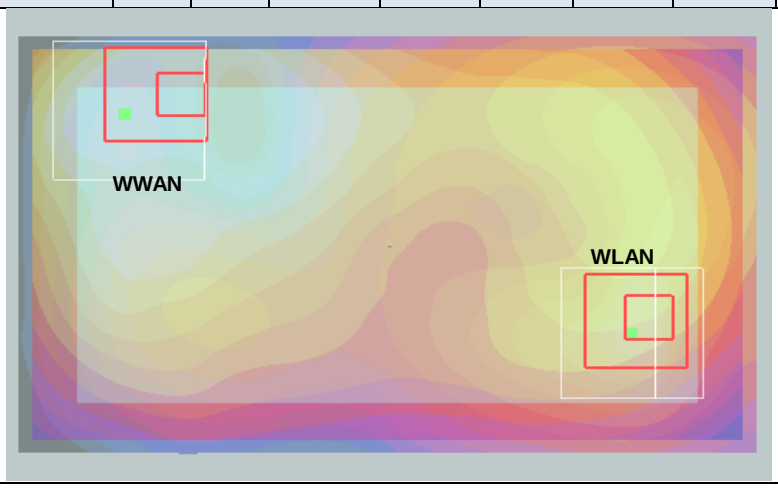
WWAN Band		Exposure Position	1	3	4		1+3+4 Summed SAR (W/kg)	SPLSR	Case No
			LTE WWAN	CDMA2000 BC1	5.2GHz / 5.3GHz / 5.5GHz / 5.8GHz WLAN				
			SAR (W/kg)	SAR (W/kg)	Band	SAR (W/kg)			
LTE	Band 13	Back	0.594	0.521	5.3G	1.086	**2.20**	0.03	Case 18
	Band 4	Back	0.524	0.521	5.3G	1.086	**2.13**	0.02	Case 20

15.4 SPLSR Evaluation and Analysis

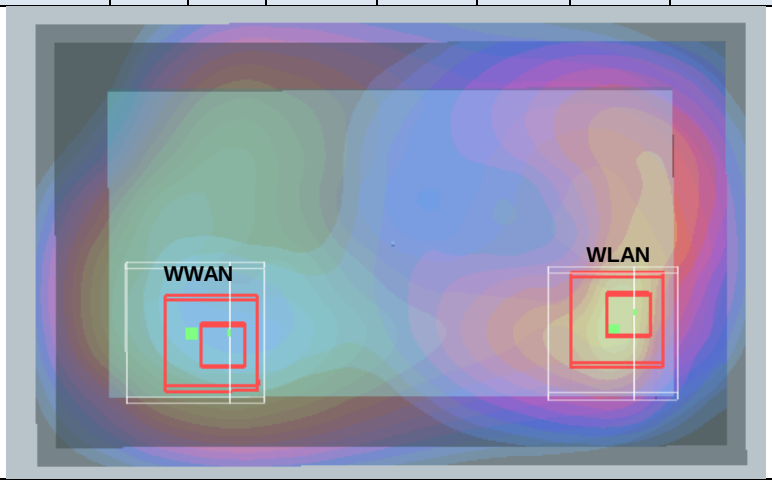
General Note:

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

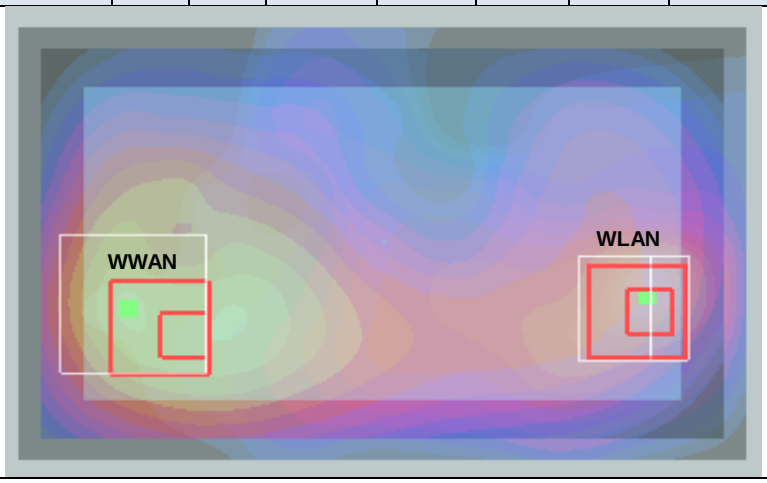
Case 1	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
	CDMA BC1	Back	1.064	1	-0.048	-0.0385	-0.203	105.8	1.62	0.02	Not required
	2.4GHz WLAN		0.554	1	-0.00161	0.0566	-0.203				



