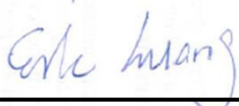


FCC SAR Test Report

APPLICANT : Motorola Mobility, LLC
EQUIPMENT : Mobile Cellular Phone
BRAND NAME : Motorola
MODEL NAME : 7383A
FCC ID : IHDT56VD6
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



SPORTON INTERNATIONAL INC.

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



Table of Contents

1. Statement of Compliance	4
2. Administration Data	5
3. Guidance Standard	5
4. Equipment Under Test (EUT) Information	6
4.1 General Information	6
5. Re-use of Measured Data	7
5.1 General LTE SAR Test and Reporting Considerations	8
6. RF Exposure Limits	10
6.1 Uncontrolled Environment	10
6.2 Controlled Environment	10
7. Specific Absorption Rate (SAR)	11
7.1 Introduction	11
7.2 SAR Definition	11
8. System Description and Setup	12
8.1 E-Field Probe	13
8.2 Data Acquisition Electronics (DAE)	13
8.3 Phantom	14
8.4 Device Holder	15
9. Measurement Procedures	16
9.1 Spatial Peak SAR Evaluation	16
9.2 Power Reference Measurement	17
9.3 Area Scan	17
9.4 Zoom Scan	18
9.5 Volume Scan Procedures	18
9.6 Power Drift Monitoring	18
10. Test Equipment List	19
11. System Verification	20
11.1 Tissue Verification	20
11.2 System Performance Check Results	22
12. RF Exposure Positions	23
12.1 Ear and handset reference point	23
12.2 Definition of the cheek position	24
12.3 Definition of the tilt position	25
12.4 Body Worn Accessory	26
12.5 Wireless Router	26
13. Conducted RF Output Power (Unit: dBm)	27
14. Antenna Location	38
15. SAR Test Results	39
15.1 Head SAR	40
15.2 Hotspot SAR	41
15.3 Body Worn Accessory SAR	41
16. Simultaneous Transmission Analysis	42
16.1 Head Exposure Conditions	43
16.2 Hotspot Exposure Conditions	45
16.3 Body-Worn Accessory Exposure Conditions	47
16.4 SPLSR Evaluation and Analysis	48
17. Uncertainty Assessment	49
18. References	51
Appendix A. Plots of System Performance Check	
Appendix B. Plots of High SAR Measurement	
Appendix C. DASY Calibration Certificate	
Appendix D. Reference Report	
Appendix F. Test Setup Photos	



Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA651006-01	Rev. 01	Initial issue of report	Jul. 15, 2016



1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for Motorola Mobility, LLC, Mobile Cellular Phone, 7383A are as follows.

Equipment Class	Frequency Band	Highest SAR Summary			Highest Simultaneous Transmission 1g SAR (W/kg)
		Head (Separation 0mm)	Body-worn (Separation 10mm)	Hotspot (Separation 10mm)	
		1g SAR (W/kg)			
Licensed	GSM850	0.71	0.92	0.92	1.57
	GSM1900	0.48	0.98	0.98	
	WCDMA II	0.79	1.37	1.37	
	WCDMA IV	1.02	1.40	1.40	
	WCDMA V	0.47	0.72	0.72	
	CDMA BC0	0.46	0.83	0.88	
	CDMA BC1	0.72	1.44	1.46	
	CDMA BC10	0.53	0.98	0.99	
	LTE Band 2	0.72	1.17	1.17	
	LTE Band 4	0.84	1.30	1.30	
	LTE Band 5	0.37	0.61	0.61	
	LTE Band 7	0.74	1.13	1.13	
	LTE Band 12	0.26	0.54	0.54	
	LTE Band 13	0.32	0.68	0.68	
	LTE Band 17				
	LTE Band 25	0.60	1.01	1.01	
	LTE Band 26	0.35	0.61	0.61	
	LTE Band 41	0.60	1.25	1.25	
DTS	2.4GHz WLAN	0.39	0.17	0.17	1.57
DSS	Bluetooth		0.07		1.50
Date of Testing:		2016/7/5 ~ 2016/7/9			

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	Motorola Mobility, LLC
Address	222 W. Merchandise Mart Plaza, Chicago IL 60654 USA

Manufacturer	
Company Name	Motorola Mobility, LLC
Address	222 W. Merchandise Mart Plaza, Chicago IL 60654 USA

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 941225 D06 Hotspot Mode SAR v02r01

4. Equipment Under Test (EUT) Information

4.1 General Information

Product Feature & Specification	
Equipment Name	Mobile Cellular Phone
Brand Name	Motorola
Model Name	7383A
FCC ID	IHDT56VD6
IMEI Code	354140070005232
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 IV: 1712.4 MHz ~ 1752.6 MHz WCDMA Band V: 826.4 MHz ~ 846.6 MHz CDMA2000 BC0: 824.7 MHz ~ 848.31 MHz CDMA 2000 BC1: 1851.25 MHz ~ 1908.75 MHz CDMA 2000 BC10: 815.25 MHz ~ 822.75 MHz LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2500 MHz ~ 2570 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 13: 777 MHz ~ 787 MHz LTE Band 17: 704 MHz ~ 716 MHz LTE Band 25: 1850 MHz ~ 1915 MHz LTE Band 26: 814 MHz ~ 849 MHz LTE Band 41: 2496 MHz ~ 2690 MHz WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Mode	· GSM/GPRS/EGPRS · RMC/AMR 12.2Kbps · HSDPA · HSUPA · DC-HSDPA · CDMA2000: 1xRTT/1xEv-Do(Rev.0)/1xEv-Do(Rev.A) · LTE: QPSK, 16QAM · 802.11b/g/n HT20 · Bluetooth with EDR / LE
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. This device 2.4GHz WLAN supports Hotspot operation and WiFi Direct (Group Client / Group Owner). 2. Selected battery 1 as the main testing and battery 2 will select worst case found in battery 1 performs. 3. While operating in Head or body condition by end user, the device will limit different maximum output powers on the UMTS B4, LTE B2 / B4 transmitter and detail descriptions of the power reduction mechanism are included in the operational description.	

5. Re-use of Measured Data

1. Introduction Section

The parent model (FCC ID: IHDT56VD4) and the child model (FCC ID: IHDT56VD6) has identical hardware components, PCB layout, antenna, SW implementation, except the power setting of UMTS B4, LTE B2/4/12 is increased.

The FCC ID: IHDT56VD4 test data shall remain representative of FCC ID: IHDT56VD6 for those unchanged frequency bands, hence IHDT56VD6 reuse test data of unchanged frequency bands from IHDT56VD4.

2. Difference Section

Difference between FCC ID: IHDT56VD4 and FCC ID: IHDT56VD6:

The power setting of UMTS B4, LTE B2/4/12 in IHDT56VD6 is higher than the power setting in IHDT56VD4.

The re-used SAR data includes the following bands and tests conditions are reference to the Appendix D Sporton SAR report No.: FA651006, FCC ID: IHDT56VD4:

- Head Condition: GSM850 / 1900, WCDMA B2 / B5, CDMA BC0 / BC1 / BC10, LTE B5 / B7 / B13 / B17 / B25 / B26 / B41, 2.4GHz WLAN and Bluetooth.

- Hotspot Condition: GSM850 / 1900, WCDMA B2 / B4 / B5, CDMA BC0 / BC1 / BC10, LTE B2 / B4 / B5 / B7 / B13 / B17 / B25 / B26 / B41.

- Body-worn Condition: GSM850 / 1900, WCDMA B2 / B4 / B5, CDMA BC0 / BC1 / BC10, LTE B2 / B4 / B5 / B7 / B13 / B17 / B25 / B26 / B41.

3. Spot Check Verification Data Section

The FCC ID: IHDT56VD4 and FCC ID: IHDT56VD6 are identical in those frequency bands that IHDT56VD6 reuse test data from IHDT56VD4, hence spot checking is not required.

4. Reference detail section:

Equipment Class	Reference FCC ID	Folder Test/RF Exposure	Report Title/Section
Licensed	IHDT56VD4	RF Exposure (FA651006)	All sections applicable
DTS	IHDT56VD4	RF Exposure (FA651006)	All sections applicable
DSS	IHDT56VD4	RF Exposure (FA651006)	All sections applicable

5.1 General LTE SAR Test and Reporting Considerations

Summarized necessary items addressed in KDB 941225 D05 v02r05												
FCC ID			IHDT56VD6									
Equipment Name			Mobile Cellular Phone									
Operating Frequency Range of each LTE transmission band			LTE Band 02: 1850 MHz ~ 1910 MHz									
			LTE Band 04: 1710 MHz ~ 1755 MHz									
			LTE Band 05: 824 MHz ~ 849 MHz									
			LTE Band 07: 2500 MHz ~ 2570 MHz									
			LTE Band 12: 699 MHz ~ 716 MHz									
			LTE Band 13: 777 MHz ~ 787 MHz									
			LTE Band 17: 704 MHz ~ 716 MHz									
			LTE Band 25: 1850 MHz ~ 1915 MHz									
			LTE Band 26: 814 MHz ~ 849 MHz									
Channel Bandwidth			LTE Band 41: 2496 MHz ~ 2690 MHz									
			LTE Band 02:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz									
			LTE Band 04:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz									
			LTE Band 05:1.4MHz, 3MHz, 5MHz, 10MHz									
			LTE Band 07: 5MHz, 10MHz, 15MHz, 20MHz									
			LTE Band 12:1.4MHz, 3MHz, 5MHz, 10MHz									
			LTE Band 13: 5MHz, 10MHz									
			LTE Band 17: 5MHz, 10MHz									
			LTE Band 25:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz									
uplink modulations used			QPSK, and 16QAM									
LTE Voice / Data requirements			Voice and Data									
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.									
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 5												
	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	20407	824.7	20415	825.5	20425	826.5	20450	829	20450	829	20450	829
M	20525	836.5	20525	836.5	20525	836.5	20525	836.5	20525	836.5	20525	836.5
H	20643	848.3	20635	847.5	20625	846.5	20600	844	20600	844	20600	844



