FCC SAR Test Report

APPLICANT	**:**	**Sony Mobile Communications AB**
EQUIPMENT	**:**	**Smart phone**
BRAND NAME	**:**	**SONY**
MODEL NAME	**:**	**D2303**
TYPE NAME	**:**	**PM-0722-BV**
FCC ID	**:**	**PY7PM-0722**
STANDARD	**:**	**FCC 47 CFR Part 2 (2.1093) ANSI/IEEE C95.1-1992 IEEE 1528-2003**

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

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

Reviewed by: Eric Huang / Deputy Manager

Approved by: Jones Tsai / Manager

Testing Laboratory
1190

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA3N1532	Rev. 01	Initial issue of report	Jan. 27, 2014
FA3N1532	Rev. 02	1. Modify WiFi direct description on page9, page53, page60. 2. Add NII frequency band simultaneously with other wireless technologies on page5. 3. Remove frequency 5600 MHz ~ 5650 MHz WLAN SAR test results and conducted power in the report. 4. Corrected typo on page13.	Feb. 18, 2014
FA3N1532	Rev. 03	Add ANT+ feature on page9.	Mar. 26, 2014

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **Sony Mobile Communications AB Smart phone, D2303** are as follows.

<Highest 1g-SAR Summary>

Exposure Position	Frequency Band	Equipment Class	Maximum RF output power (dBm)	Reported 1g-SAR (W/kg)	Highest Reported 1g-SAR (W/kg)
Head (Separation 0cm)	GPRS850 (4Tx slots)	PCE	27.50	0.35	0.70
	GSM1900 (DTM11)		21.65	0.20	
	WCDMA Band V		24.00	0.39	
	LTE Band 5		24.00	0.33	
	LTE Band 7		24.00	0.26	
	WLAN 5.2GHz Band	NII	14.00	0.34	
	WLAN 5.3GHz Band		14.00	0.44	
	WLAN 5.5GHz Band		14.00	0.47	
	WLAN 5.8GHz Band	DTS	14.00	0.27	
	WLAN 2.4GHz Band		17.00	0.70	
Hotspot (Separation 1cm)	GPRS850 (4Tx slots)	PCE	27.50	0.41	1.13
	GPRS1900(1Tx slot)		27.50	0.43	
	WCDMA Band V		24.00	0.57	
	LTE Band 5		24.00	0.42	
	LTE Band 7		21.50	1.13	
	WLAN 5.8GHz Band	DTS	14.00	0.28	
	WLAN 2.4GHz Band		17.00	0.12	
Body-worn (Separation 1.5cm)	GSM850 Voice	PCE	33.50	0.31	0.71
	EDGE1900 (4Tx slots)		25.90	0.71	
	WCDMA Band V		24.00	0.48	
	LTE Band 5		24.00	0.38	
	LTE Band 7		24.00	0.60	
	WLAN 5.2GHz Band	NII	14.00	0.09	
	WLAN 5.3GHz Band		14.00	0.16	
	WLAN 5.5GHz Band		14.00	0.12	
	WLAN 5.8GHz Band	DTS	14.00	0.16	
	WLAN 2.4GHz Band		17.00	0.06	

<Highest Simultaneous transmission 1gSAR>

Exposure Position	Frequency Band	Equipment Class	Maximum RF output power (dBm)	Highest Reported Simultaneous Transmission 1g-SAR (W/kg)
Head (Separation 0cm)	WCDMA Band V	PCE	24.00	1.09
	WLAN 2.4GHz Band	DTS	17.00	
	WCDMA Band V	PCE	24.00	0.82
	WLAN 5.5GHz Band	NII	14.00	
	WCDMA Band V	PCE	24.00	0.77
	Bluetooth	DSS	9.50	
Hotspot (Separation 1cm)	LTE Band 7	PCE	21.50	1.13
	WLAN 2.4GHz Band	DTS	14.00	
	LTE Band 7	PCE	21.50	1.13
	Bluetooth	DSS	9.50	
Body-worn (Separation 1.5cm)	EDGE1900 (4Tx slots)	PCE	25.90	0.87
	WLAN 5.8GHz Band	DTS	14.00	
	EDGE1900 (4Tx slots)	PCE	25.90	0.86
	WLAN 5.3GHz Band	NII	14.00	
	EDGE1900 (4Tx slots)	PCE	25.90	0.83
	Bluetooth	DSS	9.50	

Note: Simultaneous transmission was not evaluated as the sum of the individual SAR for WWAN and WLAN/Bluetooth was < 1.6 W/kg. This meets the requirements and simultaneous transmission exclusion specified in FCC KDB publication 648474 D04v01r02 - SAR Handset SAR.

<Highest 10g-SAR Summary>

<table>
<tr><th>Exposure Position</th><th>Frequency Band</th><th>Maximum
RF output power (dBm)</th><th>Reported
10g-SAR (W/kg)</th><th>Highest Reported
10g-SAR (W/kg)</th></tr>
<tr><td rowspan="10">Head
(Separation 0cm)</td><td>GPRS850 (4Tx slots)</td><td>27.50</td><td>0.26</td><td rowspan="10">0.32</td></tr>
<tr><td>GSM1900 (DTM11)</td><td>21.65</td><td>0.12</td></tr>
<tr><td>WCDMA Band V</td><td>24.00</td><td>0.30</td></tr>
<tr><td>LTE Band 5</td><td>24.00</td><td>0.25</td></tr>
<tr><td>LTE Band 7</td><td>24.00</td><td>0.14</td></tr>
<tr><td>WLAN 5.2GHz Band</td><td>14.00</td><td>0.07</td></tr>
<tr><td>WLAN 5.3GHz Band</td><td>14.00</td><td>0.08</td></tr>
<tr><td>WLAN 5.5GHz Band</td><td>14.00</td><td>0.10</td></tr>
<tr><td>WLAN 5.8GHz Band</td><td>14.00</td><td>0.07</td></tr>
<tr><td>WLAN 2.4GHz Band</td><td>17.00</td><td>0.32</td></tr>
<tr><td rowspan="7">Hotspot
(Separation 1cm)</td><td>GPRS850 (4Tx slots)</td><td>27.50</td><td>0.30</td><td rowspan="7">0.57</td></tr>
<tr><td>GPRS1900 (1Tx slot)</td><td>27.50</td><td>0.22</td></tr>
<tr><td>WCDMA Band V</td><td>24.00</td><td>0.45</td></tr>
<tr><td>LTE Band 5</td><td>24.00</td><td>0.33</td></tr>
<tr><td>LTE Band 7</td><td>21.50</td><td>0.57</td></tr>
<tr><td>WLAN 5.8GHz Band</td><td>14.00</td><td>0.08</td></tr>
<tr><td>WLAN 2.4GHz Band</td><td>17.00</td><td>0.07</td></tr>
<tr><td rowspan="10">Body-worn
(Separation 1.5cm)</td><td>GSM850 Voice</td><td>33.50</td><td>0.24</td><td rowspan="10">0.41</td></tr>
<tr><td>EDGE1900 (4Tx slots)</td><td>25.90</td><td>0.41</td></tr>
<tr><td>WCDMA Band V</td><td>24.00</td><td>0.37</td></tr>
<tr><td>LTE Band 5</td><td>24.00</td><td>0.29</td></tr>
<tr><td>LTE Band 7</td><td>24.00</td><td>0.33</td></tr>
<tr><td>WLAN 5.2GHz Band</td><td>14.00</td><td>0.03</td></tr>
<tr><td>WLAN 5.3GHz Band</td><td>14.00</td><td>0.05</td></tr>
<tr><td>WLAN 5.5GHz Band</td><td>14.00</td><td>0.04</td></tr>
<tr><td>WLAN 5.8GHz Band</td><td>14.00</td><td>0.05</td></tr>
<tr><td>WLAN 2.4GHz Band</td><td>17.00</td><td>0.04</td></tr>
</table>

<Highest Simultaneous transmission 10gSAR>

Exposure Position	Frequency Band	Maximum RF output power (dBm)	Highest Reported Simultaneous Transmission 10g-SAR (W/kg)
Head (Separation 0cm)	WCDMA Band V	24.00	0.62
	WLAN 2.4GHz Band	17.00	
	WCDMA Band V	24.00	0.40
	WLAN 5.5GHz Band	14.00	
	WCDMA Band V	24.00	0.45
	Bluetooth	9.50	
Hotspot (Separation 1cm)	LTE Band 7	21.50	0.57
	WLAN 2.4GHz Band	14.00	
	LTE Band 7	21.50	0.57
	Bluetooth	9.50	
Body-worn (Separation 1.5cm)	EDGE1900 (4Tx slots)	25.90	0.46
	WLAN 5.8GHz Band	14.00	
	EDGE1900 (4Tx slots)	25.90	0.46
	WLAN 5.3GHz Band	14.00	
	EDGE1900 (4Tx slots)	25.90	0.46
	Bluetooth	9.50	

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

2. Administration Data

2.1 Testing Laboratory

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

2.2 Applicant

Company Name	Sony Mobile Communications AB
Address	Nya Vattentornet, 22188 Lund, Sweden

2.3 Manufacturer

Company Name	Compal Communications, INC.
Address	No. 385, Yangguang Street, Neihu, Taipei 11491, Taiwan

2.4 Application Details

Date of Start during the Test	Dec. 10, 2013
Date of End during the Test	Jan. 03, 2014

3. General Information

3.1 Description of Equipment Under Test (EUT)

The equipment under test is a smart phone supporting, GSM850/900/1800/1900, UMTS I / V / VIII, LTE Band 1 / 3 / 5 / 7 / 8 / 20, WLAN2.4GHz 802.11 a/b/g/n, Bluetooth, FM Receiver and GPS features, and below is details of information. For FCC, only wireless modes in US frequency bands are tested.

Product Feature & Specification	
EUT	Smart phone
Brand Name	SONY
Model Name	D2303
Type Name	PM-0722-BV
FCC ID	PY7PM-0722
Wireless Technology and Frequency Range	GSM850: 824.2 MHz ~ 848.8 MHz GSM1900: 1850.2 MHz ~ 1909.8 MHz WCDMA Band V: 826.4 MHz ~ 846.6 MHz LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 7: 2502.5 MHz ~ 2567.5 MHz WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz WLAN 5.5GHz Band: 5500 MHz ~ 5700 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz NFC : 13.56 MHz
Mode	‧GSM/GPRS/EGPRS ‧RMC/AMR 12.2Kbps Rel 99 ‧HSDPA Rel 7, Cat14 ‧HSUPA Rel 6, Cat6 ‧DC-HSDPA Rel 8, Cat24 ‧LTE: QPSK, 16QAM ‧802.11a/b/g/n HT20/HT40 ‧Bluetooth v3.0+EDR，Bluetooth v4.0+LE ‧NFC: ASK ‧ANT+
Antenna Type	WWAN: PIFA Antenna WLAN: PIFA Antenna Bluetooth: PIFA Antenna NFC: Loop Antenna
HW Version	A
SW Version	18.0.C.0.30
Dual Transfer Mode Category	Class A – EUT can support Packet Switched and Circuit Switched Network simultaneously.
EUT Stage	Production Unit

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. 802.11n-HT40 is not supported in 2.4GHz and 5GHz WLNA operated in 5600 MHz ~ 5650 MHz is notched.
3. This device supports VoIP in GSM, WCDMA, LTE (e.g. 3rd part VoIP) and supports GRPS/EGPRS mode up to multi-slot class33 and supports DTM up to multi-slot class11.
4. When hotspot mode is enabled, power reduction will be activated to limit the maximum power of GSM1900 band and LTE band 7.
5. This device 2.4GHz WLAN supports Hotspot operation, and 2.4GHz / 5.8GHz WLAN supports WiFi Direct (Group Client / Group Owner), and 5.2GHz / 5.3GHz / 5.5GHz supports WiFi Direct (Group Client only).

3.2 Device Serial Number

Sample	Serial Number	IMEI Code
GSM/UMTS SAR measurements	ZH8001N9YM	004402451435402
LTE SAR measurements	ZH8001N4BQ	004402451434688
WLAN SAR measurements	ZH8001N9XX	004402451434470
GSM/UMTS Conducted measurements	ZH8001N9YM	004402451435402
LTE Conducted measurements	ZH8001N4BQ	004402451434688
BT/WLAN Conducted measurements	ZH8001NA4U	004402451443497

Note: Several samples were used with identical hardware to support SAR testing. The manufacturer has confirmed that the device tested gave the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.

3.3 Maximum RF output power among production units

Mode		Burst average power(dBm)		
		GSM 850	GSM 1900	
		Full power mode	Full power mode	Reduced power mode
GSM (GMSK, 1 Tx slot)		33.50	30.50	27.50
GPRS (GMSK, 1 Tx slot)		33.50	30.50	27.50
GPRS (GMSK, 2 Tx slots)		30.50	27.50	24.50
GPRS (GMSK, 3 Tx slots)		28.50	25.50	22.50
GPRS (GMSK, 4 Tx slots)		27.50	24.50	21.50
EDGE (8PSK, 1 Tx slot)		27.50	26.50	22.00
EDGE (8PSK, 2 Tx slots)		27.30	26.30	21.80
EDGE (8PSK, 3 Tx slots)		27.10	26.10	21.60
EDGE (8PSK, 4 Tx slots)		26.90	25.90	21.40
DTM 5	GSM (GMSK, 1 Tx slot)	30.50	27.50	24.50
	GPRS (GMSK, 1 Tx slot)	30.50	27.50	24.50
DTM 9	GSM (GMSK, 1 Tx slot)	30.50	27.50	24.50
	GPRS (GMSK, 1 Tx slot)	30.50	27.50	24.50
DTM11	GSM (GMSK, 1 Tx slot)	28.50	25.50	22.50
	GPRS (GMSK, 2 Tx slots)	28.50	25.50	22.50
DTM 5	GSM (GMSK, 1 Tx slot)	30.50	27.50	24.50
	EDGE (8PSK, 1 Tx slot)	27.30	26.30	21.80
DTM 9	GSM (GMSK, 1 Tx slot)	30.50	27.50	24.50
	EDGE (8PSK, 1 Tx slot)	27.30	26.30	21.80
DTM 11	GSM (GMSK, 1 Tx slot)	28.50	25.50	22.50
	EDGE (8PSK, 2 Tx slots)	27.10	26.10	21.60

Mode	Average power(dBm)
	WCDMA Band V
	Full power mode
AMR 12.2Kbps	24.0
RMC 12.2Kbps	24.0
HSDPA Subtest-1	24.0
DC-HSDPA Subtest-1	24.0
HSUPA Subtest-5	24.0

LTE Band 5				
Average Power (dBm)				
Modulation	BW (MHz)	RB size	Full Power mode (MPR)	Full power mode
QPSK	10	≤ 12	0	24.0
QPSK	10	> 12	0	24.0
16QAM	10	≤ 12	1	23.0
16QAM	10	> 12	1	23.0
QPSK	5	≤ 8	0	24.0
QPSK	5	> 8	0	24.0
16QAM	5	≤ 8	1	23.0
16QAM	5	> 8	1	23.0
QPSK	3	≤ 4	0	24.0
QPSK	3	> 4	0	24.0
16QAM	3	≤ 4	1	23.0
16QAM	3	> 4	1	23.0
QPSK	1.4	≤ 5	0	24.0
QPSK	1.4	> 5	0	24.0
16QAM	1.4	≤ 5	1	23.0
16QAM	1.4	> 5	1	23.0

LTE Band 7						
Average Power (dBm)						
Modulation	BW (MHz)	RB size	Full power mode MPR	Full Power	Reduced power mode MPR	Reduced Power
QPSK	20	≤ 18	0	24.0	0	21.5
QPSK	20	> 18	1	23.0	0	21.5
16QAM	20	≤ 18	1	23.0	0	21.5
16QAM	20	> 18	2	22.0	0	21.5
QPSK	15	≤ 16	0	24.0	0	21.5
QPSK	15	> 16	1	23.0	0	21.5
16QAM	15	≤ 16	1	23.0	0	21.5
16QAM	15	> 16	2	22.0	0	21.5
QPSK	10	≤ 12	0	24.0	0	21.5
QPSK	10	> 12	1	23.0	0	21.5
16QAM	10	≤ 12	1	23.0	0	21.5
16QAM	10	> 12	2	22.0	0	21.5
QPSK	5	≤ 8	0	24.0	0	21.5
QPSK	5	> 8	1	23.0	0	21.5
16QAM	5	≤ 8	1	23.0	0	21.5
16QAM	5	> 8	2	22.0	0	21.5

Mode		Maximum Target Average Power (dBm)
2.4GHz	802.11b	17.0
	802.11g	15.0
	802.11n-HT20	14.0
5GHz	802.11a	14.0
	802.11n-HT20	14.0
	802.11n-HT40	14.0
Bluetooth v3.0+EDR		9.5
Bluetooth v4.0+LE		2.75

The table below summarized necessary items addressed in KDB 941225 D05 v02r03.

FCC ID	PY7PM-0722
EUT	Smart phone
Operating Frequency Range of each LTE transmission band	LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 7: 2502.5 MHz ~ 2567.5 MHz
Channel Bandwidth	LTE Band 5:1.4MHz, 3MHz, 5MHz, 10MHz LTE Band 7: 5MHz, 10MHz, 15MHz, 20MHz

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

LTE Band 5

	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	20407	824.7	20415	825.5	20425	826.5	20450	829
M	20525	836.5	20525	836.5	20525	836.5	20525	836.5
H	20643	848.3	20635	847.5	20625	846.5	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 category, uplink modulations used	Category 4, QPSK, and 16QAM
LTE Voice / Data requirements	Data only
LTE MPR permanently built-in by design	Yes, per 3GPP TS 36.101 v11.0.0 (see Table 6.2.3-1 below)

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)
Base station simulator used for Testing	Anritsu MT8820C
Power reduction applied to satisfy SAR compliance	Yes, When operating in hotspot mode that LTE band 7 power reduction applied to satisfy SAR compliance.

Target Power reduction applied for each wireless mode

Exposure Position / wireless mode		Hotspot(1)
GSM1900 (GMSK 1 Tx slot) - CS1		3.0 dB
GSM1900 GPRS (GMSK 1 Tx slot) - CS1		3.0 dB
GSM1900 GPRS (GMSK 2 Tx slots) - CS1		3.0 dB
GSM1900 GPRS (GMSK 3 Tx slots) - CS1		3.0 dB
GSM1900 GPRS (GMSK 4 Tx slots) - CS1		3.0 dB
GSM1900 EDGE (8PSK 1 Tx slot) - MCS5		4.5 dB
GSM1900 EDGE (8PSK 2 Tx slots) - MCS5		4.5 dB
GSM1900 EDGE (8PSK 3 Tx slots) - MCS5		4.5 dB
GSM1900 EDGE (8PSK 4 Tx slots) - MCS5		4.5 dB
DTM 5	GSM (GMSK, 1 Tx slot)	3.0 dB
	GPRS (GMSK, 1 Tx slot)	3.0 dB
DTM 9	GSM (GMSK, 1 Tx slot)	3.0 dB
	GPRS (GMSK, 1 Tx slot)	3.0 dB
DTM11	GSM (GMSK, 1 Tx slot)	3.0 dB
	GPRS (GMSK, 2 Tx slots)	3.0 dB
DTM 5	GSM (GMSK, 1 Tx slot)	3.0 dB
	EDGE (8PSK, 1 Tx slot)	4.5 dB
DTM 9	GSM (GMSK, 1 Tx slot)	3.0 dB
	EDGE (8PSK, 1 Tx slot)	4.5 dB
DTM 11	GSM (GMSK, 1 Tx slot)	3.0 dB
	EDGE (8PSK, 2 Tx slots)	4.5 dB
LTE band 7		2.5 dB

Remark:

1. (1): Reduced maximum limit applied by activation of Hotspot operation
2. When hotspot mode is enabled, power reduction will be activated to limit the maximum power of GSM1900 band and LTE band 7.
3. Power reduction is not applicable for GSM850 Band, UMTS Band 5, LTE Band 5, WLAN and Bluetooth.

3.4 Applied Standard

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

- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- IEEE 1528-2003
- FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r02
- FCC KDB 865664 D02 SAR Reporting v01r01
- FCC KDB 447498 D01 General RF Exposure Guidance v05r01
- FCC KDB 648474 D04 Handset SAR v01r02
- FCC KDB 248227 D01 SAR meas for 802 11abg v01r02
- FCC KDB 941225 D01 SAR test for 3G devices v02
- FCC KDB 941225 D02 HSPA and 1x Advanced v02r02
- FCC KDB 941225 D03 SAR Test Reduction GSM GPRS EDGE v01
- FCC KDB 941225 D04 SAR for GSM E GPRS Dual Xfer Mode v01
- FCC KDB 941225 D05 SAR for LTE Devices v02r03
- FCC KDB 941225 D06 Hotspot Mode SAR v01r01

3.5 Device Category and SAR Limits

This device belongs to portable device category because its radiating structure is allowed to be used within 20 centimeters of the body of the user. Limit for General Population/Uncontrolled exposure should be applied for this device, it is 1.6 W/kg as averaged over any 1 gram of tissue.

