FCC SAR Test Report

APPLICANT	:	Motorola Mobility LLC
EQUIPMENT	:	Mobile Cellular Phone
BRAND NAME	:	Motorola
MODEL NAME	:	10870, 10869
FCC ID	:	IHDT56WK4
STANDARD	:	FCC 47 CFR Part 2 (2.1093) ANSI/IEEE C95.1-1992 IEEE 1528-2013

We, Sporton International (KunShan) INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and had been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International (KunShan) INC., the test report shall not be reproduced except in full.

Mark Qu

Prepared by: Mark Qu / Manager

Jones Tsai

Approved by: Jones Tsai / Manager

Testing Laboratory
2627

Sporton International (KunShan) INC.
No.3-2, Pingxiang Road, Kunshan Development Zone, Jiangsu, China

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA761702-03	Rev. 01	Initial issue of report	Aug. 07, 2017

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **Motorola Mobility LLC, Mobile Cellular Phone, 10870, 10869,** are as follows.

Equipment Class	Frequency Band		Highest SAR Summary			Highest Simultaneous Transmission 1g SAR (W/kg)
			Head (Separation 0mm)	Hotspot (Separation 10mm)	Body-worn (Separation 10mm)	
			1g SAR (W/kg)			
Licensed	GSM	GSM850	0.35	0.90	0.90	1.59
		GSM1900	0.14	1.03	1.03	
	WCDMA	Band V	0.27	0.67	0.67	
		Band IV	0.13	**1.16**	**1.16**	
		Band II	0.14	1.13	1.13	
	LTE	Band 12/Band 17	0.43	0.78	0.78	
		Band 5	0.50	0.57	0.57	
		Band 66/Band 4	0.38	1.04	1.04	
		Band 2	0.50	1.09	1.09	
		Band 7	0.34	1.15	0.56	
DTS	WLAN	2.4GHz WLAN	0.91	0.54	0.54	1.58
NII		5GHz WLAN	**0.97**	0.83	0.83	1.59
DSS	Bluetooth	2.4GHz Bluetooth				1.49
Date of Testing:			2017/7/11~2017/7/13			

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6W/kg as averaged over any 1 gram of tissue) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013 and FCC KDB publications.

2. Administration Data

Testing Laboratory	
Test Site	Sporton International (KunShan) INC.
Test Site Location	No.3-2, Pingxiang Road, Kunshan Development Zone, Jiangsu, China TEL: 86-0512-5790-0158 FAX: 86-0512-5790-0958

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

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

3. Guidance Applied

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

- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- IEEE 1528-2013
- FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
- FCC KDB 865664 D02 SAR Reporting v01r02
- FCC KDB 447498 D01 General RF Exposure Guidance v06
- FCC KDB 648474 D04 SAR Evaluation Considerations for Wireless Handsets v01r03
- FCC KDB 248227 D01 802.11 Wi-Fi SAR v02r02
- FCC KDB 941225 D01 3G SAR Procedures v03r01
- FCC KDB 941225 D05 SAR for LTE Devices v02r05
- FCC KDB 941225 D05A Rel.10 LTE SAR Test Guidance v01r02
- FCC KDB 941225 D06 Hotspot Mode SAR v02r01

4. Equipment Under Test (EUT) Information

4.1 General Information

Product Feature & Specification	
Equipment Name	Mobile Cellular Phone
Brand Name	Motorola
Model Name	10870, 10869
FCC ID	IHDT56WK4
IMEI Code	SIM1: 356485080012498 SIM2: 356485080012506
Wireless Technology and Frequency Range	GSM850: 824.2 MHz ~ 848.8 MHz GSM1900: 1850.2 MHz ~ 1909.8 MHz WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz WCDMA Band IV: 1712.4 MHz ~ 1752.6 MHz WCDMA Band V: 826.4 MHz ~ 846.6 MHz LTE Band 2: 1850.7 MHz ~ 1909.3 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 MHz LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 7: 2502.5 MHz ~ 2567.5 MHz LTE Band 12: 699.7 MHz ~ 715.3 MHz LTE Band 17: 706.5 MHz ~ 713.5 MHz LTE Band 66: 1710.7 MHz ~1779.3 MHz WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz WLAN 5.5GHz Band: 5500 MHz ~ 5700 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz NFC : 13.56 MHz
Mode	GSM/GPRS/EGPRS RMC/AMR 12.2Kbps HSDPA HSUPA DC-HSDPA HSPA+ (16QAM uplink is not supported) LTE: QPSK, 16QAM, 64QAM WLAN 2.4GHz 802.11b/g/n HT20/HT40 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80 Bluetooth v3.0+EDR, Bluetooth v4.0 LE, Bluetooth v4.1 LE, Bluetooth v4.2 LE, Bluetooth v5.0 LE NFC
HW Version	DVT2
SW Version	NPW26.75
GSM / (E)GPRS Transfer mode	Class B – EUT cannot support Packet Switched and Circuit Switched Network simultaneously but can automatically switch between Packet and Circuit Switched Network.
EUT Stage	Identical Prototype