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 12												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)				
L	23017	699.7	23025	700.5	23035	701.5	23060	704				
M	23095	707.5	23095	707.5	23095	707.5	23095	707.5				
H	23173	715.3	23165	714.5	23155	713.5	23130	711				
LTE Band 13												
	Bandwidth 5 MHz				Bandwidth 10 MHz							
	Channel #		Freq.(MHz)		Channel #		Freq.(MHz)					
L	23205		779.5		23230		782					
M	23230		782									
H	23255		784.5									
LTE Band 17												
	Bandwidth 5 MHz				Bandwidth 10 MHz							
	Channel #		Freq.(MHz)		Channel #		Freq. (MHz)					
L	23755		706.5		23780		709					
M	23790		710		23790		710					
H	23825		713.5		23800		711					
LTE Band 25												
	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	26047	1850.7	26055	1851.5	26065	1852.5	26090	1855	26115	1857.5	26140	1860
M	26340	1880	26340	1880	26340	1880	26340	1880	26340	1880	26340	1880
H	26683	1914.3	26675	1913.5	26665	1912.5	26640	1910	26615	1907.5	26590	1905
LTE Band 26												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz			
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	26697	814.7	26705	815.5	26715	816.5	26740	819	26765	821.5		
M	26865	831.5	26865	831.5	26865	831.5	26865	831.5	26865	831.5		
H	27033	848.3	27025	847.5	27015	846.5	26990	844	26965	841.5		
LTE Band 41												
	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)		
L	39675	2498.5	39700	2501	39725	2503.5	39750	2506				
L	40148	2545.8	40160	2547	40173	2548.3	40185	2549.5				
M	40620	2593	40620	2593	40620	2593	40620	2593				
H	41093	2640.3	41080	2639	41068	2637.8	41055	2636.5				
H	41565	2687.5	41540	2685	41515	2682.5	41490	2680				

6. RF Exposure Limits

6.1 Uncontrolled Environment

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

6.2 Controlled Environment

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

Limits for Occupational/Controlled Exposure (W/kg)

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

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

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

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

7. Specific Absorption Rate (SAR)

7.1 Introduction

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

7.2 SAR Definition

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

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

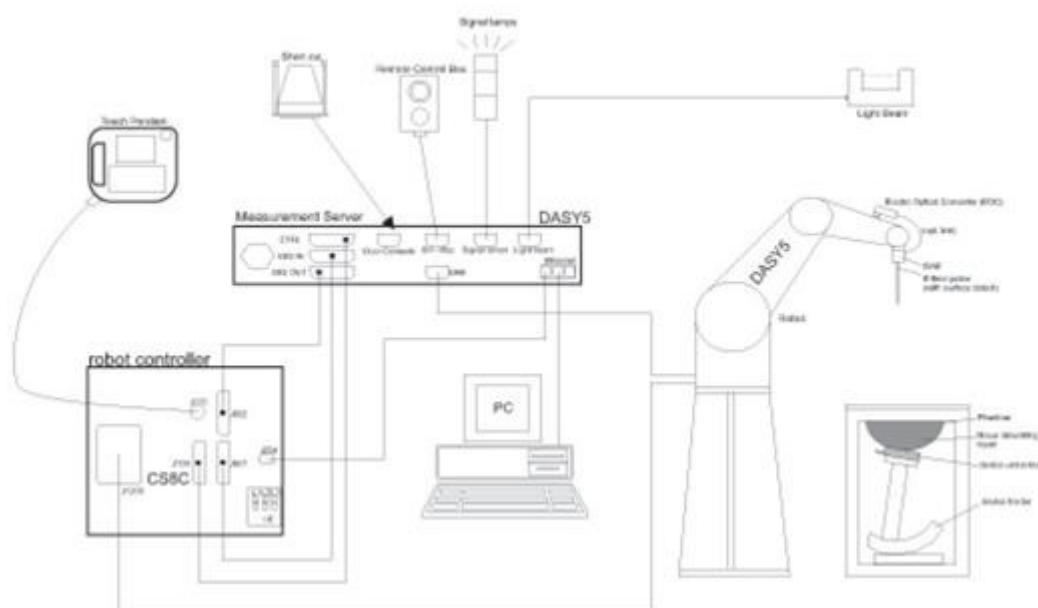
SAR is expressed in units of Watts per kilogram (W/kg)

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

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

8. System Description and Setup

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



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

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 μ W/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 μ W/g – >100 mW/g Linearity: ± 0.2 dB (noise: typically <1 μ W/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 from the measurement grid to the high-resolution grid
- (e) Extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
- (f) Calculation of the averaged SAR within masses of 1g and 10g

9.2 Power Reference Measurement

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

9.3 Area Scan

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

Area scan parameters extracted from FCC KDB 865664 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	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	$30^\circ \pm 1^\circ$	$20^\circ \pm 1^\circ$
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 $\leq$ 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 to 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 whose 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: $\Delta x_{\text{Zoom}}, \Delta y_{\text{Zoom}}$			≤ 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: $\Delta z_{\text{Zoom}}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{\text{Zoom}}(1)$: between 1 st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{\text{Zoom}}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{\text{Zoom}}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm
Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.				
* When zoom scan is required and the <i>reported</i> SAR from the <i>area scan based 1-g SAR estimation</i> procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.				

9.5 Volume Scan Procedures

The volume scan is used to 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	750MHz System Validation Kit	D750V3	1012	May. 18, 2016	May. 17, 2017
SPEAG	1900MHz System Validation Kit	D1900V2	5d041	Oct. 22, 2015	Oct. 21, 2016
SPEAG	Data Acquisition Electronics	DAE3	495	May. 27, 2016	May. 26, 2017
SPEAG	Data Acquisition Electronics	DAE4	778	May. 12, 2016	May. 11, 2017
SPEAG	Data Acquisition Electronics	DAE3	577	Sep. 24, 2015	Sep. 23, 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	3931	Oct. 01, 2015	Sep. 30, 2016
SPEAG	Dosimetric E-Field Probe	EX3DV4	7346	Sep. 02, 2015	Sep. 01, 2016
WonDer	Thermometer	WD-5015	TM685	Oct. 16, 2015	Oct. 15, 2016
WonDer	Thermometer	WD-5015	TM642	Oct. 16, 2015	Oct. 15, 2016
WonDer	Thermometer	WD-5015	TM281	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 (ϵ_r)
For Head								
750	41.1	57.0	0.2	1.4	0.2	0	0.89	41.9
835	40.3	57.9	0.2	1.4	0.2	0	0.90	41.5
900	40.3	57.9	0.2	1.4	0.2	0	0.97	41.5
1800, 1900, 2000	55.2	0	0	0.3	0	44.5	1.40	40.0
2450	55.0	0	0	0	0	45.0	1.80	39.2
2600	54.8	0	0	0.1	0	45.1	1.96	39.0
For Body								
750	51.7	47.2	0	0.9	0.1	0	0.96	55.5
835	50.8	48.2	0	0.9	0.1	0	0.97	55.2
900	50.8	48.2	0	0.9	0.1	0	1.05	55.0
1800, 1900, 2000	70.2	0	0	0.4	0	29.4	1.52	53.3
2450	68.6	0	0	0	0	31.4	1.95	52.7
2600	68.1	0	0	0.1	0	31.8	2.16	52.5

Simulating Liquid for 5GHz, Manufactured by SPEAG

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

<Tissue Dielectric Parameter Check Results>

Frequency (MHz)	Tissue Type	Liquid Temp. (°C)	Conductivity (σ)	Permittivity (ϵ_r)	Conductivity Target (σ)	Permittivity Target (ϵ_r)	Delta (σ) (%)	Delta (ϵ_r) (%)	Limit (%)	Date
750	HSL	22.5	0.874	41.763	0.89	41.90	-1.80	-0.33	±5	2016/7/9
750	MSL	22.5	0.965	56.454	0.96	55.50	0.52	1.72	±5	2016/7/9
1750	HSL	22.7	1.363	39.207	1.37	40.10	-0.51	-2.23	±5	2016/7/5
1750	HSL	22.7	1.363	39.207	1.37	40.10	-0.51	-2.23	±5	2016/7/5
1900	HSL	22.4	1.419	38.429	1.40	40.00	1.36	-3.93	±5	2016/7/7

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 (%)
2016/7/9	750	HSL	250	D750V3-1012	EX3DV4 - SN7346	DAE4 Sn778	2.01	8.21	8.04	-2.07
2016/7/9	750	MSL	250	D750V3-1012	EX3DV4 - SN7346	DAE4 Sn778	2.12	8.72	8.48	-2.75
2016/7/5	1750	HSL	250	D1750V2-1068	ES3DV3 - SN3270	DAE3 Sn577	9.08	36.80	36.32	-1.30
2016/7/5	1750	HSL	250	D1750V2-1068	EX3DV4 - SN3925	DAE3 Sn495	9.25	36.80	37.00	0.54
2016/7/7	1900	HSL	250	D1900V2-5d041	EX3DV4 - SN3931	DAE4 Sn778	10.40	39.80	41.60	4.52

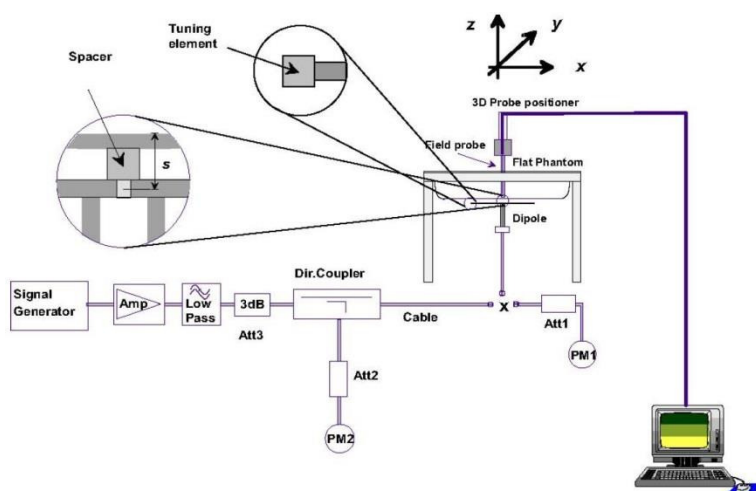


Fig 8.3.1 System Performance Check Setup



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.