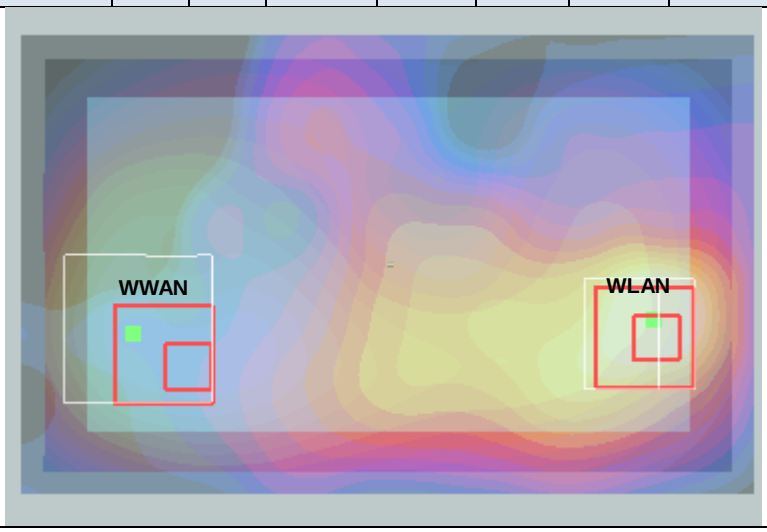
Case 2	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
	LTE Band 4	Back	1.128	1	0.00301	-0.0375	-0.203	94.2	1.68	0.02	Not required
	2.4GHz WLAN		0.554	1	-0.00161	0.0566	-0.203				



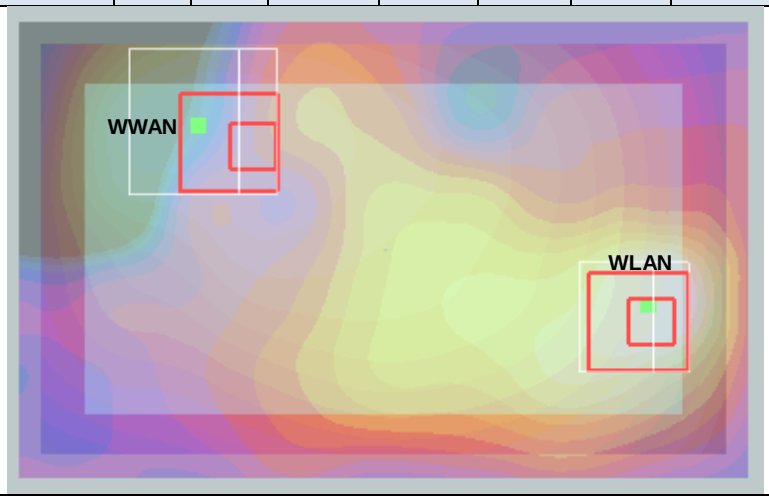
	Band	Position	SAR (W/kg)	Gap	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				(cm)	X	Y	Z				
Case 3	GSM1900	Back	1.014	1	0.00499	-0.0385	-0.203	97.8	2.18	0.03	Not required
	5.2 GHz WLAN		1.166	1	-0.002	0.059	-0.203				



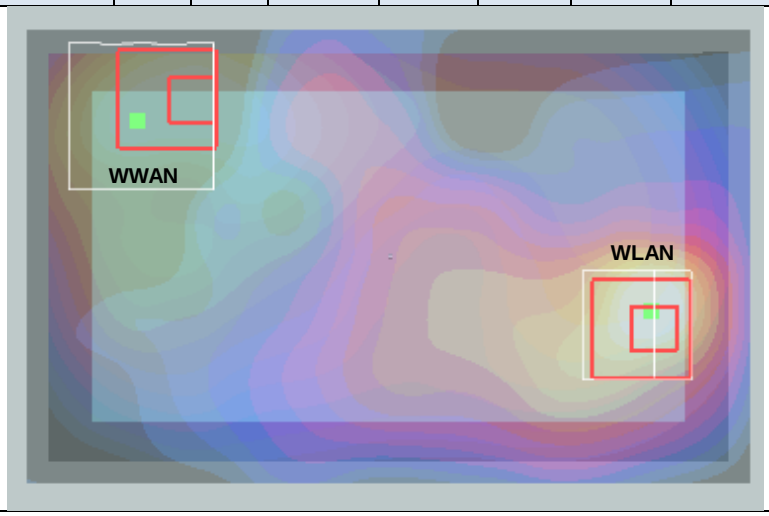
	Band	Position	SAR (W/kg)	Gap	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				(cm)	X	Y	Z				
Case 4	WCDMA II	Back	0.605	1	0.00502	-0.0385	-0.203	97.8	1.77	0.02	Not required
	5.2 GHz WLAN		1.166	1	-0.002	0.059	-0.203				



