FCC SAR Test Report

APPLICANT	:	Lenovo(Shanghai) Electronics Technology Co., Ltd.
EQUIPMENT	:	Portable Tablet Computer
BRAND NAME	:	Lenovo
MODEL NAME	:	Lenovo TB-7703X
FCC ID	:	O57TB7703X
STANDARD	:	FCC 47 CFR Part 2 (2.1093) ANSI/IEEE C95.1-1992 IEEE 1528-2013

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

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

Reviewed by: Eric Huang / Deputy Manager

Approved by: Jones Tsai / Manager

Testing Laboratory
1190

SPORTON INTERNATIONAL INC.
No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Taoyuan City, Taiwan (R.O.C.)

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA652010	Rev. 01	Initial issue of report	Jul. 01, 2016

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for Lenovo(Shanghai) Electronics Technology Co., Ltd., Portable Tablet Computer, Lenovo TB-7703X, are as follows.

Equipment Class	Frequency Band	Highest SAR Summary		Highest Simultaneous Transmission 1g SAR (W/kg)
		Head	Body	
		1g SAR (W/kg)		
Licensed	GSM850	0.14	1.18	1.55
	GSM1900	0.05	1.19	
	WCDMA II	0.10	1.16	
	WCDMA V	0.15	1.16	
	LTE Band 2	0.13	1.16	
	LTE Band 4	0.07	1.29	
	LTE Band 7	0.72	1.38	
	LTE Band 38	0.80	1.38	
DTS	2.4GHz WLAN	0.40	1.10	
Date of Testing:		2016/6/9 ~ 2016/6/17		

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 1528-2013 and FCC KDB publications

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 District, Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978

Applicant	
Company Name	Lenovo(Shanghai) Electronics Technology Co., Ltd.
Address	NO.68 BUILDING, 199 FENJU RD, China (Shanghai) Pilot Free Trade Zone, 200131, CHINA

Manufacturer	
Company Name	Lenovo PC HK Limited
Address	23/F, Lincoln House, Taikoo Place 979 King's Road, Quarry Bay, Hong Kong

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 1528-2013
- FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
- FCC KDB 865664 D02 SAR Reporting v01r02
- FCC KDB 447498 D01 General RF Exposure Guidance v06
- FCC KDB 648474 D04 SAR Evaluation Considerations for Wireless Handsets v01r03
- FCC KDB 248227 D01 802.11 Wi-Fi SAR v02r02
- FCC KDB 941225 D01 3G SAR Procedures v03r01
- FCC KDB 941225 D05 SAR for LTE Devices v02r05
- FCC KDB 616217 D04 SAR for laptop and tablets v01r02

4. Equipment Under Test (EUT) Information

4.1 General Information

Product Feature & Specification	
Equipment Name	Portable Tablet Computer
Brand Name	Lenovo
Model Name	Lenovo TB-7703X
FCC ID	O57TB7703X
Wireless Technology and Frequency Range	GSM850: 824.2 MHz ~ 848.8 MHz GSM1900: 1850.2 MHz ~ 1909.8 MHz WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz WCDMA Band V: 826.4 MHz ~ 846.6 MHz LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 7: 2500 MHz ~ 2570 MHz LTE Band 38: 2572.5 MHz ~ 2617.5 MHz WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Mode	· GSM/GPRS/EGPRS · RMC/AMR 12.2Kbps · HSDPA · HSUPA · HSPA+ (16QAM uplink) · LTE: QPSK, 16QAM · 802.11b/g/n HT20/HT40 · Bluetooth EDR/LE/HS
HW Version	LenovoPad TB-7703X
SW Version	TB-7703X_160818
GSM / (E)GPRS Transfer mode	Class B – EUT cannot support Packet Switched and Circuit Switched Network simultaneously but can automatically switch between Packet and Circuit Switched Network.
EUT Stage	Identical Prototype
Remark: 1. Selected sample1 as main test, sample2 will verify worst case found in sample1, sample detail information as following table.	

Object	Sample 1	Sample 2
IMEI Code	861663030002227	861663030000528
Battery	Sunwoda:L14D1P31 3.8V,3500mAh	SCUD: L14D1P31 3.8V,3500mAh
Rear Camera	O-film: L545A00	Qtech: FH545AB
Speaker	Honghua: S B 9 5 7 8 C A	Lianchuanghongsheng: MBQD7822A121000
Vibrator	AWA:LC-B318	Chaoying:CY-1027M（3.0V)
Memory	Samsung: KMQX10013M-B419(32G) KMQE10013M-B318(16G)	Hynix: H9TQ26ABJTACUR(32G) H9TQ17ABJTACUR (16G)
Receiver	Lianchuanghongsheng: MRFD1506A557039	Honghua:R0615A27C

4.2 General LTE SAR Test and Reporting Considerations

Summarized necessary items addressed in KDB 941225 D05 v02r05	
FCC ID	O57TB7703X
Equipment Name	Portable Tablet Computer
Operating Frequency Range of each LTE transmission band	LTE Band 02: 1850 MHz ~ 1910 MHz LTE Band 04: 1710 MHz ~ 1755 MHz LTE Band 07: 2500 MHz ~ 2570 MHz LTE Band 38: 2570 MHz ~ 2610 MHz
Channel Bandwidth	LTE Band 02:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE Band 04:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE Band 07: 5MHz, 10MHz, 15MHz, 20MHz LTE Band 38: 5MHz, 10MHz, 15MHz, 20MHz
uplink modulations used	QPSK, and 16QAM
LTE Voice / Data requirements	1. Data only
LTE MPR permanently built-in by design	Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3

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

LTE A-MPR	In the base station simulator configuration, Network Setting value is set to NS_01 to disable A-MPR during SAR testing and the LTE SAR tests was transmitting on all TTI frames (Maximum TTI)
Spectrum plots for RB configuration	A properly configured base station simulator was used for the SAR and power measurement; therefore, spectrum plots for each RB allocation and offset configuration are not included in the SAR report.
Power reduction applied to satisfy SAR compliance	1. Yes, Proximity Sensor.

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

LTE Band 2

	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	18607	1850.7	18615	1851.5	18625	1852.5	18650	1855	18675	1857.5	18700	1860
M	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880
H	19193	1909.3	19185	1908.5	19175	1907.5	19150	1905	19125	1902.5	19100	1900

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

LTE Band 7

	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	20775	2502.5	20800	2505	20825	2507.5	20850	2510
M	21100	2535	21100	2535	21100	2535	21100	2535
H	21425	2567.5	21400	2565	21375	2562.5	21350	2560

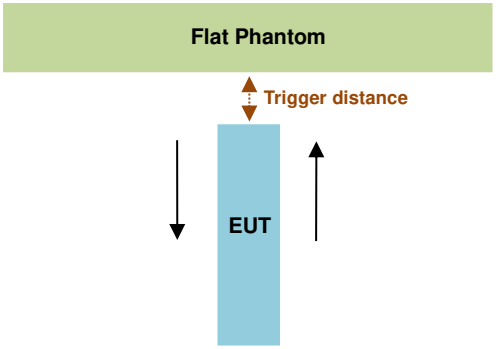
LTE Band 38

	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	37775	2572.5	37800	2575	37825	2577.5	37850	2580
M	38000	2595	38000	2595	38000	2595	38000	2595
H	38225	2617.5	38200	2615	38175	2612.5	38150	2610

5. Proximity Sensor Triggering Test

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

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



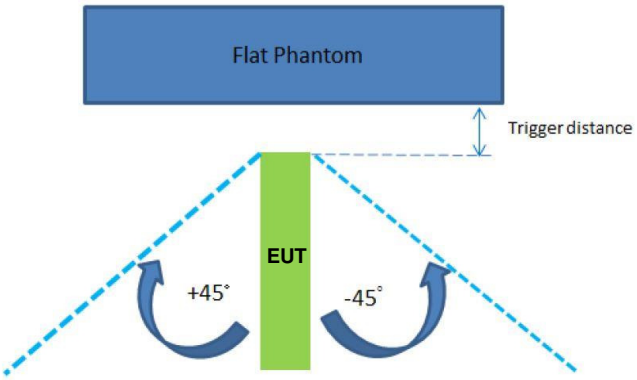
Proximity Sensor Trigger Distance (mm)			
Position	Bottom Face	Edge 3	Edge 4
Minimum	12	15	5

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

If a sensor is spatially offset from the antenna(s), it is necessary to verify sensor triggering for conditions where the antenna is next to the user but the sensor is laterally further away to ensure sensor coverage is sufficient for reducing the power to maintain compliance. For p-sensor coverage testing, the device is moved and “along the direction of maximum antenna and sensor offset”.
Illustrated in the internal photo exhibit, although the senor is spatially offset, there is no trigger condition where the antenna is next to the user but the sensor is laterally further away, therefore proximity sensor coverage testing is not required.
This procedure is not required because antenna and sensor are collocated and the peak SAR location is overlapping with the sensor.

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

The influence of table tilt angles to proximity sensor triggering was determined by positioning each tablet edge that contains a transmitting antenna, perpendicular to the flat phantom, edge3 at 15 mm, edge4 at 5mm separation. Rotating the tablet around the edge next to the phantom in ≤ 10° increments until the tablet is ± 45° from the vertical position at 0°, and the maximum output power remains in the reduced mode.



The Sensor Trigger Distance (mm)		
Position	Edge 3	Edge 4
Minimum	15	5

Proximity sensor power reduction

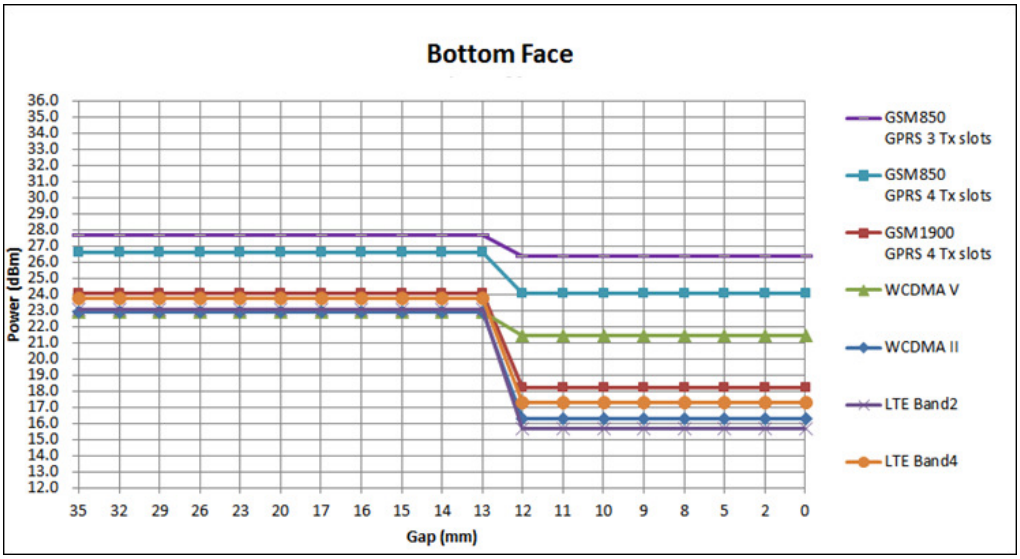
Exposure Position / wireless mode	Bottom Face(1)	Edge 1	Edge 2	Edge 3(1)	Edge 4(1)
GSM850 GSM (GMSK, 1 Tx slot)	2.0 dB	0 dB	0 dB	2.0 dB	2.0 dB
GSM850 GPRS (GMSK 1 Tx slot) - CS1	2.0 dB			2.0 dB	2.0 dB
GSM850 GPRS (GMSK 2 Tx slot) - CS1	2.0 dB			2.0 dB	2.0 dB
GSM850 GPRS (GMSK 3 Tx slot) - CS1	1.5 dB			1.5 dB	1.5 dB
GSM850 GPRS (GMSK 4 Tx slot) - CS1	2.5 dB			2.5 dB	2.5 dB
GSM850 EDGE (8PSK 1 Tx slot) - MCS5	3.5 dB			3.5 dB	3.5 dB
GSM850 EDGE (8PSK 2 Tx slot) - MCS5	4.0 dB			4.0 dB	4.0 dB
GSM850 EDGE (8PSK 3 Tx slot) - MCS5	4.0 dB			4.0 dB	4.0 dB
GSM850 EDGE (8PSK 4 Tx slot) - MCS5	3.5 dB			3.5 dB	3.5 dB
GSM1900 GSM (GMSK, 1 Tx slot)	5.5 dB			5.5 dB	5.5 dB
GSM1900 GPRS (GMSK 1 Tx slot) - CS1	5.5 dB			5.5 dB	5.5 dB
GSM1900 GPRS (GMSK 2 Tx slot) - CS1	4.5 dB			4.5 dB	4.5 dB
GSM1900 GPRS (GMSK 3 Tx slot) - CS1	4.5 dB			4.5 dB	4.5 dB
GSM1900 GPRS (GMSK 4 Tx slot) - CS1	5.5 dB			5.5 dB	5.5 dB
GSM1900 EDGE (8PSK 1 Tx slot) - MCS5	5.0 dB			5.0 dB	5.0 dB
GSM1900 EDGE (8PSK 2 Tx slot) - MCS5	5.5 dB			5.5 dB	5.5 dB
GSM1900 EDGE (8PSK 3 Tx slot) - MCS5	5.5 dB			5.5 dB	5.5 dB
GSM1900 EDGE (8PSK 4 Tx slot) - MCS5	5.0 dB			5.0 dB	5.0 dB
WCDMA Band V	1.5 dB			1.5 dB	1.5 dB
WCDMA Band II	6.5 dB			6.5 dB	6.5 dB
LTE Band 2	7.5 dB			7.5 dB	7.5 dB
LTE Band 4	6.0 dB			6.0 dB	6.0 dB
LTE Band 7	0 dB			0 dB	0 dB
LTE Band 38	0 dB			0 dB	0 dB

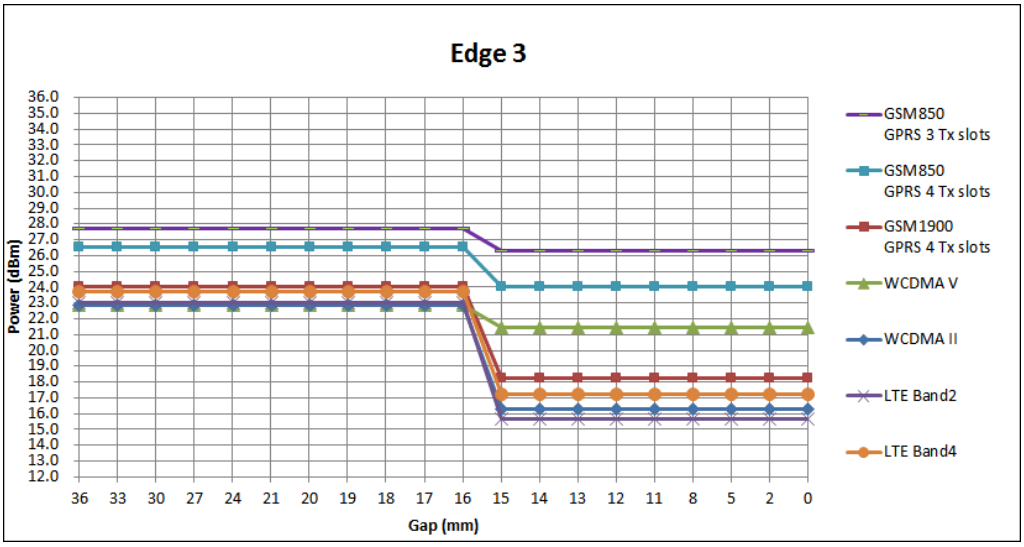
Remark:

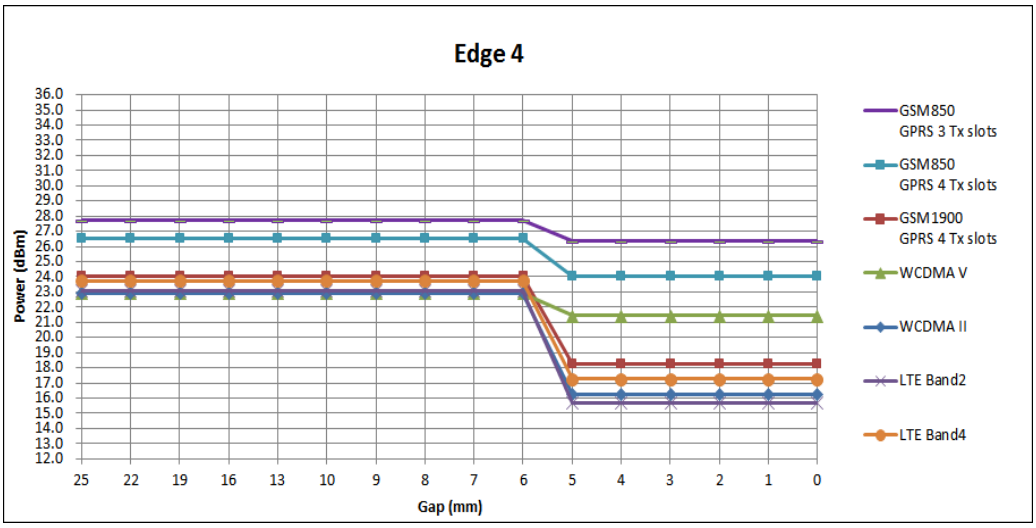
1. (1): Reduced maximum limit applied by activation of proximity sensor, except LTE Band 7 and Band 38.
2. Power reduction is not applicable for WLAN and Bluetooth.
3. Tests were performed in accordance with KDB 616217 D04 section 6.1, 6.2, 6.3, 6.4 and 6.5 and compliant results are shown and described in exhibit “P-Sensor operational description
4. For verification of compliance of power reduction scheme, additional SAR testing with EUT transmitting at full RF power at a conservative trigger distance was performed:
   - Bottom Face: 11 mm
   - Edge3: 14 mm
   - Edge4: 4 mm

Power Measurement during Sensor Trigger distance testing

Band/Mode	Ch #	Measured power reduction (dBm)		Reduction Levels
		w/o power back-off	w/ power back-off	(dB)
GSM850 GPRS (GMSK 3 Tx slot) - CS1	189	27.70	26.33	1.37
GSM850 GPRS (GMSK 4 Tx slot) - CS1	251	26.56	24.07	2.49
GSM1900 GPRS (GMSK 4 Tx slot) - CS1	661	24.03	18.24	5.79
WCDMA Band V	4182	22.89	21.43	1.46
WCDMA Band II	9538	22.89	16.26	6.63
LTE Band 2	18900	23.05	15.69	7.36
LTE Band 4	20175	23.72	17.26	6.46






Edge 4
Power (dBm)
36.0
35.0
34.0
33.0
32.0
31.0
30.0
29.0
28.0
27.0
26.0
25.0
24.0
23.0
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
25 22 19 16 13 10 9 8 7 6 5 4 3 2 1 0
Gap (mm)
GSM850
GPRS 3 Tx slots
GSM850
GPRS 4 Tx slots
GSM1900
GPRS 4 Tx slots
WCDMA V
WCDMA II
LTE Band2
LTE Band4

6. RF Exposure Limits

6.1 Uncontrolled Environment

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

6.2 Controlled Environment

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

Limits for Occupational/Controlled Exposure (W/kg)

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

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

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

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

7. Specific Absorption Rate (SAR)

7.1 Introduction

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

7.2 SAR Definition

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

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

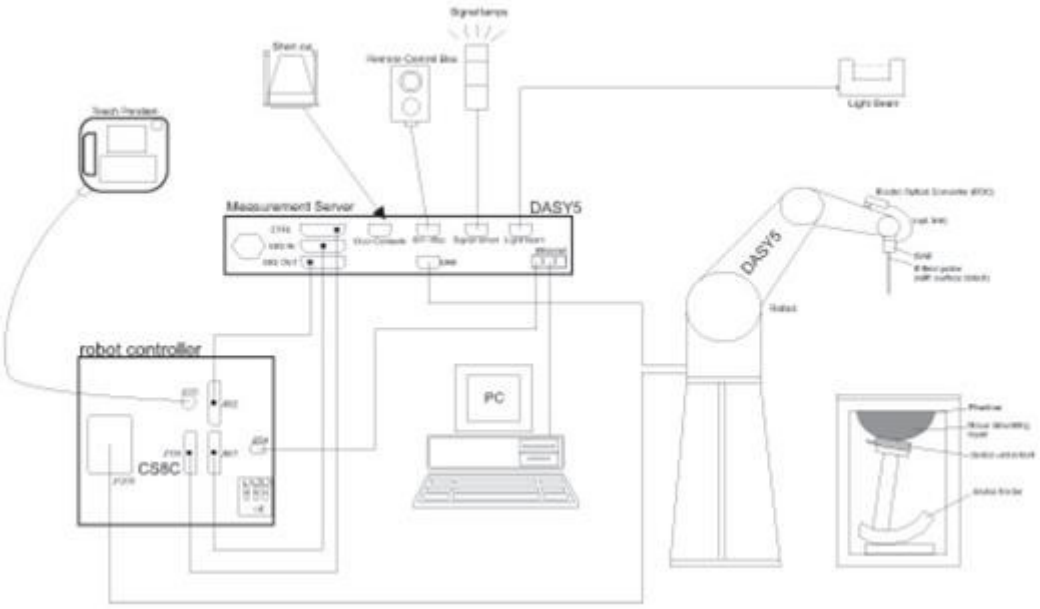
SAR is expressed in units of Watts per kilogram (W/kg)

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

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

8. System Description and Setup

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



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

8.1 E-Field Probe

The SAR measurement is conducted with the dosimetric probe (manufactured by SPEAG).The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency. This probe has a built in optical surface detection system to prevent from collision with phantom.