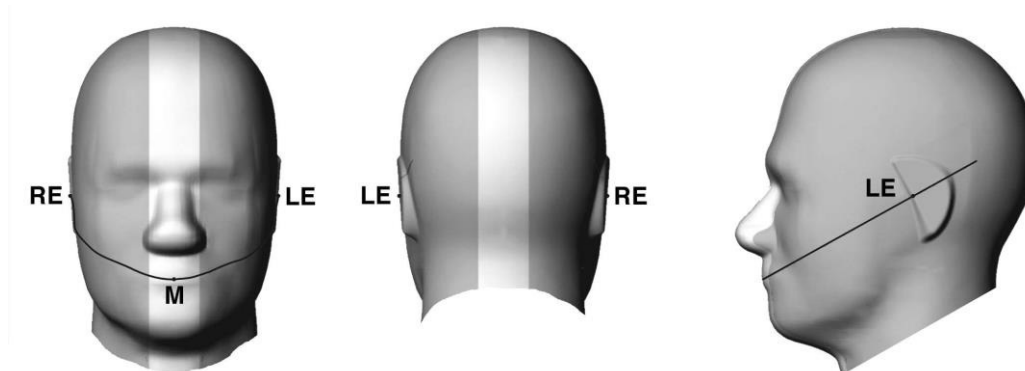


Fig 9.1.1 Front, back, and side views of SAM twin phantom

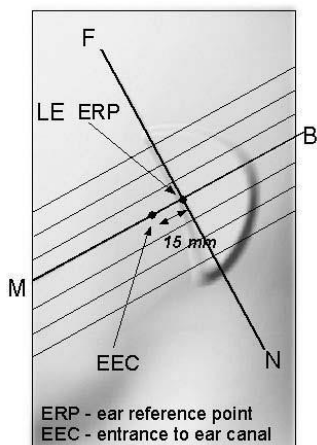


Fig 9.1.2 Close-up side view of phantom showing the ear region.

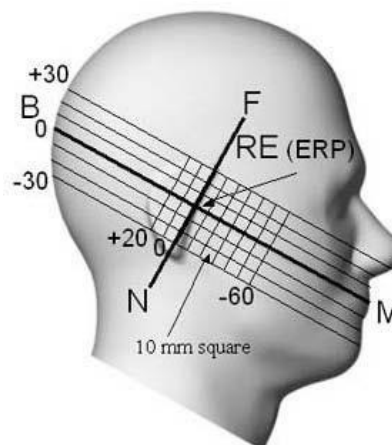


Fig 9.1.3 Side view of the phantom showing relevant markings and seven cross-sectional plane locations

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 w_t 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 w_b 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.

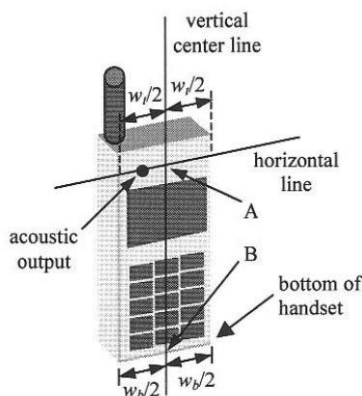


Fig 9.2.1 Handset vertical and horizontal reference lines—“fixed case”

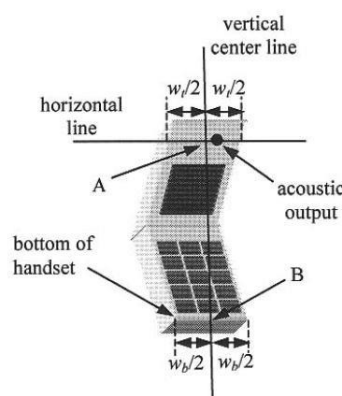


Fig 9.2.2 Handset vertical and horizontal reference lines—“clam-shell case”

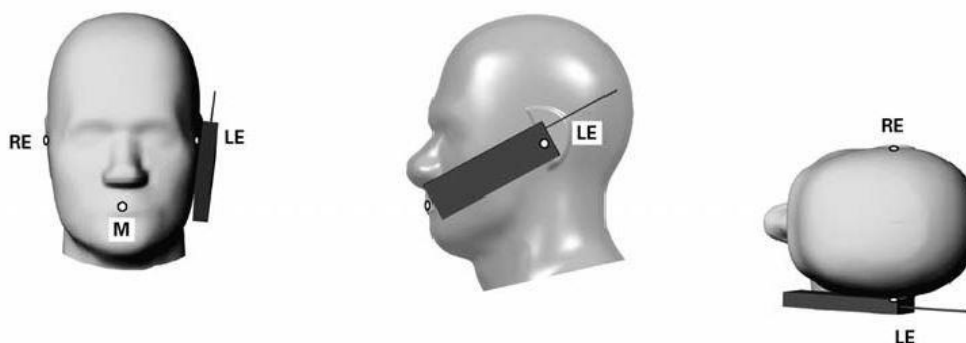


Fig 9.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

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

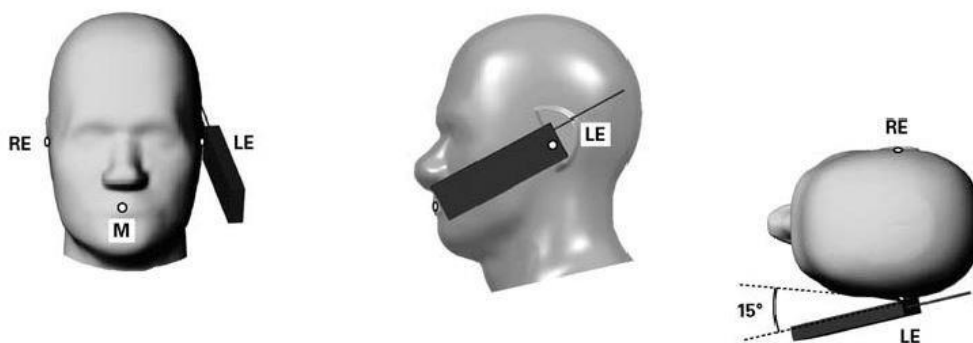


Fig 9.3.1 Tilt position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which define the Reference Plane for handset positioning, are indicated.

12.4 Body Worn Accessory

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 9.4). Per KDB648474 D04v01r03, body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB 447498 D01v06 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for body-worn accessory, measured without a headset connected to the handset is $< 1.2 \text{ W/kg}$, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

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

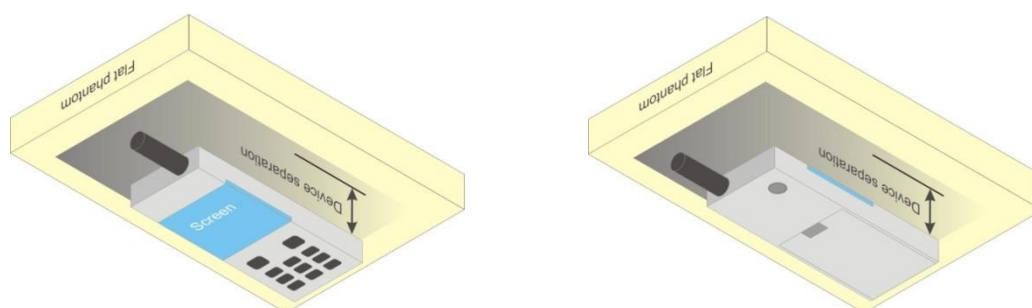


Fig 9.4 Body Worn Position

12.5 Wireless Router

Some battery-operated handsets have the capability to transmit and receive user through simultaneous transmission of WIFI simultaneously with a separate licensed transmitter. The FCC has provided guidance in FCC KDB Publication 941225 D06 v02r01 where SAR test considerations for handsets ($L \times W \geq 9 \text{ cm} \times 5 \text{ cm}$) are based on a composite test separation distance of 10mm from the front, back and edges of the device containing transmitting antennas within 2.5cm of their edges, determined from general mixed use conditions for this type of devices. Since the hotspot SAR results may overlap with the body-worn accessory SAR requirements, the more conservative configurations can be considered, thus excluding some body-worn accessory SAR tests.

When the user enables the personal wireless router functions for the handset, actual operations include simultaneous transmission of both the WIFI transmitter and another licensed transmitter. Both transmitters often do not transmit at the same transmitting frequency and thus cannot be evaluated for SAR under actual use conditions due to the limitations of the SAR assessment probes. Therefore, SAR must be evaluated for each frequency transmission and mode separately and spatially summed with the WIFI transmitter according to FCC KDB Publication 447498 D01v06 publication procedures. The "Portable Hotspot" feature on the handset was NOT activated during SAR assessments, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal at a time.

13. Conducted RF Output Power (Unit: dBm)

<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 DC-HSDPA, the device was configured according to the H-Set 12, Fixed Reference Channel (FRC) configuration in Table C.8.1.12 of 3GPP TS 34.121-1, with the primary and the secondary serving HS-DSCH Cell enabled during the power measurement.