Remark:

1. WLAN operation in 5600 MHz ~ 5650 MHz is notched.
2. This device supports VoIP in GPRS, EGPRS, WCDMA and LTE (e.g. for 3rd-party VoIP), LTE supports VoLTE operation.
3. This device 2.4GHz WLAN/5.2GHz WLAN/5.8GHz WLAN support hotspot operation, and 5.2GHz WLAN/5.8GHz WLAN supports WiFi Direct (GC/GO), and 5.3GHz / 5.5GHz supports WiFi Direct (GC only).
4. This device does not support DTM operation and supports GRPS/EGRPS mode up to multi-slot class 12.
5. There are two different types of EUT. They are dual SIM card mobile (10869) and single SIM card mobile (10870). It is special to declare. The others are the same including circuit design, PCB board, structure and all components. After pre-scan two types of EUT, we found test result of the sample that dual SIM was the worst, so we chose dual SIM card mobile to perform all tests.
6. The dual SIM card mobile has 2 SIM slots and supports dual SIM dual standby. The WWAN radio transmission will be enabled by either one SIM at a time (single active). After pre-scan two SIM cards power, we found test result of the SIM1 was the worse, so we chose dual SIM1 card to perform all tests.

7. The device employs proximity sensors that detect the presence of the user's body at the front or back faces of the device. When front or back body worn condition is detected, WCDMA band II/IV, and LTE band 2/4/7/66 reduced power will be active. (P-sensor can't work at detecting presence of the user's body at the four edges of the device.)
8. When hotspot mode is enabled, power reduction will be activated to limit the maximum power of WCDMA band II/IV, and LTE band 2/4/7/66.
9. This device hotspot reduced power and P-sensor reduced power level are the same. So only show one reduced power level for hotspot reduced power and P-sensor reduced power for this application.
10. When the phone is in talking mode and receiver worked, then power reduction will be implemented immediately in WLAN.
11. This device has two antennas. WWAN antenna 1 is located on the left side of bottom edge of the device and WWAN antenna 2 is located on the right side of bottom edge of the device which can refer to antenna location chapter. WWAN antenna 1 frequency bands include GSM850/1900, WCDMA Band II/IV/V, LTE Band 2/4/5/12/17/66 and WWAN antenna 2 frequency bands only include LTE Band 7.
12. This device implements antenna tuning techniques for several WWAN (cellular) operating modes and frequencies for the purpose of improving antenna efficiency over a broad range of frequencies. Specifically, these techniques are employed in the WCDMA and LTE modes of WWAN antenna 1.

4.2 Specification of Accessory

Specification of Accessory				
AC Adapter 1 (US)	**Brand Name**	Motorola (Salom)	**Model Name**	SC-22
	Power Rating	I/P: 100 - 240 Vac, 500 mA, O/P: 5/9/12 Vdc, 3000/1600/1200 mA		
AC Adapter 2 (US)	**Brand Name**	Motorola (Chenyang)	**Model Name**	SC-22
	Power Rating	I/P: 100 - 240 Vac, 500 mA, O/P: 5/9/12 Vdc, 3000/1600/1200 mA		
AC Adapter 3 (US)	**Brand Name**	Motorola (LiteOn)	**Model Name**	SC-22
	Power Rating	I/P: 100 - 240 Vac, 500 mA, O/P: 5/9/12 Vdc, 3000/1600/1200 mA		
Battery	**Brand Name**	Motorola (Sunwoda)	**Model Name**	HX40
	Power Rating	3.8Vdc, 2810mAh	**Type**	Li-ion
Earphone	**Brand Name**	Motorola (Cosonic)	**Model Name**	SH38C16618
	Signal Line Type	1.10 meter, non-shielded cable, without ferrite core		
USB Cable 1	**Brand Name**	Motorola (Saibao)	**Model Name**	SKN6473A
	Signal Line Type	1.10 meter, shielded cable, without ferrite core		
USB Cable 2	**Brand Name**	Motorola (Foxlink)	**Model Name**	SKN6473A
	Signal Line Type	1.10 meter, shielded cable, without ferrite core		
USB Cable 3	**Brand Name**	Motorola (Cabletech)	**Model Name**	SKN6473A
	Signal Line Type	1.10 meter, shielded cable, without ferrite core		