<ES3DV3 Probe>

Construction	Symmetric design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Frequency	10 MHz – 4 GHz; Linearity: ±0.2 dB (30 MHz – 4 GHz)	
Directivity	±0.2 dB in TSL (rotation around probe axis) ±0.3 dB in TSL (rotation normal to probe axis)	
Dynamic Range	5 µW/g – >100 mW/g; Linearity: ±0.2 dB	
Dimensions	Overall length: 337 mm (tip: 20 mm) Tip diameter: 3.9 mm (body: 12 mm) Distance from probe tip to dipole centers: 3.0 mm	

<EX3DV4 Probe>

Construction	Symmetric design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Frequency	10 MHz – >6 GHz Linearity: ±0.2 dB (30 MHz – 6 GHz)	
Directivity	±0.3 dB in TSL (rotation around probe axis) ±0.5 dB in TSL (rotation normal to probe axis)	
Dynamic Range	10 µW/g – >100 mW/g Linearity: ±0.2 dB (noise: typically <1 µW/g)	
Dimensions	Overall length: 337 mm (tip: 20 mm) Tip diameter: 2.5 mm (body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm	

8.2 Data Acquisition Electronics (DAE)

The data acquisition electronics (DAE) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock.

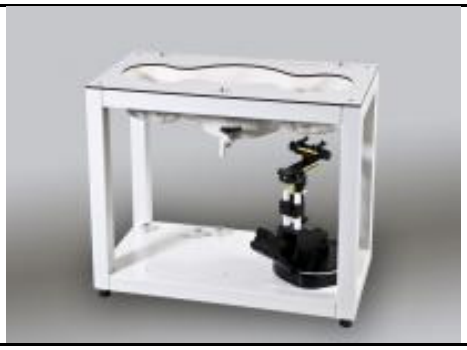
The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

Fig 5.1 Photo of DAE

8.3 Phantom

<SAM Twin Phantom>

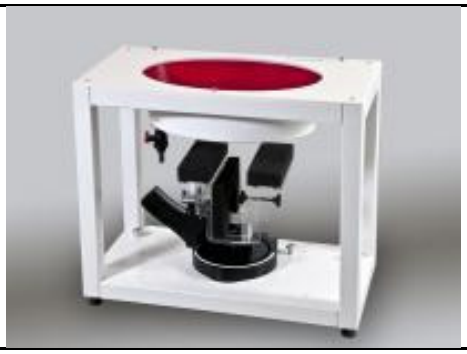
Shell Thickness	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm
Filling Volume	Approx. 25 liters
Dimensions	Length: 1000 mm; Width: 500 mm; Height: adjustable feet
Measurement Areas	Left Hand, Right Hand, Flat Phantom



The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. A white cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.

<ELI Phantom>

Shell Thickness	2 ± 0.2 mm (sagging: <1%)
Filling Volume	Approx. 30 liters
Dimensions	Major ellipse axis: 600 mm Minor axis: 400 mm



The ELI phantom is intended for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI4 is fully compatible with standard and all known tissue simulating liquids.

8.4 Device Holder

<Mounting Device for Hand-Held Transmitter>

In combination with the Twin SAM V5.0/V5.0c or ELI phantoms, the Mounting Device for Hand-Held Transmitters enables rotation of the mounted transmitter device to specified spherical coordinates. At the heads, the rotation axis is at the ear opening. Transmitter devices can be easily and accurately positioned according to IEC 62209-1, IEEE 1528, FCC, or other specifications. The device holder can be locked for positioning at different phantom sections (left head, right head, flat). And upgrade kit to Mounting Device to enable easy mounting of wider devices like big smart-phones, e-books, small tablets, etc. It holds devices with width up to 140 mm.

Mounting Device for Hand-Held Transmitters

Mounting Device Adaptor for Wide-Phones

<Mounting Device for Laptops and other Body-Worn Transmitters>

The extension is lightweight and made of POM, acrylic glass and foam. It fits easily on the upper part of the mounting device in place of the phone positioned. The extension is fully compatible with the SAM Twin and ELI phantoms.

Mounting Device for Laptops

9. Measurement Procedures

The measurement procedures are as follows:

<Conducted power measurement>

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

<SAR measurement>

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

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

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

9.1 Spatial Peak SAR Evaluation

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

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

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

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

9.2 Power Reference Measurement

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

9.3 Area Scan

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

Area scan parameters extracted from FCC KDB 865664 D01v01r04 SAR measurement 100 MHz to 6 GHz.

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

9.4 Zoom Scan

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

Zoom scan parameters extracted from FCC KDB 865664 D01v01r04 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.

9.5 Volume Scan Procedures

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

9.6 Power Drift Monitoring

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

10. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	835MHz System Validation Kit	D835V2	499	Mar. 21, 2016	Mar. 20, 2017
SPEAG	1750MHz System Validation Kit	D1750V2	1068	Nov. 23, 2015	Nov. 22, 2016
SPEAG	1900MHz System Validation Kit	D1900V2	5d041	Oct. 22, 2015	Oct. 21, 2016
SPEAG	2450MHz System Validation Kit	D2450V2	736	Aug. 20, 2015	Aug. 19, 2016
SPEAG	2600MHz System Validation Kit	D2600V2	1008	Aug. 19, 2015	Aug. 18, 2016
SPEAG	Data Acquisition Electronics	DAE3	495	May. 27, 2016	May. 26, 2017
SPEAG	Data Acquisition Electronics	DAE3	577	Sep. 24, 2015	Sep. 23, 2016
SPEAG	Data Acquisition Electronics	DAE4	1399	Nov. 23, 2015	Nov. 22, 2016
SPEAG	Dosimetric E-Field Probe	EX3DV4	3925	May. 26, 2016	May. 25, 2017
SPEAG	Dosimetric E-Field Probe	ES3DV3	3270	Sep. 28, 2015	Sep. 27, 2016
SPEAG	Dosimetric E-Field Probe	EX3DV4	3955	Nov. 24, 2015	Nov. 23, 2016
WonDer	Thermometer	WD-5015	TM281	Oct. 16, 2015	Oct. 15, 2016
Wisewind	Thermometer	HTC-1	TM560	Oct. 16, 2015	Oct. 15, 2016
Wisewind	Thermometer	HTC-1	TM225	Oct. 16, 2015	Oct. 15, 2016
Anritsu	Radio Communication Analyzer	MT8820C	6201341950	Dec. 18, 2015	Dec. 17, 2016
Agilent	Wireless Communication Test Set	E5515C	MY50266977	May. 17, 2016	May. 16, 2017
SPEAG	Device Holder	N/A	N/A	N/A	N/A
R&S	Signal Generator	MG3710A	6201502524	Dec. 18, 2015	Dec. 17, 2016
Agilent	ENA Network Analyzer	E5071C	MY46316648	Jan. 12, 2016	Jan. 11, 2017
SPEAG	Dielectric Probe Kit	DAK-3.5	1126	Jul. 21, 2015	Jul. 20, 2016
LINE SEIKI	Digital Thermometer	LKMelectronic	DTM3000SPEZIAL/90900	Aug. 26, 2015	Aug. 25, 2016
Anritsu	Power Meter	ML2495A	1419002	May. 10, 2016	May. 09, 2017
Anritsu	Power Sensor	MA2411B	1339124	May. 10, 2016	May. 09, 2017
Agilent	Spectrum Analyzer	E4408B	MY44211028	Aug. 24, 2015	Aug. 23, 2016
ATM	Dual Directional Coupler	C122H-10	P610410z-02	Note 1	
Woken	Attenuator 1	WK0602-XX	N/A	Note 1	
PE	Attenuator 2	PE7005-10	N/A	Note 1	
PE	Attenuator 3	PE7005- 3	N/A	Note 1	
AR	Power Amplifier	5S1G4M2	0328767	Note 1	
Mini-Circuits	Power Amplifier	ZVE-3W	162601250	Note 1	

General Note:

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

11. System Verification

11.1 Tissue Verification

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

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

Simulating Liquid for 5GHz, Manufactured by SPEAG

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

<Tissue Dielectric Parameter Check Results>

Frequency (MHz)	Tissue Type	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
835	HSL	22.2	0.906	42.533	0.90	41.50	0.67	2.49	±5	2016/6/12
835	HSL	22.7	0.900	41.018	0.90	41.50	0.00	-1.16	±5	2016/6/15
835	MSL	22.6	0.971	57.288	0.97	55.20	0.10	3.78	±5	2016/6/10
835	MSL	22.6	0.971	57.288	0.97	55.20	0.10	3.78	±5	2016/6/10
835	MSL	22.7	0.971	55.373	0.97	55.20	0.10	0.31	±5	2016/6/15
1750	HSL	22.2	1.366	40.427	1.37	40.10	-0.29	0.82	±5	2016/6/12
1750	MSL	22.2	1.502	55.061	1.49	53.40	0.81	3.11	±5	2016/6/9
1750	MSL	22.2	1.516	54.811	1.49	53.40	1.74	2.64	±5	2016/6/14
1900	HSL	22.2	1.420	40.915	1.40	40.00	1.43	2.29	±5	2016/6/12
1900	HSL	22.2	1.420	40.915	1.40	40.00	1.43	2.29	±5	2016/6/12
1900	MSL	22.5	1.545	54.037	1.52	53.30	1.64	1.38	±5	2016/6/9
1900	MSL	22.2	1.521	52.686	1.52	53.30	0.07	-1.15	±5	2016/6/11
1900	MSL	22.2	1.521	52.686	1.52	53.30	0.07	-1.15	±5	2016/6/11
2450	HSL	22.6	1.731	38.775	1.80	39.20	-3.83	-1.08	±5	2016/6/17
2450	MSL	22.7	1.919	52.839	1.95	52.70	-1.59	0.26	±5	2016/6/17
2450	MSL	22.7	1.919	52.839	1.95	52.70	-1.59	0.26	±5	2016/6/17
2600	HSL	22.2	1.998	39.859	1.96	39.00	1.94	2.20	±5	2016/6/12
2600	HSL	22.6	1.931	37.158	1.96	39.00	-1.48	-4.72	±5	2016/6/17
2600	MSL	22.2	2.120	52.711	2.16	52.50	-1.85	0.40	±5	2016/6/9
2600	MSL	22.2	2.120	52.711	2.16	52.50	-1.85	0.40	±5	2016/6/9
2600	MSL	22.7	2.200	51.757	2.16	52.50	1.85	-1.42	±5	2016/6/16

11.2 System Performance Check Results

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

Date	Frequency (MHz)	Tissue Type	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 1g SAR (W/kg)	Targeted 1g SAR (W/kg)	Normalized 1g SAR (W/kg)	Deviation (%)
2016/6/12	835	HSL	250	D835V2-499	ES3DV3 - SN3270	DAE4 Sn1399	2.28	9.14	9.12	-0.22
2016/6/15	835	HSL	250	D835V2-499	EX3DV4 - SN3955	DAE3 Sn577	2.27	9.14	9.08	-0.66
2016/6/10	835	MSL	250	D835V2-499	ES3DV3 - SN3270	DAE4 Sn1399	2.25	9.52	9	-5.46
2016/6/10	835	MSL	250	D835V2-499	ES3DV3 - SN3270	DAE3 Sn577	2.45	9.52	9.8	2.94
2016/6/15	835	MSL	250	D835V2-499	EX3DV4 - SN3955	DAE3 Sn577	2.49	9.52	9.96	4.62
2016/6/12	1750	HSL	250	D1750V2-1068	ES3DV3 - SN3270	DAE4 Sn1399	9.10	36.80	36.4	-1.09
2016/6/9	1750	MSL	250	D1750V2-1068	ES3DV3 - SN3270	DAE4 Sn1399	9.43	35.70	37.72	5.66
2016/6/14	1750	MSL	250	D1750V2-1068	ES3DV3 - SN3270	DAE3 Sn577	9.25	35.70	37	3.64
2016/6/12	1900	HSL	250	D1900V2-5d041	ES3DV3 - SN3270	DAE4 Sn1399	9.85	39.80	39.4	-1.01
2016/6/12	1900	HSL	250	D1900V2-5d041	ES3DV3 - SN3270	DAE3 Sn577	9.84	39.80	39.36	-1.11
2016/6/9	1900	MSL	250	D1900V2-5d041	EX3DV4 - SN3925	DAE3 Sn495	10.00	40.00	40	0.00
2016/6/11	1900	MSL	250	D1900V2-5d041	ES3DV3 - SN3270	DAE4 Sn1399	9.61	40.00	38.44	-3.90
2016/6/11	1900	MSL	250	D1900V2-5d041	ES3DV3 - SN3270	DAE3 Sn577	9.18	40.00	36.72	-8.20
2016/6/17	2450	HSL	250	D2450V2-736	EX3DV4 - SN3955	DAE3 Sn577	12.60	53.40	50.4	-5.62
2016/6/17	2450	MSL	250	D2450V2-736	ES3DV3 - SN3270	DAE4 Sn1399	12.80	51.90	51.2	-1.35
2016/6/17	2450	MSL	250	D2450V2-736	EX3DV4 - SN3955	DAE3 Sn577	12.00	51.90	48	-7.51
2016/6/12	2600	HSL	250	D2600V2-1008	ES3DV3 - SN3270	DAE4 Sn1399	14.70	56.30	58.8	4.44
2016/6/17	2600	HSL	250	D2600V2-1008	EX3DV4 - SN3955	DAE3 Sn577	13.80	56.30	55.2	-1.95
2016/6/9	2600	MSL	250	D2600V2-1008	EX3DV4 - SN3925	DAE3 Sn495	13.40	55.80	53.6	-3.94
2016/6/9	2600	MSL	250	D2600V2-1008	ES3DV3 - SN3270	DAE4 Sn1399	14.00	55.80	56	0.36
2016/6/16	2600	MSL	250	D2600V2-1008	EX3DV4 - SN3955	DAE3 Sn577	13.60	55.80	54.4	-2.51

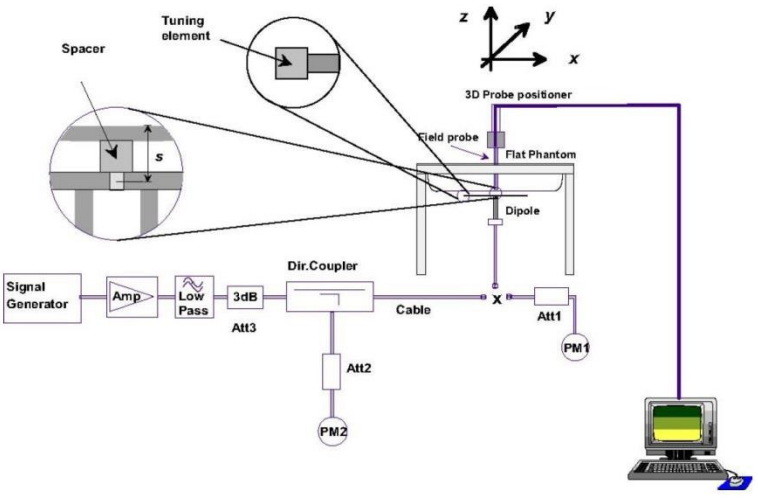


Fig 8.3.1 System Performance Check Setup

Fig 8.3.2 Setup Photo

12. RF Exposure Positions

12.1 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.

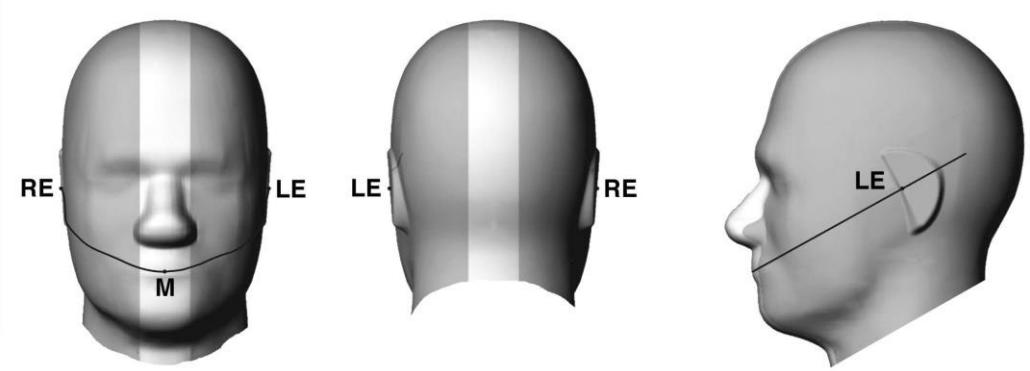


Fig 9.1.1 Front, back, and side views of SAM twin phantom

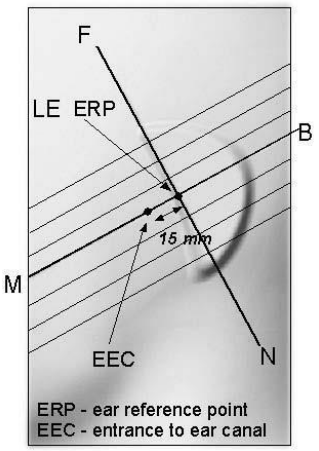


Fig 9.1.2 Close-up side view of phantom showing the ear region.

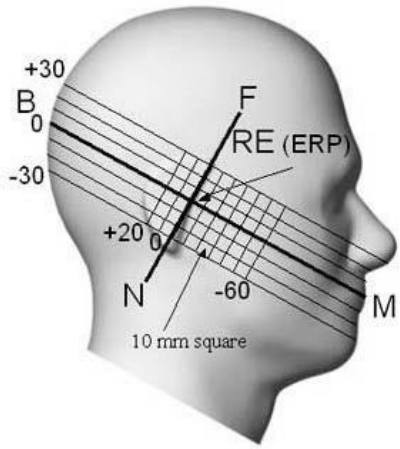


Fig 9.1.3 Side view of the phantom showing relevant markings and seven cross-sectional plane locations

12.2 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.