A summary of these settings are illustrated below:

HSDPA Setup Configuration:

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

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

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

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

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

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

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

Setup Configuration

HSUPA Setup Configuration:

- a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.
- b. The RF path losses were compensated into the measurements.
- c. A call was established between EUT and Base Station with following setting * :
 - i. Call Configs = 5.2B, 5.9B, 5.10B, and 5.13.2B with QPSK
 - ii. Set the Gain Factors (β_c and β_d) and parameters (AG Index) were set according to each specific sub-test in the following table, C11.1.3, quoted from the TS 34.121
 - iii. Set Cell Power = -86 dBm
 - iv. Set Channel Type = 12.2k + HSPA
 - v. Set UE Target Power
 - vi. Power Ctrl Mode= Alternating bits
 - vii. Set and observe the E-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} (Note 1)	β_{ec}	β_{ed} (Note 5) (Note 6)	β_{ed} (SF)	β_{ed} (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 6)	E-TFCI
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/25	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	$\beta_{ed1}: 47/15$ $\beta_{ed2}: 47/15$	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 (Note 4)	15/15 (Note 4)	64	15/15 (Note 4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81
Note 1: $\Delta_{ACK}, \Delta_{NACK}$ and $\Delta_{CQI} = 30/15$ with $\beta_{hs} = 30/15 * \beta_c$. Note 2: CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$. For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference. Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 10/15$ and $\beta_d = 15/15$. Note 4: For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 14/15$ and $\beta_d = 15/15$. Note 5: In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g. Note 6: β_{ed} can not be set directly, it is set by Absolute Grant Value.													

Setup Configuration

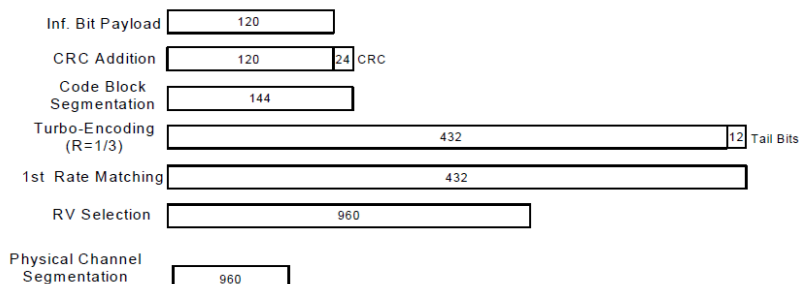
DC-HSDPA 3GPP release 8 Setup Configuration:

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

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

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

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


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

**<WCDMA Conducted Power>****General Note:**

1. Per KDB 941225 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 / DC-HSDPA is $\leq \frac{1}{4}$ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA / DC-HSDPA to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA.

Band		WCDMA IV			Tune-up Limit (dBm)
TX Channel		1312	1413	1513	
Rx Channel		1537	1638	1738	
Frequency (MHz)		1712.4	1732.6	1752.6	
3GPP Rel 99	AMR 12.2Kbps	23.28	23.39	23.62	25.00
3GPP Rel 99	RMC 12.2Kbps	23.30	23.41	23.64	25.00
3GPP Rel 6	HSDPA Subtest-1	22.20	22.36	22.58	24.00
3GPP Rel 6	HSDPA Subtest-2	22.18	22.32	22.55	24.00
3GPP Rel 6	HSDPA Subtest-3	21.76	21.85	21.65	23.50
3GPP Rel 6	HSDPA Subtest-4	21.75	21.86	21.63	23.50
3GPP Rel 8	DC-HSDPA Subtest-1	22.18	22.35	22.56	24.00
3GPP Rel 8	DC-HSDPA Subtest-2	22.16	22.30	22.53	24.00
3GPP Rel 8	DC-HSDPA Subtest-3	21.75	21.83	21.63	23.50
3GPP Rel 8	DC-HSDPA Subtest-4	21.74	21.82	21.62	23.50
3GPP Rel 6	HSUPA Subtest-1	22.06	22.03	22.01	24.00
3GPP Rel 6	HSUPA Subtest-2	20.91	20.98	20.93	22.00
3GPP Rel 6	HSUPA Subtest-3	21.22	21.27	21.25	23.00
3GPP Rel 6	HSUPA Subtest-4	20.99	20.98	20.95	22.00
3GPP Rel 6	HSUPA Subtest-5	22.18	22.30	22.53	24.00

<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 $\frac{1}{2}$ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM SAR testing is not required.
7. Per KDB 941225 D05v02r05, Smaller bandwidth output power for each RB allocation configuration is $>$ not $\frac{1}{2}$ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
8. For LTE B4 / B12 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.



<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	22.73	23.09	22.92	24.5	0
20	QPSK	1	49	22.98	23.11	23.15		
20	QPSK	1	99	22.92	22.83	22.82		
20	QPSK	50	0	21.87	22.08	21.92	23.5	1
20	QPSK	50	24	21.97	22.10	22.12		
20	QPSK	50	50	21.91	21.89	21.91		
20	QPSK	100	0	21.81	22.02	22.03		
20	16QAM	1	0	22.04	21.99	22.33	23.5	1
20	16QAM	1	49	22.00	22.25	22.46		
20	16QAM	1	99	22.10	21.93	22.33		
20	16QAM	50	0	20.94	21.05	21.10	22.5	2
20	16QAM	50	24	20.95	21.05	20.77		
20	16QAM	50	50	20.98	20.78	20.97		
20	16QAM	100	0	20.89	20.90	20.99		
Channel				18675	18900	19125	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1857.5	1880	1902.5		
15	QPSK	1	0	22.60	23.17	22.88	24.5	0
15	QPSK	1	37	22.72	22.87	22.82		
15	QPSK	1	74	22.86	22.63	22.82		
15	QPSK	36	0	21.87	22.09	21.87	23.5	1
15	QPSK	36	20	21.77	22.06	21.90		
15	QPSK	36	39	21.86	21.93	21.94		
15	QPSK	75	0	21.79	22.03	21.87		
15	16QAM	1	0	22.21	22.43	22.16	23.5	1
15	16QAM	1	37	22.06	22.29	22.13		
15	16QAM	1	74	21.85	21.59	21.83		
15	16QAM	36	0	20.70	21.16	20.78	22.5	2
15	16QAM	36	20	20.66	21.06	20.96		
15	16QAM	36	39	20.72	20.92	20.90		
15	16QAM	75	0	20.86	20.92	20.84		
Channel				18650	18900	19150	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1855	1880	1905		
10	QPSK	1	0	22.68	22.94	22.88	24.5	0
10	QPSK	1	25	22.95	22.99	22.91		
10	QPSK	1	49	22.60	22.76	22.79		
10	QPSK	25	0	21.64	22.01	21.92	23.5	1
10	QPSK	25	12	21.83	21.95	21.92		
10	QPSK	25	25	21.73	21.87	21.95		
10	QPSK	50	0	21.74	21.94	21.90		
10	16QAM	1	0	22.13	22.30	22.20	23.5	1
10	16QAM	1	25	21.98	22.10	22.02		
10	16QAM	1	49	22.00	21.94	21.94		
10	16QAM	25	0	20.72	21.06	20.99	22.5	2
10	16QAM	25	12	20.68	20.84	20.89		
10	16QAM	25	25	20.75	20.90	20.94		
10	16QAM	50	0	20.69	21.00	20.97		



Channel				18625	18900	19175	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1852.5	1880	1907.5		
5	QPSK	1	0	22.55	22.74	22.78	24.5	0
5	QPSK	1	12	22.53	22.72	22.76		
5	QPSK	1	24	22.54	22.63	22.88		
5	QPSK	12	0	22.64	21.91	21.82	23.5	1
5	QPSK	12	7	21.68	21.95	21.83		
5	QPSK	12	13	21.57	21.94	21.82		
5	QPSK	25	0	21.73	21.89	21.76	23.5	1
5	16QAM	1	0	21.78	22.20	22.11		
5	16QAM	1	12	21.78	22.16	22.12		
5	16QAM	1	24	21.86	22.14	21.91	22.5	2
5	16QAM	12	0	20.81	21.02	20.81		
5	16QAM	12	7	20.75	21.01	20.88		
5	16QAM	12	13	20.65	20.98	20.88	20.67	20.82
5	16QAM	25	0	20.67	21.05	20.82		
Channel				18615	18900	19185	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1851.5	1880	1908.5		
3	QPSK	1	0	22.51	22.93	22.65	24.5	0
3	QPSK	1	8	22.73	22.95	22.89		
3	QPSK	1	14	22.71	22.91	22.68		
3	QPSK	8	0	21.70	21.99	21.88	23.5	1
3	QPSK	8	4	21.71	21.95	21.76		
3	QPSK	8	7	21.71	21.93	21.89		
3	QPSK	15	0	21.70	21.90	21.78	23.5	1
3	16QAM	1	0	21.88	22.25	22.10		
3	16QAM	1	8	21.87	22.13	22.05		
3	16QAM	1	14	21.78	22.20	21.93	22.5	2
3	16QAM	8	0	20.68	20.93	21.07		
3	16QAM	8	4	20.71	20.96	20.87		
3	16QAM	8	7	20.72	20.94	20.85	20.80	20.96
3	16QAM	15	0	20.80	20.94	20.96		
Channel				18607	18900	19193	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1850.7	1880	1909.3		
1.4	QPSK	1	0	22.69	22.79	22.77	24.5	0
1.4	QPSK	1	3	22.68	22.88	22.93		
1.4	QPSK	1	5	22.60	22.81	22.79		
1.4	QPSK	3	0	22.78	22.93	22.93		
1.4	QPSK	3	1	22.92	23.03	23.03		
1.4	QPSK	3	3	22.74	23.03	22.89		
1.4	QPSK	6	0	21.75	21.99	21.78	23.5	1
1.4	16QAM	1	0	21.87	22.17	22.02	23.5	1
1.4	16QAM	1	3	21.71	22.21	21.99		
1.4	16QAM	1	5	21.85	22.23	22.11		
1.4	16QAM	3	0	21.77	21.96	22.03		
1.4	16QAM	3	1	21.81	21.98	22.04		
1.4	16QAM	3	3	21.83	21.79	22.01	22.5	2
1.4	16QAM	6	0	20.59	20.79	20.51		