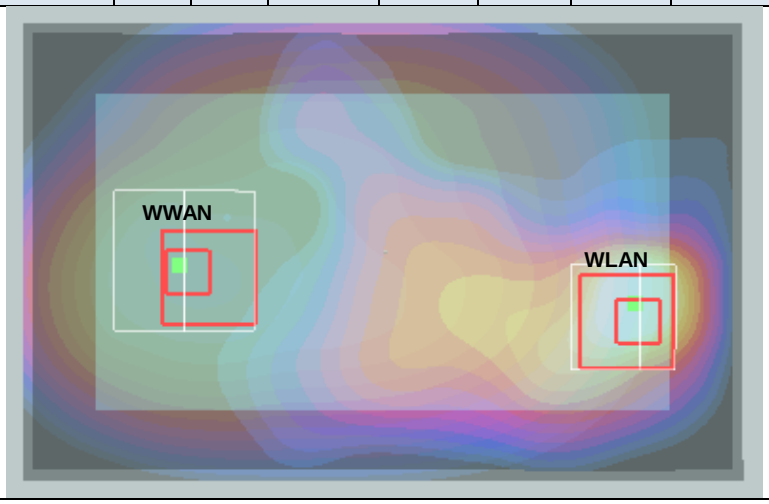
	Band	Position	SAR (W/kg)	Gap	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				(cm)	X	Y	Z				
Case 5	CDMA BC0	Back	0.796	1	-0.045	-0.0315	-0.203	100.2	1.96	0.03	Not required
	5.2 GHz WLAN		1.166	1	-0.002	0.059	-0.203				



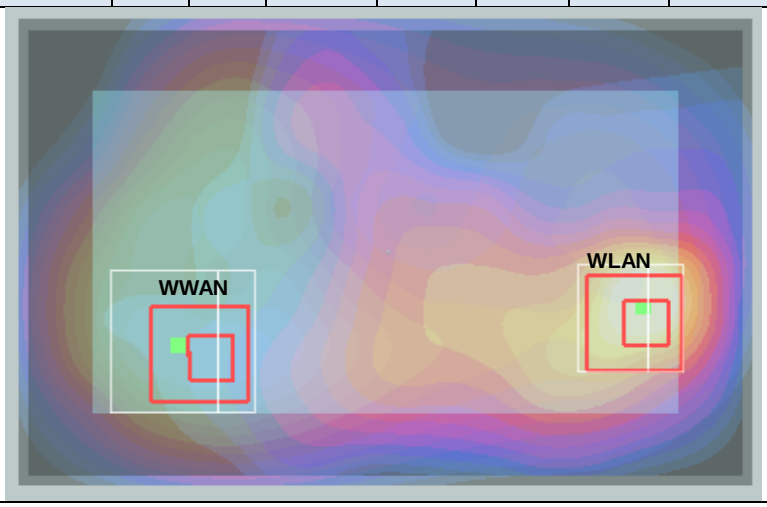
	Band	Position	SAR (W/kg)	Gap	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				(cm)	X	Y	Z				
Case 6	CDMA BC1	Back	1.064	1	-0.048	-0.0385	-0.203	107.8	2.23	0.03	Not required
	5.2 GHz WLAN		1.166	1	-0.002	0.059	-0.203				