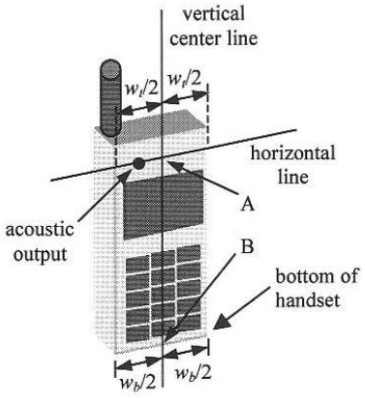


Fig 9.2.1 Handset vertical and horizontal reference lines—"fixed case

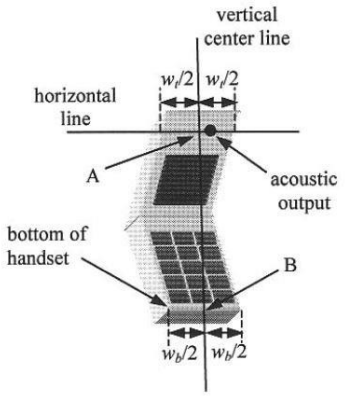


Fig 9.2.2 Handset vertical and horizontal reference lines—"clam-shell case"

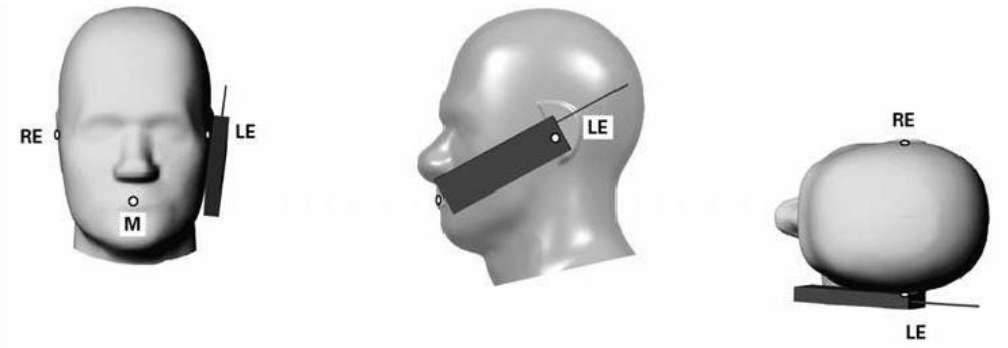


Fig 9.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

12.3 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

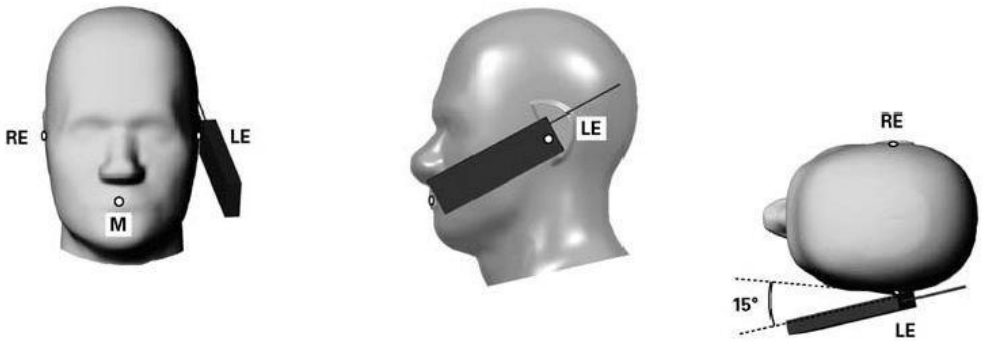


Fig 9.3.1 Tilt position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which define the Reference Plane for handset positioning, are indicated.

12.4 SAR Testing for Tablet

This device can be used also in full sized tablet exposure conditions, due to its size. Per FCC KDB 616217, the back surface and edges of the tablet should be tested for SAR compliance with the tablet touching the phantom. The SAR exclusion threshold in KDB 447498 D01v06 can be applied to determine SAR test exclusion for adjacent edge configurations. The closest distance from the antenna to an adjacent tablet edge is used to determine if SAR testing is required for the adjacent edges, with the adjacent edge positioned against the phantom and the edge containing the antenna positioned perpendicular to the phantom.

13. Conducted RF Output Power (Unit: dBm)

<GSM Conducted Power>

1. Per KDB 447498 D01v06, the maximum output power channel is used for SAR testing and for further SAR test reduction.
2. Per KDB 941225 D01v03r01, for SAR test reduction for GSM / GPRS / 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,
   (a) For Head SAR, the GPRS (4Tx slots) was considered as the primary mode.
   (b-1) For Body SAR, the GPRS (4Tx slots) was considered as the primary mode, when EUT operation without power back-off.
   (b-2) For Body SAR, the GPRS (3Tx slots) was considered as the primary mode, when EUT operation with power back-off.
3. Other configurations of GSM / GPRS / EDGE are considered as secondary modes. The 3G SAR test reduction procedure is applied, when the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ ¼ dB higher than the primary mode, SAR measurement is not required for the secondary mode.

Default Power Mode

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 1 Tx slot	32.69	32.75	32.72	33.00	23.69	23.75	23.72	24.00
GPRS 1 Tx slot	32.67	32.73	32.70	33.00	23.67	23.73	23.70	24.00
GPRS 2 Tx slots	29.82	29.85	29.91	30.00	23.82	23.85	23.91	24.00
GPRS 3 Tx slots	27.72	27.70	27.68	28.00	23.46	23.44	23.42	23.74
GPRS 4 Tx slots	26.45	26.53	26.56	27.00	23.45	23.53	23.56	24.00
EDGE 1 Tx slot	27.01	26.97	27.09	27.50	18.01	17.97	18.09	18.50
EDGE 2 Tx slots	25.08	25.07	25.21	25.50	19.08	19.07	19.21	19.50
EDGE 3 Tx slots	23.29	23.28	23.30	23.50	19.03	19.02	19.04	19.24
EDGE 4 Tx slots	20.89	20.89	21.01	21.50	17.89	17.89	18.01	18.50

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 1 Tx slot	29.78	29.86	29.94	30.00	20.78	20.86	20.94	21.00
GPRS 1 Tx slot	29.77	29.84	29.92	30.00	20.77	20.84	20.92	21.00
GPRS 2 Tx slots	26.53	26.67	26.75	27.00	20.53	20.67	20.75	21.00
GPRS 3 Tx slots	24.71	24.86	24.93	25.50	20.45	20.60	20.67	21.24
GPRS 4 Tx slots	23.70	24.03	23.86	24.50	20.70	21.03	20.86	21.50
EDGE 1 Tx slot	26.13	26.17	26.23	26.50	17.13	17.17	17.23	17.50
EDGE 2 Tx slots	24.63	24.71	24.79	25.00	18.63	18.71	18.79	19.00
EDGE 3 Tx slots	22.63	22.71	22.81	23.00	18.37	18.45	18.55	18.74
EDGE 4 Tx slots	20.41	20.51	20.60	21.00	17.41	17.51	17.60	18.00

Reduced Power Mode

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 1 Tx slot	30.68	30.74	30.84	31.00	21.68	21.74	21.84	22.00
GPRS 1 Tx slot	30.70	30.76	30.85	31.00	21.70	21.76	21.85	22.00
GPRS 2 Tx slots	27.79	27.88	27.98	28.00	21.79	21.88	21.98	22.00
GPRS 3 Tx slots	26.30	26.33	26.28	26.50	22.04	22.07	22.02	22.24
GPRS 4 Tx slots	23.84	23.95	24.07	24.50	20.84	20.95	21.07	21.50
EDGE 1 Tx slot	23.72	23.66	23.75	24.00	14.72	14.66	14.75	15.00
EDGE 2 Tx slots	21.23	21.27	21.32	21.50	15.23	15.27	15.32	15.50
EDGE 3 Tx slots	19.33	19.39	19.47	19.50	15.07	15.13	15.21	15.24
EDGE 4 Tx slots	17.39	17.24	17.37	18.00	14.39	14.24	14.37	15.00

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 1 Tx slot	24.20	24.23	24.22	24.50	15.20	15.23	15.22	15.50
GPRS 1 Tx slot	24.23	24.24	24.26	24.50	15.23	15.24	15.26	15.50
GPRS 2 Tx slots	22.11	22.14	22.19	22.50	16.11	16.14	16.19	16.50
GPRS 3 Tx slots	20.31	20.38	20.39	21.00	16.05	16.12	16.13	16.74
GPRS 4 Tx slots	18.22	18.24	18.29	19.00	15.22	15.24	15.29	16.00
EDGE 1 Tx slot	21.01	21.09	21.25	21.50	12.01	12.09	12.25	12.50
EDGE 2 Tx slots	18.69	18.81	18.94	19.50	12.69	12.81	12.94	13.50
EDGE 3 Tx slots	17.03	17.19	17.31	17.50	12.77	12.93	13.05	13.24
EDGE 4 Tx slots	15.17	15.39	15.37	16.00	12.17	12.39	12.37	13.00

<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 D01v03r01 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 HSPA+ devices supporting 16 QAM in the uplink, power measurements procedure is according to the configurations in Table C.11.1.4 of 3GPP TS 34.121-1.

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

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 D01v03r01, for SAR testing is measured using a 12.2 kbps RMC with TPC bits configured to all "1's".
2. Per KDB 941225 D01v03r01, 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 / HSPA+ 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 / HSPA+ to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA / HSPA+.

Default Power Mode

Band		WCDMA V			Tune-up Limit (dBm)	WCDMA II			Tune-up Limit (dBm)
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	
3GPP Rel 99	AMR 12.2Kbps	22.85	22.87	22.83	23.00	22.67	22.77	22.87	23.00
3GPP Rel 99	RMC 12.2Kbps	22.87	22.89	22.85	23.00	22.69	22.79	22.89	23.00
3GPP Rel 6	HSDPA Subtest-1	21.90	21.93	21.86	23.00	21.71	21.86	21.88	23.00
3GPP Rel 6	HSDPA Subtest-2	21.85	21.96	21.84	23.00	21.75	21.87	21.91	23.00
3GPP Rel 6	HSDPA Subtest-3	21.38	21.42	21.39	22.50	21.26	21.37	21.68	22.50
3GPP Rel 6	HSDPA Subtest-4	21.36	21.41	21.36	22.50	21.24	21.34	21.64	22.50
3GPP Rel 6	HSUPA Subtest-1	21.26	21.99	21.39	23.00	21.62	21.61	21.83	23.00
3GPP Rel 6	HSUPA Subtest-2	20.54	20.92	20.32	22.00	20.92	21.03	20.95	22.00
3GPP Rel 6	HSUPA Subtest-3	20.41	20.17	20.48	22.00	20.72	20.73	20.69	22.00
3GPP Rel 6	HSUPA Subtest-4	21.15	21.06	21.26	22.00	21.36	21.43	21.37	22.00
3GPP Rel 6	HSUPA Subtest-5	21.98	21.92	21.94	23.00	21.94	22.05	22.09	23.00
3GPP Rel 7	HSPA+ (16QAM) Subtest-1	21.83	21.89	21.85	22.00	21.76	21.87	21.93	22.00

Reduced Power Mode

Band		WCDMA V			Tune-up Limit (dBm)	WCDMA II			Tune-up Limit (dBm)
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	
3GPP Rel 99	AMR 12.2Kbps	21.22	21.30	21.28	21.50	16.14	16.20	16.23	16.50
3GPP Rel 99	RMC 12.2Kbps	21.26	21.43	21.35	21.50	16.15	16.21	16.26	16.50
3GPP Rel 6	HSDPA Subtest-1	20.22	20.42	20.22	21.50	15.74	15.87	15.55	16.50
3GPP Rel 6	HSDPA Subtest-2	20.28	20.46	20.20	21.50	15.71	15.84	15.52	16.50
3GPP Rel 6	HSDPA Subtest-3	19.81	19.92	19.89	21.00	14.85	15.30	15.00	16.00
3GPP Rel 6	HSDPA Subtest-4	19.84	19.83	19.66	21.00	15.15	15.29	14.99	16.00
3GPP Rel 6	HSUPA Subtest-1	19.76	20.34	19.86	21.50	15.33	15.50	15.16	16.50
3GPP Rel 6	HSUPA Subtest-2	18.84	19.37	18.81	20.50	14.88	14.82	14.53	15.50
3GPP Rel 6	HSUPA Subtest-3	18.79	18.56	18.93	20.50	14.43	14.41	14.11	15.50
3GPP Rel 6	HSUPA Subtest-4	19.54	19.48	19.72	20.50	14.89	15.01	14.72	15.50
3GPP Rel 6	HSUPA Subtest-5	20.33	20.28	20.26	21.50	15.00	15.14	14.84	16.50
3GPP Rel 7	HSPA+ (16QAM) Subtest-1	20.16	20.32	20.34	20.50	15.12	15.08	14.96	15.50

<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 D05v02r05, 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 D05v02r05, 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 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05v02r05, 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 D05v02r05, 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 D05v02r05, 16QAM SAR testing is not required.
7. Per KDB 941225 D05v02r05, 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 D05v02r05, smaller bandwidth SAR testing is not required.
8. For LTE B4 the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 D05v02r05, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

Default Power Mode

<LTE Band 2>

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				18700	18900	19100		
Frequency (MHz)				1860	1880	1900		
20	QPSK	1	0	22.75	22.70	22.98	23.5	0
20	QPSK	1	49	22.88	23.05	23.04		
20	QPSK	1	99	22.72	22.60	22.69		
20	QPSK	50	0	21.33	21.39	21.44	22.5	1
20	QPSK	50	24	21.46	21.53	21.49		
20	QPSK	50	50	21.28	21.39	21.46		
20	QPSK	100	0	21.33	21.44	21.43		
20	16QAM	1	0	21.80	21.83	21.80	22.5	1
20	16QAM	1	49	21.54	21.89	21.81		
20	16QAM	1	99	21.57	21.62	21.84		
20	16QAM	50	0	20.43	20.43	20.61	21.5	2
20	16QAM	50	24	20.20	20.50	20.49		
20	16QAM	50	50	20.15	20.36	20.62		
20	16QAM	100	0	20.26	20.58	20.42		
Channel				18675	18900	19125	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1857.5	1880	1902.5		
15	QPSK	1	0	22.88	22.86	22.83	23.5	0
15	QPSK	1	37	22.68	23.07	23.36		
15	QPSK	1	74	22.55	22.88	23.05		
15	QPSK	36	0	20.99	21.20	21.16	22.5	1
15	QPSK	36	20	20.87	21.20	21.18		
15	QPSK	36	39	20.92	21.12	21.29		
15	QPSK	75	0	20.97	21.17	21.19		
15	16QAM	1	0	21.87	21.84	21.90	22.5	1
15	16QAM	1	37	21.65	21.84	21.98		
15	16QAM	1	74	21.70	21.88	21.97		
15	16QAM	36	0	20.01	20.14	20.13	21.5	2
15	16QAM	36	20	20.00	20.13	20.12		
15	16QAM	36	39	19.86	20.13	20.37		
15	16QAM	75	0	20.02	20.19	20.09		
Channel				18650	18900	19150	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1855	1880	1905		
10	QPSK	1	0	22.79	22.93	22.85	23.5	0
10	QPSK	1	25	22.73	23.02	23.29		
10	QPSK	1	49	22.69	22.74	23.06		
10	QPSK	25	0	21.45	21.53	21.58	22.5	1
10	QPSK	25	12	21.39	21.54	21.75		
10	QPSK	25	25	21.45	21.57	21.66		
10	QPSK	50	0	21.40	21.61	21.62		
10	16QAM	1	0	21.80	21.96	21.88	22.5	1
10	16QAM	1	25	21.64	21.73	22.33		
10	16QAM	1	49	21.74	21.87	21.93		
10	16QAM	25	0	20.39	20.69	20.53	21.5	2
10	16QAM	25	12	20.53	20.58	20.67		
10	16QAM	25	25	20.50	20.70	20.75		
10	16QAM	50	0	20.37	20.45	20.76		

Channel				18625	18900	19175	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1852.5	1880	1907.5		
5	QPSK	1	0	22.62	22.83	23.07	23.5	0
5	QPSK	1	12	22.97	23.05	23.04		
5	QPSK	1	24	22.85	22.94	22.98		
5	QPSK	12	0	20.81	20.96	21.15	22.5	1
5	QPSK	12	7	20.77	20.93	21.10		
5	QPSK	12	13	20.81	21.03	21.09		
5	QPSK	25	0	20.82	20.98	21.08		
5	16QAM	1	0	21.69	21.74	21.90	22.5	1
5	16QAM	1	12	21.64	21.85	21.98		
5	16QAM	1	24	21.72	21.87	21.88		
5	16QAM	12	0	19.85	19.90	19.99	21.5	2
5	16QAM	12	7	19.81	19.97	20.03		
5	16QAM	12	13	19.76	19.97	20.12		
5	16QAM	25	0	19.79	20.03	20.03		
Channel				18615	18900	19185	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1851.5	1880	1908.5		
3	QPSK	1	0	22.71	22.72	22.87	23.5	0
3	QPSK	1	8	22.82	23.08	23.03		
3	QPSK	1	14	22.58	22.78	22.98		
3	QPSK	8	0	21.77	21.91	22.16	22.5	1
3	QPSK	8	4	21.85	21.99	22.02		
3	QPSK	8	7	21.83	22.03	22.02		
3	QPSK	15	0	21.71	21.94	21.99		
3	16QAM	1	0	21.77	21.74	21.92	22.5	1
3	16QAM	1	8	21.69	21.81	21.89		
3	16QAM	1	14	21.72	21.87	22.03		
3	16QAM	8	0	20.70	21.12	21.05	21.5	2
3	16QAM	8	4	20.74	21.12	20.93		
3	16QAM	8	7	20.89	21.06	21.10		
3	16QAM	15	0	20.75	21.06	21.03		
Channel				18607	18900	19193	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1850.7	1880	1909.3		
1.4	QPSK	1	0	22.54	22.68	22.94	23.5	0
1.4	QPSK	1	3	22.72	22.76	22.92		
1.4	QPSK	1	5	22.57	22.78	22.96		
1.4	QPSK	3	0	22.72	22.68	23.03		
1.4	QPSK	3	1	22.79	22.94	23.10		
1.4	QPSK	3	3	22.72	22.96	23.00		
1.4	QPSK	6	0	21.83	21.97	21.96	22.5	1
1.4	16QAM	1	0	21.64	21.71	21.85	22.5	1
1.4	16QAM	1	3	21.76	21.81	22.03		
1.4	16QAM	1	5	21.79	21.74	21.53		
1.4	16QAM	3	0	21.59	21.74	21.48		
1.4	16QAM	3	1	21.63	21.80	21.90		
1.4	16QAM	3	3	21.65	21.71	21.90		
1.4	16QAM	6	0	20.59	21.00	21.09	21.5	2

<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	23.55	23.72	23.45	24	0
20	QPSK	1	49	23.35	23.52	23.42		
20	QPSK	1	99	23.23	23.12	23.29		
20	QPSK	50	0	22.51	22.52	22.44	23	1
20	QPSK	50	24	22.35	22.45	22.37		
20	QPSK	50	50	22.30	22.30	22.32		
20	QPSK	100	0	22.32	22.47	22.32		
20	16QAM	1	0	22.97	22.98	22.80	23	1
20	16QAM	1	49	22.58	22.95	22.63		
20	16QAM	1	99	22.58	22.46	22.49		
20	16QAM	50	0	21.37	21.55	21.46	22	2
20	16QAM	50	24	21.29	21.39	21.29		
20	16QAM	50	50	21.23	21.26	21.33		
20	16QAM	100	0	21.35	21.39	21.34		
Channel				20025	20175	20325	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1717.5	1732.5	1747.5		
15	QPSK	1	0	23.53	23.44	23.23	24	0
15	QPSK	1	37	23.17	23.17	23.10		
15	QPSK	1	74	23.29	23.18	23.12		
15	QPSK	36	0	22.42	22.45	22.32	23	1
15	QPSK	36	20	22.30	22.38	22.25		
15	QPSK	36	39	22.27	22.28	22.26		
15	QPSK	75	0	22.35	22.42	22.31		
15	16QAM	1	0	22.96	22.90	22.81	23	1
15	16QAM	1	37	22.53	22.67	22.66		
15	16QAM	1	74	22.65	22.59	22.37		
15	16QAM	36	0	21.42	21.50	21.24	22	2
15	16QAM	36	20	21.29	21.32	21.14		
15	16QAM	36	39	21.26	21.22	21.37		
15	16QAM	75	0	21.24	21.48	21.25		
Channel				20000	20175	20350	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1715	1732.5	1750		
10	QPSK	1	0	23.68	23.51	23.49	24	0
10	QPSK	1	25	23.47	23.38	23.62		
10	QPSK	1	49	23.14	23.38	23.23		
10	QPSK	25	0	22.42	22.41	22.38	23	1
10	QPSK	25	12	22.41	22.45	22.36		
10	QPSK	25	25	22.26	22.20	22.40		
10	QPSK	50	0	22.39	22.37	22.27		
10	16QAM	1	0	22.90	22.81	22.74	23	1
10	16QAM	1	25	22.68	22.68	22.53		
10	16QAM	1	49	22.39	22.54	22.50		
10	16QAM	25	0	21.30	21.46	21.61	22	2
10	16QAM	25	12	21.54	21.42	21.38		
10	16QAM	25	25	21.26	21.27	21.44		
10	16QAM	50	0	21.29	21.40	21.29		