3.6 Test Conditions

3.5.1 Ambient Condition

Ambient Temperature	20 to 24 ℃
Humidity	< 60 %

3.5.2 Test Configuration

For WWAN SAR testing, the device was controlled by using a base station emulator. Communication between the device and the emulator was established by air link. The distance between the EUT and the antenna of the emulator is larger than 50 cm and the output power radiated from the emulator antenna is at least 30 dB smaller than the output power of EUT.

During WLAN SAR testing EUT is configured with the WLAN continuous TX tool, and the transmission duty factor was monitored on the spectrum analyzer with zero-span setting

Duty factor observed as below:

802.11b, 1Mbps: 97.63%

802.11a, 6Mbps: 87.26%

For WLAN SAR testing, WLAN engineering testing software installed on the EUT can provide continuous transmitting RF signal.

4. Specific Absorption Rate (SAR)

4.1 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.

4.2 SAR Definition

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

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

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

SAR measurement can be either related to the temperature elevation in tissue by

$$\mathbf{SAR} = \mathbf{C}\left(\frac{\boldsymbol{\delta}\mathbf{T}}{\boldsymbol{\delta}\mathbf{t}}\right)$$

Where: C is the specific heat capacity, δT is the temperature rise and δt is the exposure duration, or related to the electrical field in the tissue by

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

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

However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

5. SAR Measurement System

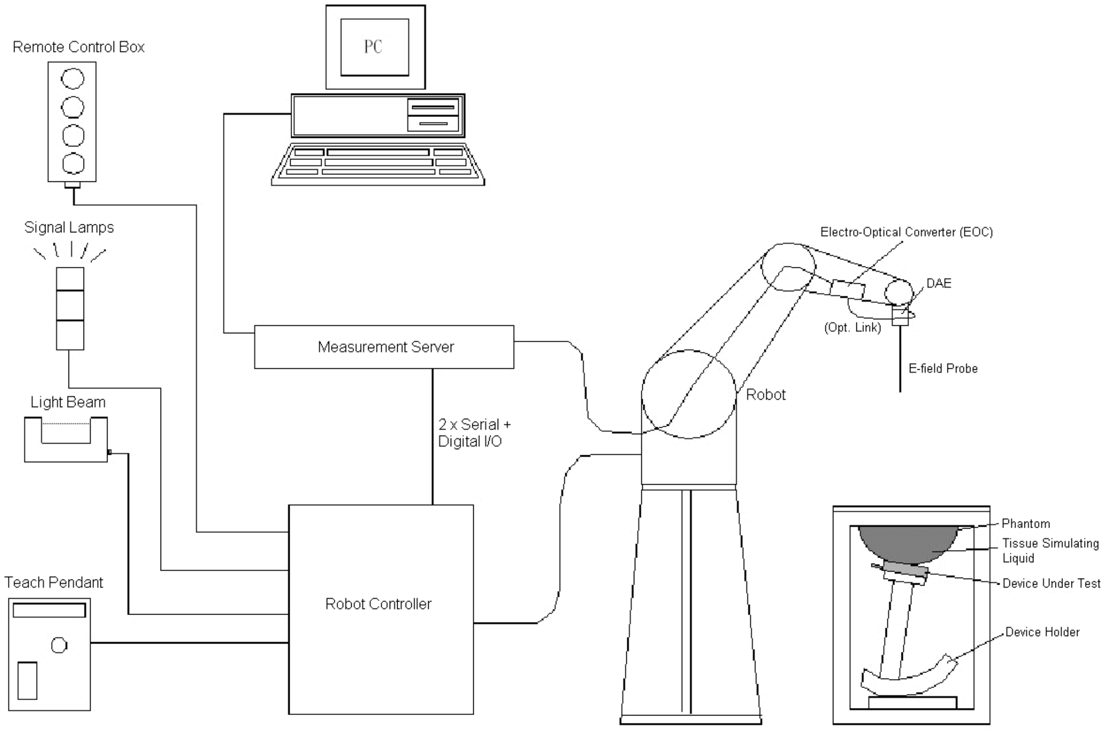


Fig 5.1 SPEAG DASY System Configurations

The DASY system for performance compliance tests is illustrated above graphically. This system consists of the following items:

- A standard high precision 6-axis robot with controller, a teach pendant and software
- A data acquisition electronic (DAE) attached to the robot arm extension
- A dosimetric probe equipped with an optical surface detector system
- The electro-optical converter (EOC) performs the conversion between optical and electrical signals
- A measurement server performs the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the accuracy of the probe positioning
- A computer operating Windows XP
- DASY software
- Remove control with teach pendant and additional circuitry for robot safety such as warming lamps, etc.
- The SAM twin phantom
- A device holder
- Tissue simulating liquid
- Dipole for evaluating the proper functioning of the system

Component details are described in in the following sub-sections.

5.1 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.

5.1.1 E-Field Probe Specification

<EX3DV4 Probe>

Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	 **Fig 5.2 Photo of EX3DV4/ES3DV4**
Frequency	10 MHz to 6 GHz; Linearity: ± 0.2 dB	
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)	
Dynamic Range	10 µW/g to 100 mW/g; Linearity: ± 0.2 dB (noise: typically < 1 µW/g)	
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm	

5.1.2 E-Field Probe Calibration

Each probe needs to be calibrated according to a dosimetric assessment procedure with accuracy better than ± 10%. The spherical isotropy shall be evaluated and within ± 0.25dB. The sensitivity parameters (NormX, NormY, and NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested. The calibration data can be referred to appendix C of this report.

5.2 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 5.3 Photo of DAE

5.3 Robot

The SPEAG DASY system uses the high precision robots (DASY4: RX90BL; DASY5: TX90XL) type from Stäubli SA (France). For the 6-axis controller system, the robot controller version (DASY4: CS7MB; DASY5: CS8c) from Stäubli is used. The Stäubli robot series have many features that are important for our application:

- High precision (repeatability ±0.035 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)

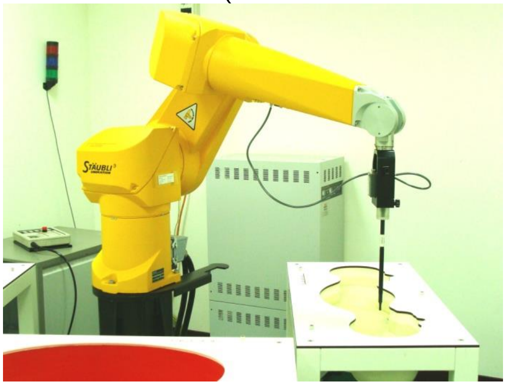


Fig 5.4 Photo of DASY4

Fig 5.5 Photo of DASY5

5.4 Measurement Server

The measurement server is based on a PC/104 CPU board with CPU (DASY4: 166 MHz, Intel Pentium; DASY5: 400 MHz, Intel Celeron), chipdisk (DASY4: 32 MB; DASY5: 128 MB), RAM (DASY4: 64 MB, DASY5: 128 MB). The necessary circuits for communication with the DAE electronic box, as well as the 16 bit AD converter system for optical detection and digital I/O interface are contained on the DASY I/O board, which is directly connected to the PC/104 bus of the CPU board.

The measurement server performs all the real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operations.

Fig 5.6 Photo of Server for DASY4

Fig 5.7 Photo of Server for DASY5

5.5 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

Fig 5.8 Photo of SAM 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.

<ELI4 Phantom>

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

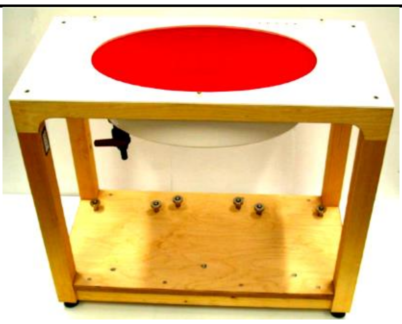


Fig 5.9 Photo of ELI4 Phantom

The ELI4 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.

5.6 Device Holder

<Device Holder for SAM Twin Phantom>

The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5 mm distance, a positioning uncertainty of ± 0.5 mm would produce a SAR uncertainty of ± 20 %. Accurate device positioning is therefore crucial for accurate and repeatable measurements. The positions in which the devices must be measured are defined by the standards.

The DASY device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation center for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.

The DASY device holder is constructed of low-loss POM material having the following dielectric parameters: relative permittivity ε = 3 and loss tangent δ = 0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

Fig 5.10 Device Holder

<Laptop Extension Kit>

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.

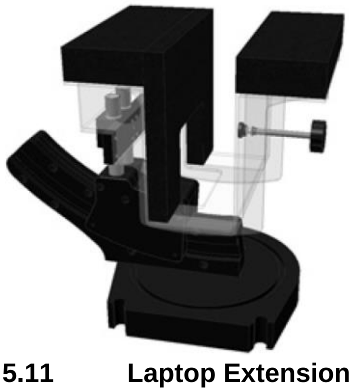


Fig 5.11 Laptop Extension Kit

5.7 Data Storage and Evaluation

5.7.1 Data Storage

The DASY software stores the assessed data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all the necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files. The post-processing software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of erroneous parameter settings. For example, if a measurement has been performed with an incorrect crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be reevaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type (e.g., [V/m], [A/m], [mW/g]). Some of these units are not available in certain situations or give meaningless results, e.g., a SAR-output in a non-lose media, will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

5.7.2 Data Evaluation

The DASY post-processing software (SEMCAD) automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software：

Probe parameters：	- Sensitivity	$Norm_i$, a_{i0}, a_{i1}, a_{i2}
	- Conversion factor	$ConvF_i$
	- Diode compression point	dcp_i
Device parameters：	- Frequency	f
	- Crest factor	cf
Media parameters：	- Conductivity	σ
	- Density	ρ

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY components. In the direct measuring mode of the multi-meter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics. If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power.

The formula for each channel can be given as：

$$\mathbf{V_i = U_i + U_i^2 \cdot \frac{cf}{dcp_i}}$$

with V_i = compensated signal of channel i, (i = x, y, z)
U_i = input signal of channel i, (i = x, y, z)
cf = crest factor of exciting field (DASY parameter)
dcp_i = diode compression point (DASY parameter)

From the compensated input signals, the primary field data for each channel can be evaluated：

E-field Probes：$\mathbf{E_i = \sqrt{\frac{V_i}{Norm_i \cdot ConvF}}}$

H-field Probes：$\mathbf{H_i = \sqrt{V_i} \cdot \frac{a_{i0} + a_{i1} f + a_{i2} f^2}{f}}$

with V_i = compensated signal of channel i, (i = x, y, z)
$Norm_i$ = sensor sensitivity of channel i, (i = x, y, z), μV/(V/m)^2 for E-field Probes
ConvF = sensitivity enhancement in solution
a_{ij} = sensor sensitivity factors for H-field probes
f = carrier frequency [GHz]
E_i = electric field strength of channel i in V/m
H_i = magnetic field strength of channel i in A/m

The RSS value of the field components gives the total field strength (Hermitian magnitude)：

$$\mathbf{E_{tot} = \sqrt{E_x^2 + E_y^2 + E_z^2}}$$

The primary field data are used to calculate the derived field units.

$$\mathbf{SAR = E_{tot}^2 \cdot \frac{\sigma}{\rho \cdot 1000}}$$

with SAR = local specific absorption rate in mW/g
E_{tot} = total field strength in V/m
σ = conductivity in [mho/m] or [Siemens/m]
ρ = equivalent tissue density in g/cm^3

Note that the density is set to 1, to account for actual head tissue density rather than the density of the tissue simulating liquid.

5.8 Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	835MHz System Validation Kit	D835V2	4d162	Nov. 11, 2013	Nov. 10, 2014
SPEAG	1900MHz System Validation Kit	D1900V2	5d182	Nov. 12, 2013	Nov. 11, 2014
SPEAG	2450MHz System Validation Kit	D2450V2	924	Nov. 13, 2013	Nov. 12, 2014
SPEAG	2600MHz System Validation Kit	D2600V2	1070	Nov. 13, 2013	Nov. 12, 2014
SPEAG	5GHz System Validation Kit	D5GHzV2	1128	Jul. 24, 2013	Jul. 23, 2014
SPEAG	Data Acquisition Electronics	DAE3	577	May. 08, 2013	May. 07, 2014
SPEAG	Data Acquisition Electronics	DAE4	778	Aug. 21, 2013	Aug. 20, 2014
SPEAG	Data Acquisition Electronics	DAE3	495	May. 08, 2013	May. 07, 2014
SPEAG	Data Acquisition Electronics	DAE4	1279	Jan. 28, 2013	Jan. 27, 2014
SPEAG	Data Acquisition Electronics	DAE4	1338	Nov. 05, 2013	Nov. 04, 2014
SPEAG	Dosimetric E-Field Probe	EX3DV4	3931	Sep. 10, 2013	Sep. 09, 2014
SPEAG	Dosimetric E-Field Probe	EX3DV4	3935	Nov. 04, 2013	Nov. 03, 2014
SPEAG	Dosimetric E-Field Probe	EX3DV4	3925	Jun. 12, 2013	Jun. 11, 2014
SPEAG	Dosimetric E-Field Probe	EX3DV4	3898	Jan. 14, 2013	Jan. 13, 2014
Wisewind	Thermometer	ETP-101	TM560	Oct. 22, 2013	Oct. 21, 2014
Wisewind	Thermometer	ETP-101	TM685	Oct. 22, 2013	Oct. 21, 2014
Wisewind	Thermometer	HTC-1	TM642	Oct. 22, 2013	Oct. 21, 2014
Wisewind	Thermometer	HTC-1	TM281	Oct. 22, 2013	Oct. 21, 2014
Agilent	Wireless Communication Test Set	E5515C	GB46311322	Mar. 25, 2013	Mar. 24, 2014
Agilent	Wireless Communication Test Set	E5515C	MY50264370	Apr. 29, 2013	Apr. 28, 2014
Agilent	Wireless Communication Test Set	E5515C	MY50266977	May. 06, 2013	May. 05, 2014
R&S	Radio communication Tester	CMW500	116160	Jan. 09, 2013	Jan. 08, 2014
SPEAG	Device Holder	N/A	N/A	NCR	NCR
R&S	Signal Generator	SMF 100A	101107	May. 27, 2013	May. 26, 2014
SPEAG	Dielectric Probe Kit	DAK-3.5	1126	Jul. 23, 2013	Jul. 22, 2014
Agilent	ENA Network Analyzer	E5071C	MY46316648	Feb. 07, 2013	Feb. 06, 2014
Anritsu	Power Meter	ML2495A	1132003	Aug. 28, 2013	Aug. 27, 2014
Anritsu	Power Sensor	MA2411B	1126017	Aug. 27, 2013	Aug. 26, 2014
Agilent	Dual Directional Coupler	778D	50422	Note 2	
Woken	Attenuator 1	WK0602-XX	N/A	Note 2	
PE	Attenuator 2	PE7005-10	N/A	Note 2	
PE	Attenuator 3	PE7005- 3	N/A	Note 2	
AR	Power Amplifier	5S1G4M2	328767	Note 3	
R&S	Spectrum Analyzer	FSP 7	101131	Jul. 09, 2013	Jul. 08, 2014

Table 5.1 Test Equipment List

Note:

1. The calibration certificate of DASY can be referred to appendix C of this report.
2. The Insertion Loss calibration of Dual Directional Coupler and Attenuator were characterized via the network analyzer and compensated during system check.
3. In system check we need to monitor the level on the power meter, and adjust the power amplifier level to have precise power level to the dipole; the measured SAR will be normalized to 1W input power according to the ratio of 1W to the input power to the dipole. For system check, the calibration of the power amplifier is deemed not critically required for correct measurement; the power meter is critical and we do have calibration for it
4. Attenuator 1 insertion loss is calibrated by the network Analyzer, which the calibration is valid, before system check.

6. Tissue Simulating Liquids

For the measurement of the field distribution inside the SAM phantom with DASY, the phantom must be filled with around 25 liters of homogeneous body tissue simulating liquid. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 6.1. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 6.2.

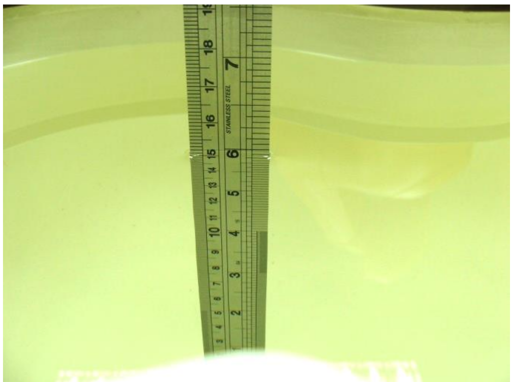


Fig 6.1 Photo of Liquid Height for Head SAR

Fig 6.2 Photo of Liquid Height for Body SAR

The following table gives the recipes for tissue simulating liquid.

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

Table 6.1 Recipes of Tissue Simulating Liquid

Simulating Liquid for 5G, Manufactured by SPEAG

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

The dielectric parameters of the liquids were verified prior to the SAR evaluation using an SPEAG DAK-3.5 Dielectric Probe Kit and an Agilent Network Analyzer.

The following table shows the measuring results for simulating liquid.

Frequency (MHz)	Tissue Type	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
835	Head	22.2	0.928	42.981	0.90	41.50	3.11	3.57	±5	2013/12/18
835	Head	22.6	0.912	40.642	0.90	41.50	1.33	-2.07	±5	2013/12/29
835	Head	22.6	0.885	42.000	0.90	41.50	-1.67	1.20	±5	2014/1/3
835	Body	22.4	0.984	54.400	0.97	55.20	1.44	-1.45	±5	2013/12/16
835	Body	22.4	0.963	54.500	0.97	55.20	-0.72	-1.27	±5	2013/12/26
835	Body	22.3	0.963	54.541	0.97	55.20	-0.72	-1.19	±5	2013/12/29
1900	Head	22.3	1.430	39.200	1.40	40.00	2.14	-2.00	±5	2013/12/26
1900	Head	22.5	1.440	38.100	1.40	40.00	2.86	-4.75	±5	2014/1/3
1900	Body	22.4	1.531	52.652	1.52	53.30	0.72	-1.22	±5	2013/12/29
1900	Body	22.4	1.530	52.500	1.52	53.30	0.66	-1.50	±5	2014/1/3
2450	Head	22.3	1.833	39.517	1.80	39.20	1.83	0.81	±5	2013/12/19
2450	Body	22.3	1.981	54.191	1.95	52.70	1.59	2.83	±5	2013/12/19
2600	Head	22.5	1.970	38.100	1.96	39.00	0.51	-2.31	±5	2013/12/20
2600	Head	22.2	1.997	37.624	1.96	39.00	1.89	-3.53	±5	2013/12/28
2600	Body	22.5	2.184	53.787	2.16	52.50	1.11	2.45	±5	2013/12/25
2600	Body	22.1	2.205	52.836	2.16	52.50	2.08	0.64	±5	2013/12/27
5200	Head	22.5	4.791	35.422	4.66	36.00	2.81	-1.61	±5	2013/12/10
5200	Body	22.4	5.244	47.499	5.30	49.00	-1.06	-3.06	±5	2013/12/11
5300	Head	22.5	4.894	35.280	4.76	35.87	2.82	-1.64	±5	2013/12/10
5300	Body	22.4	5.380	47.244	5.42	48.88	-0.74	-3.35	±5	2013/12/11
5600	Head	22.5	5.199	34.704	5.06	35.53	2.75	-2.32	±5	2013/12/10
5600	Body	22.4	5.773	46.756	5.77	48.47	0.05	-3.54	±5	2013/12/11
5800	Head	22.5	5.390	34.350	5.27	35.30	2.28	-2.69	±5	2013/12/10
5800	Body	22.4	6.127	46.464	6.00	48.20	2.12	-3.60	±5	2013/12/11
5800	Body	22.6	6.113	47.156	6.00	48.20	1.88	-2.17	±5	2013/12/25

Table 6.2 Measuring Results for Simulating Liquid

7. System Verification Procedures

Each DASY system is equipped with one or more system validation kits. These units, together with the predefined measurement procedures within the DASY software, enable the user to conduct the system performance check and system validation. System validation kit includes a dipole, tripod holder to fix it underneath the flat phantom and a corresponding distance holder.