4.3 General LTE SAR Test and Reporting Considerations

<table>
<tr><th colspan="2">Summarized necessary items addressed in KDB 941225 D05 v02r05</th></tr>
<tr><td>FCC ID</td><td>IHDT56WK4</td></tr>
<tr><td>Equipment Name</td><td>Mobile Cellular Phone</td></tr>
<tr><td>Operating Frequency Range of each LTE transmission band</td><td>LTE Band 2: 1850.7 MHz ~ 1909.3 MHz
LTE Band 4: 1710.7 MHz ~ 1754.3 MHz
LTE Band 5: 824.7 MHz ~ 848.3 MHz
LTE Band 7: 2502.5 MHz ~ 2567.5 MHz
LTE Band 12: 699.7 MHz ~ 715.3 MHz
LTE Band 17: 706.5 MHz ~ 713.5 MHz
LTE Band 66: 1710.7 MHz ~1779.3 MHz</td></tr>
<tr><td>Channel Bandwidth</td><td>LTE Band 2:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 4:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 5:1.4MHz, 3MHz, 5MHz, 10MHz
LTE Band 7: 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 12:1.4MHz, 3MHz, 5MHz, 10MHz
LTE Band 17: 5MHz, 10MHz
LTE Band 66: 1.4MHz, 3MHz,5MHz, 10MHz, 15MHz, 20MHz</td></tr>
<tr><td>uplink modulations used</td><td>QPSK, 16QAM and 64QAM</td></tr>
<tr><td>LTE Voice / Data requirements</td><td>Voice and Data</td></tr>
<tr><td>LTE Release Version</td><td>R11, Cat 5</td></tr>
<tr><td>CA Support</td><td>Yes, Downlink Only</td></tr>
<tr><td>LTE MPR permanently built-in by design</td><td>
Table 6.2.3.3-1: Maximum Power Reduction (MPR) for Power Class 3
<table>
<tr><th rowspan="2">Modulation</th><th colspan="6">Channel bandwidth / Transmission bandwidth configuration [RB]</th><th rowspan="2">MPR (dB)</th></tr>
<tr><th>1.4 MHz</th><th>3.0 MHz</th><th>5 MHz</th><th>10 MHz</th><th>15 MHz</th><th>20 MHz</th></tr>
<tr><td>QPSK</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 1</td></tr>
<tr><td>16 QAM</td><td>≤ 5</td><td>≤ 4</td><td>≤ 8</td><td>≤ 12</td><td>≤ 16</td><td>≤ 18</td><td>≤ 1</td></tr>
<tr><td>16 QAM</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 2</td></tr>
</table>
Table 6.2.3_3.3-1: Maximum Power Reduction (MPR) for Power Class 3
<table>
<tr><th rowspan="2">Modulation</th><th colspan="6">Channel bandwidth / Transmission bandwidth configuration [RB]</th><th rowspan="2">MPR (dB)</th></tr>
<tr><th>1.4 MHz</th><th>3.0 MHz</th><th>5 MHz</th><th>10 MHz</th><th>15 MHz</th><th>20 MHz</th></tr>
<tr><td>64 QAM</td><td>≤ 5</td><td>≤ 4</td><td>≤ 8</td><td>≤ 12</td><td>≤ 16</td><td>≤ 18</td><td>≤ 2</td></tr>
<tr><td>64 QAM</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 3</td></tr>
</table>
</td></tr>
<tr><td>LTE A-MPR</td><td>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)</td></tr>
<tr><td>Spectrum plots for RB configuration</td><td>A properly configured base station simulator was used for the SAR and power measurement; therefore, spectrum plots for each RB allocation and offset configuration are not included in the SAR report.</td></tr>
<tr><td>Power reduction applied to satisfy SAR compliance</td><td>Yes
1. The device employs proximity sensors that detect the presence of the user's body at the front or back faces of the device. When front or back body worn condition is detected, WCDMA band II/IV, and LTE band 2/4/7/66 reduced power will be active. (P-sensor can't work at detecting presence of the user's body at the four edges of the device.)
2. When hotspot mode is enabled, power reduction will be activated to limit the maximum power of WCDMA band II/IV, and LTE band 2/4/7/66.
3. When the phone is in talking mode and receiver worked, then power reduction will be implemented immediately at WLAN2.4GHz and WLAN5GHz.</td></tr>
<tr><td>LTE Carrier Aggregation Combinations</td><td>Inter-Band and Intra-Band possible combinations as below page and the detail power verification please referred to section 13.</td></tr>
<tr><td>LTE Carrier Aggregation Additional Information</td><td>This device does not support full CA features on 3GPP Release 10. It supports a maximum of 2 carriers in the downlink only. All uplink communications are identical to the Release 8 Specifications. Uplink communications are done on the PCC. Due to carrier capability, only the combinations listed above are supported. The following LTE Release features are not supported: Relay, HetNet, Enhanced MIMO, eICI, WiFi Offloading, MDH, eMBMA, Cross-Carrier Scheduling, Enhanced SC-FDMA.</td></tr>
</table>