Channel				19975	20175	20375	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1712.5	1732.5	1752.5		
5	QPSK	1	0	23.33	23.44	23.36	24	0
5	QPSK	1	12	23.43	23.36	23.48		
5	QPSK	1	24	23.24	23.31	23.18		
5	QPSK	12	0	22.40	22.35	22.42	23	1
5	QPSK	12	7	22.33	22.40	22.33		
5	QPSK	12	13	22.36	22.26	22.38		
5	QPSK	25	0	22.30	22.43	22.39		
5	16QAM	1	0	22.67	22.74	22.62	23	1
5	16QAM	1	12	22.64	22.67	22.67		
5	16QAM	1	24	22.59	22.51	22.45		
5	16QAM	12	0	21.33	21.30	21.27	22	2
5	16QAM	12	7	21.35	21.13	21.33		
5	16QAM	12	13	21.31	21.02	21.27		
5	16QAM	25	0	21.32	21.17	21.31		
Channel				19965	20175	20385	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1711.5	1732.5	1753.5		
3	QPSK	1	0	23.40	23.25	23.17	24	0
3	QPSK	1	8	23.49	23.37	23.31		
3	QPSK	1	14	23.29	23.13	23.04		
3	QPSK	8	0	22.59	22.46	22.33	23	1
3	QPSK	8	4	22.38	22.38	22.33		
3	QPSK	8	7	22.38	22.34	22.25		
3	QPSK	15	0	22.37	22.35	22.32		
3	16QAM	1	0	22.73	22.80	22.67	23	1
3	16QAM	1	8	22.78	22.61	22.53		
3	16QAM	1	14	22.76	22.64	22.48		
3	16QAM	8	0	21.67	21.55	21.28	22	2
3	16QAM	8	4	21.25	21.36	21.22		
3	16QAM	8	7	21.24	21.48	21.36		
3	16QAM	15	0	21.42	21.43	21.12		
Channel				19957	20175	20393	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1710.7	1732.5	1754.3		
1.4	QPSK	1	0	23.24	23.16	23.07	24	0
1.4	QPSK	1	3	23.71	23.43	23.10		
1.4	QPSK	1	5	23.25	23.28	22.93		
1.4	QPSK	3	0	23.65	23.50	23.31		
1.4	QPSK	3	1	23.70	23.53	23.29		
1.4	QPSK	3	3	23.70	23.52	23.22		
1.4	QPSK	6	0	22.48	22.45	22.09	23	1
1.4	16QAM	1	0	22.88	22.75	22.42	23	1
1.4	16QAM	1	3	22.87	22.72	22.54		
1.4	16QAM	1	5	22.92	22.63	22.36		
1.4	16QAM	3	0	22.80	22.39	22.09		
1.4	16QAM	3	1	22.81	22.44	22.67		
1.4	16QAM	3	3	22.32	22.51	22.34		
1.4	16QAM	6	0	21.21	21.39	20.96	22	2

<LTE Band 7>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				20850	21100	21350		
Frequency (MHz)				2510	2535	2560		
20	QPSK	1	0	16.50	16.38	16.64	17	0
20	QPSK	1	49	16.29	16.22	16.61		
20	QPSK	1	99	15.96	16.24	16.34		
20	QPSK	50	0	15.20	15.29	15.53	16	1
20	QPSK	50	24	15.17	15.27	15.48		
20	QPSK	50	50	15.15	15.20	15.37		
20	QPSK	100	0	15.11	15.32	15.44		
20	16QAM	1	0	15.60	15.66	15.85	16	1
20	16QAM	1	49	15.44	15.71	15.61		
20	16QAM	1	99	15.45	15.54	15.49		
20	16QAM	50	0	14.13	14.43	14.76	15	2
20	16QAM	50	24	14.18	14.33	14.61		
20	16QAM	50	50	14.22	14.27	14.35		
20	16QAM	100	0	14.13	14.37	14.51		
Channel				20825	21100	21375	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2507.5	2535	2562.5		
15	QPSK	1	0	16.27	16.29	16.74	17	0
15	QPSK	1	37	16.23	16.23	16.32		
15	QPSK	1	74	16.33	16.28	16.35		
15	QPSK	36	0	15.22	15.35	15.56	16	1
15	QPSK	36	20	15.03	15.25	15.40		
15	QPSK	36	39	15.10	15.18	15.32		
15	QPSK	75	0	15.21	15.34	15.41		
15	16QAM	1	0	15.54	15.71	15.88	16	1
15	16QAM	1	37	15.45	15.51	15.57		
15	16QAM	1	74	15.54	15.60	15.55		
15	16QAM	36	0	13.94	14.39	14.47	15	2
15	16QAM	36	20	14.08	14.32	14.39		
15	16QAM	36	39	14.16	14.17	14.35		
15	16QAM	75	0	14.14	14.23	14.53		
Channel				20800	21100	21400	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2505	2535	2565		
10	QPSK	1	0	16.21	16.32	16.43	17	0
10	QPSK	1	25	16.10	16.33	16.45		
10	QPSK	1	49	16.14	16.18	16.18		
10	QPSK	25	0	15.11	15.30	15.41	16	1
10	QPSK	25	12	15.15	15.28	15.37		
10	QPSK	25	25	15.07	15.29	15.27		
10	QPSK	50	0	15.20	15.26	15.38		
10	16QAM	1	0	15.58	15.58	15.69	16	1
10	16QAM	1	25	15.39	15.43	15.11		
10	16QAM	1	49	15.44	15.32	15.52		
10	16QAM	25	0	14.17	14.27	14.56	15	2
10	16QAM	25	12	14.07	14.27	14.45		
10	16QAM	25	25	14.14	14.29	14.37		
10	16QAM	50	0	14.06	14.24	14.35		

Channel				20775	21100	21425	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2502.5	2535	2567.5		
5	QPSK	1	0	16.12	15.99	16.47	17	0
5	QPSK	1	12	16.05	16.30	16.42		
5	QPSK	1	24	15.99	16.10	16.12		
5	QPSK	12	0	15.08	15.22	15.33	16	1
5	QPSK	12	7	15.15	15.19	15.30		
5	QPSK	12	13	15.13	15.25	15.29		
5	QPSK	25	0	15.07	15.24	15.33		
5	16QAM	1	0	15.48	15.53	15.66	16	1
5	16QAM	1	12	15.36	15.47	15.58		
5	16QAM	1	24	15.45	15.41	15.46		
5	16QAM	12	0	14.05	14.19	14.49	15	2
5	16QAM	12	7	14.04	14.26	14.29		
5	16QAM	12	13	14.12	14.22	14.30		
5	16QAM	25	0	14.12	14.51	14.30		

Reduced Power Mode

<LTE Band 2>

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				18700	18900	19100		
Frequency (MHz)				1860	1880	1900		
20	QPSK	1	0	15.43	15.43	15.29	16	0
20	QPSK	1	49	15.51	15.69	15.72		
20	QPSK	1	99	15.26	15.43	15.44		
20	QPSK	50	0	13.99	14.11	14.13	15	1
20	QPSK	50	24	13.87	14.05	13.92		
20	QPSK	50	50	13.81	14.03	13.95		
20	QPSK	100	0	13.94	13.98	14.00		
20	16QAM	1	0	14.25	14.38	14.28	15	1
20	16QAM	1	49	14.04	14.67	14.65		
20	16QAM	1	99	14.11	14.20	14.58		
20	16QAM	50	0	12.97	13.10	13.08	14	2
20	16QAM	50	24	12.75	13.05	13.02		
20	16QAM	50	50	12.80	13.02	13.04		
20	16QAM	100	0	12.91	13.05	12.99		
Channel				18675	18900	19125	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1857.5	1880	1902.5		
15	QPSK	1	0	15.40	15.38	15.54	16	0
15	QPSK	1	37	15.55	15.44	15.52		
15	QPSK	1	74	15.25	15.36	15.32		
15	QPSK	36	0	13.59	13.74	13.76	15	1
15	QPSK	36	20	13.50	13.65	13.58		
15	QPSK	36	39	13.43	13.67	13.63		
15	QPSK	75	0	13.56	13.62	13.59		
15	16QAM	1	0	14.27	14.25	14.44	15	1
15	16QAM	1	37	14.06	14.30	14.22		
15	16QAM	1	74	14.14	14.24	14.28		
15	16QAM	36	0	12.61	12.64	12.67	14	2
15	16QAM	36	20	12.51	12.74	12.70		
15	16QAM	36	39	12.45	12.78	12.54		
15	16QAM	75	0	12.57	12.62	12.68		
Channel				18650	18900	19150	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1855	1880	1905		
10	QPSK	1	0	15.24	15.46	15.38	16	0
10	QPSK	1	25	15.44	15.43	15.12		
10	QPSK	1	49	15.35	15.45	15.18		
10	QPSK	25	0	14.01	14.10	13.98	15	1
10	QPSK	25	12	13.92	14.08	14.03		
10	QPSK	25	25	13.90	14.07	14.04		
10	QPSK	50	0	13.97	14.04	14.00		
10	16QAM	1	0	14.11	14.27	14.43	15	1
10	16QAM	1	25	14.02	14.28	14.25		
10	16QAM	1	49	14.13	14.23	14.21		
10	16QAM	25	0	13.08	13.22	12.99	14	2
10	16QAM	25	12	12.85	13.10	13.04		
10	16QAM	25	25	13.02	13.09	13.04		
10	16QAM	50	0	12.93	12.88	12.92		

Channel				18625	18900	19175	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1852.5	1880	1907.5		
5	QPSK	1	0	15.29	15.41	15.21	16	0
5	QPSK	1	12	15.43	15.54	15.42		
5	QPSK	1	24	15.07	15.38	15.38		
5	QPSK	12	0	13.23	13.44	13.44	15	1
5	QPSK	12	7	13.36	13.44	13.44		
5	QPSK	12	13	13.29	13.52	13.39		
5	QPSK	25	0	13.27	13.51	13.38		
5	16QAM	1	0	14.17	14.26	14.23	15	1
5	16QAM	1	12	14.11	14.32	14.28		
5	16QAM	1	24	14.04	14.30	14.27		
5	16QAM	12	0	12.27	12.47	12.46	14	2
5	16QAM	12	7	12.28	12.46	12.37		
5	16QAM	12	13	12.32	12.44	12.33		
5	16QAM	25	0	12.37	12.52	12.39		
Channel				18615	18900	19185	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1851.5	1880	1908.5		
3	QPSK	1	0	15.42	15.45	15.26	16	0
3	QPSK	1	8	15.41	15.44	15.55		
3	QPSK	1	14	15.35	15.48	15.45		
3	QPSK	8	0	14.27	14.44	14.48	15	1
3	QPSK	8	4	14.31	14.54	14.40		
3	QPSK	8	7	14.29	14.49	14.40		
3	QPSK	15	0	14.26	14.48	14.46		
3	16QAM	1	0	14.27	14.44	14.36	15	1
3	16QAM	1	8	14.13	14.40	14.29		
3	16QAM	1	14	14.31	14.36	14.34		
3	16QAM	8	0	13.24	13.52	13.56	14	2
3	16QAM	8	4	13.35	13.47	13.45		
3	16QAM	8	7	13.42	13.38	13.26		
3	16QAM	15	0	13.25	13.16	13.19		
Channel				18607	18900	19193	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1850.7	1880	1909.3		
1.4	QPSK	1	0	15.16	15.45	15.29	16	0
1.4	QPSK	1	3	15.27	15.43	15.32		
1.4	QPSK	1	5	15.06	15.40	15.34		
1.4	QPSK	3	0	15.30	15.44	15.37		
1.4	QPSK	3	1	15.43	15.62	15.30		
1.4	QPSK	3	3	15.24	15.55	15.42		
1.4	QPSK	6	0	14.29	14.46	14.42	15	1
1.4	16QAM	1	0	14.01	14.40	14.13	15	1
1.4	16QAM	1	3	14.08	14.28	14.20		
1.4	16QAM	1	5	14.06	14.44	14.23		
1.4	16QAM	3	0	13.95	14.25	14.07		
1.4	16QAM	3	1	13.98	14.32	14.11		
1.4	16QAM	3	3	13.98	14.21	13.94		
1.4	16QAM	6	0	13.32	13.44	13.40	14	2

<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	17.05	17.26	17.24	18	0
20	QPSK	1	49	16.87	16.94	16.85		
20	QPSK	1	99	16.60	16.82	16.68		
20	QPSK	50	0	15.98	16.04	16.02	17	1
20	QPSK	50	24	15.84	15.91	15.82		
20	QPSK	50	50	15.84	15.93	15.73		
20	QPSK	100	0	15.96	15.98	15.89		
20	16QAM	1	0	16.46	16.35	16.44	17	1
20	16QAM	1	49	16.20	16.58	16.52		
20	16QAM	1	99	16.12	15.95	15.89		
20	16QAM	50	0	14.96	15.13	15.04	16	2
20	16QAM	50	24	14.77	14.97	14.94		
20	16QAM	50	50	14.84	14.95	14.73		
20	16QAM	100	0	14.85	14.91	14.97		
Channel				20025	20175	20325	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1717.5	1732.5	1747.5		
15	QPSK	1	0	17.17	17.05	16.89	18	0
15	QPSK	1	37	16.79	16.89	16.51		
15	QPSK	1	74	16.87	16.85	16.64		
15	QPSK	36	0	16.02	15.96	15.92	17	1
15	QPSK	36	20	15.95	15.95	15.76		
15	QPSK	36	39	15.79	15.93	15.72		
15	QPSK	75	0	15.91	15.96	15.71		
15	16QAM	1	0	16.48	16.35	16.32	17	1
15	16QAM	1	37	16.20	16.21	16.00		
15	16QAM	1	74	16.09	16.08	15.91		
15	16QAM	36	0	14.92	14.73	14.81	16	2
15	16QAM	36	20	14.85	14.96	14.76		
15	16QAM	36	39	14.79	14.94	14.62		
15	16QAM	75	0	14.90	14.88	14.72		
Channel				20000	20175	20350	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1715	1732.5	1750		
10	QPSK	1	0	17.22	17.00	16.85	18	0
10	QPSK	1	25	16.86	16.90	16.69		
10	QPSK	1	49	16.87	16.87	16.71		
10	QPSK	25	0	16.00	15.98	15.84	17	1
10	QPSK	25	12	15.95	15.91	15.74		
10	QPSK	25	25	15.87	15.86	15.73		
10	QPSK	50	0	15.94	15.91	15.73		
10	16QAM	1	0	16.41	16.32	16.21	17	1
10	16QAM	1	25	16.16	16.18	15.96		
10	16QAM	1	49	16.17	16.09	15.95		
10	16QAM	25	0	15.02	15.00	14.73	16	2
10	16QAM	25	12	15.07	14.95	14.69		
10	16QAM	25	25	14.97	14.98	14.73		
10	16QAM	50	0	14.94	15.05	14.73		

Channel				19975	20175	20375	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1712.5	1732.5	1752.5		
5	QPSK	1	0	17.15	16.92	16.69	18	0
5	QPSK	1	12	16.80	16.93	16.64		
5	QPSK	1	24	16.82	16.69	16.64		
5	QPSK	12	0	15.96	15.94	15.73	17	1
5	QPSK	12	7	15.84	15.94	15.71		
5	QPSK	12	13	15.85	15.90	15.73		
5	QPSK	25	0	15.81	15.90	15.70		
5	16QAM	1	0	16.23	16.19	16.04	17	1
5	16QAM	1	12	16.10	16.16	15.98		
5	16QAM	1	24	16.15	16.17	15.96		
5	16QAM	12	0	14.98	14.89	14.73	16	2
5	16QAM	12	7	14.87	14.89	14.70		
5	16QAM	12	13	14.77	14.82	14.64		
5	16QAM	25	0	14.93	14.95	14.70		
Channel				19965	20175	20385	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1711.5	1732.5	1753.5		
3	QPSK	1	0	16.82	16.72	16.51	18	0
3	QPSK	1	8	16.64	16.80	16.61		
3	QPSK	1	14	16.61	16.71	16.36		
3	QPSK	8	0	15.88	15.91	15.68	17	1
3	QPSK	8	4	15.79	15.83	15.67		
3	QPSK	8	7	15.85	15.85	15.67		
3	QPSK	15	0	15.79	15.82	15.67		
3	16QAM	1	0	16.24	16.14	16.02	17	1
3	16QAM	1	8	15.98	16.08	15.91		
3	16QAM	1	14	16.09	16.13	16.00		
3	16QAM	8	0	14.82	15.05	14.62	16	2
3	16QAM	8	4	14.95	14.89	14.61		
3	16QAM	8	7	14.72	14.90	14.61		
3	16QAM	15	0	14.63	14.74	14.49		
Channel				19957	20175	20393	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1710.7	1732.5	1754.3		
1.4	QPSK	1	0	16.84	16.65	16.52	18	0
1.4	QPSK	1	3	17.03	16.71	16.66		
1.4	QPSK	1	5	16.82	16.68	16.73		
1.4	QPSK	3	0	16.83	16.65	16.73		
1.4	QPSK	3	1	16.84	16.78	16.76		
1.4	QPSK	3	3	16.93	16.89	16.63		
1.4	QPSK	6	0	15.92	15.85	15.69	17	1
1.4	16QAM	1	0	16.17	16.00	16.02	17	1
1.4	16QAM	1	3	16.09	16.06	15.99		
1.4	16QAM	1	5	16.24	16.06	15.99		
1.4	16QAM	3	0	16.07	15.95	15.70		
1.4	16QAM	3	1	16.05	16.00	15.79		
1.4	16QAM	3	3	16.07	15.98	15.88		
1.4	16QAM	6	0	14.82	14.93	14.62	16	2

<TDD LTE SAR Measurement>

TDD LTE configuration setup for SAR measurement

SAR was tested with a fixed periodic duty factor according to the highest transmission duty factor implemented for the device and supported by 3GPP.

a. 3GPP TS 36.211 section 4.2 for Type 2 Frame Structure and Table 4.2-2 for uplink-downlink configurations

b. "special subframe S" contains both uplink and downlink transmissions, it has been taken into consideration to determine the transmission duty factor according to the worst case uplink and downlink cyclic prefix requirements for UpPTS

c. Establishing connections with base station simulators ensure a consistent means for testing SAR and recommended for evaluating SAR. The Anritsu MT8820C (firmware: #22.52#004) was used for LTE output power measurements and SAR testing.

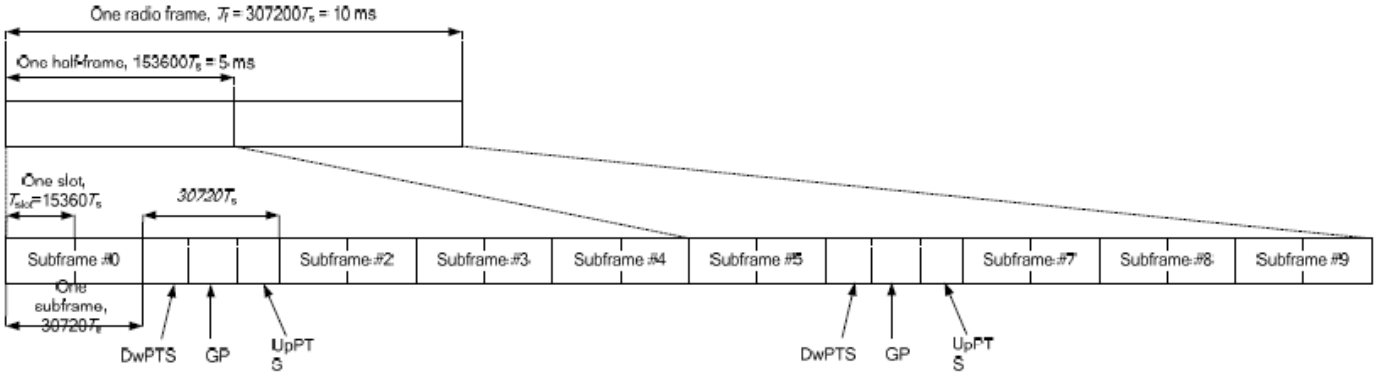


Figure 4.2-1: Frame structure type 2 (for 5 ms switch-point periodicity).

Table 4.2-2: Uplink-downlink configurations.

Uplink-downlink configuration	Downlink-to-Uplink Switch-point periodicity	Subframe number									
		0	1	2	3	4	5	6	7	8	9
0	5 ms	D	S	U	U	U	D	S	U	U	U
1	5 ms	D	S	U	U	D	D	S	U	U	D
2	5 ms	D	S	U	D	D	D	S	U	D	D
3	10 ms	D	S	U	U	U	D	D	D	D	D
4	10 ms	D	S	U	U	D	D	D	D	D	D
5	10 ms	D	S	U	D	D	D	D	D	D	D
6	5 ms	D	S	U	U	U	D	S	U	U	D

Table 4.2-1: Configuration of special subframe (lengths of DwPTS/GP/UpPTS).