<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	24.20	24.23	24.20		
20	QPSK	1	49	24.19	24.17	24.18	25	0
20	QPSK	1	99	23.93	23.96	24.09		
20	QPSK	50	0	22.15	22.18	22.13		
20	QPSK	50	24	22.09	22.06	22.08	24	1
20	QPSK	50	50	22.10	22.03	22.04		
20	QPSK	100	0	22.08	22.11	22.10		
20	16QAM	1	0	22.59	22.47	22.44	24	1
20	16QAM	1	49	22.32	22.19	22.27		
20	16QAM	1	99	22.27	22.21	22.33		
20	16QAM	50	0	21.20	21.20	21.07	23	2
20	16QAM	50	24	21.00	21.14	21.06		
20	16QAM	50	50	21.00	21.01	21.01		
20	16QAM	100	0	21.16	21.08	21.11		
Channel				20025	20175	20325	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1717.5	1732.5	1747.5		
15	QPSK	1	0	24.25	24.08	24.24		
15	QPSK	1	37	24.04	23.84	24.05	25	0
15	QPSK	1	74	23.93	23.96	24.05		
15	QPSK	36	0	22.08	22.15	22.15		
15	QPSK	36	20	22.03	22.01	22.12	24	1
15	QPSK	36	39	22.03	22.02	22.07		
15	QPSK	75	0	22.01	22.12	22.08		
15	16QAM	1	0	22.62	22.50	22.56	24	1
15	16QAM	1	37	22.34	22.14	22.35		
15	16QAM	1	74	22.32	22.24	22.39		
15	16QAM	36	0	21.03	21.10	21.20	23	2
15	16QAM	36	20	21.03	21.02	21.12		
15	16QAM	36	39	21.10	21.00	21.14		
15	16QAM	75	0	21.02	21.05	21.04		
Channel				20000	20175	20350	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1715	1732.5	1750		
10	QPSK	1	0	24.31	24.30	24.30		
10	QPSK	1	25	24.19	24.00	24.01	25	0
10	QPSK	1	49	24.15	24.01	24.12		
10	QPSK	25	0	22.04	22.09	22.15		
10	QPSK	25	12	22.08	22.03	22.08	24	1
10	QPSK	25	25	22.01	22.02	22.11		
10	QPSK	50	0	22.08	22.13	22.09		
10	16QAM	1	0	22.54	22.52	22.48	24	1
10	16QAM	1	25	22.34	22.17	22.34		
10	16QAM	1	49	22.32	22.18	22.44		
10	16QAM	25	0	21.12	21.20	21.14	23	2
10	16QAM	25	12	21.07	21.07	21.05		
10	16QAM	25	25	21.10	21.06	21.09		
10	16QAM	50	0	21.02	21.04	21.01		



Channel				19975	20175	20375	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1712.5	1732.5	1752.5		
5	QPSK	1	0	24.02	24.06	24.11	25	0
5	QPSK	1	12	24.10	24.10	24.21		
5	QPSK	1	24	23.93	23.75	24.11		
5	QPSK	12	0	22.14	22.02	22.09	24	1
5	QPSK	12	7	22.08	22.03	22.08		
5	QPSK	12	13	22.06	22.00	22.10		
5	QPSK	25	0	22.04	22.01	22.02		
5	16QAM	1	0	22.43	22.22	22.33	24	1
5	16QAM	1	12	22.34	22.24	22.29		
5	16QAM	1	24	22.20	22.09	22.29		
5	16QAM	12	0	21.06	21.06	21.01	23	2
5	16QAM	12	7	21.03	21.06	21.05		
5	16QAM	12	13	21.04	21.05	21.10		
5	16QAM	25	0	21.07	21.02	21.09		
Channel				19965	20175	20385	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1711.5	1732.5	1753.5		
3	QPSK	1	0	23.96	23.89	24.16	25	0
3	QPSK	1	8	23.98	24.12	24.26		
3	QPSK	1	14	23.97	23.99	24.14		
3	QPSK	8	0	22.05	22.00	22.10	24	1
3	QPSK	8	4	22.15	22.04	22.29		
3	QPSK	8	7	22.02	22.02	22.20		
3	QPSK	15	0	22.03	22.05	22.07		
3	16QAM	1	0	22.49	22.34	22.40	24	1
3	16QAM	1	8	22.32	22.27	22.47		
3	16QAM	1	14	22.36	22.28	22.36		
3	16QAM	8	0	21.09	21.01	21.04	23	2
3	16QAM	8	4	21.10	21.01	21.21		
3	16QAM	8	7	21.06	21.05	21.06		
3	16QAM	15	0	21.07	21.10	21.11		
Channel				19957	20175	20393	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1710.7	1732.5	1754.3		
1.4	QPSK	1	0	23.90	23.85	24.14	25	0
1.4	QPSK	1	3	24.19	23.99	24.12		
1.4	QPSK	1	5	24.00	23.83	23.96		
1.4	QPSK	3	0	24.10	23.87	24.13		
1.4	QPSK	3	1	24.04	24.07	24.18		
1.4	QPSK	3	3	24.04	23.94	24.17		
1.4	QPSK	6	0	22.20	22.02	22.05	24	1
1.4	16QAM	1	0	22.45	22.23	22.43	24	1
1.4	16QAM	1	3	22.33	22.22	22.26		
1.4	16QAM	1	5	22.39	22.30	22.37		
1.4	16QAM	3	0	22.24	22.11	22.20		
1.4	16QAM	3	1	22.21	22.18	22.19		
1.4	16QAM	3	3	22.22	22.15	22.24		
1.4	16QAM	6	0	21.04	21.03	21.09	23	2

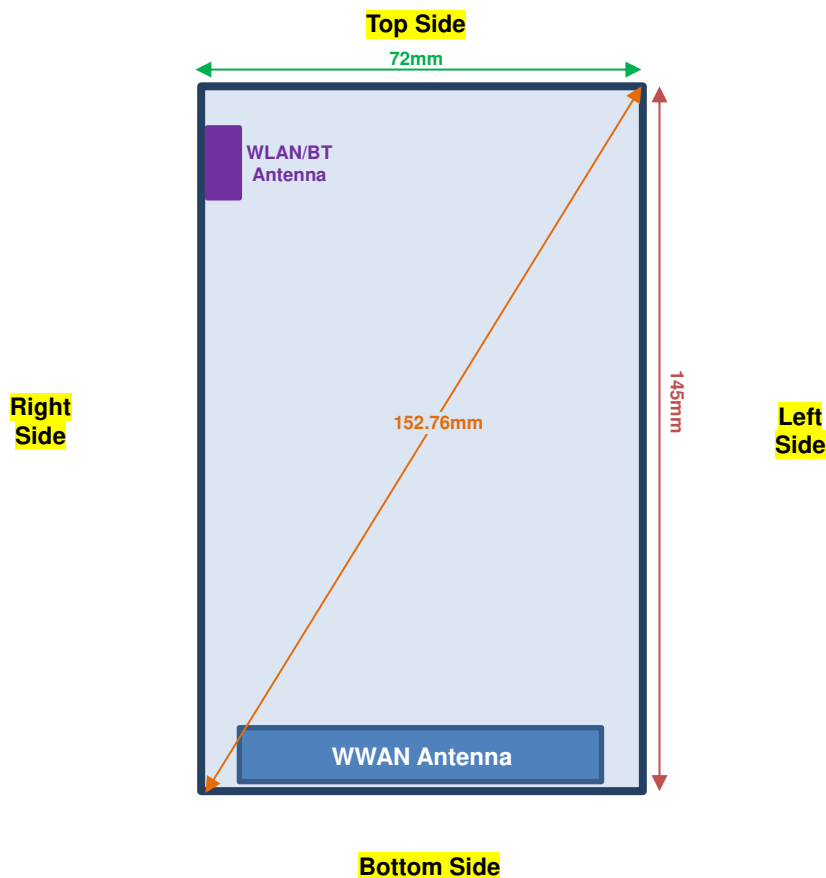


<LTE Band 12>

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				23060	23095	23130		
Frequency (MHz)				704	707.5	711		
10	QPSK	1	0	23.57	23.65	23.73	24.7	0
10	QPSK	1	25	23.62	23.70	23.80		
10	QPSK	1	49	23.87	23.91	23.89		
10	QPSK	25	0	21.94	22.04	22.09	23.7	1
10	QPSK	25	12	21.95	21.92	22.09		
10	QPSK	25	25	21.99	22.12	22.11		
10	QPSK	50	0	21.99	22.11	22.09		
10	16QAM	1	0	22.13	22.14	22.28	23.7	1
10	16QAM	1	25	22.11	22.13	22.24		
10	16QAM	1	49	22.07	22.25	22.35		
10	16QAM	25	0	20.84	21.04	21.10	22.7	2
10	16QAM	25	12	20.95	21.03	21.13		
10	16QAM	25	25	20.98	20.95	21.07		
10	16QAM	50	0	20.93	20.96	20.85		
Channel				23035	23095	23155	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				701.5	707.5	713.5		
5	QPSK	1	0	23.67	23.72	23.76	24.7	0
5	QPSK	1	12	23.64	23.59	23.81		
5	QPSK	1	24	23.55	23.56	23.76		
5	QPSK	12	0	21.91	21.95	21.90	23.7	1
5	QPSK	12	7	21.89	21.97	22.03		
5	QPSK	12	13	21.97	21.99	22.07		
5	QPSK	25	0	21.93	22.02	22.07		
5	16QAM	1	0	22.14	22.20	22.27	23.7	1
5	16QAM	1	12	22.15	22.21	22.28		
5	16QAM	1	24	22.16	22.07	22.19		
5	16QAM	12	0	20.84	20.98	20.90	22.7	2
5	16QAM	12	7	20.84	20.86	20.90		
5	16QAM	12	13	20.84	21.18	20.85		
5	16QAM	25	0	20.80	20.92	20.99		
Channel				23025	23095	23165	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				700.5	707.5	714.5		
3	QPSK	1	0	23.73	23.70	23.71	24.7	0
3	QPSK	1	8	23.67	23.59	23.65		
3	QPSK	1	14	23.48	23.47	23.59		
3	QPSK	8	0	22.01	22.09	22.09	23.7	1
3	QPSK	8	4	22.03	22.01	22.14		
3	QPSK	8	7	22.01	21.96	22.08		
3	QPSK	15	0	22.04	22.04	21.99		
3	16QAM	1	0	22.26	22.27	22.34	23.7	1
3	16QAM	1	8	22.18	22.20	22.25		
3	16QAM	1	14	22.26	22.20	22.26		
3	16QAM	8	0	21.05	21.12	21.13	22.7	2
3	16QAM	8	4	21.12	20.99	21.21		
3	16QAM	8	7	21.15	21.13	21.19		
3	16QAM	15	0	20.97	20.97	21.00		