Transmission (H, M, L) channel numbers and frequencies in each LTE band												
LTE Band 2												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	18607	1850.7	18615	1851.5	18625	1852.5	18650	1855	18675	1857.5	18700	1860
M	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880
H	19193	1909.3	19185	1908.5	19175	1907.5	19150	1905	19125	1902.5	19100	1900
LTE Band 4												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	19957	1710.7	19965	1711.5	19975	1712.5	20000	1715	20025	1717.5	20050	1720
M	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5
H	20393	1754.3	20385	1753.5	20375	1752.5	20350	1750	20325	1747.5	20300	1745
LTE Band 5								
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz	
	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 Band 12								
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	23017	699.7	23025	700.5	23035	701.5	23060	704
M	23095	707.5	23095	707.5	23095	707.5	23095	707.5
H	23173	715.3	23165	714.5	23155	713.5	23130	711
LTE Band 17				
	Bandwidth 5 MHz		Bandwidth 10 MHz	
	Channel #	Freq.(MHz)	Channel #	Freq. (MHz)
L	23755	706.5	23780	709
M	23790	710	23790	710
H	23825	713.5	23800	711
LTE Band 66												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	131979	1710.7	131987	1711.5	131997	1712.5	132022	1715	132047	1717.5	132072	1720
M	132322	1745	132322	1745	132322	1745	132322	1745	132322	1745	132322	1745
H	132665	1779.3	132657	1778.5	132647	1777.5	132622	1775	132597	1772.5	132572	1770

5. Re-use of Measured Data

5.1 Introduction Section

This application re-uses data collected on a similar device. The subject device of this application (Model: 10870, 10869, FCC ID: IHDT56WK4) is electrically identical to the reference device (Model: 10647, FCC ID: IHDT56WK1) for the portions of the circuitry corresponding to the data being re-used, as treated by KDB Publication 178919 D01.

5.2 Difference Section

For details concerning the similarity with respect to component placement, mechanical/electrical design etc., please refer to the Product Equality Declaration “PED” file.

The re-used RF data includes the following bands provided in Appendix E (Sporton SAR Report No. FA761702-01 for the reference device Model: 10647, FCC ID: IHDT56WK1):

- GSM850/1900
- WCDMA Band V/IV/II
- LTE Band 4/7/12/17/66

LTE Band 2/5 and WLAN/Bluetooth full SAR test, spot check for WWAN (except for LTE Band 2/5) is performed for ensure that SAR measurement for both device are the same. So, the original SAR value can represent this application.