Special subframe configuration	Normal cyclic prefix in downlink			Extended cyclic prefix in downlink		
	DwPTS	UpPTS		DwPTS	UpPTS	
		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink
0	$6592 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$	$7680 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$
1	$19760 \cdot T_s$			$20480 \cdot T_s$		
2	$21952 \cdot T_s$			$23040 \cdot T_s$		
3	$24144 \cdot T_s$			$25600 \cdot T_s$		
4	$26336 \cdot T_s$			$7680 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$
5	$6592 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$	$20480 \cdot T_s$		
6	$19760 \cdot T_s$			$23040 \cdot T_s$		
7	$21952 \cdot T_s$			$12800 \cdot T_s$		
8	$24144 \cdot T_s$			-	-	-
9	$13168 \cdot T_s$			-	-	-

Special subframe (30720·T_s): Normal cyclic prefix in downlink (UpPTS)			
	Special subframe configuration	**Normal cyclic prefix in uplink**	**Extended cyclic prefix in uplink**
Uplink duty factor in one special subframe	**0~4**	7.13%	8.33%
	5~9	14.3%	16.7%

Special subframe(30720·T_s): Extended cyclic prefix in downlink (UpPTS)			
	Special subframe configuration	**Normal cyclic prefix in uplink**	**Extended cyclic prefix in uplink**
Uplink duty factor in one special subframe	**0~3**	7.13%	8.33%
	4~7	14.3%	16.7%

The highest duty factor is resulted from:

i. Uplink-downlink configuration: 0. In a half-frame consisted of 5 subfames, uplink operation is in 3 uplink subframes and 1 special subframe.

ii. special subframe configuration: 5-9 for normal cyclic prefix in downlink, 4-7 for extended cyclic prefix in downlink

iii. for special subframe with extended cyclic prefix in uplink, the total uplink duty factor in one half-frame is: (3+0.167)/5 = 63.3%

iv. for special subframe with normal cyclic prefix in uplink, the total uplink duty factor in one half-frame is: (3+0.143)/5 = 62.9%

v. For TDD LTE SAR measurement, the duty cycle 1:1.59 (62.9 %) was used perform testing and considering the theoretical duty cycle of 63.3% for extended cyclic prefix in the uplink, and the theoretical duty cycle of 62.9% for normal cyclic prefix in uplink, a scaling factor of extended cyclic prefix 63.3%/62.9% = 1.006 is applied to scale-up the measured SAR result. The scaled TDD LTE SAR = measured SAR (W/kg)* Tune-up Scaling Factor* scaling factor for extended cyclic prefix.

<LTE Band 38>

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				37850	38000	38150		
Frequency (MHz)				2580	2595	2610		
20	QPSK	1	0	19.40	19.41	19.36	19.5	0
20	QPSK	1	49	19.29	19.20	19.26		
20	QPSK	1	99	19.16	19.13	19.26		
20	QPSK	50	0	18.87	18.89	18.85	18.5	1
20	QPSK	50	24	18.80	18.63	18.83		
20	QPSK	50	50	18.79	18.60	18.79		
20	QPSK	100	0	18.73	18.77	18.70		
20	16QAM	1	0	18.76	19.17	18.74	19	0.5
20	16QAM	1	49	18.83	18.81	18.98		
20	16QAM	1	99	18.42	18.38	18.60		
20	16QAM	50	0	18.78	18.89	18.91	18.5	1
20	16QAM	50	24	18.63	18.71	18.77		
20	16QAM	50	50	18.65	18.53	18.91		
20	16QAM	100	0	18.67	18.62	18.73		
Channel				37825	38000	38175	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2577.5	2595	2612.5		
15	QPSK	1	0	18.94	19.49	19.25	19.5	0
15	QPSK	1	37	19.15	19.11	19.22		
15	QPSK	1	74	19.18	18.89	19.19		
15	QPSK	36	0	18.19	18.24	18.46	18.5	1
15	QPSK	36	20	18.16	18.19	18.53		
15	QPSK	36	39	18.28	18.13	18.49		
15	QPSK	75	0	18.16	18.40	18.45		
15	16QAM	1	0	18.72	19.09	18.96	19	0.5
15	16QAM	1	37	18.89	18.91	18.90		
15	16QAM	1	74	18.95	18.87	18.91		
15	16QAM	36	0	18.16	18.27	18.26	18.5	1
15	16QAM	36	20	18.13	18.21	18.14		
15	16QAM	36	39	18.15	18.10	18.17		
15	16QAM	75	0	18.26	18.05	18.39		
Channel				37800	38000	38200	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2575	2595	2615		
10	QPSK	1	0	19.36	19.69	19.59	19.5	0
10	QPSK	1	25	19.36	19.27	19.70		
10	QPSK	1	49	19.33	19.30	19.58		
10	QPSK	25	0	18.16	18.18	18.23	18.5	1
10	QPSK	25	12	18.22	18.16	18.21		
10	QPSK	25	25	18.39	18.12	18.21		
10	QPSK	50	0	18.24	18.23	18.19		
10	16QAM	1	0	18.59	19.42	19.03	19	0.5
10	16QAM	1	25	18.82	18.70	18.86		
10	16QAM	1	49	18.78	18.52	19.00		
10	16QAM	25	0	18.06	18.33	18.43	18.5	1
10	16QAM	25	12	18.14	18.27	18.31		
10	16QAM	25	25	18.31	18.14	18.38		
10	16QAM	50	0	18.19	18.14	18.17		

Channel				37775	38000	38225	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2572.5	2595	2617.5		
5	QPSK	1	0	19.06	19.28	19.35	19.5	0
5	QPSK	1	12	19.30	19.25	19.21		
5	QPSK	1	24	19.17	19.14	19.22		
5	QPSK	12	0	18.20	18.36	18.22	18.5	1
5	QPSK	12	7	18.07	18.29	18.18		
5	QPSK	12	13	18.13	18.32	18.16		
5	QPSK	25	0	18.13	18.42	18.37		
5	16QAM	1	0	18.76	18.87	18.93	19	0.5
5	16QAM	1	12	18.76	18.68	18.64		
5	16QAM	1	24	18.76	18.63	18.87		
5	16QAM	12	0	18.00	18.15	18.02	18.5	1
5	16QAM	12	7	18.04	18.25	18.03		
5	16QAM	12	13	18.10	18.20	18.00		
5	16QAM	25	0	18.33	18.40	18.08		

<WLAN Conducted Power>

General Note:

1. Per KDB 248227 D01v02r02, SAR test reduction is determined according to 802.11 transmission mode configurations and certain exposure conditions with multiple test positions. In the 2.4 GHz band, separate SAR procedures are applied to DSSS and OFDM configurations to simplify DSSS test requirements. For OFDM, in both 2.4 and 5 GHz bands, an initial test configuration must be determined for each standalone and aggregated frequency band, according to the transmission mode configuration with the highest maximum output power specified for production units to perform SAR measurements. If the same highest maximum output power applies to different combinations of channel bandwidths, modulations and data rates, additional procedures are applied to determine which test configurations require SAR measurement. When applicable, an initial test position may be applied to reduce the number of SAR measurements required for next to the ear, UMPC mini-tablet or hotspot mode configurations with multiple test positions.
2. For 2.4 GHz 802.11b DSSS, either the initial test position procedure for multiple exposure test positions or the DSSS procedure for fixed exposure position is applied; these are mutually exclusive. For 2.4 GHz and 5 GHz OFDM configurations, the initial test configuration is applied to measure SAR using either the initial test position procedure for multiple exposure test position configurations or the initial test configuration procedures for fixed exposure test conditions. Based on the reported SAR of the measured configurations and maximum output power of the transmission mode configurations that are not included in the initial test configuration, the subsequent test configuration and initial test position procedures are applied to determine if SAR measurements are required for the remaining OFDM transmission configurations. In general, the number of test channels that require SAR measurement is minimized based on maximum output power measured for the test sample(s).
3. For OFDM transmission configurations in the 2.4 GHz and 5 GHz bands, When the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/g/n/ac mode is used for SAR measurement, on the highest measured output power channel for each frequency band.
4. DSSS and OFDM configurations are considered separately according to the required SAR procedures. SAR is measured in the initial test position using the 802.11 transmission mode configuration required by the DSSS procedure or initial test configuration and subsequent test configuration(s) according to the OFDM procedures.18 The initial test position procedure is described in the following:
    a. When the reported SAR of the initial test position is ≤ 0.4 W/kg, further SAR measurement is not required for the other test positions in that exposure configuration and 802.11 transmission mode combinations within the frequency band or aggregated band.
    b. When the reported SAR of the test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position to measure the subsequent next closet/smallest test separation distance and maximum coupling test position on the highest maximum output power channel, until the report SAR is ≤ 0.8 W/kg or all required test position are tested.
    c. For all positions/configurations, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.

<2.4GHz WLAN>

	Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Tune-Up Limit	Duty Cycle %
2.4GHz WLAN	802.11b	CH 1	2412	1Mbps	14.04	14.10	97.59
		CH 6	2437		14.89	15.00	
		CH 11	2462		14.50	15.00	
	802.11g	CH 1	2412	6Mbps	12.01	12.50	87.04
		CH 6	2437		13.03	13.50	
		CH 11	2462		12.72	13.00	
	802.11n-HT20	CH 1	2412	MCS0	10.44	11.50	86.53
		CH 6	2437		11.18	11.50	
		CH 11	2462		10.85	11.50	
	802.11n-HT40	CH 3	2422	MCS0	10.71	12.00	75.39
		CH 6	2437		11.11	12.00	
		CH 9	2452		11.01	12.00	

14. Bluetooth Exclusions Applied

Mode Band	Average power(dBm)	
	Bluetooth-EDR	Bluetooth-LE
2.4GHz Bluetooth	3.0	2.0

Note:

1. Per KDB 447498 D01v06, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:
   [(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)] ·[√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR
   - f(GHz) is the RF channel transmit frequency in GHz
   - Power and distance are rounded to the nearest mW and mm before calculation
   - The result is rounded to one decimal place for comparison

Bluetooth Max Power (dBm)	Separation Distance (mm)	Frequency (GHz)	exclusion thresholds
3.0	< 5	2.48	0.63

Note:

Per KDB 447498 D01v06, when the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion. The test exclusion threshold is 0.63 which is <= 3, SAR testing is not required.

15. Antenna Location

Back View

<SAR test exclusion table>

Exposure Position	Wireless Interface	GSM 850	GSM 1900	WCDMA Band V	WCDMA Band II	LTE Band 2	LTE Band 4	LTE Band 7	LTE Band 38	2.4GHz WLAN
	Calculated Frequency	848MHz	1909MHz	846MHz	1907MHz	848MHz	1754MHz	1909MHz	1914MHz	2462MHz
	Maximum power (dBm)	24.0	21.5	23.0	23.0	23.5	24.0	17.0	19.5	15.0
	Maximum rated power(mW)	251.0	141.0	200.0	200.0	224.0	251.0	50.0	89.0	32.0
Bottom Face	Separation distance(mm)	≤5.0								
	exclusion threshold	46.2	39.0	36.8	55.2	41.3	66.5	13.8	24.6	10.0
	Testing required?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Edge 1	Separation distance(mm)	163.0						≤5.0		15.0
	exclusion threshold	802.0	1239.0	800.0	1239.0	802.0	1243.0	13.8	24.6	3.4
	Testing required?	No	No	No	No	No	No	Yes	Yes	Yes
Edge 2	Separation distance(mm)	82.0						70.1		≤5.0
	exclusion threshold	344.0	429.0	344.0	429.0	344.0	433.0	310.0	309.0	10.0
	Testing required?	No	No	No	No	No	No	No	No	Yes
Edge 3	Separation distance(mm)	≤5.0						179.2		145.0
	exclusion threshold	46.2	39.0	36.8	55.2	41.3	66.5	1401.0	1400.0	1046.0
	Testing required?	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
Edge 4	Separation distance(mm)	≤5.0								90.0
	exclusion threshold	46.2	39.0	36.8	55.2	41.3	66.5	13.8	24.6	496.0
	Testing required?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No

16. SAR Test Results

General Note:

1. Per KDB 447498 D01v06, 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
   e. For TDD LTE SAR measurement, the duty cycle 1:1.59 (62.9 %) was used perform testing and considering the theoretical duty cycle of 63.3% for extended cyclic prefix in the uplink, and the theoretical duty cycle of 62.9% for normal cyclic prefix in uplink, a scaling factor of extended cyclic prefix 63.3%/62.9% = 1.006 is applied to scale-up the measured SAR result. The Reported TDD LTE SAR = measured SAR (W/kg)* Tune-up Scaling Factor* scaling factor for extended cyclic prefix.
2. Per KDB 447498 D01v06, 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 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.
4. For the exposure positions that proximity sensor power reduction is applied for SAR compliance, additional SAR testing with EUT transmitting full power in normal mode was performed; 11mm for bottom face, 14mm for edge3, 4mm for edge4

GSM Note:

1. Per KDB 447498 D01v06, the maximum output power channel is used for SAR testing and for further SAR test reduction.
2. Per KDB 941225 D01v03r01, for SAR test reduction for GSM / GPRS / 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,
   (a) For Head SAR, the GPRS (4Tx slots) was considered as the primary mode.
   (b-1) For Body SAR, the GPRS (4Tx slots) was considered as the primary mode, when EUT operation without power back-off.
   (b-2) For Body SAR, the GPRS (3Tx slots) was considered as the primary mode, when EUT operation with power back-off.
3. Other configurations of GSM / GPRS / EDGE are considered as secondary modes. The 3G SAR test reduction procedure is applied, when the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ ¼ dB higher than the primary mode, SAR measurement is not required for the secondary mode.

UMTS Note:

1. Per KDB 941225 D01v03r01, for SAR testing is measured using a 12.2 kbps RMC with TPC bits configured to all "1's".
2. Per KDB 941225 D01v03r01, 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 / HSPA+ 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 / HSPA+ to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA / HSPA+.

LTE Note:

1. Per KDB 941225 D05v02r05, 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 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
3. Per KDB 941225 D05v02r05, 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 D05v02r05, 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 D05v02r05, 16QAM SAR testing is not required.
5. Per KDB 941225 D05v02r05, 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 D05v02r05, smaller bandwidth SAR testing is not required.
6. For LTE B4 the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 D05v02r05, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

WLAN Note:

1. Per KDB 248227 D01v02r02, for 2.4GHz 802.11g/n SAR testing is not required when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.
2. When the reported SAR of the test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position to measure the subsequent next closet/smallest test separation distance and maximum coupling test position on the highest maximum output power channel, until the report SAR is ≤ 0.8 W/kg or all required test position are tested.
3. For all positions / configurations, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions / configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.
4. During SAR testing the WLAN transmission was verified using a spectrum analyzer.

16.1 Head SAR

<GSM SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Sample	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	GSM850	GPRS (4 Tx slots)	Right Cheek	0mm	Sample 1	251	848.8	26.56	27.00	1.107	-0.15	0.113	0.125
	GSM850	GPRS (4 Tx slots)	Right Cheek	0mm	Sample 1	128	824.2	26.45	27.00	1.135	0.03	0.079	0.090
	GSM850	GPRS (4 Tx slots)	Right Cheek	0mm	Sample 1	189	836.4	26.53	27.00	1.114	0.02	0.087	0.097
01	GSM850	GPRS (4 Tx slots)	Right Cheek	0mm	Sample 2	251	848.8	26.56	27.00	1.107	-0.07	0.129	0.143
	GSM850	GPRS (4 Tx slots)	Right Tilted	0mm	Sample 1	251	848.8	26.56	27.00	1.107	0.05	0.056	0.062
	GSM850	GPRS (4 Tx slots)	Left Cheek	0mm	Sample 1	251	848.8	26.56	27.00	1.107	0.07	0.098	0.108
	GSM850	GPRS (4 Tx slots)	Left Tilted	0mm	Sample 1	251	848.8	26.56	27.00	1.107	0.06	0.065	0.072
	GSM1900	GPRS (4 Tx slots)	Right Cheek	0mm	Sample 1	661	1880	24.03	24.50	1.114	0	0.006	0.007
	GSM1900	GPRS (4 Tx slots)	Right Tilted	0mm	Sample 1	661	1880	24.03	24.50	1.114	0.14	0.024	0.027
	GSM1900	GPRS (4 Tx slots)	Left Cheek	0mm	Sample 1	661	1880	24.03	24.50	1.114	0.09	0.029	0.032
	GSM1900	GPRS (4 Tx slots)	Left Cheek	0mm	Sample 1	512	1850.2	23.70	24.50	1.202	0.04	0.041	0.049
02	GSM1900	GPRS (4 Tx slots)	Left Cheek	0mm	Sample 1	810	1909.8	23.86	24.50	1.159	0.08	0.046	0.053
	GSM1900	GPRS (4 Tx slots)	Left Cheek	0mm	Sample 2	810	1909.8	23.86	24.50	1.159	0.06	0.041	0.048
	GSM1900	GPRS (4 Tx slots)	Left Tilted	0mm	Sample 1	661	1880	24.03	24.50	1.114	0.18	0.015	0.017

<WCDMA SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Sample	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WCDMA II	RMC 12.2Kbps	Right Cheek	0mm	Sample 1	9538	1907.6	22.89	23.00	1.026	0.04	0.011	0.011
	WCDMA II	RMC 12.2Kbps	Right Tilted	0mm	Sample 1	9538	1907.6	22.89	23.00	1.026	0.05	0.056	0.057
	WCDMA II	RMC 12.2Kbps	Left Cheek	0mm	Sample 1	9538	1907.6	22.89	23.00	1.026	0.05	0.062	0.064
	WCDMA II	RMC 12.2Kbps	Left Cheek	0mm	Sample 1	9262	1852.4	22.69	23.00	1.074	-0.03	0.074	0.079
03	WCDMA II	RMC 12.2Kbps	Left Cheek	0mm	Sample 1	9400	1880	22.79	23.00	1.050	0.01	0.094	0.099
	WCDMA II	RMC 12.2Kbps	Left Cheek	0mm	Sample 2	9400	1880	22.89	23.00	1.026	0.11	0.086	0.088
	WCDMA II	RMC 12.2Kbps	Left Tilted	0mm	Sample 1	9538	1907.6	22.89	23.00	1.026	0.1	0.027	0.028
	WCDMA V	RMC 12.2Kbps	Right Cheek	0mm	Sample 1	4182	836.4	22.89	23.00	1.026	-0.02	0.130	0.133
	WCDMA V	RMC 12.2Kbps	Right Cheek	0mm	Sample 1	4132	826.4	22.87	23.00	1.030	-0.04	0.128	0.132
04	WCDMA V	RMC 12.2Kbps	Right Cheek	0mm	Sample 1	4233	846.6	22.85	23.00	1.035	-0.06	0.149	0.154
	WCDMA V	RMC 12.2Kbps	Right Cheek	0mm	Sample 2	4233	846.6	22.85	23.00	1.035	0	0.135	0.140
	WCDMA V	RMC 12.2Kbps	Right Tilted	0mm	Sample 1	4182	836.4	22.89	23.00	1.026	0.07	0.090	0.092
	WCDMA V	RMC 12.2Kbps	Left Cheek	0mm	Sample 1	4182	836.4	22.89	23.00	1.026	0.14	0.113	0.116
	WCDMA V	RMC 12.2Kbps	Left Tilted	0mm	Sample 1	4182	836.4	22.89	23.00	1.026	0.07	0.093	0.095

<FDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Sample	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	LTE Band 2	20M	QPSK	1	49	Right Cheek	0mm	Sample 1	18900	1880	23.05	23.50	1.109	-0.04	0.051	0.057
	LTE Band 2	20M	QPSK	50	24	Right Cheek	0mm	Sample 1	18900	1880	21.53	22.50	1.250	-0.13	0.043	0.054
	LTE Band 2	20M	QPSK	1	49	Right Tilted	0mm	Sample 1	18900	1880	23.05	23.50	1.109	0.02	0.051	0.057
	LTE Band 2	20M	QPSK	50	24	Right Tilted	0mm	Sample 1	18900	1880	21.53	22.50	1.250	0.08	0.036	0.045
	LTE Band 2	20M	QPSK	1	49	Left Cheek	0mm	Sample 1	18900	1880	23.05	23.50	1.109	0.04	0.089	0.099
	LTE Band 2	20M	QPSK	1	49	Left Cheek	0mm	Sample 1	18700	1860	22.88	23.50	1.153	0	0.096	0.111
05	LTE Band 2	20M	QPSK	1	49	Left Cheek	0mm	Sample 1	19100	1900	23.04	23.50	1.112	-0.02	0.112	0.125
	LTE Band 2	20M	QPSK	1	49	Left Cheek	0mm	Sample 2	19100	1900	23.04	23.50	1.112	0.01	0.089	0.099
	LTE Band 2	20M	QPSK	50	24	Left Cheek	0mm	Sample 1	18900	1880	21.53	22.50	1.250	0.12	0.073	0.091
	LTE Band 2	20M	QPSK	1	49	Left Tilted	0mm	Sample 1	18900	1880	23.05	23.50	1.109	0.13	0.034	0.038
	LTE Band 2	20M	QPSK	50	24	Left Tilted	0mm	Sample 1	18900	1880	21.53	22.50	1.250	0.12	0.024	0.030
	LTE Band 4	20M	QPSK	1	0	Right Cheek	0mm	Sample 1	20175	1732.5	23.72	24.00	1.067	0.13	0.046	0.049
	LTE Band 4	20M	QPSK	50	0	Right Cheek	0mm	Sample 1	20175	1732.5	22.52	23.00	1.117	0.13	0.039	0.044
	LTE Band 4	20M	QPSK	1	0	Right Tilted	0mm	Sample 1	20175	1732.5	23.72	24.00	1.067	0.17	0.035	0.037
	LTE Band 4	20M	QPSK	50	0	Right Tilted	0mm	Sample 1	20175	1732.5	22.52	23.00	1.117	-0.04	0.030	0.034
	LTE Band 4	20M	QPSK	1	0	Left Cheek	0mm	Sample 1	20175	1732.5	23.72	24.00	1.067	0.1	0.054	0.058
06	LTE Band 4	20M	QPSK	1	0	Left Cheek	0mm	Sample 2	20175	1732.5	23.72	24.00	1.067	0.19	0.061	0.065
	LTE Band 4	20M	QPSK	50	0	Left Cheek	0mm	Sample 1	20175	1732.5	22.52	23.00	1.117	0.11	0.046	0.051
	LTE Band 4	20M	QPSK	1	0	Left Tilted	0mm	Sample 1	20175	1732.5	23.72	24.00	1.067	0.11	0.046	0.049
	LTE Band 4	20M	QPSK	50	0	Left Tilted	0mm	Sample 1	20175	1732.5	22.52	23.00	1.117	0.13	0.024	0.027
	LTE Band 7	20M	QPSK	1	0	Right Cheek	0mm	Sample 1	21350	2560	16.64	17.00	1.086	-0.04	0.538	0.584
	LTE Band 7	20M	QPSK	1	0	Right Cheek	0mm	Sample 1	20850	2510	16.50	17.00	1.122	-0.04	0.513	0.576
	LTE Band 7	20M	QPSK	1	0	Right Cheek	0mm	Sample 1	21100	2535	16.38	17.00	1.153	-0.04	0.501	0.578
07	LTE Band 7	20M	QPSK	1	0	Right Cheek	0mm	Sample 2	21350	2560	16.64	17.00	1.086	-0.03	0.658	0.715
	LTE Band 7	20M	QPSK	50	0	Right Cheek	0mm	Sample 1	21350	2560	15.53	16.00	1.114	0.02	0.416	0.464
	LTE Band 7	20M	QPSK	1	0	Right Tilted	0mm	Sample 1	21350	2560	16.64	17.00	1.086	0.09	0.462	0.502
	LTE Band 7	20M	QPSK	50	0	Right Tilted	0mm	Sample 1	21350	2560	15.53	16.00	1.114	0.03	0.375	0.418
	LTE Band 7	20M	QPSK	1	0	Left Cheek	0mm	Sample 1	21350	2560	16.64	17.00	1.086	0.02	0.190	0.206
	LTE Band 7	20M	QPSK	50	0	Left Cheek	0mm	Sample 1	21350	2560	15.53	16.00	1.114	-0.03	0.137	0.153
	LTE Band 7	20M	QPSK	1	0	Left Tilted	0mm	Sample 1	21350	2560	16.64	17.00	1.086	-0.01	0.214	0.232
	LTE Band 7	20M	QPSK	50	0	Left Tilted	0mm	Sample 1	21350	2560	15.53	16.00	1.114	0.11	0.166	0.185

<TDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Sample	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)
	LTE Band 38	20M	QPSK	1	0	Right Cheek	0mm	Sample 1	38000	2595	19.41	19.50	1.021	62.9	1.006	-0.07	0.645	0.662
	LTE Band 38	20M	QPSK	1	0	Right Cheek	0mm	Sample 1	37850	2580	19.40	19.50	1.023	62.9	1.006	-0.07	0.636	0.655
	LTE Band 38	20M	QPSK	1	0	Right Cheek	0mm	Sample 1	38150	2610	19.36	19.50	1.033	62.9	1.006	-0.07	0.634	0.659
08	LTE Band 38	20M	QPSK	1	0	Right Cheek	0mm	Sample 2	38000	2595	19.41	19.50	1.021	62.9	1.006	-0.06	0.772	0.793
	LTE Band 38	20M	QPSK	50	0	Right Cheek	0mm	Sample 1	38000	2595	18.89	18.50	0.914	62.9	1.006	-0.12	0.527	0.485
	LTE Band 38	20M	QPSK	1	0	Right Tilted	0mm	Sample 1	38000	2595	19.41	19.50	1.021	62.9	1.006	-0.13	0.550	0.565
	LTE Band 38	20M	QPSK	50	0	Right Tilted	0mm	Sample 1	38000	2595	18.89	18.50	0.914	62.9	1.006	0.12	0.502	0.462
	LTE Band 38	20M	QPSK	1	0	Left Cheek	0mm	Sample 1	38000	2595	19.41	19.50	1.021	62.9	1.006	0.09	0.262	0.269
	LTE Band 38	20M	QPSK	50	0	Left Cheek	0mm	Sample 1	38000	2595	18.89	18.50	0.914	62.9	1.006	0.02	0.225	0.207
	LTE Band 38	20M	QPSK	1	0	Left Tilted	0mm	Sample 1	38000	2595	19.41	19.50	1.021	62.9	1.006	0.13	0.285	0.293
	LTE Band 38	20M	QPSK	50	0	Left Tilted	0mm	Sample 1	38000	2595	18.89	18.50	0.914	62.9	1.006	-0.05	0.239	0.220

<WLAN SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Sample	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WLAN2.4GHz	802.11b 1Mbps	Right Cheek	0mm	Sample 1	6	2437	14.89	15.00	1.027	97.59	1.025	0.12	0.084	0.088
	WLAN2.4GHz	802.11b 1Mbps	Right Tilted	0mm	Sample 1	6	2437	14.89	15.00	1.027	97.59	1.025	0.11	0.077	0.081
	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	0mm	Sample 1	6	2437	14.89	15.00	1.027	97.59	1.025	-0.12	0.281	0.296
	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	0mm	Sample 1	1	2412	14.04	14.10	1.015	97.59	1.025	-0.03	0.285	0.296
	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	0mm	Sample 1	11	2462	14.50	15.00	1.123	97.59	1.025	-0.12	0.289	0.333
09	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	0mm	Sample 2	11	2462	14.50	15.00	1.123	97.59	1.025	-0.03	0.346	0.398
	WLAN2.4GHz	802.11b 1Mbps	Left Tilted	0mm	Sample 1	6	2437	14.89	15.00	1.027	97.59	1.025	0.09	0.104	0.109

16.2 Body SAR

<GSM SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Power Reduction	Sample	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)	Bottom Face	0mm	ON	Sample 1	251	848.8	26.28	26.50	1.052	-0.03	1.070	1.126
	GSM850	GPRS (3 Tx slots)	Bottom Face	0mm	ON	Sample 1	128	824.2	26.30	26.50	1.047	0	1.130	1.183
	GSM850	GPRS (3 Tx slots)	Bottom Face	0mm	ON	Sample 1	189	824.2	26.33	26.50	1.040	-0.03	1.130	1.175
10	GSM850	GPRS (3 Tx slots)	Bottom Face	0mm	ON	Sample 2	128	824.2	26.30	26.50	1.047	-0.09	1.130	1.183
	GSM850	GPRS (3 Tx slots)	Bottom Face	0mm	ON	Sample 2	189	836.4	26.33	26.50	1.040	-0.01	1.130	1.175
	GSM850	GPRS (3 Tx slots)	Bottom Face	0mm	ON	Sample 2	251	848.8	26.28	26.50	1.052	0.02	1.070	1.126
	GSM850	GPRS (3 Tx slots)	Edge 3	0mm	ON	Sample 1	189	836.4	26.33	26.50	1.040	0.08	0.547	0.569
	GSM850	GPRS (3 Tx slots)	Edge 4	0mm	ON	Sample 1	189	836.4	26.33	26.50	1.040	-0.1	0.455	0.473
	GSM850	GPRS (4 Tx slots)	Bottom Face	11mm	OFF	Sample 1	251	848.8	26.56	27.00	1.107	-0.01	0.238	0.263
	GSM850	GPRS (4 Tx slots)	Edge 3	14mm	OFF	Sample 1	251	848.8	26.56	27.00	1.107	-0.12	0.716	0.792
	GSM850	GPRS (4 Tx slots)	Edge 4	4mm	OFF	Sample 1	251	848.8	26.56	27.00	1.107	-0.06	0.231	0.256
	GSM1900	GPRS (3 Tx slots)	Bottom Face	0mm	ON	Sample 1	810	1909.8	20.39	21.00	1.151	0	0.833	0.959
	GSM1900	GPRS (3 Tx slots)	Bottom Face	0mm	ON	Sample 1	512	1850.2	20.31	21.00	1.172	0.06	0.716	0.839
	GSM1900	GPRS (3 Tx slots)	Bottom Face	0mm	ON	Sample 1	661	1880	20.38	21.00	1.153	0.07	0.758	0.874
	GSM1900	GPRS (3 Tx slots)	Edge 3	0mm	ON	Sample 1	810	1909.8	20.39	21.00	1.151	-0.04	1.010	1.162
	GSM1900	GPRS (3 Tx slots)	Edge 3	0mm	ON	Sample 1	512	1850.2	20.31	21.00	1.172	-0.03	0.986	1.156
11	GSM1900	GPRS (3 Tx slots)	Edge 3	0mm	ON	Sample 1	661	1880	20.38	21.00	1.153	-0.11	1.030	1.188
	GSM1900	GPRS (3 Tx slots)	Edge 3	0mm	ON	Sample 2	661	1880	20.38	21.00	1.153	-0.11	0.953	1.099
	GSM1900	GPRS (3 Tx slots)	Edge 3	0mm	ON	Sample 2	512	1850.2	20.31	21.00	1.172	0.12	0.903	1.058
	GSM1900	GPRS (3 Tx slots)	Edge 3	0mm	ON	Sample 2	810	1909.8	20.39	21.00	1.151	-0.19	0.920	1.059
	GSM1900	GPRS (3 Tx slots)	Edge 4	0mm	ON	Sample 1	810	1909.8	20.39	21.00	1.151	0.01	0.188	0.216
	GSM1900	GPRS (4 Tx slots)	Bottom Face	11mm	OFF	Sample 1	661	1880	24.03	24.50	1.114	-0.18	0.287	0.320
	GSM1900	GPRS (4 Tx slots)	Edge 3	14mm	OFF	Sample 1	661	1880	24.03	24.50	1.114	-0.17	0.271	0.302
	GSM1900	GPRS (4 Tx slots)	Edge 4	4mm	OFF	Sample 1	661	1880	24.03	24.50	1.114	-0.15	0.179	0.199

<WCDMA SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Power Reduction	Sample	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WCDMA II	RMC 12.2Kbps	Bottom Face	0mm	ON	Sample 1	9538	1907.6	16.26	16.50	1.057	-0.16	0.803	0.849
	WCDMA II	RMC 12.2Kbps	Bottom Face	0mm	ON	Sample 1	9262	1852.4	16.15	16.50	1.084	-0.11	0.743	0.805
	WCDMA II	RMC 12.2Kbps	Bottom Face	0mm	ON	Sample 1	9400	1880	16.21	16.50	1.069	0.03	0.796	0.851
	WCDMA II	RMC 12.2Kbps	Edge 3	0mm	ON	Sample 1	9538	1907.6	16.26	16.50	1.057	-0.07	0.938	0.991
	WCDMA II	RMC 12.2Kbps	Edge 3	0mm	ON	Sample 1	9262	1852.4	16.15	16.50	1.084	-0.07	0.896	0.971
	WCDMA II	RMC 12.2Kbps	Edge 3	0mm	ON	Sample 1	9400	1880	16.21	16.50	1.069	-0.1	0.954	1.020
	WCDMA II	RMC 12.2Kbps	Edge 3	0mm	ON	Sample 2	9400	1880	16.21	16.50	1.069	-0.13	1.060	1.133
	WCDMA II	RMC 12.2Kbps	Edge 3	0mm	ON	Sample 2	9262	1852.4	16.15	16.50	1.084	-0.09	1.030	1.116
12	WCDMA II	RMC 12.2Kbps	Edge 3	0mm	ON	Sample 2	9538	1907.6	16.26	16.50	1.057	-0.12	1.100	1.162
	WCDMA II	RMC 12.2Kbps	Edge 4	0mm	ON	Sample 1	9538	1907.6	16.26	16.50	1.057	-0.01	0.201	0.212
	WCDMA II	RMC 12.2Kbps	Bottom Face	11mm	OFF	Sample 1	9538	1907.6	22.89	23.00	1.026	-0.1	0.713	0.731
	WCDMA II	RMC 12.2Kbps	Edge 3	14mm	OFF	Sample 1	9538	1907.6	22.89	23.00	1.026	-0.05	0.583	0.598
	WCDMA II	RMC 12.2Kbps	Edge 4	4mm	OFF	Sample 1	9538	1907.6	22.89	23.00	1.026	0.01	0.400	0.410
	WCDMA V	RMC 12.2Kbps	Bottom Face	0mm	ON	Sample 1	4182	836.4	21.43	21.50	1.016	-0.01	1.050	1.067
13	WCDMA V	RMC 12.2Kbps	Bottom Face	0mm	ON	Sample 1	4132	826.4	21.26	21.50	1.057	-0.02	1.100	1.162
	WCDMA V	RMC 12.2Kbps	Bottom Face	0mm	ON	Sample 1	4233	846.6	21.35	21.50	1.035	0.02	0.976	1.010
	WCDMA V	RMC 12.2Kbps	Bottom Face	0mm	ON	Sample 2	4182	836.4	21.43	21.50	1.016	-0.1	0.871	0.885
	WCDMA V	RMC 12.2Kbps	Bottom Face	0mm	ON	Sample 2	4132	826.4	21.26	21.50	1.057	0.02	0.870	0.919
	WCDMA V	RMC 12.2Kbps	Bottom Face	0mm	ON	Sample 2	4233	846.6	21.35	21.50	1.035	-0.03	0.802	0.830
	WCDMA V	RMC 12.2Kbps	Edge 3	0mm	ON	Sample 1	4182	836.4	21.43	21.50	1.016	0.03	0.551	0.560
	WCDMA V	RMC 12.2Kbps	Edge 4	0mm	ON	Sample 1	4182	836.4	21.43	21.50	1.016	0.03	0.632	0.642
	WCDMA V	RMC 12.2Kbps	Bottom Face	11mm	OFF	Sample 1	4182	836.4	22.89	23.00	1.026	-0.07	0.352	0.361
	WCDMA V	RMC 12.2Kbps	Edge 3	14mm	OFF	Sample 1	4182	836.4	22.87	23.00	1.030	0.05	0.234	0.241
	WCDMA V	RMC 12.2Kbps	Edge 4	4mm	OFF	Sample 1	4182	836.4	22.85	23.00	1.035	0.06	0.388	0.402

<FDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Power Reduction	Sample	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	LTE Band 2	20M	QPSK	1	49	Bottom Face	0mm	ON	Sample 1	19100	1900	15.72	16.00	1.067	0.11	0.762	0.813
	LTE Band 2	20M	QPSK	1	49	Bottom Face	0mm	ON	Sample 1	18700	1860	15.51	16.00	1.119	0.04	0.734	0.822
	LTE Band 2	20M	QPSK	1	49	Bottom Face	0mm	ON	Sample 1	18900	1880	15.69	16.00	1.074	-0.05	0.750	0.805
	LTE Band 2	20M	QPSK	50	0	Bottom Face	0mm	ON	Sample 1	19100	1900	14.13	15.00	1.222	0.04	0.531	0.649
	LTE Band 2	20M	QPSK	100	0	Bottom Face	0mm	ON	Sample 1	19100	1900	14.00	15.00	1.259	-0.11	0.539	0.679
	LTE Band 2	20M	QPSK	1	49	Edge 3	0mm	ON	Sample 1	19100	1880	15.72	16.00	1.067	-0.18	0.894	0.954
	LTE Band 2	20M	QPSK	1	49	Edge 3	0mm	ON	Sample 1	18700	1860	15.51	16.00	1.119	-0.18	0.860	0.963
	LTE Band 2	20M	QPSK	1	49	Edge 3	0mm	ON	Sample 1	18900	1880	15.69	16.00	1.074	0.04	0.920	0.988
14	LTE Band 2	20M	QPSK	1	49	Edge 3	0mm	ON	Sample 2	18900	1880	15.69	16.00	1.074	-0.02	1.080	1.160
	LTE Band 2	20M	QPSK	1	49	Edge 3	0mm	ON	Sample 2	18700	1860	15.51	16.00	1.119	-0.14	0.974	1.090
	LTE Band 2	20M	QPSK	1	49	Edge 3	0mm	ON	Sample 2	19100	1900	15.72	16.00	1.067	-0.14	1.060	1.131
	LTE Band 2	20M	QPSK	50	0	Edge 3	0mm	ON	Sample 1	19100	1900	14.13	15.00	1.222	-0.14	0.715	0.874
	LTE Band 2	20M	QPSK	50	0	Edge 3	0mm	ON	Sample 1	18700	1860	13.99	15.00	1.262	-0.05	0.672	0.848
	LTE Band 2	20M	QPSK	50	0	Edge 3	0mm	ON	Sample 1	18900	1880	14.11	15.00	1.227	-0.08	0.713	0.875
	LTE Band 2	20M	QPSK	100	0	Edge 3	0mm	ON	Sample 1	19100	1900	14.00	15.00	1.259	-0.1	0.694	0.874
	LTE Band 2	20M	QPSK	1	49	Edge 4	0mm	ON	Sample 1	19100	1900	15.51	16.00	1.119	-0.17	0.200	0.224
	LTE Band 2	20M	QPSK	50	0	Edge 4	0mm	ON	Sample 1	19100	1900	14.13	15.00	1.222	0.04	0.149	0.182
	LTE Band 2	20M	QPSK	1	49	Bottom Face	11mm	OFF	Sample 1	18900	1880	23.05	23.50	1.109	0.06	0.767	0.851
	LTE Band 2	20M	QPSK	1	49	Bottom Face	11mm	OFF	Sample 1	18700	1860	22.88	23.50	1.153	0.03	0.712	0.821
	LTE Band 2	20M	QPSK	1	49	Bottom Face	11mm	OFF	Sample 1	19100	1900	23.04	23.50	1.112	0	0.804	0.894
	LTE Band 2	20M	QPSK	50	24	Bottom Face	11mm	OFF	Sample 1	18900	1880	21.53	22.50	1.250	0.07	0.548	0.685
	LTE Band 2	20M	QPSK	100	0	Bottom Face	11mm	OFF	Sample 1	18900	1880	21.44	22.50	1.276	0.06	0.568	0.725
	LTE Band 2	20M	QPSK	1	49	Edge 3	14mm	OFF	Sample 1	18900	1880	23.05	23.50	1.109	-0.19	0.601	0.667
	LTE Band 2	20M	QPSK	50	24	Edge 3	14mm	OFF	Sample 1	18900	1880	21.53	22.50	1.250	-0.07	0.451	0.564
	LTE Band 2	20M	QPSK	1	49	Edge 4	4mm	OFF	Sample 1	18900	1880	23.05	23.50	1.109	0.09	0.490	0.543
	LTE Band 2	20M	QPSK	50	24	Edge 4	4mm	OFF	Sample 1	18900	1880	21.53	22.50	1.250	-0.16	0.341	0.426
	LTE Band 4	20M	QPSK	1	0	Bottom Face	0mm	ON	Sample 1	20175	1732.5	17.26	18.00	1.186	0.11	0.717	0.850
	LTE Band 4	20M	QPSK	50	0	Bottom Face	0mm	ON	Sample 1	20175	1732.5	16.04	17.00	1.247	0.02	0.560	0.699
	LTE Band 4	20M	QPSK	100	0	Bottom Face	0mm	ON	Sample 1	20175	1732.5	15.98	17.00	1.265	0.06	0.566	0.716
	LTE Band 4	20M	QPSK	1	0	Edge 3	0mm	ON	Sample 1	20175	1732.5	17.26	18.00	1.186	-0.02	0.860	1.020
15	LTE Band 4	20M	QPSK	1	0	Edge 3	0mm	ON	Sample 2	20175	1732.5	17.26	18.00	1.186	-0.12	1.090	1.292
	LTE Band 4	20M	QPSK	50	0	Edge 3	0mm	ON	Sample 1	20175	1732.5	16.04	17.00	1.247	-0.17	0.674	0.841
	LTE Band 4	20M	QPSK	100	0	Edge 3	0mm	ON	Sample 1	20175	1732.5	15.98	17.00	1.265	-0.17	0.693	0.876
	LTE Band 4	20M	QPSK	1	0	Edge 4	0mm	ON	Sample 1	20175	1732.5	17.26	18.00	1.186	0.18	0.220	0.261
	LTE Band 4	20M	QPSK	50	0	Edge 4	0mm	ON	Sample 1	20175	1732.5	16.04	17.00	1.247	-0.06	0.182	0.227
	LTE Band 4	20M	QPSK	1	0	Bottom Face	11mm	OFF	Sample 1	20175	1732.5	23.72	24.00	1.067	0.17	0.421	0.449
	LTE Band 4	20M	QPSK	50	0	Bottom Face	11mm	OFF	Sample 1	20175	1732.5	22.52	23.00	1.117	-0.05	0.353	0.394
	LTE Band 4	20M	QPSK	1	0	Edge 3	14mm	OFF	Sample 1	20175	1732.5	23.72	24.00	1.067	-0.12	0.402	0.429
	LTE Band 4	20M	QPSK	50	0	Edge 3	14mm	OFF	Sample 1	20175	1732.5	22.52	23.00	1.117	-0.15	0.328	0.366
	LTE Band 4	20M	QPSK	1	0	Edge 4	4mm	OFF	Sample 1	20175	1732.5	23.72	24.00	1.067	-0.17	0.277	0.295
	LTE Band 4	20M	QPSK	50	0	Edge 4	4mm	OFF	Sample 1	20175	1732.5	22.52	23.00	1.117	0.08	0.238	0.266