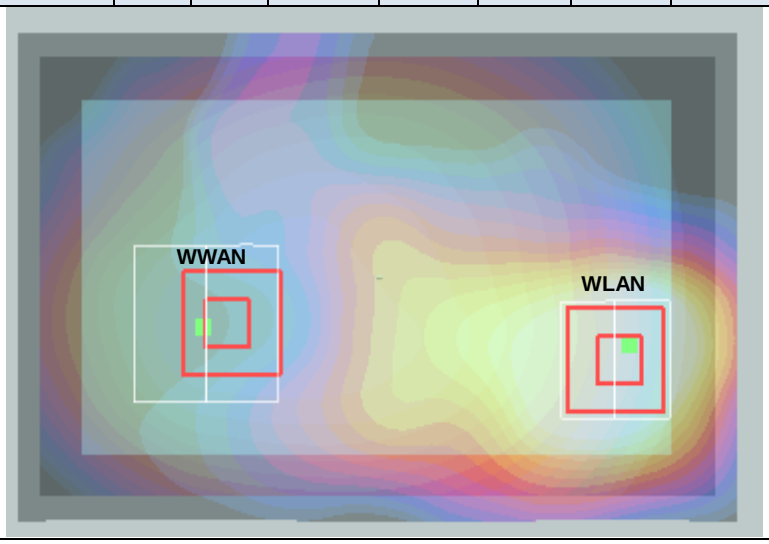
	Band	Position	SAR (W/kg)	Gap	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				(cm)	X	Y	Z				
Case 7	LTE Band 13	Back	0.944	1	-0.015	-0.0455	-0.203	105.3	2.11	0.03	Not required
	5.2 GHz WLAN		1.166	1	-0.002	0.059	-0.203				



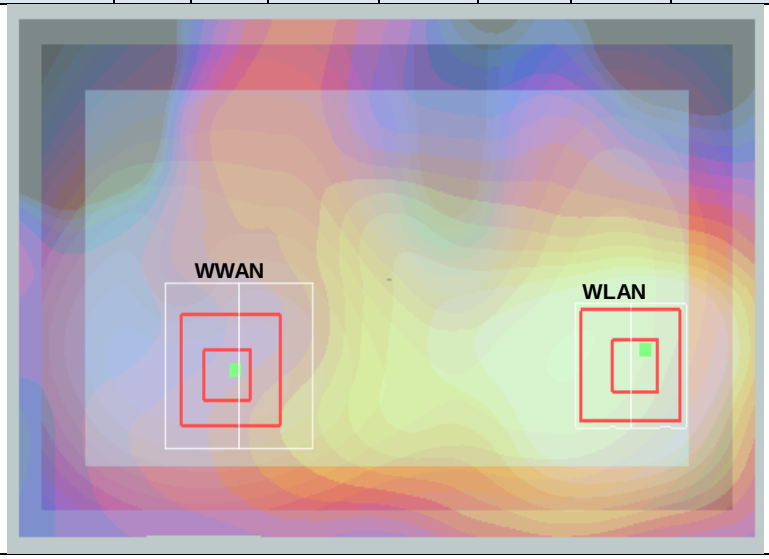
	Band	Position	SAR (W/kg)	Gap	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				(cm)	X	Y	Z				
Case 8	LTE Band 4	Back	1.128	1	0.00301	-0.0375	-0.203	96.6	2.29	0.04	Not required
	5.2 GHz WLAN		1.166	1	-0.002	0.059	-0.203				



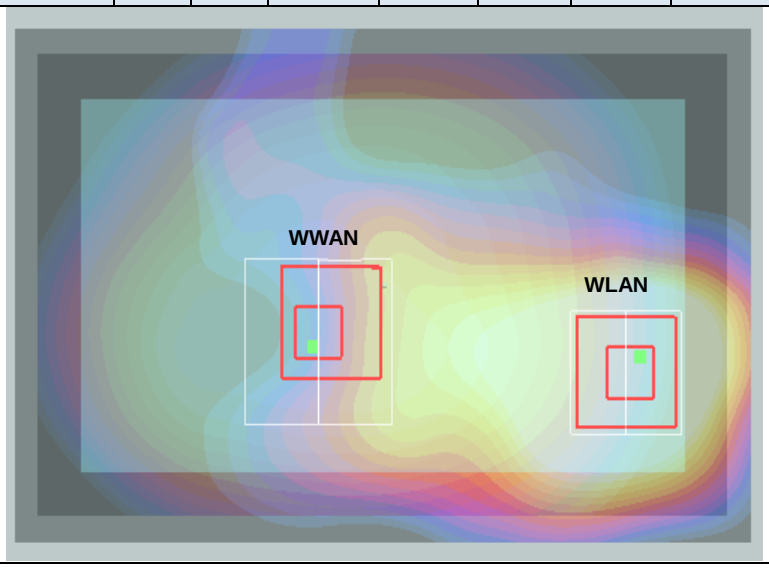
Case 9	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	SAR peak location (m) Y	SAR peak location (m) Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
	GSM850	Back	0.763	1.5	-0.00751	-0.038	-0.203	91.3	1.85	0.03	Not required
	5.3 GHz WLAN		1.086	1.5	0.000024	0.053	-0.203				