5.3 Spot Check Verification Data Section

Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Power Mode	Ch.	Freq. (MHz)	Original model (FCC ID: IHDT56WK1)				Spot check model (FCC ID: IHDT56WK4)				Deviation
											Average Power (dBm)	Tune-Up Limit (dBm)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Average Power (dBm)	Tune-Up Limit (dBm)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	
GSM850	-	-	-	-	GPRS 2 Tx slots	Back	10	Full	251	848.8	30.69	31.0	0.835	0.897	30.69	31.0	0.712	0.765	-14.72%
GSM1900	-	-	-	-	GPRS 2 Tx slots	Front	10	Full	512	1850.2	26.75	27.5	0.863	1.026	26.75	27.5	0.996	1.184	15.40%
WCDMA Band V	-	-	-	-	RMC12.2Kbps	Back	10	Full	4182	836.4	23.10	23.5	0.607	0.666	23.10	23.5	0.625	0.685	2.85%
WCDMA Band IV	-				RMC12.2Kbps	Front	10	Reduced	1513	1752.6	21.58	22.0	1.050	1.157	21.58	22.0	0.996	1.097	-5.19%
WCDMA Band II	-	-	-	-	RMC12.2Kbps	Back	10	Reduced	9262	1852.4	21.49	22.0	1.000	1.125	21.49	22.0	0.914	1.028	-8.62%
LTE Band 12	10M	QPSK	1	0	-	Back	10	Full	23095	707.5	22.91	23.5	0.678	0.777	22.91	23.5	0.614	0.703	-9.52%
LTE Band 66	20M	QPSK	1	0	-	Front	10	Reduced	132572	1770	20.85	21.5	0.894	1.038	20.85	21.5	0.831	0.965	-7.03%
LTE Band 7	20M	QPSK	1	0	-	Bottom Side	10	Reduced	20850	2510	20.22	20.50	1.080	1.152	20.22	20.50	1.010	1.077	-6.51%

Note: In the table above, all the deviation of SAR test results are compliant with uncertainty budget.

5.4 Reference detail Section

Reference FCC ID	Folder Test/RF Exposure	Report Title/Section
IHDT56WK1	RF Exposure(FA761702-01)	All sections applicable

6. RF Exposure Limits

6.1 Uncontrolled Environment

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

6.2 Controlled Environment

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

Limits for Occupational/Controlled Exposure (W/kg)

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

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

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

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

7. Specific Absorption Rate (SAR)

7.1 Introduction

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

7.2 SAR Definition

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

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

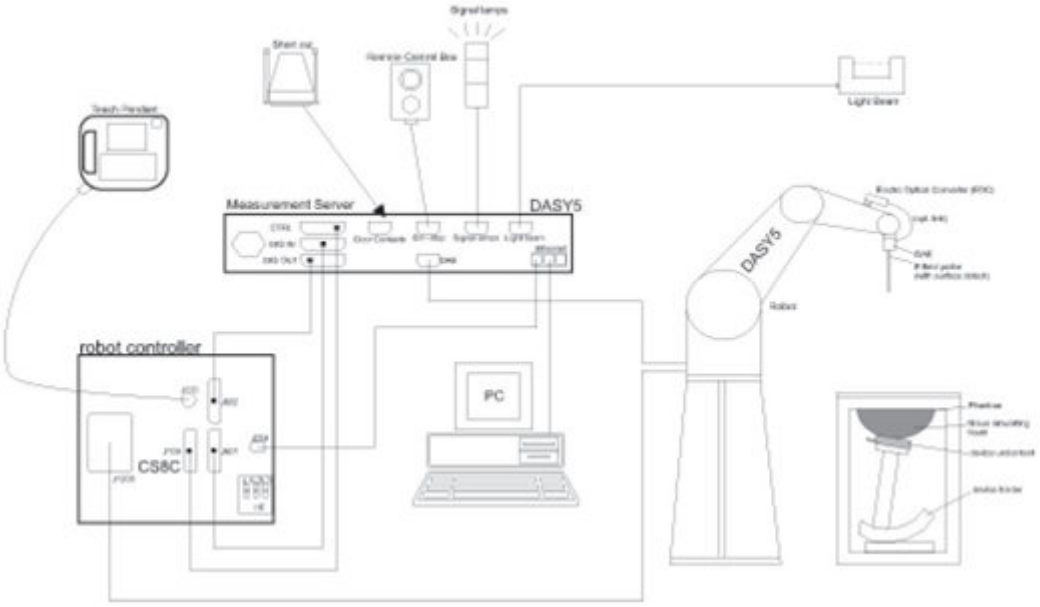
SAR is expressed in units of Watts per kilogram (W/kg)