7.1 Purpose of System Performance check

The system performance check verifies that the system operates within its specifications. System and operator errors can be detected and corrected. It is recommended that the system performance check be performed prior to any usage of the system in order to guarantee reproducible results. The system performance check uses normal SAR measurements in a simplified setup with a well characterized source. This setup was selected to give a high sensitivity to all parameters that might fail or vary over time. The system check does not intend to replace the calibration of the components, but indicates situations where the system uncertainty is exceeded due to drift or failure.

7.2 System Setup

In the simplified setup for system evaluation, the EUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave that comes from a signal generator. The calibrated dipole must be placed beneath the flat phantom section of the SAM twin phantom with the correct distance holder. The distance holder should touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The equipment setup is shown below:

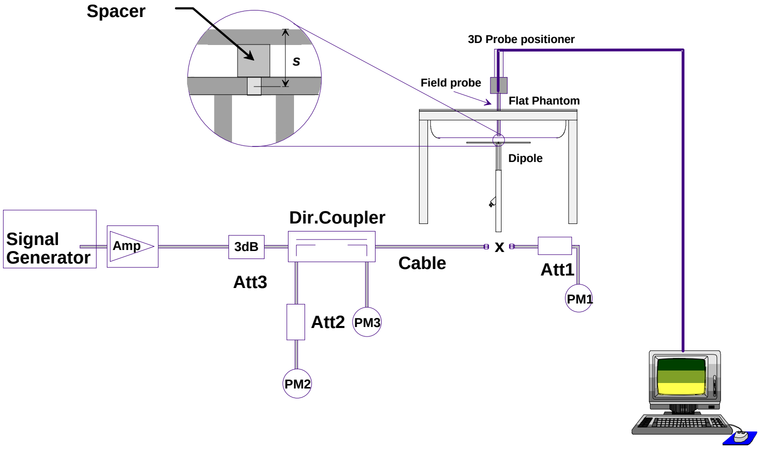


Fig 7.1 System Setup for System Evaluation

1. Signal Generator
2. Amplifier
3. Directional Coupler
4. Power Meter
5. Calibrated Dipole

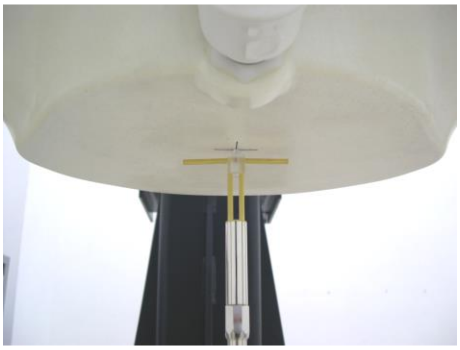


Fig 7.2 Photo of Dipole Setup

7.3 SAR System Verification Results

Comparing to the original SAR value provided by SPEAG, the verification data should be within its specification of 10 %. Table 7.1 shows the target SAR and measured SAR after normalized to 1W input power. The table below indicates the system performance check can meet the variation criterion and the plots can be referred to Appendix A of this report.

Date	Frequency (MHz)	Tissue Type	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured SAR (W/kg)	Targeted SAR (W/kg)	Normalized SAR (W/kg)	Deviation (%)
2013/12/18	835	Head	250	D835V2-SN:4d162	3898	1279	2.55	9.53	10.20	7.03
2013/12/29	835	Head	250	D835V2-SN:4d162	3935	1338	2.54	9.53	10.16	6.61
2014/1/3	835	Head	250	D835V2-SN:4d162	3931	1279	2.47	9.53	9.88	3.67
2013/12/16	835	Body	250	D835V2-SN:4d162	3898	1279	2.50	9.28	10.00	7.76
2013/12/26	835	Body	250	D835V2-SN:4d162	3925	495	2.40	9.28	9.60	3.45
2013/12/29	835	Body	250	D835V2-SN:4d162	3898	778	2.47	9.28	9.88	6.47
2013/12/26	1900	Head	250	D1900V2-SN:5d182	3925	495	10.10	40.10	40.40	0.75
2014/1/3	1900	Head	250	D1900V2-SN:5d182	3931	1279	10.50	40.10	42.00	4.74
2013/12/29	1900	Body	250	D1900V2-SN:5d182	3931	577	9.70	39.50	38.80	-1.77
2014/1/3	1900	Body	250	D1900V2-SN:5d182	3931	1279	10.40	39.50	41.60	5.32
2013/12/19	2450	Head	250	D2450V2-SN:924	3925	495	13.80	52.40	55.20	5.34
2013/12/19	2450	Body	250	D2450V2-SN:924	3925	495	12.50	50.20	50.00	-0.40
2013/12/20	2600	Head	250	D2600V2-SN:1070	3935	1338	14.70	56.60	58.80	3.89
2013/12/28	2600	Head	250	D2600V2-SN:1070	3935	1338	15.00	56.60	60.00	6.01
2013/12/25	2600	Body	250	D2600V2-SN:1070	3935	1279	13.90	55.70	55.6	-0.18
2013/12/27	2600	Body	250	D2600V2-SN:1070	3935	1338	14.70	55.70	58.80	5.57
2013/12/10	5200	Head	100	D5GHzV2-SN:1128	3925	495	8.03	78.20	80.30	2.69
2013/12/11	5200	Body	100	D5GHzV2-SN:1128	3925	495	7.61	73.40	76.10	3.68
2013/12/10	5300	Head	100	D5GHzV2-SN:1128	3925	495	8.52	80.60	85.20	5.71
2013/12/11	5300	Body	100	D5GHzV2-SN:1128	3925	495	7.27	74.30	72.70	-2.15
2013/12/10	5600	Head	100	D5GHzV2-SN:1128	3925	495	8.14	80.50	81.40	1.12
2013/12/11	5600	Body	100	D5GHzV2-SN:1128	3925	495	8.17	77.80	81.70	5.01
2013/12/10	5800	Head	100	D5GHzV2-SN:1128	3925	495	8.19	77.20	81.90	6.09
2013/12/11	5800	Body	100	D5GHzV2-SN:1128	3925	495	7.47	72.20	74.70	3.46
2013/12/25	5800	Body	100	D5GHzV2-SN:1128	3925	495	7.46	72.20	74.60	3.32

Table 7.1 Target and Measurement SAR after Normalized

8. EUT Testing Position

8.1 Define two imaginary lines on the handset

(a) 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, and the midpoint of the width w_b of the bottom of the handset.

(b) The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output. The horizontal line is also tangential to the face of the handset at point A.

(c) 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, especially for clamshell handsets, handsets with flip covers, and other irregularly shaped handsets.

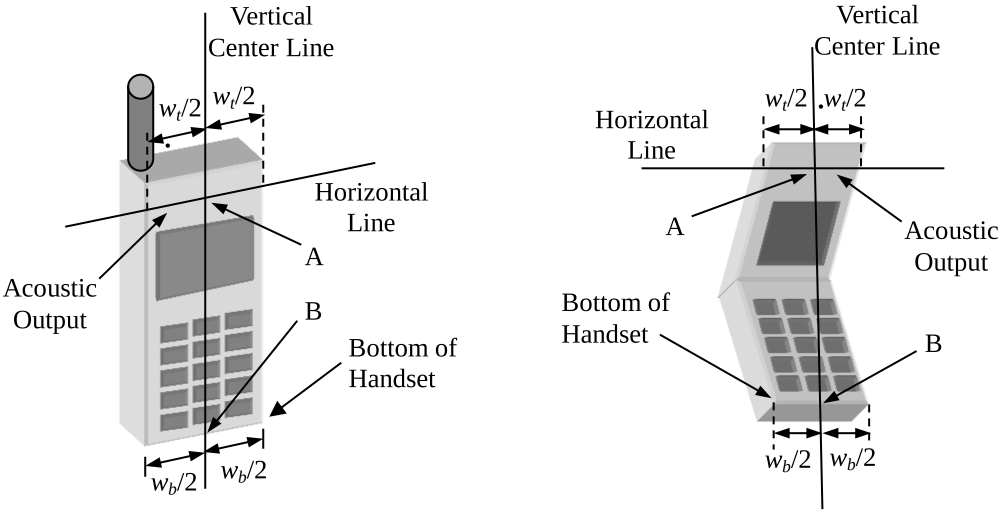


Fig 8.1 Illustration for Handset Vertical and Horizontal Reference Lines

8.2 Cheek Position

(a) To position the device with the vertical center line of the body of the device and the horizontal line crossing the center piece in a plane parallel to the sagittal plane of the phantom. While maintaining the device in this plane, align the vertical center line with the reference plane containing the three ear and mouth reference point (M: Mouth, RE: Right Ear, and LE: Left Ear) and align the center of the ear piece with the line RE-LE.

(b) To move the device towards the phantom with the ear piece aligned with the line LE-RE until the phone touched the ear. While maintaining the device in the reference plane and maintaining the phone contact with the ear, move the bottom of the phone until any point on the front side is in contact with the cheek of the phantom or until contact with the ear is lost (see Fig. 8.2).

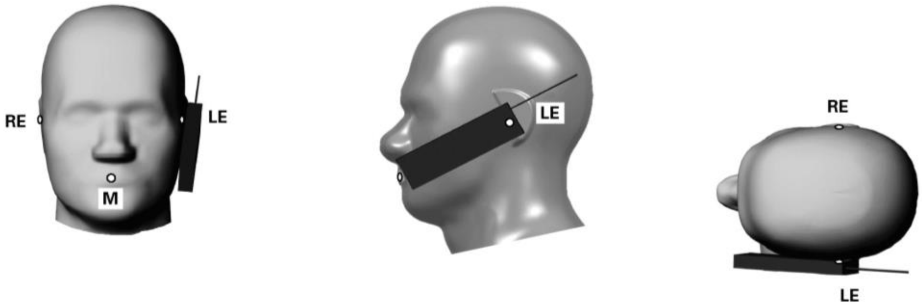


Fig 8.2 Illustration for Cheek Position

8.3 Tilted Position

(a) To position the device in the “cheek” position described above.

(b) While maintaining the device the reference plane described above and pivoting against the ear, moves it outward away from the mouth by an angle of 15 degrees or until contact with the ear is lost (see Fig. 8.3).

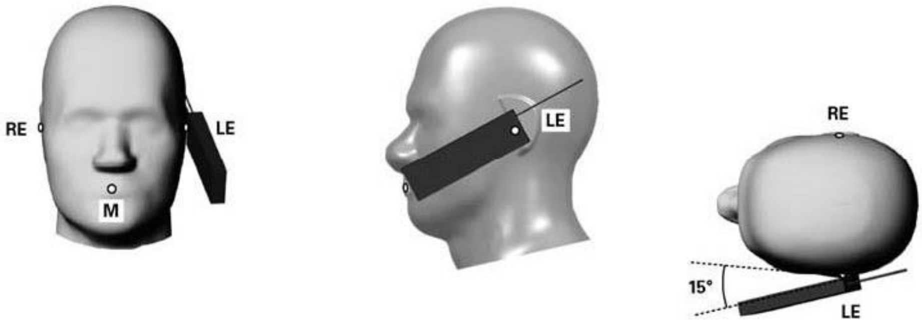


Fig 8.3 Illustration for Tilted Position

8.4 Body Worn Position

(a) To position the device parallel to the phantom surface with either keypad up or down.
(b) To adjust the device parallel to the flat phantom.
(c) To adjust the distance between the device surface and the flat phantom to 1.5 cm.

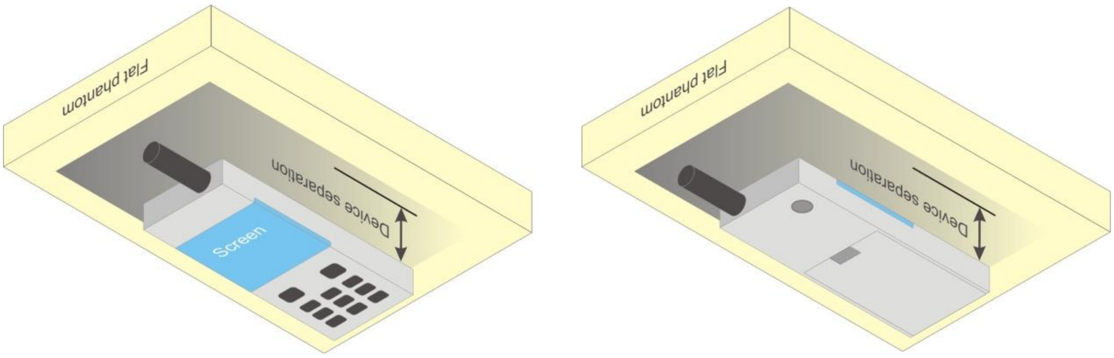


Fig 8.4 Illustration for Body Worn Position

8.5 Hotspot Position

(a) To position the device parallel to the phantom surface with all sides and either keypad up or down.
(b) To adjust the device parallel to the flat phantom.
(c) To adjust the distance between the device and the flat phantom to 1.0cm.

<EUT Setup Photos>

Please refer to Appendix D for the test setup photos.

9. Measurement Procedures

The measurement procedures are as follows:

<Conducted power measurement>

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

<SAR measurement>

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

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

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

9.1 Spatial Peak SAR Evaluation

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

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

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

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

9.2 Power Reference Measurement

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

9.3 Area & Zoom Scan Procedures

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10 g. Area scan and zoom scan resolution setting follows KDB 865664 D01v01r02 quoted below.

When the 1-g SAR of the highest peak is within 2 dB of the SAR limit, additional zoom scans are required for other peaks within 2 dB of the highest peak that have not been included in any zoom scan to ensure there is no increase in SAR.

<table>
<tr><th colspan="3"></th><th>$\leq$ 3 GHz</th><th>> 3 GHz</th></tr>
<tr><td colspan="3">Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface</td><td>5 ± 1 mm</td><td>$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm</td></tr>
<tr><td colspan="3">Maximum probe angle from probe axis to phantom surface normal at the measurement location</td><td>30° ± 1°</td><td>20° ± 1°</td></tr>
<tr><td colspan="3" rowspan="2">Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}</td><td>$\leq$ 2 GHz: $\leq$ 15 mm
2 – 3 GHz: $\leq$ 12 mm</td><td>3 – 4 GHz: $\leq$ 12 mm
4 – 6 GHz: $\leq$ 10 mm</td></tr>
<tr><td colspan="2">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.</td></tr>
<tr><td colspan="3">Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}</td><td>$\leq$ 2 GHz: $\leq$ 8 mm
2 – 3 GHz: $\leq$ 5 mm*</td><td>3 – 4 GHz: $\leq$ 5 mm*
4 – 6 GHz: $\leq$ 4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">uniform grid: $\Delta z_{Zoom}(n)$</td><td>$\leq$ 5 mm</td><td>3 – 4 GHz: $\leq$ 4 mm
4 – 5 GHz: $\leq$ 3 mm
5 – 6 GHz: $\leq$ 2 mm</td></tr>
<tr><td rowspan="2">graded grid</td><td>$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface</td><td>$\leq$ 4 mm</td><td>3 – 4 GHz: $\leq$ 3 mm
4 – 5 GHz: $\leq$ 2.5 mm
5 – 6 GHz: $\leq$ 2 mm</td></tr>
<tr><td>$\Delta z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>$\geq$ 30 mm</td><td>3 – 4 GHz: $\geq$ 28 mm
4 – 5 GHz: $\geq$ 25 mm
5 – 6 GHz: $\geq$ 22 mm</td></tr>
<tr><td colspan="5">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 <u>*reported*</u> SAR from the area scan based *1-g SAR estimation* procedures of KDB 447498 is $\leq$ 1.4 W/kg, $\leq$ 8 mm, $\leq$ 7 mm and $\leq$ 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.</td></tr>
</table>

9.4 Volume Scan Procedures

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

9.5 SAR Averaged Methods

In DASY, the interpolation and extrapolation are both based on the modified Quadratic Shepard's method. The interpolation scheme combines a least-square fitted function method and a weighted average method which are the two basic types of computational interpolation and approximation.

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1 g and 10 g cubes, the extrapolation distance should not be larger than 5 mm.

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. Bluetooth Exclusions Applied

Mode Band	Average power(dBm)	
	Bluetooth v3.0+EDR	Bluetooth v4.0+LE
2.4GHz Bluetooth	9.5	2.75

Note:

1. Per KDB 447498 D01v05r01, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:

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

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

2. Per KDB 447498 D01v05r01 exclusion thresholds is 2.83 < 3, RF exposure evaluation is not required.

11. Conducted RF Output Power (Unit: dBm)

<GSM Conducted Power>

Note:

1. For DTM multi-slot class mode, the device was linked with base station simulator (Agilent E5515C) and transmit maximum power on maximum number of TX slots, i.e. one CS timeslot, and additional PS timeslots (1 for DTM class 5 and 9, 2 for DTM class 11) in one TDMA frame.
2. Agilent E5515C was used to setup the device operated under DTM mode for power measurement and SAR testing. For conducted power, the power of the burst for voice and the power of the bursts for data was reported separately in the table above, and the frame-average power is derived below to determine SAR testing.
   *DTM frame average power (dBm) = 10*log [∑(power of each slot, in mW)/8]*
3. Per KDB 447498 D01v05r01, the maximum output power channel is used for SAR testing and for further SAR test reduction.
4. For Head and body-worn SAR testing, the EUT was set in GSM Voice for GSM850 and DTM Multi-slot class 11 for GSM1900 due to its highest frame-average power and considering the possibility of e.g. 3rd part VoIP operation was additional EGPRS SAR testing performed on voice mode worse case.
5. For hotspot mode SAR testing of GSM850 band, GPRS, EDGE and DTM were evaluated, and EUT was set in GPRS 4 Tx slots due to its highest frame-average power.
6. Power reduction which is triggered by hotspot mode is implemented in GSM1900 band, for hotspot mode SAR testing EUT was set in reduced power mode and GPRS 1 Tx slot due to its highest frame-average power.