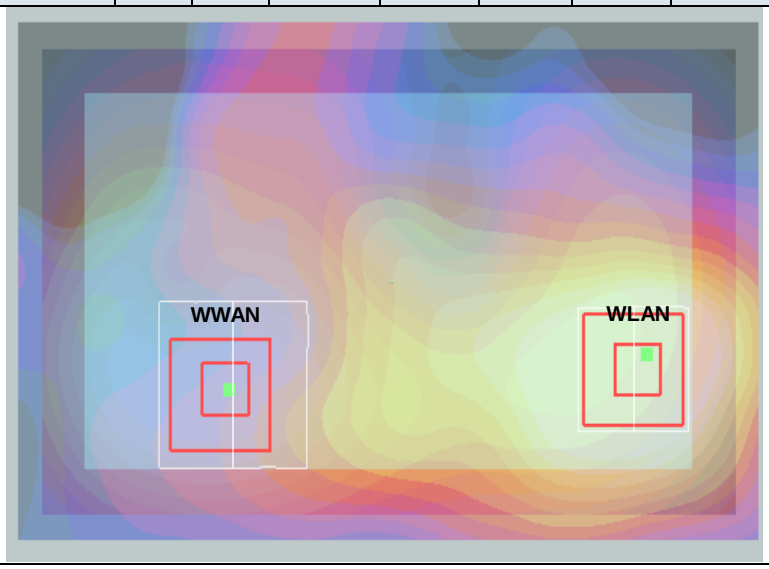
Case 10	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	SAR peak location (m) Y	SAR peak location (m) Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
	GSM1900	Back	0.57	1.5	-0.000015	-0.032	-0.203	85.0	1.66	0.03	Not required
	5.3 GHz WLAN		1.086	1.5	0.000024	0.053	-0.203				



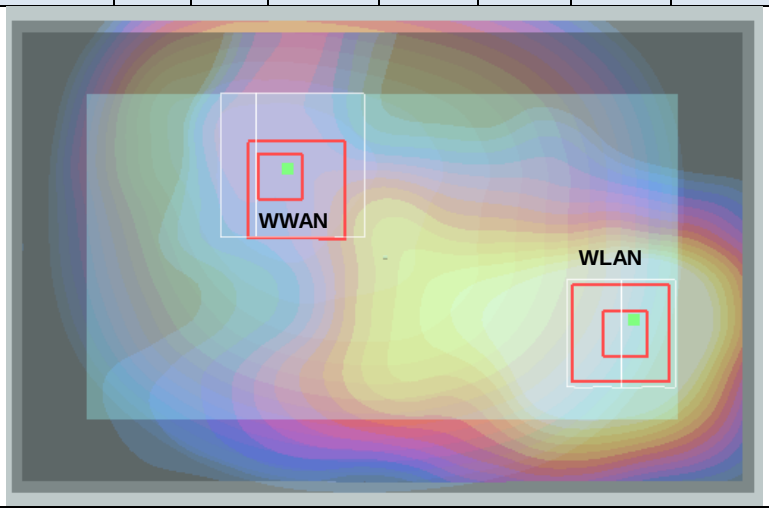
Case	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
11	WCDMA V	Back	0.591	1.5	-0.00603	-0.014	-0.203	67.3	1.68	0.03	Not required
	5.3 GHz WLAN		1.086	1.5	0.000024	0.053	-0.203				



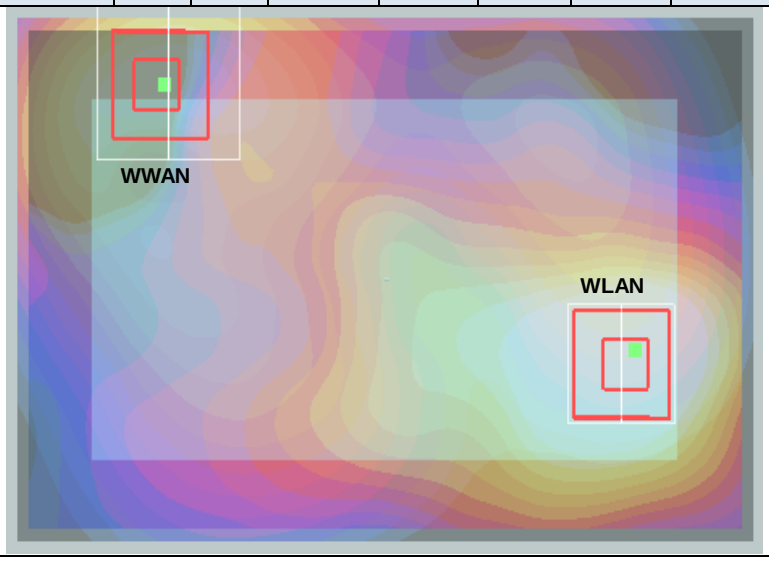
Case	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
12	WCDMA II	Back	0.618	1.5	0.00301	-0.0335	-0.203	86.6	1.70	0.03	Not required
	5.3 GHz WLAN		1.086	1.5	0.000024	0.053	-0.203				