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

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

8. System Description and Setup

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



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

8.1 E-Field Probe

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

<EX3DV4 Probe>

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

8.2 Data Acquisition Electronics (DAE)

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

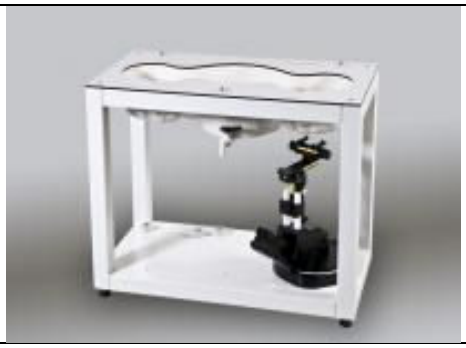
The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

Fig 5.1 Photo of DAE

8.3 Phantom

<SAM Twin Phantom>

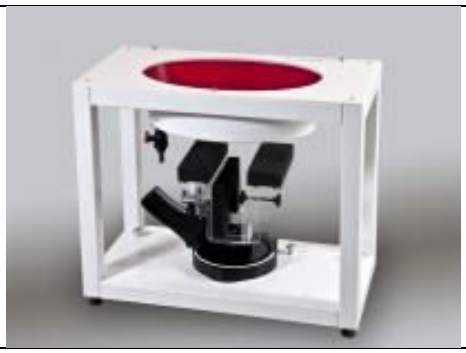
Shell Thickness	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm
Filling Volume	Approx. 25 liters
Dimensions	Length: 1000 mm; Width: 500 mm; Height: adjustable feet
Measurement Areas	Left Hand, Right Hand, Flat Phantom



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

<ELI Phantom>

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



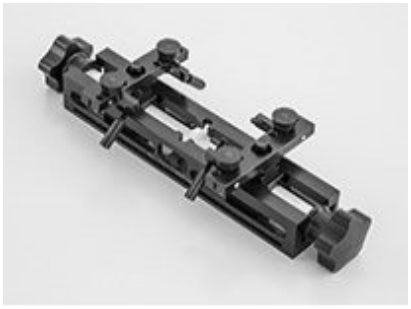
The ELI phantom is intended for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI4 is fully compatible with standard and all known tissue simulating liquids.

8.4 Device Holder

<Mounting Device for Hand-Held Transmitter>

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

Mounting Device for Hand-Held Transmitters



Mounting Device Adaptor for Wide-Phones

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

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

Mounting Device for Laptops

9. Measurement Procedures

The measurement procedures are as follows:

<Conducted power measurement>

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

<SAR measurement>

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

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

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

9.1 Spatial Peak SAR Evaluation

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

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

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

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

9.2 Power Reference Measurement

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

9.3 Area Scan

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

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

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

9.4 Zoom Scan

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

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

			≤ 3 GHz	> 3 GHz
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.

* When zoom scan is required and the *reported* SAR from the *area scan based 1-g SAR estimation* procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.