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Power Reduction	Sample	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	LTE Band 7	20M	QPSK	1	0	Bottom Face	0mm	OFF	Sample 1	21350	2560	16.64	17.00	1.086	-0.09	1.000	1.086
	LTE Band 7	20M	QPSK	1	0	Bottom Face	0mm	OFF	Sample 1	20850	2510	16.50	17.00	1.122	0.01	0.979	1.098
	LTE Band 7	20M	QPSK	1	0	Bottom Face	0mm	OFF	Sample 1	21100	2535	16.38	17.00	1.153	0.12	0.970	1.119
	LTE Band 7	20M	QPSK	50	0	Bottom Face	0mm	OFF	Sample 1	21350	2560	15.53	16.00	1.114	-0.05	0.741	0.826
	LTE Band 7	20M	QPSK	50	0	Bottom Face	0mm	OFF	Sample 1	20850	2510	15.20	16.00	1.202	-0.01	0.689	0.828
	LTE Band 7	20M	QPSK	50	0	Bottom Face	0mm	OFF	Sample 1	21100	2535	15.29	16.00	1.178	-0.07	0.692	0.815
	LTE Band 7	20M	QPSK	100	0	Bottom Face	0mm	OFF	Sample 1	21350	2560	15.44	16.00	1.138	-0.13	0.764	0.869
	LTE Band 7	20M	QPSK	1	0	Edge 1	0mm	OFF	Sample 1	21350	2560	16.64	17.00	1.086	-0.01	0.450	0.489
	LTE Band 7	20M	QPSK	50	0	Edge 1	0mm	OFF	Sample 1	21350	2560	15.53	16.00	1.114	-0.05	0.389	0.433
	LTE Band 7	20M	QPSK	1	0	Edge 4	0mm	OFF	Sample 1	21350	2560	16.64	17.00	1.086	0.04	0.874	0.950
	LTE Band 7	20M	QPSK	1	0	Edge 4	0mm	OFF	Sample 1	20850	2510	16.50	17.00	1.122	-0.13	1.000	1.122
	LTE Band 7	20M	QPSK	1	0	Edge 4	0mm	OFF	Sample 1	21100	2535	16.38	17.00	1.153	-0.15	0.934	1.077
16	LTE Band 7	20M	QPSK	1	0	Edge 4	0mm	OFF	Sample 2	20850	2510	16.50	17.00	1.122	-0.08	1.230	1.380
	LTE Band 7	20M	QPSK	1	0	Edge 4	0mm	OFF	Sample 2	21100	2535	16.38	17.00	1.153	-0.1	1.140	1.315
	LTE Band 7	20M	QPSK	1	0	Edge 4	0mm	OFF	Sample 2	21350	2560	16.64	17.00	1.086	-0.18	1.220	1.325
	LTE Band 7	20M	QPSK	50	0	Edge 4	0mm	OFF	Sample 1	21350	2560	15.53	16.00	1.114	-0.12	0.726	0.809
	LTE Band 7	20M	QPSK	50	0	Edge 4	0mm	OFF	Sample 1	20850	2510	15.20	16.00	1.202	-0.19	0.767	0.922
	LTE Band 7	20M	QPSK	50	0	Edge 4	0mm	OFF	Sample 1	21100	2535	15.29	16.00	1.178	-0.17	0.712	0.838
	LTE Band 7	20M	QPSK	100	0	Edge 4	0mm	OFF	Sample 1	21350	2560	15.44	16.00	1.138	-0.02	0.687	0.782

<TDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Power Reduction	Sample	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)
	LTE Band 38	20M	QPSK	1	0	Bottom Face	0mm	OFF	Sample 1	38000	2595	19.41	19.50	1.021	62.9	1.006	0.11	1.020	1.048
	LTE Band 38	20M	QPSK	1	0	Bottom Face	0mm	OFF	Sample 1	37850	2580	19.40	19.50	1.023	62.9	1.006	-0.06	1.020	1.050
	LTE Band 38	20M	QPSK	1	0	Bottom Face	0mm	OFF	Sample 1	38150	2610	19.36	19.50	1.033	62.9	1.006	-0.09	1.020	1.060
	LTE Band 38	20M	QPSK	1	0	Bottom Face	0mm	OFF	Sample 2	37850	2580	19.40	19.50	1.023	62.9	1.006	-0.16	1.340	1.379
	LTE Band 38	20M	QPSK	1	0	Bottom Face	0mm	OFF	Sample 2	38000	2595	19.41	19.50	1.021	62.9	1.006	-0.18	1.320	1.356
17	LTE Band 38	20M	QPSK	1	0	Bottom Face	0mm	OFF	Sample 2	38150	2610	19.36	19.50	1.033	62.9	1.006	0.11	1.330	1.382
	LTE Band 38	20M	QPSK	50	0	Bottom Face	0mm	OFF	Sample 1	38000	2595	18.89	19.00	1.026	62.9	1.006	-0.19	1.040	1.073
	LTE Band 38	20M	QPSK	50	0	Bottom Face	0mm	OFF	Sample 1	37850	2580	18.87	19.00	1.030	62.9	1.006	-0.18	1.070	1.109
	LTE Band 38	20M	QPSK	50	0	Bottom Face	0mm	OFF	Sample 1	38150	2610	18.85	19.00	1.035	62.9	1.006	-0.12	0.988	1.029
	LTE Band 38	20M	QPSK	100	0	Bottom Face	0mm	OFF	Sample 1	38000	2595	18.77	19.00	1.054	62.9	1.006	-0.08	0.959	1.017
	LTE Band 38	20M	QPSK	1	0	Edge 1	0mm	OFF	Sample 1	38000	2595	19.41	19.50	1.021	62.9	1.006	0.1	0.645	0.662
	LTE Band 38	20M	QPSK	50	0	Edge 1	0mm	OFF	Sample 1	38000	2595	18.89	19.00	1.026	62.9	1.006	0.07	0.611	0.630
	LTE Band 38	20M	QPSK	1	0	Edge 4	0mm	OFF	Sample 1	38000	2595	19.41	19.50	1.021	62.9	1.006	-0.09	0.949	0.975
	LTE Band 38	20M	QPSK	1	0	Edge 4	0mm	OFF	Sample 1	37850	2580	19.40	19.50	1.023	62.9	1.006	-0.11	0.933	0.960
	LTE Band 38	20M	QPSK	1	0	Edge 4	0mm	OFF	Sample 1	38150	2610	19.36	19.50	1.033	62.9	1.006	-0.07	0.945	0.982
	LTE Band 38	20M	QPSK	50	0	Edge 4	0mm	OFF	Sample 1	38000	2595	18.89	18.50	0.914	62.9	1.006	-0.08	0.763	0.702
	LTE Band 38	20M	QPSK	100	0	Edge 4	0mm	OFF	Sample 1	38000	2595	18.77	18.50	0.940	62.9	1.006	-0.05	0.754	0.713

<WLAN SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Sample	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WLAN2.4GHz	802.11b 1Mbps	Bottom Face	0mm	Sample 1	6	2437	14.89	15.00	1.027	97.59	1.025	0.11	0.863	0.908
	WLAN2.4GHz	802.11b 1Mbps	Bottom Face	0mm	Sample 1	1	2412	14.04	14.10	1.015	97.59	1.025	-0.19	0.867	0.902
	WLAN2.4GHz	802.11b 1Mbps	Bottom Face	0mm	Sample 1	11	2462	14.50	15.00	1.123	97.59	1.025	0.07	0.785	0.904
	WLAN2.4GHz	802.11b 1Mbps	Bottom Face	0mm	Sample 2	6	2437	14.89	15.00	1.027	97.59	1.025	-0.04	0.944	0.993
18	WLAN2.4GHz	802.11b 1Mbps	Bottom Face	0mm	Sample 2	1	2412	14.04	14.10	1.015	97.59	1.025	0.04	1.060	1.103
	WLAN2.4GHz	802.11b 1Mbps	Bottom Face	0mm	Sample 2	11	2462	14.50	15.00	1.123	97.59	1.025	0.15	0.950	1.094
	WLAN2.4GHz	802.11b 1Mbps	Edge 1	0mm	Sample 1	6	2437	14.89	15.00	1.027	97.59	1.025	0.13	0.047	0.049
	WLAN2.4GHz	802.11b 1Mbps	Edge 2	0mm	Sample 1	6	2437	14.89	15.00	1.027	97.59	1.025	-0.12	0.510	0.537

16.3 Repeated SAR Measurement

No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Power Reduction	Sample	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	GSM850					GPRS (3 Tx slots)	Bottom Face	0mm	ON	Sample 2	189	836.4	26.33	26.50	1.040		1.000	-0.01	1.130		1.175
2nd	GSM850					GPRS (3 Tx slots)	Bottom Face	0mm	ON	Sample 2	189	836.4	26.33	26.50	1.040		1.000	0.02	1.050	1.08	1.092
1st	WCDMA II					RMC 12.2Kbps	Edge 3	0mm	ON	Sample 2	9538	1907.6	16.26	16.50	1.057		1.000	-0.12	1.100		1.162
2nd	WCDMA II					RMC 12.2Kbps	Edge 3	0mm	ON	Sample 2	9538	1907.6	16.26	16.50	1.057		1.000	-0.15	1.090	1.01	1.152
1st	LTE Band 4	20M	QPSK	1	0		Edge 3	0mm	ON	Sample 2	20175	1732.5	17.26	18.00	1.186		1.000	-0.12	1.090		1.292
2nd	LTE Band 4	20M	QPSK	1	0		Edge 3	0mm	ON	Sample 2	20175	1732.5	17.26	18.00	1.186		1.000	-0.06	1.050	1.04	1.245
1st	LTE Band 38	20M	QPSK	1	0		Bottom Face	0mm	ON	Sample 2	37850	2580	19.40	19.50	1.023	62.9	1.006	-0.16	1.340		1.379
2nd	LTE Band 38	20M	QPSK	1	0		Bottom Face	0mm	ON	Sample 2	38000	2580	19.40	19.50	1.023	62.9	1.006	-0.09	1.300	1.03	1.338
1st	WLAN2.4GHz					802.11b 1Mbps	Bottom Face	0mm	-	Sample 2	1	2412	14.04	14.10	1.015	97.59	1.025	0.04	1.060		1.103
2nd	WLAN2.4GHz					802.11b 1Mbps	Bottom Face	0mm	-	Sample 2	1	2412	14.04	14.10	1.015	97.59	1.025	0.11	1.050	1.02	1.092

General Note:

1. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.
2. Per KDB 865664 D01v01r04, if the ratio among the repeated measurement is ≤ 1.2 and the measured SAR <1.45W/kg, only one repeated measurement is required.
3. The ratio is the difference in percentage between original and repeated *measured SAR*.
4. All measurement SAR result is scaled-up to account for tune-up tolerance and is compliant.

17. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations	Portable Tablet		Note
		Head	Body	
1.	GSM Voice + WLAN2.4GHz	Yes	Yes	
2.	GPRS/EDGE + WLAN2.4GHz	Yes	Yes	Hotspot
3.	WCDMA + WLAN2.4GHz	Yes	Yes	Hotspot
4.	LTE + WLAN2.4GHz	Yes	Yes	Hotspot
5.	GSM Voice + Bluetooth		Yes	
6.	GPRS/EDGE + Bluetooth		Yes	WWAN VoIP
7.	WCDMA+ Bluetooth		Yes	WWAN VoIP
8.	LTE + Bluetooth		Yes	WWAN VoIP

General Note:

1. WLAN and Bluetooth share the same antenna, and cannot transmit simultaneously.
2. The Scaled SAR summation is calculated based on the same configuration and test position.
3. The worst case WLAN reported SAR for each configuration was used for SAR summation. Therefore, the following summations represent the absolute worst cases for simultaneous transmission with WLAN.
4. For simultaneous transmission analysis for exposure position of 11mm for bottom face, 14mm for edge3, 4mm for edge4,WLAN SAR tested at 0mm separation is worse and the test data is used for conservative SAR summation.
5. Per KDB 447498 D01v06, 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 16.3.
6. For simultaneous transmission analysis, Bluetooth SAR is estimated per KDB 447498 D01v06 based on the formula below.
   i) (*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)]·[√f(GHz)/*x*] W/kg for *test separation distances* ≤ 50 mm; where *x* = 7.5 for 1-g SAR, and *x* = 18.75 for 10-g SAR.
   ii) When the minimum separation distance is < 5mm, the distance is used 5mm to determine SAR test exclusion.
   iii) 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the *test separation distances* is > 50 mm.
   iv) Bluetooth estimated SAR is conservatively determined by 5mm separation, for all applicable exposure positions.

Bluetooth Max Power	Exposure Position	All Position
3.0 dBm	Estimated SAR (W/kg)	0.084 W/kg

17.1 Head Exposure Conditions

WWAN Band		Exposure Position	1 WWAN 1g SAR (W/kg)	2 2.4GHz WLAN 1g SAR (W/kg)	1+2 Summed 1g SAR (W/kg)
GSM	GSM850	Right Cheek	0.143	0.088	**0.231**
		Right Tilted	0.062	0.081	**0.143**
		Left Cheek	0.108	0.398	**0.506**
		Left Tilted	0.072	0.109	**0.181**
	GSM1900	Right Cheek	0.007	0.088	**0.095**
		Right Tilted	0.027	0.081	**0.108**
		Left Cheek	0.053	0.398	**0.451**
		Left Tilted	0.017	0.109	**0.126**
WCDMA	WCDMA II	Right Cheek	0.011	0.088	**0.099**
		Right Tilted	0.057	0.081	**0.138**
		Left Cheek	0.099	0.398	**0.497**
		Left Tilted	0.028	0.109	**0.137**
	WCDMA V	Right Cheek	0.154	0.088	**0.242**
		Right Tilted	0.092	0.081	**0.173**
		Left Cheek	0.116	0.398	**0.514**
		Left Tilted	0.095	0.109	**0.204**
LTE	LTE Band 2	Right Cheek	0.057	0.088	**0.145**
		Right Tilted	0.057	0.081	**0.138**
		Left Cheek	0.125	0.398	**0.523**
		Left Tilted	0.038	0.109	**0.147**
	LTE Band 4	Right Cheek	0.049	0.088	**0.137**
		Right Tilted	0.037	0.081	**0.118**
		Left Cheek	0.065	0.398	**0.463**
		Left Tilted	0.049	0.109	**0.158**
	LTE Band 7	Right Cheek	0.715	0.088	**0.803**
		Right Tilted	0.502	0.081	**0.583**
		Left Cheek	0.206	0.398	**0.604**
		Left Tilted	0.232	0.109	**0.341**
	LTE Band 38	Right Cheek	0.793	0.088	**0.881**
		Right Tilted	0.565	0.081	**0.646**
		Left Cheek	0.269	0.398	**0.667**
		Left Tilted	0.293	0.109	**0.402**

17.2 Body Exposure Conditions

WWAN Band		Exposure Position	1 WWAN 1g SAR (W/kg)	2 2.4GHz WLAN 1g SAR (W/kg)	3 Bluetooth Estimated 1g SAR (W/kg)	1+2 Summed 1g SAR (W/kg)	1+3 Summed 1g SAR (W/kg)	SPLSR	Case No
GSM	GSM850	Bottom Face at 11mm	0.263	1.103	0.084	**1.366**	**0.347**		
		Edge 3 at 14mm	0.792			**0.792**	**0.792**		
		Edge 4 at 4mm	0.256			**0.256**	**0.256**		
		Bottom Face at 0mm	1.183	1.103	0.084	**2.286**	**1.267**	**0.02**	**Case 1**
		Edge 1 at 0mm		0.049	0.084	**0.049**	**0.084**		
		Edge 2 at 0mm		0.537	0.084	**0.537**	**0.084**		
		Edge 3 at 0mm	0.569			**0.569**	**0.569**		
		Edge 4 at 0mm	0.473			**0.473**	**0.473**		
	GSM1900	Bottom Face at 11mm	0.320	1.103	0.084	**1.423**	**0.404**		
		Edge 3 at 14mm	0.302			**0.302**	**0.302**		
		Edge 4 at 4mm	0.199			**0.199**	**0.199**		
		Bottom Face at 0mm	0.959	1.103	0.084	**2.062**	**1.043**	**0.02**	**Case 2**
		Edge 1 at 0mm		0.049	0.084	**0.049**	**0.084**		
		Edge 2 at 0mm		0.537	0.084	**0.537**	**0.084**		
		Edge 3 at 0mm	1.188			**1.188**	**1.188**		
		Edge 4 at 0mm	0.216			**0.216**	**0.216**		
WCDMA	WCDMA II	Bottom Face at 11mm	0.731	1.103	0.084	**1.834**	**0.815**	**0.01**	**Case 3**
		Edge 3 at 14mm	0.598			**0.598**	**0.598**		
		Edge 4 at 4mm	0.410			**0.410**	**0.410**		
		Bottom Face at 0mm	0.851	1.103	0.084	**1.954**	**0.935**	**0.04**	**Case 4**
		Edge 1 at 0mm		0.049	0.084	**0.049**	**0.084**		
		Edge 2 at 0mm		0.537	0.084	**0.537**	**0.084**		
		Edge 3 at 0mm	1.162			**1.162**	**1.162**		
		Edge 4 at 0mm	0.212			**0.212**	**0.212**		
	WCDMA V	Bottom Face at 11mm	0.361	1.103	0.084	**1.464**	**0.445**		
		Edge 3 at 14mm	0.241			**0.241**	**0.241**		
		Edge 4 at 4mm	0.402			**0.402**	**0.402**		
		Bottom Face at 0mm	1.162	1.103	0.084	**2.265**	**1.246**	**0.02**	**Case 5**
		Edge 1 at 0mm		0.049	0.084	**0.049**	**0.084**		
		Edge 2 at 0mm		0.537	0.084	**0.537**	**0.084**		
		Edge 3 at 0mm	0.560			**0.560**	**0.560**		
		Edge 4 at 0mm	0.642			**0.642**	**0.642**		