<Full power mode>

Band GSM850		Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
TX Channel		128	189	251		128	189	251	
Frequency (MHz)		824.2	836.4	848.8		824.2	836.4	848.8	
GSM (GMSK, 1 Tx slot)		33.36	33.31	33.26	33.50	24.36	24.31	24.26	24.50
GPRS (GMSK, 1 Tx slot)		33.32	33.29	33.27	33.50	24.32	24.29	24.27	24.50
GPRS (GMSK, 2 Tx slots)		30.32	30.35	30.27	30.50	24.32	24.35	24.27	24.50
GPRS (GMSK, 3 Tx slots)		28.47	28.42	28.39	28.50	24.21	24.16	24.13	24.24
GPRS (GMSK, 4 Tx slots)		27.41	27.46	27.31	27.50	24.41	24.46	24.31	24.50
EDGE (8PSK, 1 Tx slot)		27.35	27.45	27.49	27.50	18.35	18.45	18.49	18.50
EDGE (8PSK, 2 Tx slots)		27.23	27.29	27.25	27.30	21.23	21.29	21.25	21.30
EDGE (8PSK, 3 Tx slots)		27.04	27.08	27.06	27.10	22.78	22.82	22.80	22.84
EDGE (8PSK, 4 Tx slots)		26.80	26.84	26.86	26.90	23.80	23.84	23.86	23.90
DTM 5 (2Tx slots)	GSM (GMSK, 1 Tx slot)	30.28	30.26	30.24	30.50	24.23	24.20	24.18	24.50
	GPRS (GMSK, 1 Tx slot)	30.22	30.19	30.16	30.50				
DTM 9 (2Tx slots)	GSM (GMSK, 1 Tx slot)	30.30	30.26	30.22	30.50	24.22	24.19	24.19	24.50
	GPRS (GMSK, 1 Tx slot)	30.19	30.17	30.20	30.50				
DTM 11 (3Tx slots)	GSM (GMSK, 1 Tx slot)	28.45	28.43	28.37	28.50	24.17	24.14	24.10	24.24
	GPRS (GMSK, 2 Tx slots)	28.42	28.39	28.35	28.50				
DTM 5 (2Tx slots)	GSM (GMSK, 1 Tx slot)	30.26	30.22	30.21	30.50	22.98	22.96	22.95	23.17
	EDGE (8PSK, 1 Tx slot)	27.21	27.25	27.24	27.30				
DTM 9 (2Tx slots)	GSM (GMSK, 1 Tx slot)	30.19	30.23	30.21	30.50	22.94	22.96	22.95	23.17
	EDGE (8PSK, 1 Tx slot)	27.23	27.22	27.22	27.30				
DTM 11 (3Tx slots)	GSM (GMSK, 1 Tx slot)	28.42	28.36	28.31	28.50	23.28	23.28	23.27	23.36
	EDGE (8PSK, 2 Tx slots)	27.02	27.06	27.08	27.10				

Remark: The frame-averaged power is linearly scaled the maximum burst averaged power over 8 time slots.
The calculated method are shown as below:
Frame-averaged power = Maximum burst averaged power (1 Tx Slot) - 9 dB
Frame-averaged power = Maximum burst averaged power (2 Tx Slots) - 6 dB
Frame-averaged power = Maximum burst averaged power (3 Tx Slots) - 4.26 dB
Frame-averaged power = Maximum burst averaged power (4 Tx Slots) - 3 dB

<Hotspot inactive - full power mode>

<table>
<tr><td colspan="2">Band GSM1900</td><td colspan="3">Burst Average Power (dBm)</td><td rowspan="3">Tune-up Limit (dBm)</td><td colspan="3">Frame-Average Power (dBm)</td><td rowspan="3">Tune-up Limit (dBm)</td></tr>
<tr><td colspan="2">TX Channel</td><td>512</td><td>661</td><td>810</td><td>512</td><td>661</td><td>810</td></tr>
<tr><td colspan="2">Frequency (MHz)</td><td>1850.2</td><td>1880</td><td>1909.8</td><td>1850.2</td><td>1880</td><td>1909.8</td></tr>
<tr><td colspan="2">GSM (GMSK, 1 Tx slot)</td><td>29.93</td><td>30.11</td><td>30.38</td><td>30.50</td><td>20.93</td><td>21.11</td><td>21.38</td><td>21.50</td></tr>
<tr><td colspan="2">GPRS (GMSK, 1 Tx slot)</td><td>29.92</td><td>30.09</td><td>30.47</td><td>30.50</td><td>20.92</td><td>21.09</td><td>21.47</td><td>21.50</td></tr>
<tr><td colspan="2">GPRS (GMSK, 2 Tx slots)</td><td>27.22</td><td>27.34</td><td>27.42</td><td>27.50</td><td>21.22</td><td>21.34</td><td>21.42</td><td>21.50</td></tr>
<tr><td colspan="2">GPRS (GMSK, 3 Tx slots)</td><td>25.42</td><td>25.44</td><td>25.48</td><td>25.50</td><td>21.16</td><td>21.18</td><td>21.22</td><td>21.24</td></tr>
<tr><td colspan="2">GPRS (GMSK, 4 Tx slots)</td><td>24.35</td><td>24.42</td><td>24.46</td><td>24.50</td><td>21.35</td><td>21.42</td><td>21.46</td><td>21.50</td></tr>
<tr><td colspan="2">EDGE (8PSK, 1 Tx slot)</td><td>25.10</td><td>25.40</td><td>25.60</td><td>26.50</td><td>16.10</td><td>16.40</td><td>16.60</td><td>17.50</td></tr>
<tr><td colspan="2">EDGE (8PSK, 2 Tx slots)</td><td>24.99</td><td>25.31</td><td>25.51</td><td>26.30</td><td>18.99</td><td>19.31</td><td>19.51</td><td>20.30</td></tr>
<tr><td colspan="2">EDGE (8PSK, 3 Tx slots)</td><td>24.91</td><td>25.17</td><td>25.33</td><td>26.10</td><td>20.65</td><td>20.91</td><td>21.07</td><td>21.84</td></tr>
<tr><td colspan="2">EDGE (8PSK, 4 Tx slots)</td><td>24.68</td><td>25.00</td><td>25.22</td><td>25.90</td><td>21.68</td><td>22.00</td><td>22.22</td><td>22.90</td></tr>
<tr><td rowspan="2">DTM 5 (2Tx slots)</td><td>GSM (GMSK, 1 Tx slot)</td><td>27.18</td><td>27.38</td><td>27.39</td><td>27.50</td><td rowspan="2">21.09</td><td rowspan="2">21.31</td><td rowspan="2">21.36</td><td rowspan="2">21.50</td></tr>
<tr><td>GPRS (GMSK, 1 Tx slot)</td><td>27.04</td><td>27.28</td><td>27.37</td><td>27.50</td></tr>
<tr><td rowspan="2">DTM 9 (2Tx slots)</td><td>GSM (GMSK, 1 Tx slot)</td><td>27.07</td><td>27.31</td><td>27.41</td><td>27.50</td><td rowspan="2">20.98</td><td rowspan="2">21.23</td><td rowspan="2">21.35</td><td rowspan="2">21.50</td></tr>
<tr><td>GPRS (GMSK, 1 Tx slot)</td><td>26.94</td><td>27.19</td><td>27.33</td><td>27.50</td></tr>
<tr><td rowspan="2">DTM 11 (3Tx slots)</td><td>GSM (GMSK, 1 Tx slot)</td><td>25.26</td><td>25.43</td><td>25.48</td><td>25.50</td><td rowspan="2">20.93</td><td rowspan="2">21.09</td><td rowspan="2">21.14</td><td rowspan="2">21.24</td></tr>
<tr><td>GPRS (GMSK, 2 Tx slots)</td><td>25.15</td><td>25.31</td><td>25.36</td><td>25.50</td></tr>
<tr><td rowspan="2">DTM 5 (2Tx slots)</td><td>GSM (GMSK, 1 Tx slot)</td><td>27.16</td><td>27.18</td><td>27.26</td><td>27.50</td><td rowspan="2">20.04</td><td rowspan="2">20.17</td><td rowspan="2">20.31</td><td rowspan="2">20.92</td></tr>
<tr><td>EDGE (8PSK, 1 Tx slot)</td><td>24.58</td><td>24.91</td><td>25.14</td><td>26.30</td></tr>
<tr><td rowspan="2">DTM 9 (2Tx slots)</td><td>GSM (GMSK, 1 Tx slot)</td><td>27.14</td><td>27.19</td><td>27.22</td><td>27.50</td><td rowspan="2">20.03</td><td rowspan="2">20.18</td><td rowspan="2">20.28</td><td rowspan="2">20.92</td></tr>
<tr><td>EDGE (8PSK, 1 Tx slot)</td><td>24.60</td><td>24.92</td><td>25.12</td><td>26.30</td></tr>
<tr><td rowspan="2">DTM 11 (3Tx slots)</td><td>GSM (GMSK, 1 Tx slot)</td><td>25.42</td><td>25.46</td><td>25.48</td><td>25.50</td><td rowspan="2">20.58</td><td rowspan="2">20.75</td><td rowspan="2">20.87</td><td rowspan="2">21.65</td></tr>
<tr><td>EDGE (8PSK, 2 Tx slots)</td><td>24.52</td><td>24.77</td><td>24.94</td><td>26.10</td></tr>
<tr><td colspan="10">Remark: The frame-averaged power is linearly scaled the maximum burst averaged power over 8 time slots.
The calculated method are shown as below:
Frame-averaged power = Maximum burst averaged power (1 Tx Slot) - 9 dB
Frame-averaged power = Maximum burst averaged power (2 Tx Slots) - 6 dB
Frame-averaged power = Maximum burst averaged power (3 Tx Slots) - 4.26 dB
Frame-averaged power = Maximum burst averaged power (4 Tx Slots) - 3 dB</td></tr>
</table>

<Hotspot active - reduced power mode>

Band GSM1900		Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
TX Channel		512	661	810		512	661	810	
Frequency (MHz)		1850.2	1880	1909.8		1850.2	1880	1909.8	
GSM (GMSK, 1 Tx slot)		26.84	27.08	27.37	27.50	17.84	18.08	18.37	18.50
GPRS (GMSK, 1 Tx slot)		26.81	27.07	27.36	27.50	17.81	18.07	18.36	18.50
GPRS (GMSK, 2 Tx slots)		23.17	23.45	23.64	24.50	17.17	17.45	17.64	18.50
GPRS (GMSK, 3 Tx slots)		21.19	21.39	21.48	22.50	16.93	17.13	17.22	18.24
GPRS (GMSK, 4 Tx slots)		20.23	20.40	20.67	21.50	17.23	17.40	17.67	18.50
EDGE (8PSK, 1 Tx slot)		21.48	21.78	21.95	22.00	12.48	12.78	12.95	13.00
EDGE (8PSK, 2 Tx slots)		21.34	21.66	21.79	21.80	15.34	15.66	15.79	15.80
EDGE (8PSK, 3 Tx slots)		21.01	21.28	21.44	21.60	16.75	17.02	17.18	17.34
EDGE (8PSK, 4 Tx slots)		21.03	21.29	21.38	21.40	18.03	18.29	18.38	18.40
DTM 5 (2Tx slots)	GSM (GMSK, 1 Tx slot)	23.08	23.41	23.61	24.50	17.04	17.37	17.57	18.50
	GPRS (GMSK, 1 Tx slot)	23.04	23.37	23.58	24.50				
DTM 9 (2Tx slots)	GSM (GMSK, 1 Tx slot)	23.11	23.42	23.70	24.50	17.06	17.36	17.65	18.50
	GPRS (GMSK, 1 Tx slot)	23.06	23.35	23.64	24.50				
DTM 11 (3Tx slots)	GSM (GMSK, 1 Tx slot)	21.24	21.46	21.56	22.50	16.93	17.06	17.21	18.24
	GPRS (GMSK, 2 Tx slots)	21.16	21.25	21.43	22.50				
DTM 5 (2Tx slots)	GSM (GMSK, 1 Tx slot)	23.14	23.37	23.58	24.50	16.30	16.56	16.74	17.34
	EDGE (8PSK, 1 Tx slot)	21.31	21.62	21.74	21.80				
DTM 9 (2Tx slots)	GSM (GMSK, 1 Tx slot)	23.11	23.34	23.52	24.50	16.26	16.52	16.71	17.34
	EDGE (8PSK, 1 Tx slot)	21.26	21.55	21.76	21.80				
DTM 11 (3Tx slots)	GSM (GMSK, 1 Tx slot)	21.16	21.31	21.45	22.50	16.78	17.00	17.16	17.66
	EDGE (8PSK, 2 Tx slots)	20.98	21.24	21.40	21.60				

Remark: The frame-averaged power is linearly scaled the maximum burst averaged power over 8 time slots.
The calculated method are shown as below:
Frame-averaged power = Maximum burst averaged power (1 Tx Slot) - 9 dB
Frame-averaged power = Maximum burst averaged power (2 Tx Slots) - 6 dB
Frame-averaged power = Maximum burst averaged power (3 Tx Slots) - 4.26 dB
Frame-averaged power = Maximum burst averaged power (4 Tx Slots) - 3 dB

<WCDMA Conducted Power>

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:

HSDPA Setup Configuration:

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

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

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1, Note 2)	CM (dB) (Note 3)	MPR (dB) (Note 3)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 (Note 4)	15/15 (Note 4)	64	12/15 (Note 4)	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

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

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 Δ_{NACK} = 30/15 with $\beta_{hs} = 30/15 * \beta_c$, and Δ_{CQI} = 24/15 with $\beta_{hs} = 24/15 * \beta_c$.

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

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

Setup Configuration

HSUPA Setup Configuration:

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

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

Sub-test	β_c	β_d	β_d *(SF)*	β_c/β_d	β_{HS} *(Note1)*	β_{ec}	β_{ed} *(Note 5) (Note 6)*	β_{ed} *(SF)*	β_{ed} *(Codes)*	CM *(dB) (Note 2)*	MPR *(dB) (Note 2)*	*AG Index (Note 6)*	*E-TFCI*
1	11/15 *(Note 3)*	15/15 *(Note 3)*	64	11/15 *(Note 3)*	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed}1: 47/15 β_{ed}2: 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 *(Note 4)*	15/15 *(Note 4)*	64	15/15 *(Note 4)*	30/15	24/15	134/15	4	1	1.0	0.0	21	81

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

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

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

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

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

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

Setup Configuration

DC-HSDPA 3GPP release 8 Setup Configuration:

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

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

C.8.1.12 Fixed Reference Channel Definition H-Set 12

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

Parameter	Unit	Value
Nominal Avg. Inf. Bit Rate	kbps	60
Inter-TTI Distance	TTI's	1
Number of HARQ Processes	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.		

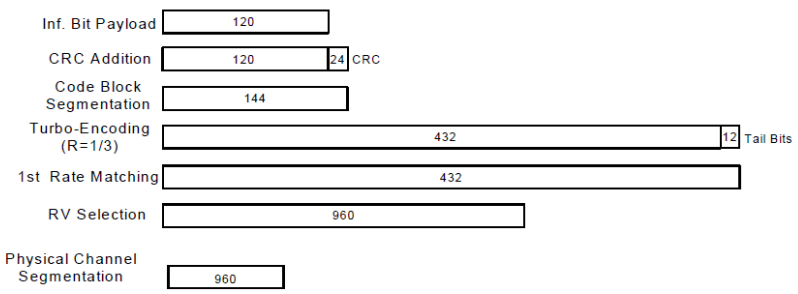


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

Setup Configuration

<WCDMA Conducted Power>

Note:

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

<Full power mode>

Band			WCDMA V		
TX Channel			4132	4182	4233
Frequency (MHz)			826.4	836.4	846.6
MPR (dB)	3GPP Rel 99	AMR 12.2Kbps	23.96	23.95	23.91
	3GPP Rel 99	RMC 12.2Kbps	23.99	23.98	23.94
0	3GPP Rel 6	HSDPA Subtest-1	22.73	22.70	22.64
0	3GPP Rel 6	HSDPA Subtest-2	22.73	22.62	22.62
0.5	3GPP Rel 6	HSDPA Subtest-3	22.81	22.63	22.74
0.5	3GPP Rel 6	HSDPA Subtest-4	22.81	22.64	22.77
0	3GPP Rel 8	DC-HSDPA Subtest-1	22.76	22.72	22.69
0	3GPP Rel 8	DC-HSDPA Subtest-2	22.77	22.76	22.72
0.5	3GPP Rel 8	DC-HSDPA Subtest-3	22.21	22.16	22.14
0.5	3GPP Rel 8	DC-HSDPA Subtest-4	22.23	22.21	22.19
0	3GPP Rel 6	HSUPA Subtest-1	23.01	23.04	22.96
2	3GPP Rel 6	HSUPA Subtest-2	21.84	21.76	21.72
1	3GPP Rel 6	HSUPA Subtest-3	22.10	22.01	21.89
2	3GPP Rel 6	HSUPA Subtest-4	21.82	21.68	21.75
0	3GPP Rel 6	HSUPA Subtest-5	22.69	22.71	22.66

<LTE Conducted Power>

Note:

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

<LTE Band 5 Conducted Power>

Full Power Mode

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune up Limit (dBm)	Target MPR (dB)
Channel				20450	20525	20600		
Frequency (MHz)				829	836.5	844		
10	QPSK	1	0	23.92	23.92	23.77	24	0
10	QPSK	1	24	23.81	23.77	23.79		
10	QPSK	1	49	23.79	23.86	23.80		
10	QPSK	25	0	23.50	23.63	23.64	24	0
10	QPSK	25	12	23.41	23.54	23.78		
10	QPSK	25	24	23.30	23.52	23.60		
10	QPSK	50	0	23.29	23.24	23.30		
10	16QAM	1	0	22.68	22.75	22.52	23	1
10	16QAM	1	24	22.53	22.48	22.45		
10	16QAM	1	49	22.69	22.51	22.82		
10	16QAM	25	0	22.50	22.46	22.67	23	1
10	16QAM	25	12	22.31	22.44	22.61		
10	16QAM	25	24	22.28	22.33	22.62		
10	16QAM	50	0	22.24	22.24	22.50		
Channel				20425	20525	20625	Tune up Limit (dBm)	Target MPR (dB)
Frequency (MHz)				826.5	836.5	846.5		
5	QPSK	1	0	23.89	23.75	23.55	24	0
5	QPSK	1	12	23.76	23.83	23.76		
5	QPSK	1	24	23.77	23.85	23.85		
5	QPSK	12	0	23.57	23.82	23.71	24	0
5	QPSK	12	6	23.53	23.78	23.83		
5	QPSK	12	11	23.52	23.70	23.79		
5	QPSK	25	0	23.29	23.30	23.50		
5	16QAM	1	0	22.97	22.94	22.91	23	1
5	16QAM	1	12	22.95	22.98	22.89		
5	16QAM	1	24	22.97	22.89	22.97		
5	16QAM	12	0	22.78	22.87	22.85	23	1
5	16QAM	12	6	22.61	22.84	22.85		
5	16QAM	12	11	22.59	22.85	22.78		
5	16QAM	25	0	22.53	22.88	22.50		
Channel				20415	20525	20635	Tune up Limit (dBm)	Target MPR (dB)
Frequency (MHz)				825.5	836.5	847.5		
3	QPSK	1	0	23.85	23.83	23.87	24	0
3	QPSK	1	7	23.91	23.92	23.87		
3	QPSK	1	14	**23.95**	23.90	23.88		
3	QPSK	8	0	23.60	23.85	23.76	24	0
3	QPSK	8	4	23.54	23.84	23.63		
3	QPSK	8	7	23.49	23.87	23.78		
3	QPSK	15	0	23.33	23.23	23.30		
3	16QAM	1	0	22.97	22.95	22.84	23	1
3	16QAM	1	7	22.96	22.88	22.93		
3	16QAM	1	14	22.81	22.94	22.97		
3	16QAM	8	0	22.56	22.91	22.85	23	1
3	16QAM	8	4	22.59	22.92	22.83		
3	16QAM	8	7	22.65	22.81	22.99		
3	16QAM	15	0	22.31	22.50	22.34		

Channel				20407	20525	20643	Tune up Limit (dBm)	Target MPR (dB)
Frequency (MHz)				824.7	836.5	848.3		
1.4	QPSK	1	0	23.94	23.77	23.58	24	0
1.4	QPSK	1	2	23.74	23.85	23.67		
1.4	QPSK	1	5	23.85	23.83	23.80		
1.4	QPSK	3	0	23.66	23.91	23.79		
1.4	QPSK	3	1	23.47	23.82	23.90		
1.4	QPSK	3	2	23.61	23.65	23.70		
1.4	QPSK	6	0	23.43	23.21	23.48	24	0
1.4	16QAM	1	0	22.91	22.93	22.86	23	1
1.4	16QAM	1	2	22.97	22.98	22.92		
1.4	16QAM	1	5	22.98	22.89	22.99		
1.4	16QAM	3	0	22.88	22.79	22.91		
1.4	16QAM	3	1	22.63	22.89	22.80		
1.4	16QAM	3	2	22.68	22.87	22.76		
1.4	16QAM	6	0	22.55	22.91	22.45	23	1

<LTE Band 7 Conducted Power>

Hotspot inactive - full power mode

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune up Limit (dBm)	Target MPR (dB)
Channel				20850	21100	21350		
Frequency (MHz)				2510	2535	2560		
20	QPSK	1	0	23.64	23.46	23.90	24	0
20	QPSK	1	49	23.51	23.45	23.42		
20	QPSK	1	99	23.46	23.72	23.60		
20	QPSK	50	0	22.78	22.50	22.90	23	1
20	QPSK	50	24	22.50	22.16	22.39		
20	QPSK	50	49	22.35	22.65	22.33		
20	QPSK	100	0	22.46	22.39	22.37		
20	16QAM	1	0	22.53	22.58	22.57	23	1
20	16QAM	1	49	22.64	22.35	22.40		
20	16QAM	1	99	22.67	22.61	22.55		
20	16QAM	50	0	21.07	21.54	21.50	22	2
20	16QAM	50	24	21.38	21.42	21.50		
20	16QAM	50	49	21.22	21.57	21.54		
20	16QAM	100	0	21.03	21.38	21.37		
Channel				20825	21100	21375	Tune up Limit (dBm)	Target MPR (dB)
Frequency (MHz)				2507.5	2535	2562.5		
15	QPSK	1	0	23.43	23.39	23.17	24	0
15	QPSK	1	37	23.23	23.30	23.49		
15	QPSK	1	74	23.51	23.39	23.60		
15	QPSK	36	0	22.57	22.40	22.20	23	1
15	QPSK	36	18	22.76	22.34	22.52		
15	QPSK	36	37	22.57	22.33	22.52		
15	QPSK	75	0	22.49	22.19	22.45		
15	16QAM	1	0	22.39	22.55	22.35	23	1
15	16QAM	1	37	22.33	22.45	22.58		
15	16QAM	1	74	22.40	22.10	22.57		
15	16QAM	36	0	21.32	21.40	21.15	22	2
15	16QAM	36	18	21.57	21.40	21.58		
15	16QAM	36	37	21.49	21.43	21.49		
15	16QAM	75	0	21.41	21.13	21.31		
Channel				20800	21100	21400	Tune up Limit (dBm)	Target MPR (dB)
Frequency (MHz)				2505	2535	2565		
10	QPSK	1	0	23.50	23.11	23.32	24	0
10	QPSK	1	24	23.77	23.28	23.77		
10	QPSK	1	49	23.80	23.33	23.55		
10	QPSK	25	0	22.42	22.31	22.71	23	1
10	QPSK	25	12	22.58	22.26	22.65		
10	QPSK	25	24	22.38	22.37	22.36		
10	QPSK	50	0	22.31	22.17	22.45		
10	16QAM	1	0	22.65	22.15	22.56	23	1
10	16QAM	1	24	22.55	22.06	22.41		
10	16QAM	1	49	22.24	22.24	22.30		
10	16QAM	25	0	21.39	21.34	21.38	22	2
10	16QAM	25	12	21.47	21.20	21.26		
10	16QAM	25	24	21.39	21.37	21.43		
10	16QAM	50	0	21.31	21.07	21.09		