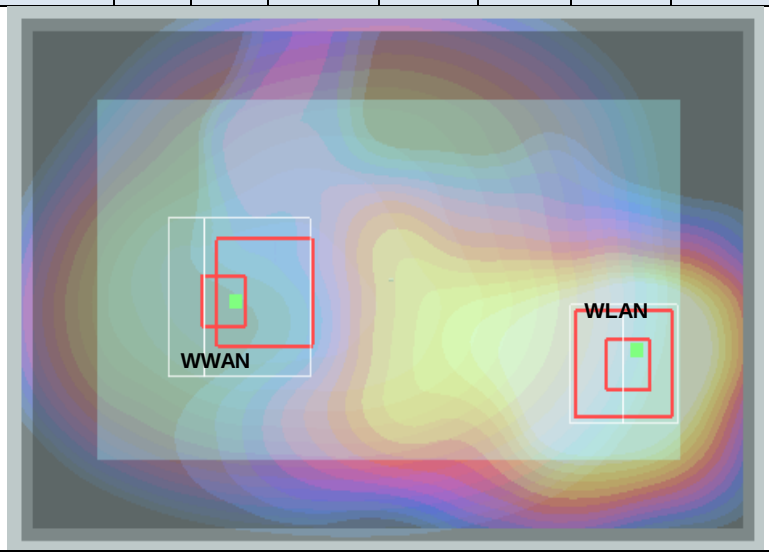
Case	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
13	CDMA BC0	Back	0.544	1.5	-0.0375	-0.028	-0.204	89.3	1.63	0.02	Not required
	5.3 GHz WLAN		1.086	1.5	0.000024	0.053	-0.203				



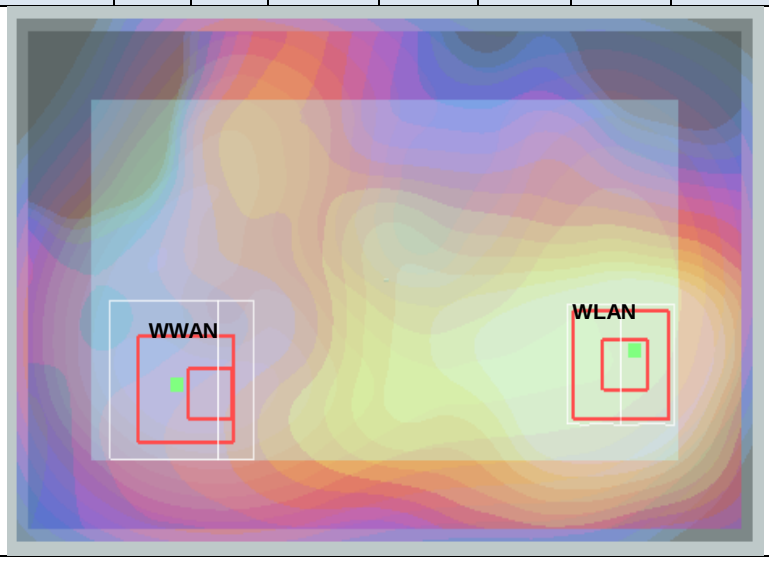
Case	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
14	CDMA BC1	Back	0.521	1.5	-0.057	-0.0485	-0.203	116.4	1.61	0.02	Not required
	5.3 GHz WLAN		1.086	1.5	0.000024	0.053	-0.203				