Channel				23017	23095	23173	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				699.7	707.5	715.3		
1.4	QPSK	1	0	23.57	23.56	23.49	24.7	0
1.4	QPSK	1	3	23.56	23.83	23.74		
1.4	QPSK	1	5	23.54	23.69	23.68		
1.4	QPSK	3	0	23.58	23.63	23.67		
1.4	QPSK	3	1	23.76	23.59	23.76		
1.4	QPSK	3	3	23.62	23.68	23.75		
1.4	QPSK	6	0	21.94	21.95	22.06	23.7	1
1.4	16QAM	1	0	22.17	22.10	22.12	23.7	1
1.4	16QAM	1	3	22.09	22.14	22.15		
1.4	16QAM	1	5	22.18	22.16	22.19		
1.4	16QAM	3	0	21.95	22.04	22.26		
1.4	16QAM	3	1	21.98	22.05	22.13		
1.4	16QAM	3	3	21.99	22.05	22.10		
1.4	16QAM	6	0	20.84	20.85	20.81	22.7	2

14. Antenna Location



Distance of the Antenna to the EUT surface/edge						
Antennas	Back	Front	Top Side	Bottom Side	Right Side	Left Side
WWAN Ant	≤ 25mm	≤ 25mm	> 25mm	≤ 25mm	≤ 25mm	≤ 25mm
BT & WLAN Ant	≤ 25mm	≤ 25mm	≤ 25mm	> 25mm	≤ 25mm	> 25mm

Positions for SAR tests; Hotspot mode						
Antennas	Back	Front	Top Side	Bottom Side	Right Side	Left Side
WWAN Ant	Yes	Yes	No	Yes	Yes	Yes
BT & WLAN Ant	Yes	Yes	Yes	No	Yes	No

General Note:

- Referring to KDB 941225 D06 v02r01, when the overall device length and width are > 9cm*5cm, the test distance is 10 mm. SAR must be measured for all sides and surfaces.

15. 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 WWAN: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
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 ≥ 0.8 W/kg.
4. Per KDB 648474 D04v01r03, when the reported SAR for a body-worn accessory measured without a headset connected to the handset is < 1.2 W/kg, SAR testing with a headset connected to the handset is not required.
5. Per KDB 648474 D04v01r03, for additional battery option, need repeat SAR testing at the worst position, for each wireless mode and each band.

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 / DC-HSDPA is $\leq \frac{1}{4}$ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA / DC-HSDPA to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA.

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 $> \text{not } \frac{1}{2}$ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM SAR testing is not required.
5. Per KDB 941225 D05v02r05, Smaller bandwidth output power for each RB allocation configuration is $> \text{not } \frac{1}{2}$ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
6. For LTE B4 / B12 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.

**15.1 Head SAR****<WCDMA SAR>**

Plot No.	Band	Mode	Test Position	Gap (mm)	Battery	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 IV	RMC 12.2Kbps	Right Cheek	0mm	Battery 1	1513	1752.6	23.64	25.00	1.368	-0.15	0.468	0.640
	WCDMA IV	RMC 12.2Kbps	Right Tilted	0mm	Battery 1	1513	1752.6	23.64	25.00	1.368	-0.12	0.315	0.431
01	WCDMA IV	RMC 12.2Kbps	Left Cheek	0mm	Battery 1	1513	1752.6	23.64	25.00	1.368	0	0.743	1.016
	WCDMA IV	RMC 12.2Kbps	Left Cheek	0mm	Battery 2	1513	1752.6	23.64	25.00	1.368	0.11	0.698	0.955
	WCDMA IV	RMC 12.2Kbps	Left Cheek	0mm	Battery 1	1312	1712.4	23.30	23.30	1.000	0.03	0.563	0.563
	WCDMA IV	RMC 12.2Kbps	Left Cheek	0mm	Battery 1	1413	1732.6	23.41	23.41	1.000	0.03	0.635	0.635
	WCDMA IV	RMC 12.2Kbps	Left Tilted	0mm	Battery 1	1513	1752.6	23.64	25.00	1.368	-0.03	0.355	0.486
	WCDMA IV	RMC 12.2Kbps	Right Cheek	0mm	Battery 1	1513	1752.6	23.64	25.00	1.368	-0.15	0.468	0.640

<FDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Battery	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	Battery 1	19100	1900	23.15	24.50	1.365	-0.16	0.372	0.508
	LTE Band 2	20M	QPSK	50	24	Right Cheek	0mm	Battery 1	19100	1900	22.12	23.50	1.374	0.02	0.281	0.386
	LTE Band 2	20M	QPSK	1	49	Right Tilted	0mm	Battery 1	19100	1900	23.15	24.50	1.365	0.13	0.120	0.164
	LTE Band 2	20M	QPSK	50	24	Right Tilted	0mm	Battery 1	19100	1900	22.12	23.50	1.374	0.06	0.089	0.122
	LTE Band 2	20M	QPSK	1	49	Left Cheek	0mm	Battery 1	19100	1900	23.15	24.50	1.365	-0.12	0.412	0.562
02	LTE Band 2	20M	QPSK	1	49	Left Cheek	0mm	Battery 1	18700	1860	22.98	24.50	1.419	-0.14	0.510	0.724
	LTE Band 2	20M	QPSK	1	49	Left Cheek	0mm	Battery 1	18900	1880	23.11	24.50	1.377	0.08	0.456	0.628
	LTE Band 2	20M	QPSK	1	49	Left Cheek	0mm	Battery 2	18700	1860	22.98	24.50	1.419	-0.13	0.505	0.717
	LTE Band 2	20M	QPSK	50	24	Left Cheek	0mm	Battery 1	19100	1900	22.12	23.50	1.374	-0.13	0.340	0.467
	LTE Band 2	20M	QPSK	1	49	Left Tilted	0mm	Battery 1	19100	1900	23.15	24.50	1.365	-0.11	0.129	0.176
	LTE Band 2	20M	QPSK	50	24	Left Tilted	0mm	Battery 1	19100	1900	22.12	23.50	1.374	-0.04	0.110	0.151
	LTE Band 4	20M	QPSK	1	0	Right Cheek	0mm	Battery 1	20175	1732.5	24.23	25.00	1.194	-0.1	0.394	0.470
	LTE Band 4	20M	QPSK	50	0	Right Cheek	0mm	Battery 1	20175	1732.5	22.18	24.00	1.521	0.05	0.287	0.436
	LTE Band 4	20M	QPSK	1	0	Right Tilted	0mm	Battery 1	20175	1732.5	24.23	25.00	1.194	0.1	0.317	0.378
	LTE Band 4	20M	QPSK	50	0	Right Tilted	0mm	Battery 1	20175	1732.5	22.18	24.00	1.521	0.03	0.194	0.295
03	LTE Band 4	20M	QPSK	1	0	Left Cheek	0mm	Battery 1	20175	1732.5	24.23	25.00	1.194	-0.11	0.702	0.838
	LTE Band 4	20M	QPSK	1	0	Left Cheek	0mm	Battery 2	20175	1732.5	24.23	25.00	1.194	-0.14	0.696	0.831
	LTE Band 4	20M	QPSK	50	0	Left Cheek	0mm	Battery 1	20175	1732.5	22.18	24.00	1.521	0.08	0.484	0.736
	LTE Band 4	20M	QPSK	100	0	Left Cheek	0mm	Battery 1	20175	1732.5	22.11	24.00	1.545	0.08	0.435	0.672
	LTE Band 4	20M	QPSK	1	0	Left Tilted	0mm	Battery 1	20175	1732.5	24.23	25.00	1.194	0.04	0.361	0.431
	LTE Band 4	20M	QPSK	50	0	Left Tilted	0mm	Battery 1	20175	1732.5	22.18	24.00	1.521	0.05	0.244	0.371
	LTE Band 12	10M	QPSK	1	49	Right Cheek	0mm	Battery 1	23095	707.5	23.91	24.70	1.199	-0.01	0.217	0.260
	LTE Band 12	10M	QPSK	25	25	Right Cheek	0mm	Battery 1	23095	707.5	22.12	23.70	1.439	-0.09	0.177	0.255
	LTE Band 12	10M	QPSK	1	49	Right Tilted	0mm	Battery 1	23095	707.5	23.91	24.70	1.199	-0.08	0.151	0.181
	LTE Band 12	10M	QPSK	25	25	Right Tilted	0mm	Battery 1	23095	707.5	22.12	23.70	1.439	-0.08	0.118	0.170
04	LTE Band 12	10M	QPSK	1	49	Left Cheek	0mm	Battery 1	23095	707.5	23.91	24.70	1.199	0.11	0.219	0.263
	LTE Band 12	10M	QPSK	1	49	Left Cheek	0mm	Battery 2	23095	707.5	23.91	24.70	1.199	0.12	0.205	0.246
	LTE Band 12	10M	QPSK	25	25	Left Cheek	0mm	Battery 1	23095	707.5	22.12	23.70	1.439	-0.09	0.179	0.258
	LTE Band 12	10M	QPSK	1	49	Left Tilted	0mm	Battery 1	23095	707.5	23.91	24.70	1.199	-0.13	0.152	0.182
	LTE Band 12	10M	QPSK	25	25	Left Tilted	0mm	Battery 1	23095	707.5	22.12	23.70	1.439	-0.04	0.122	0.176