Channel				20775	21100	21425	Tune up Limit (dBm)	Target MPR (dB)
Frequency (MHz)				2502.5	2535	2567.5		
5	QPSK	1	0	23.19	23.26	23.50	24	0
5	QPSK	1	12	23.20	23.26	23.50		
5	QPSK	1	24	23.53	23.38	23.48		
5	QPSK	12	0	22.30	21.99	22.24	23	1
5	QPSK	12	6	22.39	21.98	22.23		
5	QPSK	12	11	22.41	22.39	22.58		
5	QPSK	25	0	22.34	22.42	22.62		
5	16QAM	1	0	22.06	22.06	22.43	23	1
5	16QAM	1	12	22.30	22.07	22.44		
5	16QAM	1	24	22.17	22.21	21.98		
5	16QAM	12	0	21.23	21.03	21.26	22	2
5	16QAM	12	6	21.15	20.92	21.23		
5	16QAM	12	11	21.31	21.35	21.60		
5	16QAM	25	0	21.24	21.45	21.67		

<LTE Band 7 Conducted Power>

<Hotspot active - reduced power mode>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune up Limit (dBm)	Target MPR (dB)
Channel				20850	21100	21350		
Frequency (MHz)				2510	2535	2560		
20	QPSK	1	0	21.48	21.38	21.49	21.5	0
20	QPSK	1	49	21.28	21.34	21.09		
20	QPSK	1	99	21.21	21.34	21.36		
20	QPSK	50	0	21.27	21.35	21.09	21.5	0
20	QPSK	50	24	21.27	21.34	21.16		
20	QPSK	50	49	21.33	21.26	21.28		
20	QPSK	100	0	21.32	21.29	21.15		
20	16QAM	1	0	21.20	21.27	21.12	21.5	0
20	16QAM	1	49	21.24	21.26	21.11		
20	16QAM	1	99	21.43	21.30	21.33		
20	16QAM	50	0	21.33	21.35	21.07	21.5	0
20	16QAM	50	24	21.30	21.33	21.13		
20	16QAM	50	49	21.33	21.36	21.27		
20	16QAM	100	0	21.30	21.25	21.26		
Channel				20825	21100	21375	Tune up Limit (dBm)	Target MPR (dB)
Frequency (MHz)				2507.5	2535	2562.5		
15	QPSK	1	0	21.18	21.34	20.96	21.5	0
15	QPSK	1	37	21.22	21.22	21.13		
15	QPSK	1	74	21.36	21.21	21.29		
15	QPSK	36	0	21.13	21.26	21.09	21.5	0
15	QPSK	36	18	21.19	21.22	21.18		
15	QPSK	36	37	21.26	21.22	21.33		
15	QPSK	75	0	21.23	21.22	21.14		
15	16QAM	1	0	21.15	21.24	20.98	21.5	0
15	16QAM	1	37	21.22	21.10	21.09		
15	16QAM	1	74	21.24	21.09	21.32		
15	16QAM	36	0	21.16	21.23	21.10	21.5	0
15	16QAM	36	18	21.21	21.28	21.06		
15	16QAM	36	37	21.26	21.15	21.15		
15	16QAM	75	0	21.23	21.24	21.11		
Channel				20800	21100	21400	Tune up Limit (dBm)	Target MPR (dB)
Frequency (MHz)				2505	2535	2565		
10	QPSK	1	0	21.13	21.26	21.15	21.5	0
10	QPSK	1	24	21.20	21.27	21.20		
10	QPSK	1	49	21.29	21.21	21.32		
10	QPSK	25	0	21.16	21.29	21.17	21.5	0
10	QPSK	25	12	21.21	21.24	21.25		
10	QPSK	25	24	21.23	21.27	21.15		
10	QPSK	50	0	21.13	21.25	21.22		
10	16QAM	1	0	21.09	21.21	21.10	21.5	0
10	16QAM	1	24	21.16	21.14	21.14		
10	16QAM	1	49	21.24	21.11	21.28		
10	16QAM	25	0	21.21	21.27	21.14	21.5	0
10	16QAM	25	12	21.27	21.25	21.26		
10	16QAM	25	24	21.22	21.24	21.25		
10	16QAM	50	0	21.13	21.25	21.25		

Channel				20775	21100	21425	Tune up Limit (dBm)	Target MPR (dB)
Frequency (MHz)				2502.5	2535	2567.5		
5	QPSK	1	0	21.12	21.28	21.37	21.5	0
5	QPSK	1	12	21.15	21.23	21.27		
5	QPSK	1	24	21.20	21.20	21.28		
5	QPSK	12	0	21.14	21.32	21.17	21.5	0
5	QPSK	12	6	21.15	21.29	21.24		
5	QPSK	12	11	21.18	21.27	21.23		
5	QPSK	25	0	21.15	21.26	21.26		
5	16QAM	1	0	21.07	21.20	21.30	21.5	0
5	16QAM	1	12	21.11	21.14	21.21		
5	16QAM	1	24	21.19	21.18	21.25		
5	16QAM	12	0	21.19	21.24	21.25	21.5	0
5	16QAM	12	6	21.27	21.25	21.29		
5	16QAM	12	11	21.21	21.22	21.30		
5	16QAM	25	0	21.23	21.21	21.15		

<WLAN 2.4GHz Conducted Power>

WLAN 2.4GHz 802.11b Average Power (dBm)						Tune up Limit (dBm)
Power vs. Channel			Power vs. Data Rate			
Channel	Frequency (MHz)	Data Rate 1Mbps	2Mbps	5.5Mbps	11Mbps	
CH 1	2412	16.62	16.72	16.70	16.68	17.0
CH 6	2437	16.74				
CH 11	2462	16.51				

WLAN 2.4GHz 802.11g Average Power (dBm)										Tune up Limit (dBm)
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	Data Rate 6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps	
CH 1	2412	14.77	14.87	14.87	14.86	14.84	14.72	14.61	14.60	15.0
CH 6	2437	14.92								
CH 11	2462	14.60								

WLAN 2.4GHz 802.11n-HT20 Average Power (dBm)										Tune up Limit (dBm)
Power vs. Channel			Power vs. MCS Index							
Channel	Frequency (MHz)	MCS Index MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	
CH 1	2412	13.58	13.89	13.88	13.80	13.70	13.67	13.62	13.57	14.0
CH 6	2437	13.67								
CH 11	2462	13.90								

Note:

1. Per KDB 248227 D01 v01r02, choose the highest output power channel to test SAR and determine further SAR exclusion
2. For each frequency band, testing at higher data rates and higher order modulations is not required when the maximum average output power for each of these configurations is less than 1/4dB higher than those measured at the lowest data rate
3. Apply the test exclusion rule in KDB 248227 D01 v01r02 11g, 11n-HT20 output power is less than 1/4dB higher than 11b mode, thus the SAR can be excluded.

<WLAN 5GHz Conducted Power>

WLAN 5GHz 802.11a Average Power (dBm)										Tune up Limit (dBm)
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	Data Rate 6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps	
CH 36	5180	13.90	13.88	13.87	13.85	13.84	13.65	13.63	13.61	14.0
CH 40	5200	13.70								
CH 44	5220	13.76								
CH 48	5240	13.86								
CH 52	5260	13.88	13.96	13.94	13.97	13.73	13.70	13.68	13.67	
CH 56	5280	13.79								
CH 60	5300	13.98								
CH 64	5320	13.86								
CH 100	5500	13.64	13.84	13.83	13.82	13.80	13.79	13.56	13.54	
CH 104	5520	13.60								
CH 108	5540	13.58								
CH 112	5560	13.52								
CH 116	5580	13.67								
CH 132	5660	13.75								
CH 136	5680	13.64								
CH 140	5700	13.86								
CH 149	5745	13.95	13.92	13.88	13.93	13.76	13.80	13.74	13.70	
CH 153	5765	13.74								
CH 157	5785	13.76								
CH 161	5805	13.72								
CH 165	5825	13.82								

WLAN 5GHz 802.11n-HT20 Average Power (dBm)											Tune up Limit (dBm)
Power vs. Channel			Power vs. MCS Index								
Channel	Frequency (MHz)	MCS Index MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7		
CH 36	5180	13.93	13.91	13.90	13.88	13.70	13.67	13.65	13.62		14.0
CH 40	5200	13.59									
CH 44	5220	13.70									
CH 48	5240	13.80									
CH 52	5260	13.85	13.82	13.80	13.78	13.67	13.66	13.78	13.77		
CH 56	5280	13.84									
CH 60	5300	13.96									
CH 64	5320	13.76									
CH 100	5500	13.66	13.87	13.86	13.85	13.72	13.73	13.76	13.76		
CH 104	5520	13.55									
CH 108	5540	13.52									
CH 112	5560	13.66									
CH 116	5580	13.78									
CH 132	5660	13.78									
CH 136	5680	13.58									
CH 140	5700	13.88									
CH 149	5745	13.62	13.96	13.96	13.91	13.76	13.72	13.70	13.69		
CH 153	5765	13.71									
CH 157	5785	13.98									
CH 161	5805	13.77									
CH 165	5825	13.88									

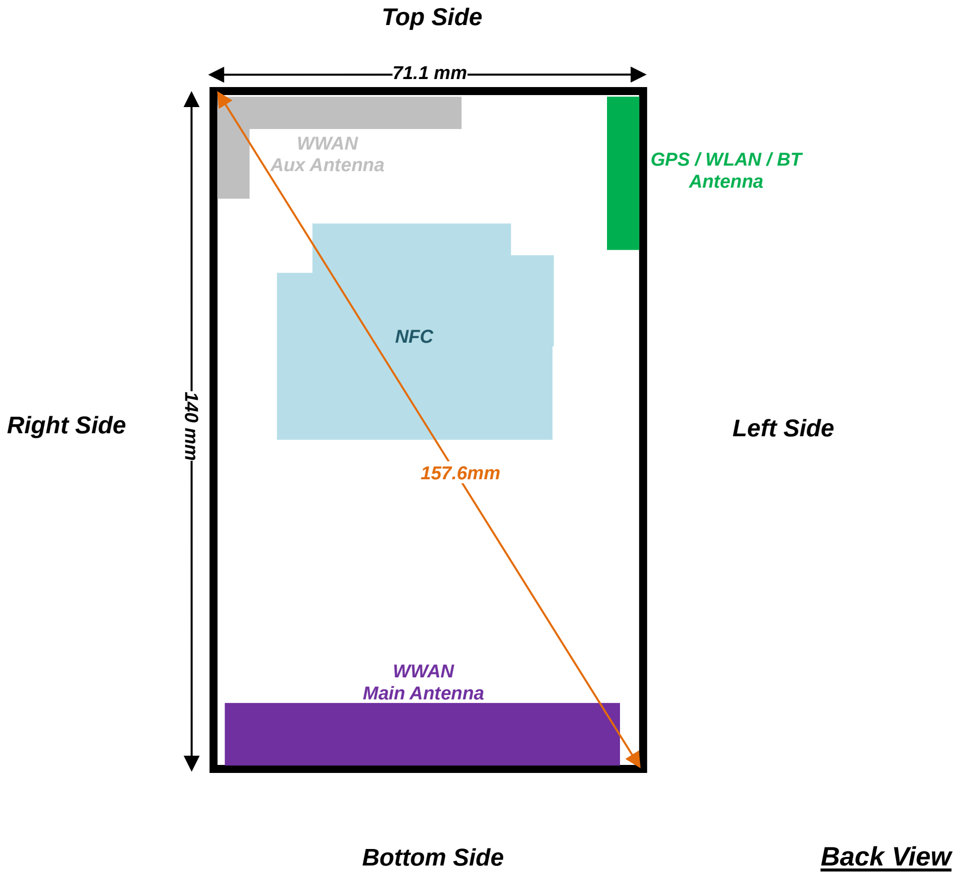
WLAN 5GHz 802.11n-HT40 Average Power (dBm)											Tune up Limit (dBm)
Power vs. Channel			Power vs. MCS Index								
Channel	Frequency (MHz)	MCS Index MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7		
CH 38	5190	13.80	13.66	13.67	13.69	13.67	13.66	13.62	13.70		14.0
CH 46	5230	13.71									
CH 54	5270	13.87	13.45	13.44	13.40	13.48	13.43	13.54	13.50		
CH 62	5310	10.73									
CH 102	5510	10.12	13.98	13.67	13.64	13.69	13.68	13.67	13.63		
CH 110	5550	13.84									
CH 134	5670	13.99									
CH 151	5755	13.63	13.74	13.59	13.43	13.62	13.52	13.67	13.63		
CH 159	5795	13.82									

Note:

1. Per KDB 248227 D01 v01r02, choose the highest output power channel to test SAR and determine further SAR exclusion
2. For each frequency band, testing at higher data rates and higher order modulations is not required when the maximum average output power for each of these configurations is less than 1/4dB higher than those measured at the lowest data rate.
3. Apply the test exclusion rule in KDB 248227 D01 v01r02, 11n-HT20 / HT40 output power is less than 1/4dB higher than 802.11a mode, thus the SAR can be excluded.

12. Antenna Location

<Smart Phone>



Distance of the Antenna to the EUT surface/edge						
Antennas	Back	Front	Top Side	Bottom Side	Right Side	Left Side
WWAN Main	≤ 25mm	≤ 25mm	120.5mm	≤ 25mm	≤ 25mm	≤ 25mm
BT&WLAN	≤ 25mm	≤ 25mm	≤ 25mm	104.9mm	58.9mm	≤ 25mm
Positions for SAR tests; Hotspot mode						
Antennas	Back	Front	Top Side	Bottom Side	Right Side	Left Side
WWAN Main	Yes	Yes	No	Yes	Yes	Yes
BT&WLAN	Yes	Yes	Yes	No	No	Yes

Note:

1. Per KDB 941225 D06 v01r01, 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 with a transmitting antenna located within 25mm from that surface or edge.

13. SAR Test Results

Note:

1. Per KDB 447498 D01v05r01, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
   a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
   b. For SAR testing of WLAN signal with non-100% duty cycle, the measured SAR is scaled-up by the duty cycle scaling factor which is equal to "1/(duty cycle)"
   c. For WWAN: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
   d. For WLAN: Reported SAR(W/kg)= Measured SAR(W/kg)* Duty Cycle scaling factor * Tune-up scaling factor
2. Per KDB 447498 D01v05r01, 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. Considering the possibility of e.g. 3rd part VoIP operation, LTE SAR for the head exposure positions and body-worn positions are performed and was additional EGPRS SAR testing performed on voice mode worse case.
4. For GSM1900 DTM of head exposure positions and body worn exposure positions, the tune-up scaling factor was used source-based time-average power and tune-up limit calculation.
5. Per KDB 941225 D02v02r02, RMC 12.2kbps setting is used to evaluate SAR. If HSDPA /HSUPA / DC-HSDPA output power is < 0.25dB higher than RMC12.2Kbps, or reported SAR with RMC 12.2kbps setting is ≤ 1.2W/kg, HSDPA /HSUPA /DC-HSDPA SAR evaluation can be excluded.
6. Per KDB 941225 D05v02r03, when reported SAR of 1RB and 50%RB allocation for QPSK ≤0.8W/kg, and 100%RB with QPSK output power is less than 1RB and 50%RB, 100%RB allocation for QPSK is not required.
7. Per KDB 941225 D05v02r03, when reported SAR of 1RB and 50%RB allocation for QPSK >0.8W/kg for any exposure position, SAR testing of 100%RB allocation for QPSK is performed at the highest power channel.
8. 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r03, 16QAM SAR testing is not required.
9. Smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r03, smaller bandwidth SAR testing is not required.
10. Per KDB 648474 D04v01r02, when the reported SAR for a body-worn accessory measured without a headset connected to the handset is < 1.2 W/kg, SAR testing with a headset connected to the handset is not required.
11. This device 2.4GHz WLAN supports Hotspot operation, and 2.4GHz / 5.8GHz WLAN supports WiFi Direct (Group Client / Group Owner), and 5.2GHz / 5.3GHz / 5.5GHz supports WiFi Direct (Group Client only).
12. When hotspot mode is enabled, power reduction will be activated to limit the maximum power of GSM1900 band, UMTS and LTE band 7.

13.1 Head SAR

<GSM SAR>

Plot No.	Band	Mode	Modulation	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
	GSM850	GSM Voice	GMSK	Right Cheek	128	824.2	33.36	33.50	1.033	0.11	0.253	0.261	0.192	0.198
	GSM850	GSM Voice	GMSK	Right Tilted	128	824.2	33.36	33.50	1.033	0.12	0.145	0.150	0.114	0.118
	GSM850	GSM Voice	GMSK	Left Cheek	128	824.2	33.36	33.50	1.033	0.14	0.232	0.240	0.179	0.185
	GSM850	GSM Voice	GMSK	Left Tilted	128	824.2	33.36	33.50	1.033	0.01	0.147	0.152	0.115	0.119
01	GSM850	GPRS (4 Tx slots)	GMSK	Right Cheek	189	836.4	27.46	27.50	1.009	0.065	0.349	0.352	0.258	0.260
	GSM1900	DTM Multi-slot class 11	GSM Voice with 8PSK 2Tx	Right Cheek	810	1909.8	20.87	21.65	1.197	0.013	0.077	0.092	0.050	0.060
	GSM1900	DTM Multi-slot class 11	GSM Voice with 8PSK 2Tx	Right Tilted	810	1909.8	20.87	21.65	1.197	0.012	0.043	0.051	0.025	0.030
02	GSM1900	DTM Multi-slot class 11	GSM Voice with 8PSK 2Tx	Left Cheek	810	1909.8	20.87	21.65	1.197	0.037	0.163	0.195	0.101	0.121
	GSM1900	DTM Multi-slot class 11	GSM Voice with 8PSK 2Tx	Left Tilted	810	1909.8	20.87	21.65	1.197	0.116	0.047	0.056	0.028	0.034
	GSM1900	EDGE (4 Tx slots)	8PSK	Left Cheek	810	1909.8	25.22	25.90	1.169	0.056	0.149	0.174	0.093	0.093

<WCDMA SAR>

Plot No.	Band	Mode	Modulation	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
03	WCDMA V	RMC12.2Kbps	QPSK	Right Cheek	4132	826.4	23.99	24.00	1.002	0.17	0.390	0.391	0.301	0.302
	WCDMA V	RMC12.2Kbps	QPSK	Right Tilted	4132	826.4	23.99	24.00	1.002	0.04	0.232	0.233	0.182	0.182
	WCDMA V	RMC12.2Kbps	QPSK	Left Cheek	4132	826.4	23.99	24.00	1.002	0.15	0.375	0.376	0.288	0.289
	WCDMA V	RMC12.2Kbps	QPSK	Left Tilted	4132	826.4	23.99	24.00	1.002	0.1	0.260	0.261	0.204	0.204

<LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
04	LTE Band 5	10M	QPSK	1	0	Right Cheek	20525	836.5	23.92	24.00	1.019	0.13	0.319	0.325	0.245	0.250
	LTE Band 5	10M	QPSK	25	12	Right Cheek	20600	844	23.78	24.00	1.052	0.05	0.271	0.285	0.207	0.218
	LTE Band 5	10M	QPSK	1	0	Right Tilted	20525	836.5	23.92	24.00	1.019	0.15	0.181	0.184	0.137	0.140
	LTE Band 5	10M	QPSK	25	12	Right Tilted	20600	844	23.78	24.00	1.052	0.18	0.145	0.153	0.108	0.114
	LTE Band 5	10M	QPSK	1	0	Left Cheek	20525	836.5	23.92	24.00	1.019	-0.05	0.286	0.291	0.219	0.223
	LTE Band 5	10M	QPSK	25	12	Left Cheek	20600	844	23.78	24.00	1.052	0.12	0.243	0.256	0.186	0.196
	LTE Band 5	10M	QPSK	1	0	Left Tilted	20525	836.5	23.92	24.00	1.019	0.06	0.174	0.177	0.132	0.134
	LTE Band 5	10M	QPSK	25	12	Left Tilted	20600	844	23.78	24.00	1.052	0.15	0.130	0.137	0.095	0.100
05	LTE Band 7	20M	QPSK	1	0	Right Cheek	21350	2560	23.90	24.00	1.023	0.049	0.258	0.264	0.139	0.142
	LTE Band 7	20M	QPSK	50	0	Right Cheek	21350	2560	22.90	23.00	1.023	0	0.190	0.194	0.103	0.105
	LTE Band 7	20M	QPSK	1	0	Right Tilted	21350	2560	23.90	24.00	1.023	0.056	0.112	0.115	0.055	0.056
	LTE Band 7	20M	QPSK	50	0	Right Tilted	21350	2560	22.90	23.00	1.023	-0.13	0.085	0.087	0.039	0.040
	LTE Band 7	20M	QPSK	1	0	Left Cheek	21350	2560	23.90	24.00	1.023	0.059	0.245	0.251	0.125	0.128
	LTE Band 7	20M	QPSK	50	0	Left Cheek	21350	2560	22.90	23.00	1.023	0.07	0.203	0.208	0.100	0.102
	LTE Band 7	20M	QPSK	1	0	Left Tilted	21350	2560	23.90	24.00	1.023	0.098	0.060	0.061	0.032	0.033
	LTE Band 7	20M	QPSK	50	0	Left Tilted	21350	2560	22.90	23.00	1.023	0.18	0.050	0.051	0.021	0.021

<WLAN SAR DTS>

Plot No.	Band	Mode	Modulation	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
06	WLAN2.4GHz	802.11b 1Mbps	DBPSK	Right Cheek	6	2437	16.74	17.00	1.061	97.63	1.024	-0.02	0.646	**0.702**	0.295	**0.320**
	WLAN2.4GHz	802.11b 1Mbps	DBPSK	Right Tilted	6	2437	16.74	17.00	1.061	97.63	1.024	0	0.461	0.501	0.210	0.228
	WLAN2.4GHz	802.11b 1Mbps	DBPSK	Left Cheek	6	2437	16.74	17.00	1.061	97.63	1.024	0.08	0.323	0.351	0.163	0.177
	WLAN2.4GHz	802.11b 1Mbps	DBPSK	Left Tilted	6	2437	16.74	17.00	1.061	97.63	1.024	0.02	0.200	0.217	0.097	0.105
07	WLAN5GHz	802.11a 6Mbps	OFDM	Right Cheek	149	5745	13.95	14.00	1.012	87.62	1.141	0.18	0.230	**0.265**	0.059	**0.068**
	WLAN5GHz	802.11a 6Mbps	OFDM	Right Tilted	149	5745	13.95	14.00	1.012	87.62	1.141	0.13	0.155	0.179	0.042	0.048
	WLAN5GHz	802.11a 6Mbps	OFDM	Left Cheek	149	5745	13.95	14.00	1.012	87.62	1.141	0.15	0.100	0.115	0.022	0.025
	WLAN5GHz	802.11a 6Mbps	OFDM	Left Tilted	149	5745	13.95	14.00	1.012	87.62	1.141	0.19	0.080	0.092	0.017	0.020

<WLAN SAR NII>

Plot No.	Band	Mode	Modulation	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
	WLAN5GHz	802.11a 6Mbps	OFDM	Right Cheek	36	5180	13.90	14.00	1.023	87.62	1.141	-0.15	0.248	0.290	0.057	0.067
08	WLAN5GHz	802.11a 6Mbps	OFDM	Right Tilted	36	5180	13.90	14.00	1.023	87.62	1.141	-0.18	0.295	**0.344**	0.062	**0.072**
	WLAN5GHz	802.11a 6Mbps	OFDM	Left Cheek	36	5180	13.90	14.00	1.023	87.62	1.141	0.07	0.088	0.103	0.027	0.032
	WLAN5GHz	802.11a 6Mbps	OFDM	Left Tilted	36	5180	13.90	14.00	1.023	87.62	1.141	0.02	0.108	0.126	0.031	0.036
	WLAN5GHz	802.11a 6Mbps	OFDM	Right Cheek	60	5300	13.98	14.00	1.005	87.62	1.141	0.04	0.318	0.365	0.067	0.077
09	WLAN5GHz	802.11a 6Mbps	OFDM	Right Tilted	60	5300	13.98	14.00	1.005	87.62	1.141	-0.06	0.387	**0.444**	0.071	**0.081**
	WLAN5GHz	802.11a 6Mbps	OFDM	Left Cheek	60	5300	13.98	14.00	1.005	87.62	1.141	-0.08	0.125	0.143	0.038	0.044
	WLAN5GHz	802.11a 6Mbps	OFDM	Left Tilted	60	5300	13.98	14.00	1.005	87.62	1.141	-0.01	0.170	0.195	0.049	0.056
	WLAN5GHz	802.11a 6Mbps	OFDM	Right Cheek	140	5700	13.86	14.00	1.033	87.62	1.141	0.1	0.363	0.428	0.076	0.090
	WLAN5GHz	802.11a 6Mbps	OFDM	Right Cheek	100	5500	13.64	14.00	1.086	87.62	1.141	0.12	0.296	0.367	0.075	0.093
	WLAN5GHz	802.11a 6Mbps	OFDM	Right Cheek	116	5580	13.67	14.00	1.079	87.62	1.141	-0.19	0.178	0.219	0.056	0.069
10	WLAN5GHz	802.11a 6Mbps	OFDM	Right Tilted	140	5700	13.86	14.00	1.033	87.62	1.141	0.18	0.401	**0.473**	0.084	**0.099**
	WLAN5GHz	802.11a 6Mbps	OFDM	Right Tilted	100	5500	13.64	14.00	1.086	87.62	1.141	0.1	0.313	0.388	0.066	0.082
	WLAN5GHz	802.11a 6Mbps	OFDM	Right Tilted	116	5580	13.67	14.00	1.079	87.62	1.141	0.14	0.128	0.158	0.034	0.042
	WLAN5GHz	802.11a 6Mbps	OFDM	Left Cheek	140	5700	13.86	14.00	1.033	87.62	1.141	0.07	0.218	0.257	0.058	0.068
	WLAN5GHz	802.11a 6Mbps	OFDM	Left Tilted	140	5700	13.86	14.00	1.033	87.62	1.141	0.08	0.258	0.304	0.067	0.079

13.2 Hotspot SAR

Distance of the Antenna to the EUT surface/edge						
Antennas	Back	Front	Top Side	Bottom Side	Right Side	Left Side
WWAN Main	≤ 25mm	≤ 25mm	120.5mm	≤ 25mm	≤ 25mm	≤ 25mm
BT&WLAN	≤ 25mm	≤ 25mm	≤ 25mm	104.9mm	58.9mm	≤ 25mm
Positions for SAR tests; Hotspot mode						
Antennas	Back	Front	Top Side	Bottom Side	Right Side	Left Side
WWAN Main	Yes	Yes	No	Yes	Yes	Yes
BT&WLAN	Yes	Yes	Yes	No	No	Yes

Note:

1. Per KDB 941225 D06 v01r01, 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 with a transmitting antenna located within 25mm from that surface or edge.

<GSM SAR>

Plot No.	Band	Mode	Modulation	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
	GSM850	GPRS (4 Tx slots)	GMSK	Front	1cm	189	836.4	27.46	27.50	1.009	-0.019	0.384	0.388	0.283	0.286
	GSM850	GPRS (4 Tx slots)	GMSK	Back	1cm	189	836.4	27.46	27.50	1.009	0.01	0.382	0.386	0.292	0.295
	GSM850	GPRS (4 Tx slots)	GMSK	Left Side	1cm	189	836.4	27.46	27.50	1.009	-0.072	0.368	0.371	0.258	0.260
11	GSM850	GPRS (4 Tx slots)	GMSK	Right Side	1cm	189	836.4	27.46	27.50	1.009	-0.037	0.406	0.410	0.299	0.302
	GSM850	GPRS (4 Tx slots)	GMSK	Bottom Side	1cm	189	836.4	27.46	27.50	1.009	0.026	0.095	0.096	0.054	0.054
	GSM1900	GPRS (1 Tx slots)	GMSK	Front	1cm	810	1909.8	27.36	27.50	1.033	-0.02	0.298	0.308	0.155	0.160
	GSM1900	GPRS (1 Tx slots)	GMSK	Back	1cm	810	1909.8	27.36	27.50	1.033	0	0.301	0.311	0.155	0.160
	GSM1900	GPRS (1 Tx slots)	GMSK	Left Side	1cm	810	1909.8	27.36	27.50	1.033	-0.03	0.033	0.034	0.019	0.020
	GSM1900	GPRS (1 Tx slots)	GMSK	Right Side	1cm	810	1909.8	27.36	27.50	1.033	-0.12	0.015	0.015	0.008	0.008
12	GSM1900	GPRS (1 Tx slots)	GMSK	Bottom Side	1cm	810	1909.8	27.36	27.50	1.033	-0.03	0.419	0.433	0.214	0.221

<WCDMA SAR>

Plot No.	Band	Mode	Modulation	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
	WCDMA V	RMC 12.2Kbps	QPSK	Front	1cm	4132	826.4	23.99	24.00	1.002	-0.05	0.567	0.568	0.444	0.445
13	WCDMA V	RMC 12.2Kbps	QPSK	Back	1cm	4132	826.4	23.99	24.00	1.002	0.06	0.568	0.569	0.446	0.447
	WCDMA V	RMC 12.2Kbps	QPSK	Left Side	1cm	4132	826.4	23.99	24.00	1.002	-0.03	0.489	0.490	0.345	0.346
	WCDMA V	RMC 12.2Kbps	QPSK	Right Side	1cm	4132	826.4	23.99	24.00	1.002	0.05	0.467	0.468	0.329	0.330
	WCDMA V	RMC 12.2Kbps	QPSK	Bottom Side	1cm	4132	826.4	23.99	24.00	1.002	0.11	0.119	0.119	0.070	0.070

<LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
14	LTE Band 5	10M	QPSK	1	0	Front	1cm	20525	836.5	23.92	24.00	1.019	0.01	0.410	0.418	0.321	0.327
	LTE Band 5	10M	QPSK	25	12	Front	1cm	20600	844	23.78	24.00	1.052	0.1	0.292	0.307	0.228	0.240
	LTE Band 5	10M	QPSK	1	0	Back	1cm	20525	836.5	23.92	24.00	1.019	0	0.387	0.394	0.303	0.309
	LTE Band 5	10M	QPSK	25	12	Back	1cm	20600	844	23.78	24.00	1.052	0	0.272	0.286	0.212	0.223
	LTE Band 5	10M	QPSK	1	0	Left Side	1cm	20525	836.5	23.92	24.00	1.019	0.01	0.321	0.327	0.225	0.229
	LTE Band 5	10M	QPSK	25	12	Left Side	1cm	20600	844	23.78	24.00	1.052	0.03	0.215	0.226	0.150	0.158
	LTE Band 5	10M	QPSK	1	0	Right Side	1cm	20525	836.5	23.92	24.00	1.019	0.01	0.291	0.296	0.204	0.208
	LTE Band 5	10M	QPSK	25	12	Right Side	1cm	20600	844	23.78	24.00	1.052	0.04	0.179	0.188	0.126	0.133
	LTE Band 5	10M	QPSK	1	0	Bottom Side	1cm	20525	836.5	23.92	24.00	1.019	0	0.092	0.094	0.053	0.054
	LTE Band 5	10M	QPSK	25	12	Bottom Side	1cm	20600	844	23.78	24.00	1.052	0.06	0.089	0.094	0.051	0.054
	LTE Band 7	20M	QPSK	1	0	Front	1cm	21350	2560	21.49	21.50	1.002	-0.04	0.620	0.621	0.330	0.331
	LTE Band 7	20M	QPSK	50	0	Front	1cm	21100	2535	21.35	21.50	1.035	-0.03	0.663	0.686	0.343	0.355
	LTE Band 7	20M	QPSK	1	0	Back	1cm	21350	2560	21.49	21.50	1.002	0.04	0.738	0.740	0.398	0.399
	LTE Band 7	20M	QPSK	50	0	Back	1cm	21100	2535	21.35	21.50	1.035	-0.03	0.762	0.789	0.404	0.418
	LTE Band 7	20M	QPSK	1	0	Left Side	1cm	21350	2560	21.49	21.50	1.002	0	0.165	0.165	0.087	0.087
	LTE Band 7	20M	QPSK	50	0	Left Side	1cm	21100	2535	21.35	21.50	1.035	-0.04	0.156	0.161	0.082	0.085
	LTE Band 7	20M	QPSK	1	0	Right Side	1cm	21350	2560	21.49	21.50	1.002	-0.1	0.082	0.082	0.046	0.046
	LTE Band 7	20M	QPSK	50	0	Right Side	1cm	21100	2535	21.35	21.50	1.035	-0.06	0.082	0.085	0.046	0.048
	LTE Band 7	20M	QPSK	1	0	Bottom Side	1cm	21350	2560	21.49	21.50	1.002	0.01	0.967	0.969	0.490	0.491
	LTE Band 7	20M	QPSK	1	0	Bottom Side	1cm	20850	2510	21.48	21.50	1.005	-0.02	1.090	1.095	0.554	0.557
	LTE Band 7	20M	QPSK	1	0	Bottom Side	1cm	21100	2535	21.38	21.50	1.028	0	1.070	1.100	0.543	0.558
	LTE Band 7	20M	QPSK	50	0	Bottom Side	1cm	21100	2535	21.35	21.50	1.035	-0.05	1.050	1.087	0.531	0.550
15	LTE Band 7	20M	QPSK	50	0	Bottom Side	1cm	20850	2510	21.27	21.50	1.054	0.03	1.070	1.128	0.540	0.569
	LTE Band 7	20M	QPSK	50	0	Bottom Side	1cm	21350	2560	21.09	21.50	1.099	-0.04	0.939	1.032	0.476	0.523
	LTE Band 7	20M	QPSK	100	0	Bottom Side	1cm	20850	2510	21.32	21.50	1.042	0.01	1.050	1.094	0.533	0.556

<WLAN SAR DTS>

Plot No.	Band	Mode	Modulation	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
16	WLAN2.4GHz	802.11b 1Mbps	DBPSK	Front	1cm	6	2437	16.74	17.00	1.061	97.63	1.024	-0.04	0.107	0.116	0.061	0.066
	WLAN2.4GHz	802.11b 1Mbps	DBPSK	Back	1cm	6	2437	16.74	17.00	1.061	97.63	1.024	-0.01	0.105	0.114	0.055	0.060
	WLAN2.4GHz	802.11b 1Mbps	DBPSK	Left Side	1cm	6	2437	16.74	17.00	1.061	97.63	1.024	-0.02	0.104	0.113	0.051	0.055
	WLAN2.4GHz	802.11b 1Mbps	DBPSK	Top Side	1cm	6	2437	16.74	17.00	1.061	97.63	1.024	0.12	0.100	0.109	0.052	0.056
	WLAN5GHz	802.11a 6Mbps	OFDM	Front	1cm	149	5745	13.95	14.00	1.012	87.62	1.141	0.12	0.030	0.035	0.010	0.011
	WLAN5GHz	802.11a 6Mbps	OFDM	Back	1cm	149	5745	13.95	14.00	1.012	87.62	1.141	0.07	0.231	0.267	0.068	0.078
17	WLAN5GHz	802.11a 6Mbps	OFDM	Left Side	1cm	149	5745	13.95	14.00	1.012	87.62	1.141	0	0.244	0.282	0.070	0.081
	WLAN5GHz	802.11a 6Mbps	OFDM	Top Side	1cm	149	5745	13.95	14.00	1.012	87.62	1.141	-0.16	0.065	0.075	0.025	0.029

13.3 Body Worn SAR

<GSM SAR>

Plot No.	Band	Mode	Modulation	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
18	GSM850	GSM Voice	GMSK	Front	1.5cm	128	824.2	33.36	33.50	1.033	-0.027	0.302	0.312	0.234	0.242
	GSM850	GSM Voice	GMSK	Back	1.5cm	128	824.2	33.36	33.50	1.033	0.001	0.288	0.297	0.222	0.229
	GSM850	GPRS (4 Tx slots)	GMSK	Front	1.5cm	189	836.4	27.46	27.50	1.009	0	0.280	0.283	0.218	0.218
	GSM1900	DTM Multi-slot class 11	GSM Voice with 8PSK 2Tx	Front	1.5cm	810	1909.8	20.87	21.65	1.197	0.02	0.575	0.688	0.314	0.376
	GSM1900	DTM Multi-slot class 11	GSM Voice with 8PSK 2Tx	Back	1.5cm	810	1909.8	20.87	21.65	1.197	-0.05	0.591	0.708	0.322	0.385
19	GSM1900	EDGE (4 Tx slots)	8PSK	Back	1.5cm	810	1909.8	25.22	25.90	1.169	-0.036	0.605	0.708	0.350	0.409

<WCDMA SAR>

Plot No.	Band	Mode	Modulation	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
20	WCDMA V	RMC 12.2Kbps	QPSK	Front	1.5cm	4132	826.4	23.99	24.00	1.002	0.12	0.477	0.478	0.368	0.369
	WCDMA V	RMC 12.2Kbps	QPSK	Back	1.5cm	4132	826.4	23.99	24.00	1.002	0.03	0.453	0.454	0.347	0.348

<LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
21	LTE Band 5	10M	QPSK	1	0	Front	1.5cm	20525	836.5	23.92	24.00	1.019	0.01	0.368	0.375	0.285	0.290
	LTE Band 5	10M	QPSK	25	12	Front	1.5cm	20600	844	23.78	24.00	1.052	0.01	0.251	0.264	0.194	0.204
	LTE Band 5	10M	QPSK	1	0	Back	1.5cm	20525	836.5	23.92	24.00	1.019	0	0.359	0.366	0.278	0.283
	LTE Band 5	10M	QPSK	25	12	Back	1.5cm	20600	844	23.78	24.00	1.052	0.05	0.218	0.229	0.168	0.177
	LTE Band 7	20M	QPSK	1	0	Front	1.5cm	21350	2560	23.90	24.00	1.023	-0.01	0.518	0.530	0.290	0.297
	LTE Band 7	20M	QPSK	50	0	Front	1.5cm	21350	2560	22.90	23.00	1.023	-0.01	0.413	0.423	0.225	0.230
22	LTE Band 7	20M	QPSK	1	0	Back	1.5cm	21350	2560	23.90	24.00	1.023	-0.01	0.582	0.596	0.326	0.334
	LTE Band 7	20M	QPSK	50	0	Back	1.5cm	21350	2560	22.90	23.00	1.023	0	0.470	0.481	0.257	0.263

<WLAN SAR DTS>

Plot No.	Band	Mode	Modulation	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
23	WLAN2.4GHz	802.11b 1Mbps	DBPSK	Front	1.5cm	6	2437	16.74	17.00	1.061	97.63	1.024	0.01	0.059	0.064	0.034	0.037
	WLAN2.4GHz	802.11b 1Mbps	DBPSK	Back	1.5cm	6	2437	16.74	17.00	1.061	97.63	1.024	-0.04	0.044	0.048	0.021	0.023
	WLAN5GHz	802.11a 6Mbps	OFDM	Front	1.5cm	149	5745	13.95	14.00	1.012	87.62	1.141	0.04	0.020	0.023	0.007	0.008
24	WLAN5GHz	802.11a 6Mbps	OFDM	Back	1.5cm	149	5745	13.95	14.00	1.012	87.62	1.141	0.03	0.139	0.160	0.046	0.053

<u><WLAN SAR NII></u>

Plot No.	Band	Mode	Modulation	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
	WLAN5GHz	802.11a 6Mbps	OFDM	Front	1.5cm	36	5180	13.90	14.00	1.023	87.62	1.141	0.14	0.010	0.012	0.003	0.003
25	WLAN5GHz	802.11a 6Mbps	OFDM	Back	1.5cm	36	5180	13.90	14.00	1.023	87.62	1.141	0.07	0.076	0.089	0.021	0.025
	WLAN5GHz	802.11a 6Mbps	OFDM	Front	1.5cm	60	5300	13.98	14.00	1.005	87.62	1.141	0.12	0.006	0.007	0.001	0.001
26	WLAN5GHz	802.11a 6Mbps	OFDM	Back	1.5cm	60	5300	13.98	14.00	1.005	87.62	1.141	-0.1	0.135	0.155	0.041	0.047
	WLAN5GHz	802.11a 6Mbps	OFDM	Front	1.5cm	140	5700	13.86	14.00	1.033	87.62	1.141	0.18	0.022	0.026	0.006	0.007
27	WLAN5GHz	802.11a 6Mbps	OFDM	Back	1.5cm	140	5700	13.86	14.00	1.033	87.62	1.141	-0.01	0.103	0.121	0.030	0.035

13.4 Repeated SAR Measurement

No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Ratio	Reported 1g SAR (W/kg)
1st	LTE Band 7	20M	QPSK	1	0	Bottom Side	1cm	20850	2510	21.48	21.50	1.005	-0.02	1.090	-	1.095
2nd	LTE Band 7	20M	QPSK	1	0	Bottom Side	1cm	20850	2510	21.48	21.50	1.005	-0.03	1.050	1.04	1.055

Note:

1. Per KDB 865664 D01v01r02, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg
2. Per KDB 865664 D01v01r02, if the ratio among the repeated measurement is ≤ 1.2 and the measured SAR <1.45W/kg, only one repeated measurement is required.
3. The ratio is the largest SAR to the smallest SAR among original and repeated measurement.
4. All measurement SAR result is scaled-up to account for tune-up tolerance and is compliant.

14. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations	Smart Phone			Note
		Head	Body-worn	Hotspot	
1.	GSM(Voice) + WLAN2.4GHz(data)	Yes	Yes		
2.	WCDMA(Voice) + WLAN2.4GHz(data)	Yes	Yes		
3.	GSM(Voice) + Bluetooth(data)	Yes	Yes		
4.	WCDMA((Voice) + Bluetooth(data)	Yes	Yes		
5.	GSM(Voice) + WLAN5GHz(data)	Yes	Yes		
6.	WCDMA(Voice) + WLAN5GHz(data)	Yes	Yes		
7.	GPRS/EDGE/DTM(Data) + WLAN2.4GHz(data)	Yes	Yes	Yes	2.4GHz Hotspot
8.	WCDMA(Data) + WLAN2.4GHz(data)	Yes	Yes	Yes	2.4GHz Hotspot
9.	LTE(Data) + WLAN2.4GHz(data)	Yes	Yes	Yes	2.4GHz Hotspot
10.	GPRS/EDGE/DTM (Data) + Bluetooth(data)	Yes	Yes	Yes	Bluetooth Tethering
11.	WCDMA(Data) + Bluetooth(data)	Yes	Yes	Yes	Bluetooth Tethering
12.	LTE(Data) + Bluetooth(data)	Yes	Yes	Yes	Bluetooth Tethering
13.	GPRS/EDGE/DTM (data) + WLAN5GHz(data)	Yes	Yes	Yes	WiFi Direct 5.8GHz (GO)
14.	WCDMA(data) + WLAN5GHz(data)	Yes	Yes	Yes	WiFi Direct 5.8GHz (GO)
15.	LTE(data) + WLAN5GHz(data)	Yes	Yes	Yes	WiFi Direct 5.8GHz (GO)

Note:

1. This device supports VoIP in GSM, WCDMA, LTE (e.g. 3rd part VoIP).
2. WLAN and Bluetooth share the same antenna, and cannot transmit simultaneously.
3. This device 2.4GHz WLAN supports Hotspot operation, and 2.4GHz / 5.8GHz WLAN supports WiFi Direct (Group Client / Group Owner), and 5.2GHz / 5.3GHz / 5.5GHz supports WiFi Direct (Group Client only).
4. EUT will choose either WLAN 2.4GHz or WLAN 5GHz according to the network signal condition; therefore, 2.4GHz WLAN and 5GHz WLAN will not operate simultaneously at any moment.
5. The Scaled SAR summation is calculated based on the same configuration and test position.
6. Per KDB 447498 D01v05r01, simultaneous transmission SAR is compliant if,
   i) Scalar SAR summation < 1.6W/kg.
   ii) SPLSR = $(SAR_1 + SAR_2)^{1.5}$ / (*min. separation distance, mm*), and the peak separation distance is determined from the square root of $[(x_1-x_2)^2 + (y_1-y_2)^2 + (z_1-z_2)^2]$, where (x_1, y_1, z_1) and (x_2, y_2, z_2) are the coordinates of the extrapolated peak SAR locations in the zoom scan
   If SPLSR ≤ 0.04, simultaneously transmission SAR measurement is not necessary
   iii) Simultaneously transmission SAR measurement, and the reported multi-band SAR < 1.6W/kg
7. For simultaneous transmission analysis, Bluetooth SAR is estimated per KDB 447498 D01v05r01 based on the formula below.
   i) (*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)]·[$\sqrt{f(GHz)}/x$] W/kg for *test separation distances* ≤ 50 mm; where *x* = 7.5 for 1-g SAR, and *x* = 18.75 for 10-g SAR.
   ii) When the minimum test separation distance is < 5mm, the distance is used 5mm to determine SAR test exclusion.
   iii) 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the *test separation distances* is > 50 mm.

Max Power	Exposure Position	Head	Hotspot	Body-worn
	Test separation	5 mm	10 mm	15mm
9.5 dBm	Estimated 1g SAR (W/kg)	0.378 W/kg	0.189 W/kg	0.126 W/kg
	Estimated 10g SAR (W/kg)	0.151 W/kg	0.076 W/kg	0.050 W/kg

14.1 Head Exposure Conditions

<WWAN + WLAN 2.4GHz Band>

	WWAN		WLAN	**Summed 1g SAR (W/kg))**
Position	WWAN Band	1g SAR (W/kg)	1g SAR (W/kg)	
Right Cheek	GSM850	0.352	0.702	**1.05**
	GSM1900	0.092	0.702	**0.79**
	WCDMA V	0.391	0.702	**1.09**
	LTE Band 5	0.325	0.702	**1.03**
	LTE Band 7	0.264	0.702	**0.97**
Right Tilted	GSM850	0.150	0.501	**0.65**
	GSM1900	0.051	0.501	**0.55**
	WCDMA V	0.233	0.501	**0.73**
	LTE Band 5	0.184	0.501	**0.69**
	LTE Band 7	0.115	0.501	**0.62**
Left Cheek	GSM850	0.240	0.351	**0.59**
	GSM1900	0.195	0.351	**0.55**
	WCDMA V	0.376	0.351	**0.73**
	LTE Band 5	0.291	0.351	**0.64**
	LTE Band 7	0.251	0.351	**0.60**
Left Tilted	GSM850	0.152	0.217	**0.37**
	GSM1900	0.056	0.217	**0.27**
	WCDMA V	0.261	0.217	**0.48**
	LTE Band 5	0.177	0.217	**0.39**
	LTE Band 7	0.061	0.217	**0.28**

	WWAN		WLAN	**Summed 10g SAR (W/kg)**
Position	WWAN Band	10g SAR (W/kg)	10g SAR (W/kg)	
Right Cheek	GSM850	0.260	0.320	**0.58**
	GSM1900	0.060	0.320	**0.38**
	WCDMA V	0.302	0.320	**0.62**
	LTE Band 5	0.250	0.320	**0.57**
	LTE Band 7	0.142	0.320	**0.46**
Right Tilted	GSM850	0.118	0.228	**0.35**
	GSM1900	0.030	0.228	**0.26**
	WCDMA V	0.182	0.228	**0.41**
	LTE Band 5	0.140	0.228	**0.37**
	LTE Band 7	0.056	0.228	**0.28**
Left Cheek	GSM850	0.185	0.177	**0.36**
	GSM1900	0.121	0.177	**0.30**
	WCDMA V	0.289	0.177	**0.47**
	LTE Band 5	0.223	0.177	**0.40**
	LTE Band 7	0.128	0.177	**0.31**
Left Tilted	GSM850	0.119	0.105	**0.22**
	GSM1900	0.034	0.105	**0.14**
	WCDMA V	0.204	0.105	**0.31**
	LTE Band 5	0.134	0.105	**0.24**
	LTE Band 7	0.033	0.105	**0.14**

<WWAN + WLAN 5.2GHz Band>

	WWAN		WLAN	Summed 1g SAR (W/kg)
Position	WWAN Band	1g SAR (W/kg)	1g SAR (W/kg)	
Right Cheek	GSM850	0.352	0.290	**0.64**
	GSM1900	0.092	0.290	**0.38**
	WCDMA V	0.391	0.290	**0.68**
	LTE Band 5	0.325	0.290	**0.62**
	LTE Band 7	0.264	0.290	**0.55**
Right Tilted	GSM850	0.150	0.344	**0.49**
	GSM1900	0.051	0.344	**0.40**
	WCDMA V	0.233	0.344	**0.58**
	LTE Band 5	0.184	0.344	**0.53**
	LTE Band 7	0.115	0.344	**0.46**
Left Cheek	GSM850	0.240	0.103	**0.34**
	GSM1900	0.195	0.103	**0.30**
	WCDMA V	0.376	0.103	**0.48**
	LTE Band 5	0.291	0.103	**0.39**
	LTE Band 7	0.251	0.103	**0.35**
Left Tilted	GSM850	0.152	0.126	**0.28**
	GSM1900	0.056	0.126	**0.18**
	WCDMA V	0.261	0.126	**0.39**
	LTE Band 5	0.177	0.126	**0.30**
	LTE Band 7	0.061	0.126	**0.19**

	WWAN		WLAN	Summed 10g SAR (W/kg)
Position	WWAN Band	10g SAR (W/kg)	10g SAR (W/kg)	
Right Cheek	GSM850	0.260	0.067	**0.33**
	GSM1900	0.060	0.067	**0.13**
	WCDMA V	0.302	0.067	**0.37**
	LTE Band 5	0.250	0.067	**0.32**
	LTE Band 7	0.142	0.067	**0.21**
Right Tilted	GSM850	0.118	0.072	**0.19**
	GSM1900	0.030	0.072	**0.10**
	WCDMA V	0.182	0.072	**0.25**
	LTE Band 5	0.140	0.072	**0.21**
	LTE Band 7	0.056	0.072	**0.13**
Left Cheek	GSM850	0.185	0.032	**0.22**
	GSM1900	0.121	0.032	**0.15**
	WCDMA V	0.289	0.032	**0.32**
	LTE Band 5	0.223	0.032	**0.26**
	LTE Band 7	0.128	0.032	**0.16**
Left Tilted	GSM850	0.119	0.036	**0.16**
	GSM1900	0.034	0.036	**0.07**
	WCDMA V	0.204	0.036	**0.24**
	LTE Band 5	0.134	0.036	**0.17**
	LTE Band 7	0.033	0.036	**0.07**

<WWAN + WLAN 5.3GHz Band>

	WWAN		WLAN	Summed 1g SAR (W/kg)
Position	WWAN Band	1g SAR (W/kg)	1g SAR (W/kg)	
Right Cheek	GSM850	0.352	0.365	**0.72**
	GSM1900	0.092	0.365	**0.46**
	WCDMA V	0.391	0.365	**0.76**
	LTE Band 5	0.325	0.365	**0.69**
	LTE Band 7	0.264	0.365	**0.63**
Right Tilted	GSM850	0.150	0.444	**0.59**
	GSM1900	0.051	0.444	**0.50**
	WCDMA V	0.233	0.444	**0.68**
	LTE Band 5	0.184	0.444	**0.63**
	LTE Band 7	0.115	0.444	**0.56**
Left Cheek	GSM850	0.240	0.143	**0.38**
	GSM1900	0.195	0.143	**0.34**
	WCDMA V	0.376	0.143	**0.52**
	LTE Band 5	0.291	0.143	**0.43**
	LTE Band 7	0.251	0.143	**0.39**
Left Tilted	GSM850	0.152	0.195	**0.35**
	GSM1900	0.056	0.195	**0.25**
	WCDMA V	0.261	0.195	**0.46**
	LTE Band 5	0.177	0.195	**0.37**
	LTE Band 7	0.061	0.195	**0.26**

	WWAN		WLAN	Summed 10g SAR (W/kg)
Position	WWAN Band	10g SAR (W/kg)	10g SAR (W/kg)	
Right Cheek	GSM850	0.260	0.077	**0.34**
	GSM1900	0.060	0.077	**0.14**
	WCDMA V	0.302	0.077	**0.38**
	LTE Band 5	0.250	0.077	**0.33**
	LTE Band 7	0.142	0.077	**0.22**
Right Tilted	GSM850	0.118	0.081	**0.20**
	GSM1900	0.030	0.081	**0.11**
	WCDMA V	0.182	0.081	**0.26**
	LTE Band 5	0.140	0.081	**0.22**
	LTE Band 7	0.056	0.081	**0.14**
Left Cheek	GSM850	0.185	0.044	**0.23**
	GSM1900	0.121	0.044	**0.17**
	WCDMA V	0.289	0.044	**0.33**
	LTE Band 5	0.223	0.044	**0.27**
	LTE Band 7	0.128	0.044	**0.17**
Left Tilted	GSM850	0.119	0.056	**0.18**
	GSM1900	0.034	0.056	**0.09**
	WCDMA V	0.204	0.056	**0.26**
	LTE Band 5	0.134	0.056	**0.19**
	LTE Band 7	0.033	0.056	**0.09**

<WWAN + WLAN 5.5GHz Band>

	WWAN		WLAN	
Position	WWAN Band	1g SAR (W/kg)	1g SAR (W/kg)	**Summed 1g SAR (W/kg)**
Right Cheek	GSM850	0.352	0.428	**0.78**
	GSM1900	0.092	0.428	**0.52**
	WCDMA V	0.391	0.428	**0.82**
	LTE Band 5	0.325	0.428	**0.75**
	LTE Band 7	0.264	0.428	**0.69**
Right Tilted	GSM850	0.150	0.473	**0.62**
	GSM1900	0.051	0.473	**0.52**
	WCDMA V	0.233	0.473	**0.71**
	LTE Band 5	0.184	0.473	**0.66**
	LTE Band 7	0.115	0.473	**0.59**
Left Cheek	GSM850	0.240	0.257	**0.50**
	GSM1900	0.195	0.257	**0.45**
	WCDMA V	0.376	0.257	**0.63**
	LTE Band 5	0.291	0.257	**0.55**
	LTE Band 7	0.251	0.257	**0.51**
Left Tilted	GSM850	0.152	0.304	**0.46**
	GSM1900	0.056	0.304	**0.36**
	WCDMA V	0.261	0.304	**0.57**
	LTE Band 5	0.177	0.304	**0.48**
	LTE Band 7	0.061	0.304	**0.37**

	WWAN		WLAN	
Position	WWAN Band	10g SAR (W/kg)	10g SAR (W/kg)	**Summed 10g SAR (W/kg)**
Right Cheek	GSM850	0.260	0.093	**0.35**
	GSM1900	0.060	0.093	**0.15**
	WCDMA V	0.302	0.093	**0.40**
	LTE Band 5	0.250	0.093	**0.34**
	LTE Band 7	0.142	0.093	**0.24**
Right Tilted	GSM850	0.118	0.099	**0.22**
	GSM1900	0.030	0.099	**0.13**
	WCDMA V	0.182	0.099	**0.28**
	LTE Band 5	0.140	0.099	**0.24**
	LTE Band 7	0.056	0.099	**0.16**
Left Cheek	GSM850	0.185	0.068	**0.25**
	GSM1900	0.121	0.068	**0.19**
	WCDMA V	0.289	0.068	**0.36**
	LTE Band 5	0.223	0.068	**0.29**
	LTE Band 7	0.128	0.068	**0.20**
Left Tilted	GSM850	0.119	0.079	**0.20**
	GSM1900	0.034	0.079	**0.11**
	WCDMA V	0.204	0.079	**0.28**
	LTE Band 5	0.134	0.079	**0.21**
	LTE Band 7	0.033	0.079	**0.11**

<WWAN + WLAN 5.8GHz Band>

	WWAN		WLAN	Summed 1g SAR (W/kg)
Position	WWAN Band	1g SAR (W/kg)	1g SAR (W/kg)	
Right Cheek	GSM850	0.352	0.265	**0.62**
	GSM1900	0.092	0.265	**0.36**
	WCDMA V	0.391	0.265	**0.66**
	LTE Band 5	0.325	0.265	**0.59**
	LTE Band 7	0.264	0.265	**0.53**
Right Tilted	GSM850	0.150	0.179	**0.33**
	GSM1900	0.051	0.179	**0.23**
	WCDMA V	0.233	0.179	**0.41**
	LTE Band 5	0.184	0.179	**0.36**
	LTE Band 7	0.115	0.179	**0.29**
Left Cheek	GSM850	0.240	0.115	**0.36**
	GSM1900	0.195	0.115	**0.31**
	WCDMA V	0.376	0.115	**0.49**
	LTE Band 5	0.291	0.115	**0.41**
	LTE Band 7	0.251	0.115	**0.37**
Left Tilted	GSM850	0.152	0.092	**0.24**
	GSM1900	0.056	0.092	**0.15**
	WCDMA V	0.261	0.092	**0.35**
	LTE Band 5	0.177	0.092	**0.27**
	LTE Band 7	0.061	0.092	**0.15**

	WWAN		WLAN	Summed 10g SAR (W/kg)
Position	WWAN Band	10g SAR (W/kg)	10g SAR (W/kg)	
Right Cheek	GSM850	0.260	0.068	**0.33**
	GSM1900	0.060	0.068	**0.13**
	WCDMA V	0.302	0.068	**0.37**
	LTE Band 5	0.250	0.068	**0.32**
	LTE Band 7	0.142	0.068	**0.21**
Right Tilted	GSM850	0.118	0.048	**0.17**
	GSM1900	0.030	0.048	**0.08**
	WCDMA V	0.182	0.048	**0.23**
	LTE Band 5	0.140	0.048	**0.19**
	LTE Band 7	0.056	0.048	**0.10**
Left Cheek	GSM850	0.185	0.025	**0.21**
	GSM1900	0.121	0.025	**0.15**
	WCDMA V	0.289	0.025	**0.31**
	LTE Band 5	0.223	0.025	**0.25**
	LTE Band 7	0.128	0.025	**0.15**
Left Tilted	GSM850	0.119	0.020	**0.14**
	GSM1900	0.034	0.020	**0.05**
	WCDMA V	0.204	0.020	**0.22**
	LTE Band 5	0.134	0.020	**0.15**
	LTE Band 7	0.033	0.020	**0.05**

<WWAN + Bluetooth>

	WWAN		Bluetooth	**Summed 1g SAR (W/kg)**
Position	WWAN Band	1g SAR (W/kg)	Estimated 1g SAR (W/kg)	
Right Cheek	GSM850	0.352	0.378	**0.73**
	GSM1900	0.092	0.378	**0.47**
	WCDMA V	0.391	0.378	**0.77**
	LTE Band 5	0.325	0.378	**0.70**
	LTE Band 7	0.264	0.378	**0.64**
Right Tilted	GSM850	0.150	0.378	**0.53**
	GSM1900	0.051	0.378	**0.43**
	WCDMA V	0.233	0.378	**0.61**
	LTE Band 5	0.184	0.378	**0.56**
	LTE Band 7	0.115	0.378	**0.49**
Left Cheek	GSM850	0.240	0.378	**0.62**
	GSM1900	0.195	0.378	**0.57**
	WCDMA V	0.376	0.378	**0.75**
	LTE Band 5	0.291	0.378	**0.67**
	LTE Band 7	0.251	0.378	**0.63**
Left Tilted	GSM850	0.152	0.378	**0.53**
	GSM1900	0.056	0.378	**0.43**
	WCDMA V	0.261	0.378	**0.64**
	LTE Band 5	0.177	0.378	**0.56**
	LTE Band 7	0.061	0.378	**0.44**

	WWAN		Bluetooth	**Summed 10g SAR (W/kg)**
Position	WWAN Band	10g SAR (W/kg)	Estimated 10g SAR (W/kg)	
Right Cheek	GSM850	0.260	0.151	**0.41**
	GSM1900	0.060	0.151	**0.21**
	WCDMA V	0.302	0.151	**0.45**
	LTE Band 5	0.250	0.151	**0.40**
	LTE Band 7	0.142	0.151	**0.29**
Right Tilted	GSM850	0.118	0.151	**0.27**
	GSM1900	0.030	0.151	**0.18**
	WCDMA V	0.182	0.151	**0.33**
	LTE Band 5	0.140	0.151	**0.29**
	LTE Band 7	0.056	0.151	**0.21**
Left Cheek	GSM850	0.185	0.151	**0.34**
	GSM1900	0.121	0.151	**0.27**
	WCDMA V	0.289	0.151	**0.44**
	LTE Band 5	0.223	0.151	**0.37**
	LTE Band 7	0.128	0.151	**0.28**
Left Tilted	GSM850	0.119	0.151	**0.27**
	GSM1900	0.034	0.151	**0.19**
	WCDMA V	0.204	0.151	**0.36**
	LTE Band 5	0.134	0.151	**0.29**
	LTE Band 7	0.033	0.151	**0.18**