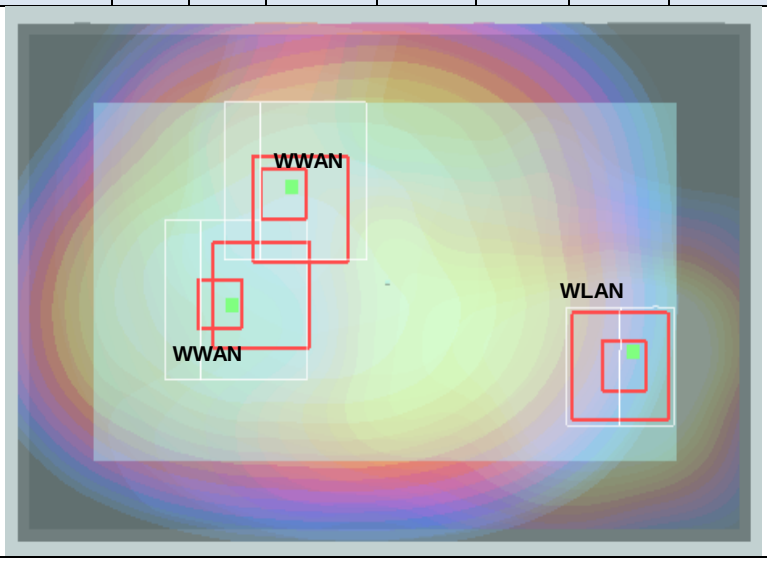
Case	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
15	LTE Band 13	Back	0.594	1.5	-0.0135	-0.0415	-0.203	95.5	1.68	0.02	Not required
	5.3 GHz WLAN		1.086	1.5	0.000024	0.053	-0.203				



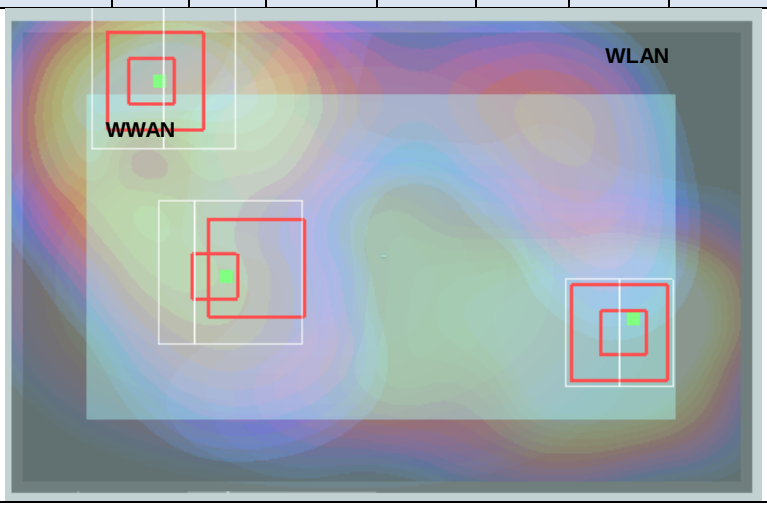
Case	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
16	LTE Band 4	Back	0.524	1.5	0.00302	-0.0375	-0.203	90.5	1.61	0.02	Not required
	5.3 GHz WLAN		1.086	1.5	0.000024	0.053	-0.203				



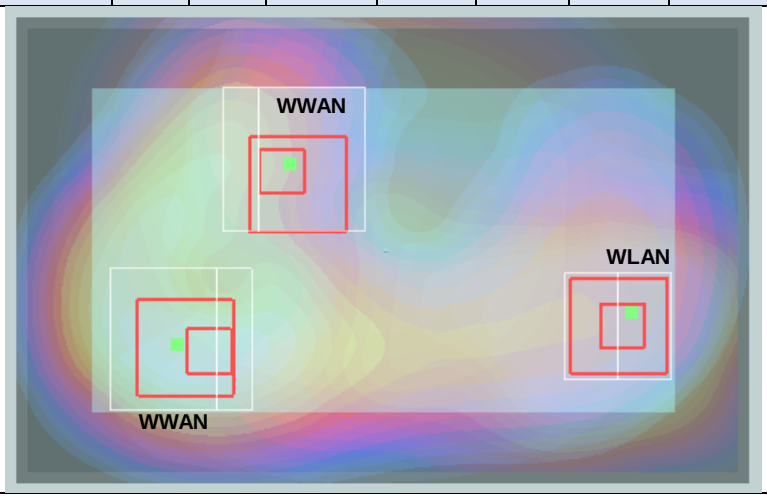
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 17	LTE Band 13	Back	0.594	1.5	-0.0135	-0.0415	-0.203	27.6	1.14	0.04	Not required
	CDMA BC0		0.544	1.5	-0.0375	-0.028	-0.204				
	LTE Band 13	Back	0.594	1.5	-0.0135	-0.0415	-0.203	95.5	1.68	0.02	Not required
	5.3 GHz WLAN		1.086	1.5	0.000024	0.053	-0.203				
	CDMA BC0	Back	0.544	1.5	-0.0375	-0.028	-0.204	89.3	1.63	0.02	Not required
	5.3 GHz WLAN		1.086	1.5	0.000024	0.053	-0.203				