15.2 Hotspot SAR

<FDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Battery	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 12	10M	QPSK	1	49	Front	10mm	Battery 1	23095	707.5	23.91	24.70	1.199	-0.12	0.321	0.385
	LTE Band 12	10M	QPSK	25	25	Front	10mm	Battery 1	23095	707.5	22.12	23.70	1.439	0.11	0.260	0.374
05	LTE Band 12	10M	QPSK	1	49	Back	10mm	Battery 1	23095	707.5	23.91	24.70	1.199	0.13	0.446	0.535
	LTE Band 12	10M	QPSK	1	49	Back	10mm	Battery 2	23095	707.5	23.91	24.70	1.199	-0.07	0.388	0.465
	LTE Band 12	10M	QPSK	25	25	Back	10mm	Battery 1	23095	707.5	22.12	23.70	1.439	-0.07	0.367	0.528
	LTE Band 12	10M	QPSK	1	49	Left Side	10mm	Battery 1	23095	707.5	23.91	24.70	1.199	0.12	0.231	0.277
	LTE Band 12	10M	QPSK	25	25	Left Side	10mm	Battery 1	23095	707.5	22.12	23.70	1.439	-0.13	0.185	0.266
	LTE Band 12	10M	QPSK	1	49	Right Side	10mm	Battery 1	23095	707.5	23.91	24.70	1.199	0.11	0.243	0.291
	LTE Band 12	10M	QPSK	25	25	Right Side	10mm	Battery 1	23095	707.5	22.12	23.70	1.439	0.07	0.202	0.291
	LTE Band 12	10M	QPSK	1	49	Bottom Side	10mm	Battery 1	23095	707.5	23.91	24.70	1.199	0.13	0.051	0.061
	LTE Band 12	10M	QPSK	25	25	Bottom Side	10mm	Battery 1	23095	707.5	22.12	23.70	1.439	0.06	0.040	0.058

15.3 Body Worn Accessory SAR

<FDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Headset	Battery	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 12	10M	QPSK	1	49	Front	10mm	-	Battery 1	23095	707.5	23.91	24.70	1.199	-0.12	0.321	0.385
	LTE Band 12	10M	QPSK	25	25	Front	10mm	-	Battery 1	23095	707.5	22.12	23.70	1.439	0.11	0.260	0.374
05	LTE Band 12	10M	QPSK	1	49	Back	10mm	-	Battery 1	23095	707.5	23.91	24.70	1.199	0.13	0.446	0.535
	LTE Band 12	10M	QPSK	1	49	Back	10mm	-	Battery 2	23095	707.5	23.91	24.70	1.199	-0.07	0.388	0.465
	LTE Band 12	10M	QPSK	25	25	Back	10mm	-	Battery 1	23095	707.5	22.12	23.70	1.439	-0.07	0.367	0.528

16. Simultaneous Transmission Analysis

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

General Note:

1. For some frequency result of data re-use were taking from parent model (FCC ID: IHDT56VD4) and these results were used perform simultaneous transmission analysis.
2. This device 2.4GHz WLAN supports Hotspot operation and WiFi Direct (Group Client / Group Owner).
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. 2.4GHz WLAN and Bluetooth cannot transmit simultaneously.
5. The Scaled SAR summation is calculated based on the same configuration and test position.
6. Per KDB 447498 D01v06, simultaneous transmission SAR is compliant if,
 - i) Scalar SAR summation < 1.6W/kg.
 - ii) $SPLSR = (SAR1 + SAR2)^{1.5} / (\text{min. separation distance, mm})$, and the peak separation distance is determined from the square root of $[(x1-x2)^2 + (y1-y2)^2 + (z1-z2)^2]$, where (x1, y1, z1) and (x2, y2, z2) are the coordinates of the extrapolated peak SAR locations in the zoom scan.
 - iii) If $SPLSR \leq 0.04$, simultaneously transmission SAR measurement is not necessary.
 - iv) Simultaneously transmission SAR measurement, and the reported multi-band SAR < 1.6W/kg.
 - v) The SPLSR calculated results please refer to section 16.4.

16.1 Head Exposure Conditions

WWAN Band		Exposure Position	1	2	1+2 Summed 1g SAR (W/kg)
			WWAN	2.4GHz WLAN	
			1g SAR (W/kg)	1g SAR (W/kg)	
GSM	GSM850	Right Cheek	0.709	0.179	0.888
		Right Tilted	0.311	0.159	0.470
		Left Cheek	0.438	0.392	0.830
		Left Tilted	0.306	0.318	0.624
	GSM1900	Right Cheek	0.326	0.179	0.505
		Right Tilted	0.187	0.159	0.346
		Left Cheek	0.476	0.392	0.868
		Left Tilted	0.226	0.318	0.544
WCDMA	WCDMA II	Right Cheek	0.654	0.179	0.833
		Right Tilted	0.316	0.159	0.475
		Left Cheek	0.792	0.392	1.184
		Left Tilted	0.341	0.318	0.659
	WCDMA IV	Right Cheek	0.640	0.179	0.819
		Right Tilted	0.431	0.159	0.590
		Left Cheek	1.016	0.392	1.408
		Left Tilted	0.486	0.318	0.804
	WCDMA V	Right Cheek	0.467	0.179	0.646
		Right Tilted	0.314	0.159	0.473
		Left Cheek	0.404	0.392	0.796
		Left Tilted	0.309	0.318	0.627
CDMA	CDMA BC0	Right Cheek	0.432	0.179	0.611
		Right Tilted	0.315	0.159	0.474
		Left Cheek	0.461	0.392	0.853
		Left Tilted	0.320	0.318	0.638
	CDMA BC1	Right Cheek	0.520	0.179	0.699
		Right Tilted	0.251	0.159	0.410
		Left Cheek	0.724	0.392	1.116
		Left Tilted	0.282	0.318	0.600
	CDMA BC10	Right Cheek	0.528	0.179	0.707
		Right Tilted	0.333	0.159	0.492
		Left Cheek	0.483	0.392	0.875
		Left Tilted	0.354	0.318	0.672



WWAN Band		Exposure Position	1	2	1+2 Summed 1g SAR (W/kg)
			WWAN	2.4GHz WLAN	
			1g SAR (W/kg)	1g SAR (W/kg)	
LTE	LTE Band 2	Right Cheek	0.508	0.179	0.687
		Right Tilted	0.164	0.159	0.323
		Left Cheek	0.717	0.392	1.109
		Left Tilted	0.176	0.318	0.494
	LTE Band 4	Right Cheek	0.470	0.179	0.649
		Right Tilted	0.378	0.159	0.537
		Left Cheek	0.838	0.392	1.230
		Left Tilted	0.431	0.318	0.749
	LTE Band 5	Right Cheek	0.374	0.179	0.553
		Right Tilted	0.230	0.159	0.389
		Left Cheek	0.351	0.392	0.743
		Left Tilted	0.260	0.318	0.578
	LTE Band 7	Right Cheek	0.254	0.179	0.433
		Right Tilted	0.249	0.159	0.408
		Left Cheek	0.739	0.392	1.131
		Left Tilted	0.160	0.318	0.478
	LTE Band 12	Right Cheek	0.260	0.179	0.439
		Right Tilted	0.181	0.159	0.340
		Left Cheek	0.263	0.392	0.655
		Left Tilted	0.182	0.318	0.500
	LTE Band 13	Right Cheek	0.320	0.179	0.499
		Right Tilted	0.242	0.159	0.401
		Left Cheek	0.307	0.392	0.699
		Left Tilted	0.235	0.318	0.553
	LTE Band 25	Right Cheek	0.397	0.179	0.576
		Right Tilted	0.124	0.159	0.283
		Left Cheek	0.597	0.392	0.989
		Left Tilted	0.139	0.318	0.457
	LTE Band 26	Right Cheek	0.354	0.179	0.533
		Right Tilted	0.228	0.159	0.387
		Left Cheek	0.316	0.392	0.708
		Left Tilted	0.247	0.318	0.565
	LTE Band 41	Right Cheek	0.195	0.179	0.374
		Right Tilted	0.141	0.159	0.300
		Left Cheek	0.598	0.392	0.990
		Left Tilted	0.080	0.318	0.398