14.2 Hotspot Exposure Conditions

<WWAN + WLAN2.4GHz Band>

	WWAN		WLAN	**Summed 1g SAR (W/kg)**
Position	WWAN Band	1g SAR (W/kg)	1g SAR (W/kg)	
Front	GSM850	0.388	0.116	**0.50**
	GSM1900	0.308	0.116	**0.42**
	WCDMA V	0.568	0.116	**0.68**
	LTE Band 5	0.418	0.116	**0.53**
	LTE Band 7	0.686	0.116	**0.80**
Back	GSM850	0.386	0.114	**0.50**
	GSM1900	0.311	0.114	**0.43**
	WCDMA V	0.569	0.114	**0.68**
	LTE Band 5	0.394	0.114	**0.51**
	LTE Band 7	0.789	0.114	**0.90**
Left Side	GSM850	0.371	0.113	**0.48**
	GSM1900	0.034	0.113	**0.15**
	WCDMA V	0.490	0.113	**0.60**
	LTE Band 5	0.327	0.113	**0.44**
	LTE Band 7	0.165	0.113	**0.28**
Right Side	GSM850	0.410		**0.41**
	GSM1900	0.015		**0.02**
	WCDMA V	0.468		**0.47**
	LTE Band 5	0.296		**0.30**
	LTE Band 7	0.085		**0.09**
Top Side	GSM850		0.109	**0.11**
	GSM1900		0.109	**0.11**
	WCDMA V		0.109	**0.11**
	LTE Band 5		0.109	**0.11**
	LTE Band 7		0.109	**0.11**
Bottom Side	GSM850	0.096		**0.10**
	GSM1900	0.433		**0.43**
	WCDMA V	0.119		**0.12**
	LTE Band 5	0.094		**0.09**
	LTE Band 7	1.128		**1.13**

	WWAN		WLAN	Summed 10g SAR (W/kg)
Position	WWAN Band	10g SAR (W/kg)	10g SAR (W/kg)	
Front	GSM850	0.286	0.066	**0.35**
	GSM1900	0.160	0.066	**0.23**
	WCDMA V	0.445	0.066	**0.51**
	LTE Band 5	0.327	0.066	**0.39**
	LTE Band 7	0.355	0.066	**0.42**
Back	GSM850	0.295	0.060	**0.36**
	GSM1900	0.160	0.060	**0.22**
	WCDMA V	0.447	0.060	**0.51**
	LTE Band 5	0.309	0.060	**0.37**
	LTE Band 7	0.418	0.060	**0.48**
Left Side	GSM850	0.260	0.055	**0.32**
	GSM1900	0.020	0.055	**0.08**
	WCDMA V	0.346	0.055	**0.40**
	LTE Band 5	0.229	0.055	**0.28**
	LTE Band 7	0.087	0.055	**0.14**
Right Side	GSM850	0.302		**0.30**
	GSM1900	0.008		**0.01**
	WCDMA V	0.330		**0.33**
	LTE Band 5	0.208		**0.21**
	LTE Band 7	0.048		**0.05**
Top Side	GSM850		0.056	**0.06**
	GSM1900		0.056	**0.06**
	WCDMA V		0.056	**0.06**
	LTE Band 5		0.056	**0.06**
	LTE Band 7		0.056	**0.06**
Bottom Side	GSM850	0.054		**0.05**
	GSM1900	0.221		**0.22**
	WCDMA V	0.070		**0.07**
	LTE Band 5	0.054		**0.05**
	LTE Band 7	0.569		**0.57**

<WWAN + WLAN 5.8GHz Band>

	WWAN		WLAN	Summed 1g SAR (W/kg)
Position	WWAN Band	1g SAR (W/kg)	1g SAR (W/kg)	
Front	GSM850	0.388	0.035	**0.42**
	GSM1900	0.308	0.035	**0.34**
	WCDMA V	0.568	0.035	**0.60**
	LTE Band 5	0.418	0.035	**0.45**
	LTE Band 7	0.686	0.035	**0.72**
Back	GSM850	0.386	0.267	**0.65**
	GSM1900	0.311	0.267	**0.58**
	WCDMA V	0.569	0.267	**0.84**
	LTE Band 5	0.394	0.267	**0.66**
	LTE Band 7	0.789	0.267	**1.06**
Left Side	GSM850	0.371	0.282	**0.65**
	GSM1900	0.034	0.282	**0.32**
	WCDMA V	0.490	0.282	**0.77**
	LTE Band 5	0.327	0.282	**0.61**
	LTE Band 7	0.165	0.282	**0.45**
Right Side	GSM850	0.410		**0.41**
	GSM1900	0.015		**0.02**
	WCDMA V	0.468		**0.47**
	LTE Band 5	0.296		**0.30**
	LTE Band 7	0.085		**0.09**
Top Side	GSM850		0.075	**0.08**
	GSM1900		0.075	**0.08**
	WCDMA V		0.075	**0.08**
	LTE Band 5		0.075	**0.08**
	LTE Band 7		0.075	**0.08**
Bottom Side	GSM850	0.096		**0.10**
	GSM1900	0.433		**0.43**
	WCDMA V	0.119		**0.12**
	LTE Band 5	0.094		**0.09**
	LTE Band 7	1.128		**1.13**

	WWAN		WLAN	**Summed 10g SAR (W/kg)**
Position	WWAN Band	10g SAR (W/kg)	10g SAR (W/kg)	
Front	GSM850	0.286	0.011	**0.30**
	GSM1900	0.160	0.011	**0.17**
	WCDMA V	0.445	0.011	**0.46**
	LTE Band 5	0.327	0.011	**0.34**
	LTE Band 7	0.355	0.011	**0.37**
Back	GSM850	0.295	0.078	**0.37**
	GSM1900	0.160	0.078	**0.24**
	WCDMA V	0.447	0.078	**0.53**
	LTE Band 5	0.309	0.078	**0.39**
	LTE Band 7	0.418	0.078	**0.50**
Left Side	GSM850	0.260	0.081	**0.34**
	GSM1900	0.020	0.081	**0.10**
	WCDMA V	0.346	0.081	**0.43**
	LTE Band 5	0.229	0.081	**0.31**
	LTE Band 7	0.087	0.081	**0.17**
Right Side	GSM850	0.302		**0.30**
	GSM1900	0.008		**0.01**
	WCDMA V	0.330		**0.33**
	LTE Band 5	0.208		**0.21**
	LTE Band 7	0.048		**0.05**
Top Side	GSM850		0.081	**0.08**
	GSM1900		0.081	**0.08**
	WCDMA V		0.081	**0.08**
	LTE Band 5		0.081	**0.08**
	LTE Band 7		0.081	**0.08**
Bottom Side	GSM850	0.054		**0.05**
	GSM1900	0.221		**0.22**
	WCDMA V	0.070		**0.07**
	LTE Band 5	0.054		**0.05**
	LTE Band 7	0.569		**0.57**

<WWAN + Bluetooth>

	WWAN		Bluetooth	**Summed 1g SAR (W/kg)**
Position	WWAN Band	1g SAR (W/kg)	Estimated 1g SAR (W/kg)	
Front	GSM850	0.388	0.189	**0.58**
	GSM1900	0.308	0.189	**0.50**
	WCDMA V	0.568	0.189	**0.76**
	LTE Band 5	0.418	0.189	**0.61**
	LTE Band 7	0.686	0.189	**0.88**
Back	GSM850	0.386	0.189	**0.58**
	GSM1900	0.311	0.189	**0.50**
	WCDMA V	0.569	0.189	**0.76**
	LTE Band 5	0.394	0.189	**0.58**
	LTE Band 7	0.789	0.189	**0.98**
Left Side	GSM850	0.371	0.189	**0.56**
	GSM1900	0.034	0.189	**0.22**
	WCDMA V	0.490	0.189	**0.68**
	LTE Band 5	0.327	0.189	**0.52**
	LTE Band 7	0.165	0.189	**0.35**
Right Side	GSM850	0.410		**0.41**
	GSM1900	0.015		**0.02**
	WCDMA V	0.468		**0.47**
	LTE Band 5	0.296		**0.30**
	LTE Band 7	0.085		**0.09**
Top Side	GSM850		0.189	**0.19**
	GSM1900		0.189	**0.19**
	WCDMA V		0.189	**0.19**
	LTE Band 5		0.189	**0.19**
	LTE Band 7		0.189	**0.19**
Bottom Side	GSM850	0.096		**0.10**
	GSM1900	0.433		**0.43**
	WCDMA V	0.119		**0.12**
	LTE Band 5	0.094		**0.09**
	LTE Band 7	1.128		**1.13**

	WWAN		Bluetooth	Summed 10g SAR (W/kg)
Position	WWAN Band	10g SAR (W/kg)	Estimated 10g SAR (W/kg)	
Front	GSM850	0.286	0.076	**0.36**
	GSM1900	0.160	0.076	**0.24**
	WCDMA V	0.445	0.076	**0.52**
	LTE Band 5	0.327	0.076	**0.40**
	LTE Band 7	0.355	0.076	**0.43**
Back	GSM850	0.295	0.076	**0.37**
	GSM1900	0.160	0.076	**0.24**
	WCDMA V	0.447	0.076	**0.52**
	LTE Band 5	0.309	0.076	**0.39**
	LTE Band 7	0.418	0.076	**0.49**
Left Side	GSM850	0.260	0.076	**0.34**
	GSM1900	0.020	0.076	**0.10**
	WCDMA V	0.346	0.076	**0.42**
	LTE Band 5	0.229	0.076	**0.31**
	LTE Band 7	0.087	0.076	**0.16**
Right Side	GSM850	0.302		**0.30**
	GSM1900	0.008		**0.01**
	WCDMA V	0.330		**0.33**
	LTE Band 5	0.208		**0.21**
	LTE Band 7	0.048		**0.05**
Top Side	GSM850		0.076	**0.08**
	GSM1900		0.076	**0.08**
	WCDMA V		0.076	**0.08**
	LTE Band 5		0.076	**0.08**
	LTE Band 7		0.076	**0.08**
Bottom Side	GSM850	0.054		**0.05**
	GSM1900	0.221		**0.22**
	WCDMA V	0.070		**0.07**
	LTE Band 5	0.054		**0.05**
	LTE Band 7	0.569		**0.57**

14.3 Body-Worn Exposure Conditions

<WWAN + WLAN2.4GHz Band>

	WWAN		WLAN	Summed 1g SAR (W/kg)
Position	WWAN Band	1g SAR (W/kg)	1g SAR (W/kg)	
Front	GSM850	0.312	0.064	**0.38**
	GSM1900	0.688	0.064	**0.75**
	WCDMA V	0.478	0.064	**0.54**
	LTE Band 5	0.375	0.064	**0.44**
	LTE Band 7	0.530	0.064	**0.59**
Back	GSM850	0.297	0.048	**0.35**
	GSM1900	0.708	0.048	**0.76**
	WCDMA V	0.454	0.048	**0.50**
	LTE Band 5	0.366	0.048	**0.41**
	LTE Band 7	0.596	0.048	**0.64**

	WWAN		WLAN	Summed 10g SAR (W/kg)
Position	WWAN Band	10g SAR (W/kg)	10g SAR (W/kg)	
Front	GSM850	0.242	0.037	**0.28**
	GSM1900	0.376	0.037	**0.41**
	WCDMA V	0.369	0.037	**0.41**
	LTE Band 5	0.290	0.037	**0.33**
	LTE Band 7	0.297	0.037	**0.33**
Back	GSM850	0.229	0.023	**0.25**
	GSM1900	0.409	0.023	**0.43**
	WCDMA V	0.348	0.023	**0.37**
	LTE Band 5	0.283	0.023	**0.31**
	LTE Band 7	0.334	0.023	**0.36**

<WWAN + WLAN5.2GHz Band>

	WWAN		WLAN	**Summed 1g SAR (W/kg)**
Position	WWAN Band	1g SAR (W/kg)	1g SAR (W/kg)	
Front	GSM850	0.312	0.012	**0.32**
	GSM1900	0.688	0.012	**0.70**
	WCDMA V	0.478	0.012	**0.49**
	LTE Band 5	0.375	0.012	**0.39**
	LTE Band 7	0.530	0.012	**0.54**
Back	GSM850	0.297	0.089	**0.39**
	GSM1900	0.708	0.089	**0.80**
	WCDMA V	0.454	0.089	**0.54**
	LTE Band 5	0.366	0.089	**0.46**
	LTE Band 7	0.596	0.089	**0.69**

	WWAN		WLAN	**Summed 10g SAR (W/kg)**
Position	WWAN Band	10g SAR (W/kg)	10g SAR (W/kg)	
Front	GSM850	0.242	0.003	**0.25**
	GSM1900	0.376	0.003	**0.38**
	WCDMA V	0.369	0.003	**0.37**
	LTE Band 5	0.290	0.003	**0.29**
	LTE Band 7	0.297	0.003	**0.30**
Back	GSM850	0.229	0.025	**0.25**
	GSM1900	0.409	0.025	**0.43**
	WCDMA V	0.348	0.025	**0.37**
	LTE Band 5	0.283	0.025	**0.31**
	LTE Band 7	0.334	0.025	**0.36**

<WWAN + WLAN5.3GHz Band>

	WWAN		WLAN	**Summed 1g SAR (W/kg)**
Position	WWAN Band	1g SAR (W/kg)	1g SAR (W/kg)	
Front	GSM850	0.312	0.007	**0.32**
	GSM1900	0.688	0.007	**0.70**
	WCDMA V	0.478	0.007	**0.49**
	LTE Band 5	0.375	0.007	**0.38**
	LTE Band 7	0.530	0.007	**0.54**
Back	GSM850	0.297	0.155	**0.45**
	GSM1900	0.708	0.155	**0.86**
	WCDMA V	0.454	0.155	**0.61**
	LTE Band 5	0.366	0.155	**0.52**
	LTE Band 7	0.596	0.155	**0.75**

	WWAN		WLAN	**Summed 10g SAR (W/kg)**
Position	WWAN Band	10g SAR (W/kg)	10g SAR (W/kg)	
Front	GSM850	0.242	0.001	**0.24**
	GSM1900	0.376	0.001	**0.38**
	WCDMA V	0.369	0.001	**0.37**
	LTE Band 5	0.290	0.001	**0.29**
	LTE Band 7	0.297	0.001	**0.30**
Back	GSM850	0.229	0.047	**0.28**
	GSM1900	0.409	0.047	**0.46**
	WCDMA V	0.348	0.047	**0.40**
	LTE Band 5	0.283	0.047	**0.33**
	LTE Band 7	0.334	0.047	**0.38**

<WWAN + WLAN5.5GHz Band>

	WWAN		WLAN	**Summed 1g SAR (W/kg)**
Position	WWAN Band	1g SAR (W/kg)	1g SAR (W/kg)	
Front	GSM850	0.312	0.026	**0.34**
	GSM1900	0.688	0.026	**0.71**
	WCDMA V	0.478	0.026	**0.50**
	LTE Band 5	0.375	0.026	**0.40**
	LTE Band 7	0.530	0.026	**0.56**
Back	GSM850	0.297	0.121	**0.42**
	GSM1900	0.708	0.121	**0.83**
	WCDMA V	0.454	0.121	**0.58**
	LTE Band 5	0.366	0.121	**0.49**
	LTE Band 7	0.596	0.121	**0.72**

	WWAN		WLAN	**Summed 10g SAR (W/kg)**
Position	WWAN Band	10g SAR (W/kg)	10g SAR (W/kg)	
Front	GSM850	0.242	0.007	**0.25**
	GSM1900	0.376	0.007	**0.38**
	WCDMA V	0.369	0.007	**0.38**
	LTE Band 5	0.290	0.007	**0.30**
	LTE Band 7	0.297	0.007	**0.30**
Back	GSM850	0.229	0.035	**0.26**
	GSM1900	0.409	0.035	**0.44**
	WCDMA V	0.348	0.035	**0.38**
	LTE Band 5	0.283	0.035	**0.32**
	LTE Band 7	0.334	0.035	**0.37**

<WWAN + WLAN5.8GHz Band>

	WWAN		WLAN	**Summed 1g SAR (W/kg)**
Position	WWAN Band	1g SAR (W/kg)	1g SAR (W/kg)	
Front	GSM850	0.312	0.023	**0.34**
	GSM1900	0.688	0.023	**0.71**
	WCDMA V	0.478	0.023	**0.50**
	LTE Band 5	0.375	0.023	**0.40**
	LTE Band 7	0.530	0.023	**0.55**
Back	GSM850	0.297	0.160	**0.46**
	GSM1900	0.708	0.160	**0.87**
	WCDMA V	0.454	0.160	**0.61**
	LTE Band 5	0.366	0.160	**0.53**
	LTE Band 7	0.596	0.160	**0.76**

	WWAN		WLAN	**Summed 10g SAR (W/kg)**
Position	WWAN Band	10g SAR (W/kg)	10g SAR (W/kg)	
Front	GSM850	0.242	0.008	**0.25**
	GSM1900	0.376	0.008	**0.38**
	WCDMA V	0.369	0.008	**0.38**
	LTE Band 5	0.290	0.008	**0.30**
	LTE Band 7	0.297	0.008	**0.31**
Back	GSM850	0.229	0.053	**0.28**
	GSM1900	0.409	0.053	**0.46**
	WCDMA V	0.348	0.053	**0.40**
	LTE Band 5	0.283	0.053	**0.34**
	LTE Band 7	0.334	0.053	**0.39**

<WWAN + Bluetooth>

	WWAN		Bluetooth	Summed 1g SAR (W/kg)
Position	WWAN Band	1g SAR (W/kg)	Estimated 1g SAR (W/kg)	
Front	GSM850	0.312	0.126	**0.44**
	GSM1900	0.688	0.126	**0.81**
	WCDMA V	0.478	0.126	**0.60**
	LTE Band 5	0.375	0.126	**0.50**
	LTE Band 7	0.530	0.126	**0.66**
Back	GSM850	0.297	0.126	**0.42**
	GSM1900	0.708	0.126	**0.83**
	WCDMA V	0.454	0.126	**0.58**
	LTE Band 5	0.366	0.126	**0.49**
	LTE Band 7	0.596	0.126	**0.72**

	WWAN		Bluetooth	Summed 10g SAR (W/kg)
Position	WWAN Band	10g SAR (W/kg)	Estimated 10g SAR (W/kg)	
Front	GSM850	0.242	0.050	**0.29**
	GSM1900	0.376	0.050	**0.43**
	WCDMA V	0.369	0.050	**0.42**
	LTE Band 5	0.290	0.050	**0.34**
	LTE Band 7	0.297	0.050	**0.35**
Back	GSM850	0.229	0.050	**0.28**
	GSM1900	0.409	0.050	**0.46**
	WCDMA V	0.348	0.050	**0.40**
	LTE Band 5	0.283	0.050	**0.33**
	LTE Band 7	0.334	0.050	**0.38**

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15. Uncertainty Assessment

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

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

A type B evaluation of standard uncertainty is typically based on scientific judgment using all of the relevant information available. These may include previous measurement data, experience, and knowledge of the behavior and properties of relevant materials and instruments, manufacture's specification, data provided in calibration reports and uncertainties assigned to reference data taken from handbooks. Broadly speaking, the uncertainty is either obtained from an outdoor source or obtained from an assumed distribution, such as the normal distribution, rectangular or triangular distributions indicated in Table 14.1

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

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

(b) κ is the coverage factor

Table 15.1. Standard Uncertainty for Assumed Distribution

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

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

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

Table 15.2. Uncertainty Budget for frequency range 300 MHz to 3 GHz

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

Table 15.3. Uncertainty Budget for frequency range 3 GHz to 6 GHz

16. References

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[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

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[4] SPEAG DASY System Handbook

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

[6] FCC KDB 447498 D01 v05r01, “Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies”, May 2013

[7] FCC KDB 648474 D04 v01r01r02, “SAR Evaluation Considerations for Wireless Handsets”, Dec 2013

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

[11] FCC KDB 941225 D01 v02, “SAR Measurement Procedures for 3G Devices – CDMA 2000 / Ev-Do / WCDMA / HSDPA / HSPA”, October 2007

[12] FCC KDB 941225 D02 v02r02, “SAR Guidance for HSPA, HSPA+, DC-HSDPA and 1x-Advanced”, May 2013.

[13] FCC KDB 941225 D06 v01r01, "SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities", May 2013

[14] FCC KDB 865664 D01 v01r02, "SAR Measurement Requirements for 100 MHz to 6 GHz", Dec 2013.