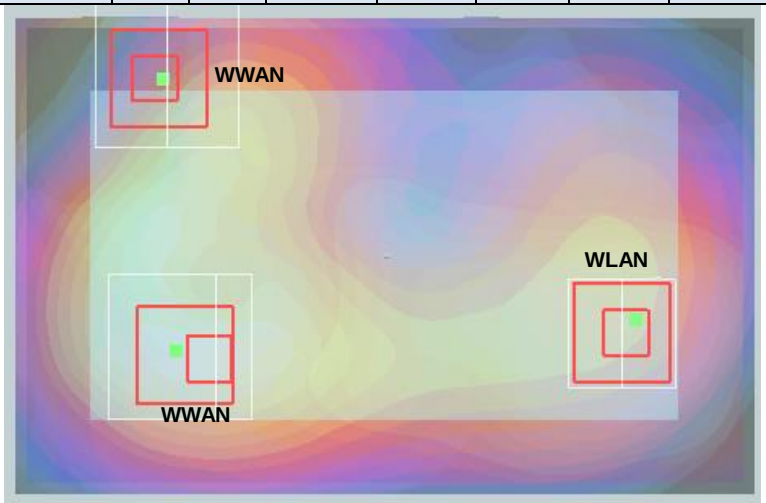
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 18	LTE Band 13	Back	0.594	1.5	-0.0135	-0.0415	-0.203	44.1	1.12	0.03	Not required
	CDMA BC1		0.521	1.5	-0.057	-0.0485	-0.203				
	LTE Band 13	Back	0.594	1.5	-0.0135	-0.0415	-0.203	95.5	1.68	0.02	Not required
	5.3 GHz WLAN		1.086	1.5	0.000024	0.053	-0.203				
	CDMA BC1	Back	0.521	1.5	-0.057	-0.0485	-0.203	116.4	1.61	0.02	Not required
	5.3 GHz WLAN		1.086	1.5	0.000024	0.053	-0.203				



	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 19	LTE Band 4	Back	0.524	1.5	0.00302	-0.0375	-0.203	41.6	1.07	0.03	Not required
	CDMA BC0		0.544	1.5	-0.0375	-0.028	-0.204				
	LTE Band 4	Back	0.524	1.5	0.00302	-0.0375	-0.203	90.5	1.61	0.02	Not required
	5.3 GHz WLAN		1.086	1.5	0.000024	0.053	-0.203				
	CDMA BC0	Back	0.544	1.5	-0.0375	-0.028	-0.204	89.3	1.63	0.02	Not required
	5.3 GHz WLAN		1.086	1.5	0.000024	0.053	-0.203				



	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 20	LTE Band 4	Back	0.524	1.5	0.00302	-0.0375	-0.203	61.0	1.05	0.02	Not required
	CDMA BC1		0.521	1.5	-0.057	-0.0485	-0.203				
	LTE Band 4	Back	0.524	1.5	0.00302	-0.0375	-0.203	90.5	1.61	0.02	Not required
	5.3 GHz WLAN		1.086	1.5	0.000024	0.053	-0.203				
	CDMA BC1	Back	0.521	1.5	-0.057	-0.0485	-0.203	116.4	1.61	0.02	Not required
	5.3GHz WLAN		1.086	1.5	0.000024	0.053	-0.203				



Test Engineer : Tommy Chen, Jerry Hu and Steven Chang

16. 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 16.1. Standard Uncertainty for Assumed Distribution

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

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

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

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

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

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

17. References

[1] FCC 47 CFR Part 2 “Frequency Allocations and Radio Treaty Matters; General Rules and Regulations”

[2] ANSI/IEEE Std. C95.1-1992, “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz”, September 1992

[3] IEEE Std. 1528-2003, “Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”, December 2003

[4] SPEAG DASY System Handbook

[5] FCC KDB 248227 D01 v01r02, “SAR Measurement Procedures for 802.11 a/b/g Transmitters”, May 2007

[6] FCC KDB 447498 D01 v05r02, “Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies”, Feb 2014

[7] FCC KDB 648474 D04 v01r02, “SAR Evaluation Considerations for Wireless Handsets”, Dec 2013.

[8] FCC KDB 941225 D01 v03, “3G SAR MEAUREMENT PROCEDURES”, Oct 2014

[9] FCC KDB 941225 D05 v02r03, “SAR Evaluation Considerations for LTE Devices”, Dec 2013

[10] FCC KDB 941225 D06 v02, "SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities", Oct 2014.

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

[12] FCC KDB 865664 D02 v01r01, “RF Exposure Compliance Reporting and Documentation Considerations” May 2013.