16.2 Hotspot Exposure Conditions

WWAN Band		Exposure Position	1	2	1+2 Summed 1g SAR (W/kg)	SPLSR	Case No
			WWAN	2.4GHz WLAN			
			1g SAR (W/kg)	1g SAR (W/kg)			
GSM	GSM850	Front	0.693	0.111	0.804		
		Back	0.917	0.174	1.091		
		Left side	0.778		0.778		
		Right side	0.764	0.097	0.861		
		Top side		0.105	0.105		
		Bottom side	0.068		0.068		
	GSM1900	Front	0.684	0.111	0.795		
		Back	0.980	0.174	1.154		
		Left side	0.454		0.454		
		Right side	0.326	0.097	0.423		
		Top side		0.105	0.105		
		Bottom side	0.311		0.311		
WCDMA	WCDMA II	Front	1.191	0.111	1.302		
		Back	1.366	0.174	1.540		
		Left side	0.691		0.691		
		Right side	0.549	0.097	0.646		
		Top side		0.105	0.105		
		Bottom side	0.472		0.472		
	WCDMA IV	Front	0.995	0.111	1.106		
		Back	1.397	0.174	1.571		
		Left side	0.420		0.420		
		Right side	0.215	0.097	0.312		
		Top side		0.105	0.105		
		Bottom side	0.377		0.377		
	WCDMA V	Front	0.549	0.111	0.660		
		Back	0.720	0.174	0.894		
		Left side	0.637		0.637		
		Right side	0.669	0.097	0.766		
		Top side		0.105	0.105		
		Bottom side	0.080		0.080		
CDMA	CDMA BC0	Front	0.668	0.111	0.779		
		Back	0.876	0.174	1.050		
		Left side	0.783		0.783		
		Right side	0.787	0.097	0.884		
		Top side		0.105	0.105		
		Bottom side	0.066		0.066		
	CDMA BC1	Front	1.106	0.111	1.217		
		Back	1.463	0.174	1.637	0.02	Case 1
		Left side	0.461		0.461		
		Right side	0.352	0.097	0.449		
		Top side		0.105	0.105		
		Bottom side	0.426		0.426		
	CDMA BC10	Front	0.758	0.111	0.869		
		Back	0.990	0.174	1.164		
		Left side	0.846		0.846		
		Right side	0.844	0.097	0.941		
		Top side		0.105	0.105		
		Bottom side	0.070		0.070		



FCC SAR Test Report

Report No. : FA651006-01

WWAN Band		Exposure Position	1	2	1+2 Summed 1g SAR (W/kg)	SPLSR	Case No
			WWAN 1g SAR (W/kg)	2.4GHz WLAN 1g SAR (W/kg)			
LTE	LTE Band 2	Front	1.018	0.111	1.129		
		Back	1.166	0.174	1.340		
		Left side	0.425		0.425		
		Right side	0.398	0.097	0.495		
		Top side		0.105	0.105		
		Bottom side	0.396		0.396		
	LTE Band 4	Front	0.859	0.111	0.970		
		Back	1.299	0.174	1.473		
		Left side	0.393		0.393		
		Right side	0.210	0.097	0.307		
		Top side		0.105	0.105		
		Bottom side	0.368		0.368		
	LTE Band 5	Front	0.490	0.111	0.601		
		Back	0.605	0.174	0.779		
		Left side	0.563		0.563		
		Right side	0.596	0.097	0.693		
		Top side		0.105	0.105		
		Bottom side	0.062		0.062		
	LTE Band 7	Front	0.860	0.111	0.971		
		Back	1.134	0.174	1.308		
		Left side	0.438		0.438		
		Right side	0.095	0.097	0.192		
		Top side		0.105	0.105		
		Bottom side	0.795		0.795		
	LTE Band 12	Front	0.385	0.111	0.496		
		Back	0.535	0.174	0.709		
		Left side	0.277		0.277		
		Right side	0.291	0.097	0.388		
		Top side		0.105	0.105		
		Bottom side	0.061		0.061		
	LTE Band 13	Front	0.496	0.111	0.607		
		Back	0.677	0.174	0.851		
		Left side	0.539		0.539		
		Right side	0.543	0.097	0.640		
		Top side		0.105	0.105		
		Bottom side	0.042		0.042		
	LTE Band 25	Front	0.674	0.111	0.785		
		Back	1.014	0.174	1.188		
		Left side	0.447		0.447		
		Right side	0.350	0.097	0.447		
		Top side		0.105	0.105		
		Bottom side	0.353		0.353		
	LTE Band 26	Front	0.463	0.111	0.574		
		Back	0.605	0.174	0.779		
		Left side	0.564		0.564		
		Right side	0.561	0.097	0.658		
		Top side		0.105	0.105		
		Bottom side	0.048		0.048		
	LTE Band 41	Front	0.631	0.111	0.742		
		Back	1.245	0.174	1.419		
		Left side	0.245		0.245		
		Right side	0.009	0.097	0.106		
		Top side		0.105	0.105		
		Bottom side	1.066		1.066		



16.3 Body-Worn Accessory Exposure Conditions

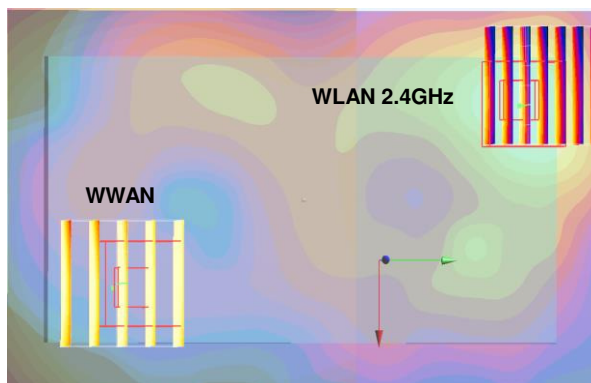
WWAN Band		Exposure Position	1	2	3	1+2 Summed 1g SAR (W/kg)	1+3 Summed 1g SAR (W/kg)	SPLSR	Case No
			WWAN	2.4GHz WLAN	Bluetooth				
			1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)				
GSM	GSM850	Front	0.693	0.111	0.015	0.804	0.708		
		Back	0.917	0.174	0.067	1.091	0.984		
	GSM1900	Front	0.684	0.111	0.015	0.795	0.699		
		Back	0.980	0.174	0.067	1.154	1.047		
WCDMA	WCDMA II	Front	1.191	0.111	0.015	1.302	1.206		
		Back	1.366	0.174	0.067	1.540	1.433		
		Back with Headset	1.312	0.174	0.067	1.486	1.379		
	WCDMA IV	Front	0.995	0.111	0.015	1.106	1.010		
		Back	1.397	0.174	0.067	1.571	1.464		
		Back with Headset	1.391	0.174	0.067	1.565	1.458		
	WCDMA V	Front	0.549	0.111	0.015	0.660	0.564		
		Back	0.720	0.174	0.067	0.894	0.787		
CDMA	CDMA BC0	Front	0.640	0.111	0.015	0.751	0.655		
		Back	0.830	0.174	0.067	1.004	0.897		
	CDMA BC1	Front	1.153	0.111	0.015	1.264	1.168		
		Back	1.436	0.174	0.067	1.610	1.503	0.02	Case 2
		Back with Headset	1.269	0.174	0.067	1.443	1.336		
	CDMA BC10	Front	0.752	0.111	0.015	0.863	0.767		
		Back	0.977	0.174	0.067	1.151	1.044		
LTE	LTE Band 2	Front	1.018	0.111	0.015	1.129	1.033		
		Back	1.166	0.174	0.067	1.340	1.233		
	LTE Band 4	Front	0.859	0.111	0.015	0.970	0.874		
		Back	1.299	0.174	0.067	1.473	1.366		
		Back with Headset	1.243	0.174	0.067	1.417	1.310		
	LTE Band 5	Front	0.490	0.111	0.015	0.601	0.505		
		Back	0.605	0.174	0.067	0.779	0.672		
	LTE Band 7	Front	0.860	0.111	0.015	0.971	0.875		
		Back	1.134	0.174	0.067	1.308	1.201		
	LTE Band 12	Front	0.385	0.111	0.015	0.496	0.400		
		Back	0.535	0.174	0.067	0.709	0.602		
	LTE Band 13	Front	0.496	0.111	0.015	0.607	0.511		
		Back	0.677	0.174	0.067	0.851	0.744		
	LTE Band 25	Front	0.674	0.111	0.015	0.785	0.689		
		Back	1.014	0.174	0.067	1.188	1.081		
	LTE Band 26	Front	0.463	0.111	0.015	0.574	0.478		
		Back	0.605	0.174	0.067	0.779	0.672		
	LTE Band 41	Front	0.631	0.111	0.015	0.742	0.646		
		Back	1.245	0.174	0.067	1.419	1.312		
		Back with Headset	1.201	0.174	0.067	1.375	1.268		

16.4 SPLSR Evaluation and Analysis

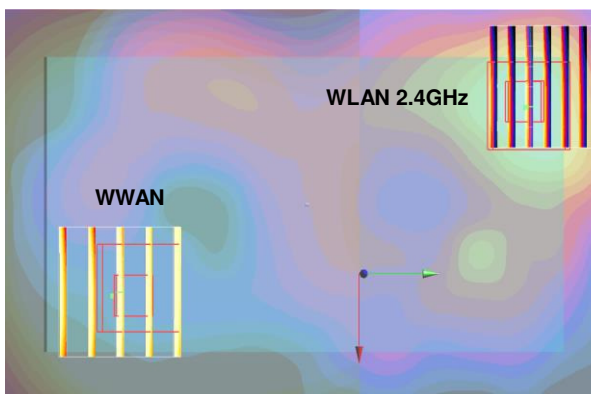
General Note:

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

Case1	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (cm)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
					X	Y	Z				
	CDMA BC1	Back	1.463	1	2.14	-5.14	0.05	121.6	1.637	0.02	Not required
	WLAN2.4GHz		0.174	1	-2.7	6.02	0.02				



Case 2	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (cm)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
					X	Y	Z				
	CDMA BC1	Back	1.436	1	2.15	-5.14	0.05	121.7	1.610	0.02	Not required
	WLAN2.4GHz		0.174	1	-2.7	6.02	0.02				



Test Engineer : Jerry Hu, Lawrence Chang, Galen Chang, Iver Zhan, Tommy Chen and Steven Chang

17. Uncertainty Assessment

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

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

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

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

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

(b) k is the coverage factor

Table 16.1. Standard Uncertainty for Assumed Distribution

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

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

Error Description	Uncertainty Value (±%)	Probability	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 16.2. Uncertainty Budget for frequency range 300 MHz to 3 GHz

18. 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 941225 D06 v02r01, "SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities", 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.