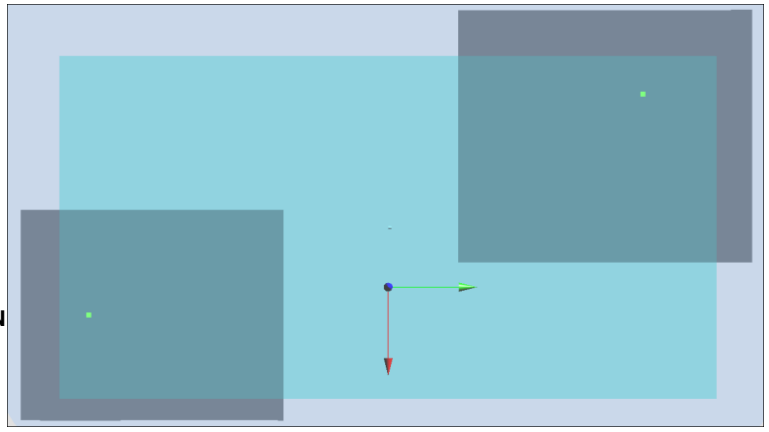
WWAN Band		Exposure Position	1 WWAN 1g SAR (W/kg)	2 2.4GHz WLAN 1g SAR (W/kg)	3 Bluetooth Estimated 1g SAR (W/kg)	1+2 Summed 1g SAR (W/kg)	1+3 Summed 1g SAR (W/kg)	SPLSR	Case No
LTE	LTE Band 2	Bottom Face at 11mm	0.894	1.103	0.084	**1.997**	**0.978**	**0.02**	**Case 6**
		Edge 3 at 14mm	0.667			**0.667**	**0.667**		
		Edge 4 at 4mm	0.543			**0.543**	**0.543**		
		Bottom Face at 0mm	0.822	1.103	0.084	**1.925**	**0.906**	**0.01**	**Case 7**
		Edge 1 at 0mm		0.049	0.084	**0.049**	**0.084**		
		Edge 2 at 0mm		0.537	0.084	**0.537**	**0.084**		
		Edge 3 at 0mm	1.160			**1.160**	**1.160**		
		Edge 4 at 0mm	0.224			**0.224**	**0.224**		
	LTE Band 4	Bottom Face at 11mm	0.449	1.103	0.084	**1.552**	**0.533**		
		Edge 3 at 14mm	0.429			**0.429**	**0.429**		
		Edge 4 at 4mm	0.295			**0.295**	**0.295**		
		Bottom Face at 0mm	0.850	1.103	0.084	**1.953**	**0.934**	**0.02**	**Case 8**
		Edge 1 at 0mm		0.049	0.084	**0.049**	**0.084**		
		Edge 2 at 0mm		0.537	0.084	**0.537**	**0.084**		
		Edge 3 at 0mm	1.292			**1.292**	**1.292**		
		Edge 4 at 0mm	0.261			**0.261**	**0.261**		
	LTE Band 7	Bottom Face at 0mm	1.119	1.103	0.084	**2.222**	**1.203**	**0.04**	**Case 9**
		Edge 1 at 0mm	0.489	0.049	0.084	**0.538**	**0.573**		
		Edge 2 at 0mm		0.537	0.084	**0.537**	**0.084**		
		Edge 4 at 0mm	1.380			**1.380**	**1.380**		
	LTE Band 38	Bottom Face at 0mm	1.382	1.103	0.084	**2.485**	**1.466**	**0.04**	**Case 10**
		Edge 1 at 0mm	0.662	0.049	0.084	**0.711**	**0.746**		
		Edge 2 at 0mm		0.537	0.084	**0.537**	**0.084**		
		Edge 4 at 0mm	0.982			**0.982**	**0.982**		

17.3 SPLSR Evaluation and Analysis

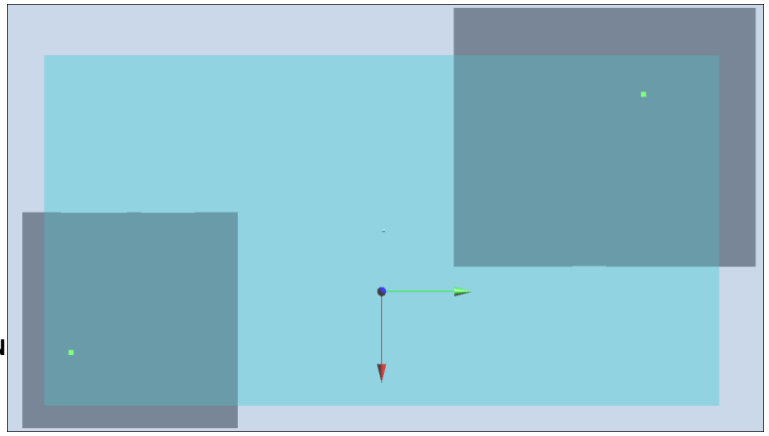
General Note:

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

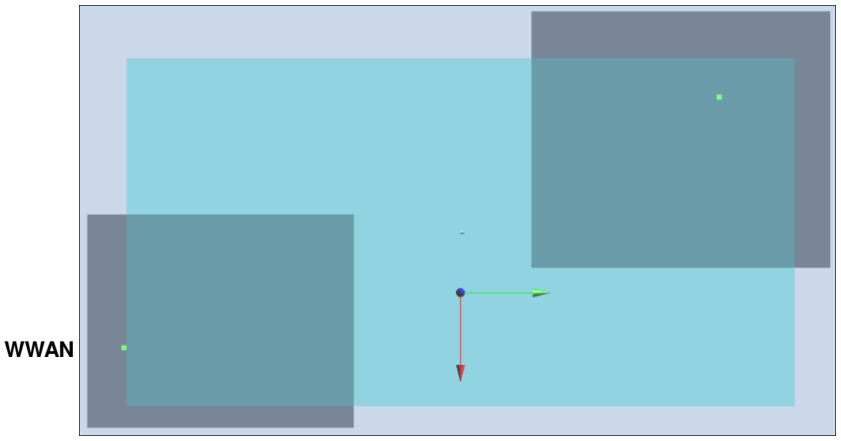
	Band	Position	SAR (W/kg)	Gap	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				(cm)	X	Y	Z				
Case 1	GSM850	Bottom Face	1.183	0cm	1.92	-8.77	-0.14	171.4	2.286	0.02	Not required
	2.4GHz WLAN		1.103	0cm	-4.1	7.28	-0.11				



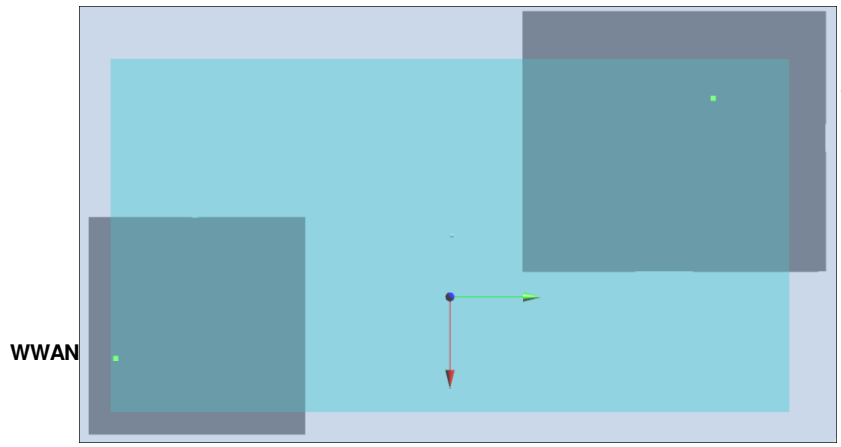
	Band	Position	SAR (W/kg)	Gap	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				(cm)	X	Y	Z				
Case 2	GSM1900	Bottom Face	0.959	0cm	3.63	-9.03	0.12	180.5	2.062	0.02	GSM1900 2.4GHz WLAN
	2.4GHz WLAN		1.103	0cm	-4.1	7.28	-0.11				



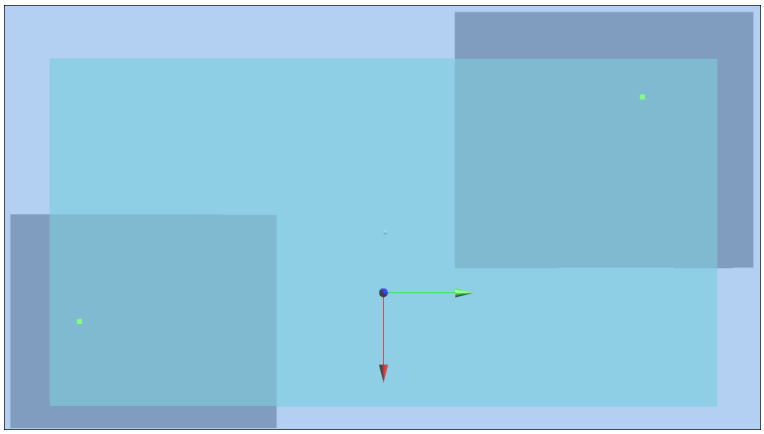
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 3	WCDMA II	Bottom Face	0.731	1.1cm	2.99	-9.51	0.13	182.3	1.834	0.01	Not required
	2.4GHz WLAN		1.103	0cm	-4.1	7.28	-0.11				



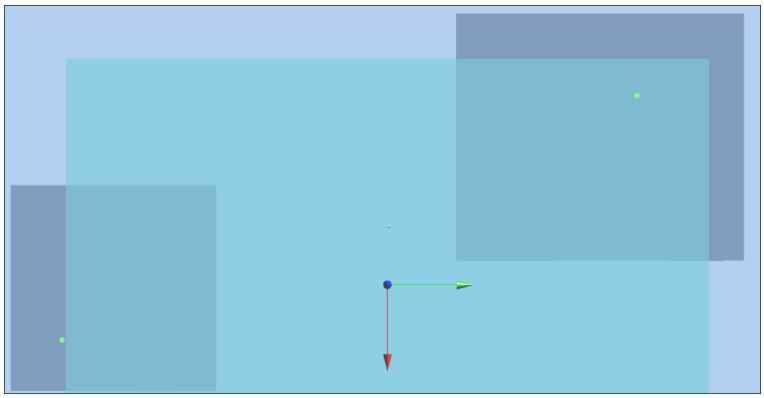
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 4	WCDMA II	Bottom Face	0.851	0cm	3.31	9.31	0.14	76.9	1.954	0.04	Not required
	2.4GHz WLAN		1.103	0cm	-4.1	7.28	-0.11				



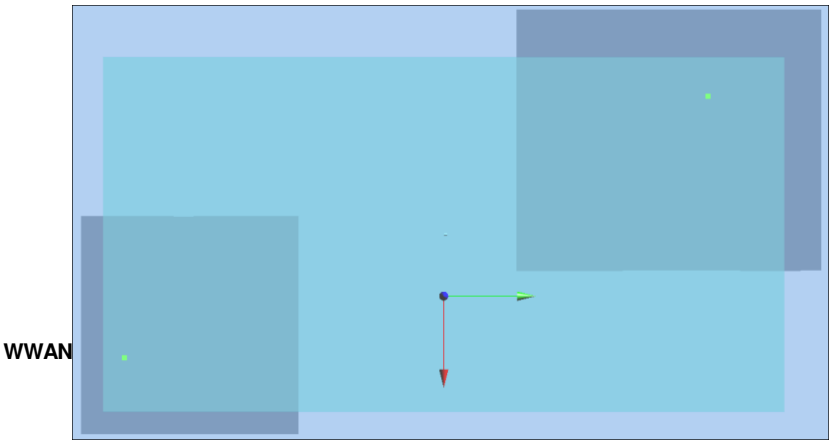
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 5	WCDMA V	Bottom Face	1.162	0cm	1.92	-8.77	-0.13	171.4	2.265	0.02	Not required
	2.4GHz WLAN		1.103	0cm	-4.1	7.28	-0.11				



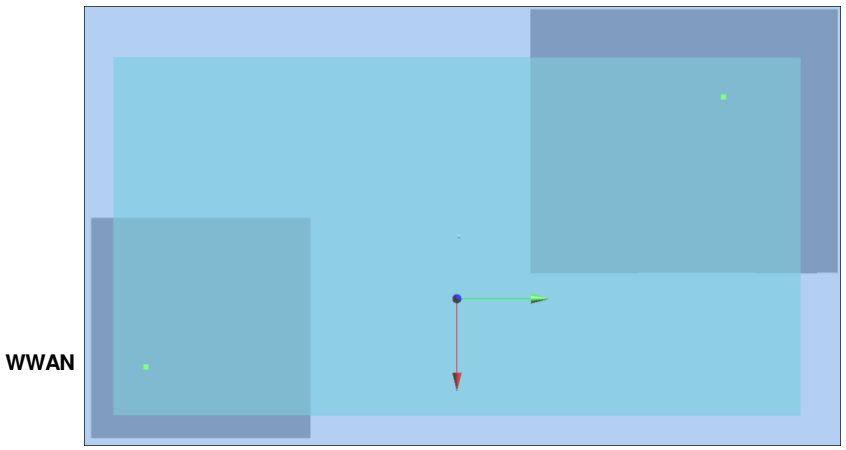
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 6	LTE Band 2	Bottom Face	0.894	1.1cm	3.52	-9.56	0.12	184.9	1.997	0.02	Not required
	2.4GHz WLAN		1.103	0cm	-4.1	7.28	-0.11				



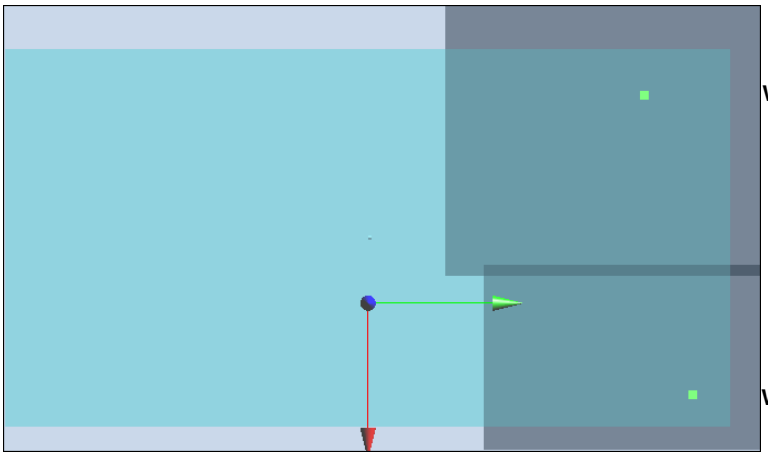
Case 7	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
	LTE Band 2	Bottom Face	0.822	0cm	3.47	-9.18	0.13	181.2	1.925	0.01	Not required
	2.4GHz WLAN		1.103	0cm	-4.1	7.28	-0.11				



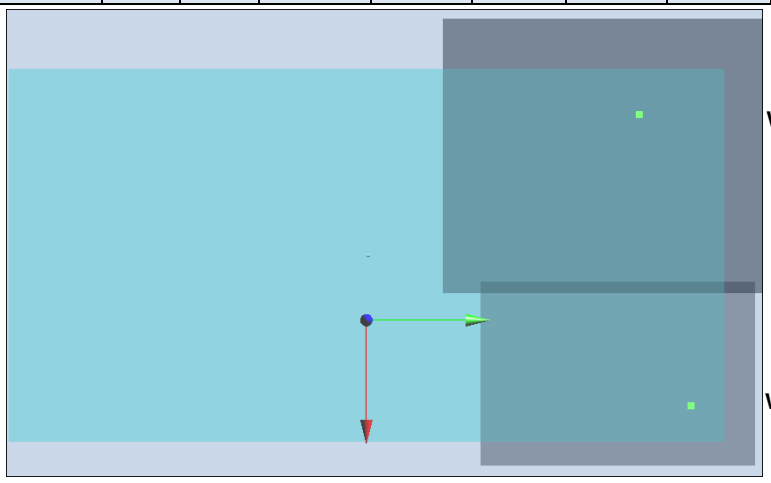
Case 8	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
	LTE Band 4	Bottom Face	0.85	0cm	3.78	-8.88	0.13	179.8	1.953	0.02	Not required
	2.4GHz WLAN		1.103	0cm	-4.1	7.28	-0.11				



	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 9	LTE Bnad 7	Bottom Face	1.119	0cm	4.36	8.1	-0.09	85.0	2.222	0.04	Not required
	2.4GHz WLAN		1.103	0cm	-4.1	7.28	-0.11				



	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 10	LTE Bnad 38	Bottom Face	1.382	0cm	4.47	8.82	-0.11	87.1	2.485	0.04	Not required
	2.4GHz WLAN		1.103	0cm	-4.1	7.28	-0.11				



Test Engineer : Ken Li Aaron Chen Tom Jiang Iran Wang Poa Pan Thomas Wang and Iver Zhan

18. Uncertainty Assessment

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

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

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

Uncertainty Distributions	Normal	Rectangular	Triangular	U-Shape
Multi-plying Factor[a]	1/k[b]	$1/\sqrt{3}$	$1/\sqrt{6}$	$1/\sqrt{2}$

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

(b) κ is the coverage factor

Table 18.1. Standard Uncertainty for Assumed Distribution

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

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

Error Description	Uncertainty Value (±%)	Probability	Divisor	(Ci) 1g	(Ci) 10g	Standard Uncertainty (1g) (±%)	Standard Uncertainty (10g) (±%)
Measurement System							
Probe Calibration	6.0	N	1	1	1	6.0	6.0
Axial Isotropy	4.7	R	1.732	0.7	0.7	1.9	1.9
Hemispherical Isotropy	9.6	R	1.732	0.7	0.7	3.9	3.9
Boundary Effects	1.0	R	1.732	1	1	0.6	0.6
Linearity	4.7	R	1.732	1	1	2.7	2.7
System Detection Limits	1.0	R	1.732	1	1	0.6	0.6
Modulation Response	3.2	R	1.732	1	1	1.8	1.8
Readout Electronics	0.3	N	1	1	1	0.3	0.3
Response Time	0.0	R	1.732	1	1	0.0	0.0
Integration Time	2.6	R	1.732	1	1	1.5	1.5
RF Ambient Noise	3.0	R	1.732	1	1	1.7	1.7
RF Ambient Reflections	3.0	R	1.732	1	1	1.7	1.7
Probe Positioner	0.4	R	1.732	1	1	0.2	0.2
Probe Positioning	2.9	R	1.732	1	1	1.7	1.7
Max. SAR Eval.	2.0	R	1.732	1	1	1.2	1.2
Test Sample Related							
Device Positioning	3.0	N	1	1	1	3.0	3.0
Device Holder	3.6	N	1	1	1	3.6	3.6
Power Drift	5.0	R	1.732	1	1	2.9	2.9
Power Scaling	0.0	R	1.732	1	1	0.0	0.0
Phantom and Setup							
Phantom Uncertainty	6.1	R	1.732	1	1	3.5	3.5
SAR correction	0.0	R	1.732	1	0.84	0.0	0.0
Liquid Conductivity Repeatability	0.2	N	1	0.78	0.71	0.1	0.1
Liquid Conductivity (target)	5.0	R	1.732	0.78	0.71	2.3	2.0
Liquid Conductivity (mea.)	2.5	R	1.732	0.78	0.71	1.1	1.0
Temp. unc. - Conductivity	3.4	R	1.732	0.78	0.71	1.5	1.4
Liquid Permittivity Repeatability	0.15	N	1	0.23	0.26	0.0	0.0
Liquid Permittivity (target)	5.0	R	1.732	0.23	0.26	0.7	0.8
Liquid Permittivity (mea.)	2.5	R	1.732	0.23	0.26	0.3	0.4
Temp. unc. - Permittivity	0.83	R	1.732	0.23	0.26	0.1	0.1
Combined Std. Uncertainty						11.4%	11.4%
Coverage Factor for 95 %						K=2	K=2
Expanded STD Uncertainty						22.9%	22.7%

Table 18.2. Uncertainty Budget for frequency range 300 MHz to 3 GHz

19. References

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

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

[3] IEEE Std. 1528-2013, “IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”, Sep 2013

[4] SPEAG DASY System Handbook

[5] FCC KDB 248227 D01 v02r02, “SAR Guidance for IEEE 802.11 (WiFi) Transmitters”, Oct 2015.

[6] FCC KDB 447498 D01 v06, “Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies”, Oct 2015

[7] FCC KDB 648474 D04 v01r03, “SAR Evaluation Considerations for Wireless Handsets”, Oct 2015.

[8] FCC KDB 941225 D01 v03r01, “3G SAR MEAUREMENT PROCEDURES”, Oct 2015

[9] FCC KDB 941225 D05 v02r05, “SAR Evaluation Considerations for LTE Devices”, Dec 2015

[10] FCC KDB 616217 D04 v01r02, “SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers”, Oct 2015

[11] FCC KDB 865664 D01 v01r04, "SAR Measurement Requirements for 100 MHz to 6 GHz", Aug 2015.

[12] FCC KDB 865664 D02 v01r02, “RF Exposure Compliance Reporting and Documentation Considerations” Oct 2015.