9.5 Volume Scan Procedures

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

9.6 Power Drift Monitoring

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

10. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	835MHz System Validation Kit	D835V2	4d091	2016/11/22	2017/11/21
SPEAG	1900MHz System Validation Kit	D1900V2	5d118	2016/11/24	2017/11/23
SPEAG	2450MHz System Validation Kit	D2450V2	840	2016/11/25	2017/11/24
SPEAG	5000MHz System Validation Kit	D5GHzV2	1113	2016/12/13	2017/12/12
SPEAG	Data Acquisition Electronics	DAE4	1210	2017/5/25	2018/5/24
SPEAG	Dosimetric E-Field Probe	EX3DV4	3857	2017/5/26	2018/5/25
SPEAG	SAM Twin Phantom	QD 000 P40 CB	TP-1542	NCR	NCR
SPEAG	SAM Twin Phantom	QD 000 P40 CB	TP-1644	NCR	NCR
SPEAG	Phone Positioner	N/A	N/A	NCR	NCR
Anritsu	Radio communication analyzer	MT8820C	6201300654	2016/8/8	2017/8/7
Anritsu	Radio communication analyzer	MT8821C	6201692204	2017/3/29	2018/3/28
Agilent	Wireless Communication Test Set	E5515C	MY52102706	2017/4/18	2018/4/17
Agilent	ENA Series Network Analyzer	E5071C	MY46111157	2017/4/18	2018/4/17
SPEAG	DAK Kit	DAK3.5	1144	2016/11/23	2017/11/22
R&S	Signal Generator	SMR40	100455	2017/1/19	2018/1/18
Anritsu	Power Senor	MA2411B	1644003	2016/12/23	2017/12/22
Anritsu	Power Meter	ML2495A	1531197	2016/12/23	2017/12/22
Anritsu	Power Senor	MA2411B	1644004	2016/12/23	2017/12/22
Anritsu	Power Meter	ML2495A	1531198	2016/12/23	2017/12/22
R&S	CBT BLUETOOTH TESTER	CBT	101137	2016/8/9	2017/8/8
R&S	Spectrum Analyzer	FSV7	101631	2016/8/8	2017/8/7
WISEWIND	Hygrometer	WISEWIND 0905	905	2017/4/20	2018/4/19
JM	DIGITAC THERMOMETER	JM222	AA1207166	2017/4/19	2018/4/18
ARRA	Power Divider	A3200-2	N/A	Note	
Agilent	Dual Directional Coupler	778D	50422	Note	
PASTERNACK	Dual Directional Coupler	PE2214-10	N/A	Note	
MCL	Attenuation1	BW-S10W5+	N/A	Note	
MCL	Attenuation2	BW-S10W5+	N/A	Note	
MCL	Attenuation3	BW-S10W5+	N/A	Note	
AR	Amplifier	5S1G4	333096	Note	
mini-circuits	Amplifier	ZVE-3W-83+	162601250	Note	

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

11. System Verification

11.1 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. 10.1. 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. 10.2.

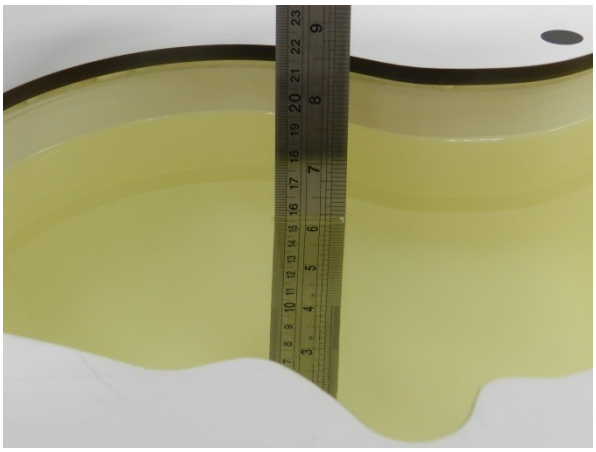


Fig 10.1Photo of Liquid Height for Head SAR

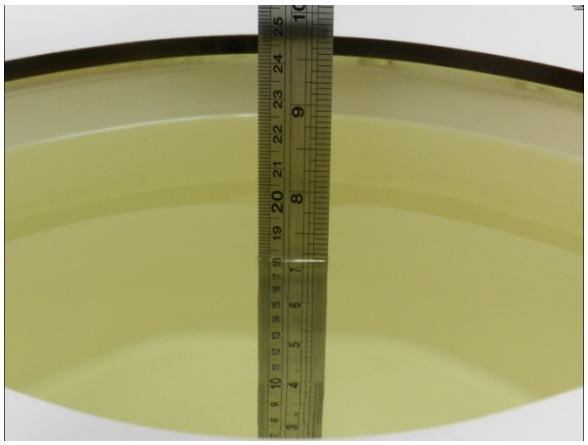


Fig 10.2 Photo of Liquid Height for Body SAR

11.2 Tissue Verification

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

Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity (σ)	Permittivity (εr)
For Head								
835	40.3	57.9	0.2	1.4	0.2	0	0.90	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
For Body								
835	50.8	48.2	0	0.9	0.1	0	0.97	55.2
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

Simulating Liquid for 5GHz, Manufactured by SPEAG

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

<Tissue Dielectric Parameter Check Results>

Frequency (MHz)	Tissue Type	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
835	Head	22.7	0.906	41.772	0.90	41.50	0.67	0.66	±5	2017/7/11
1900	Head	22.7	1.426	39.361	1.40	40.00	1.86	-1.60	±5	2017/7/12
2450	Head	22.8	1.872	38.239	1.80	39.20	4.00	-2.45	±5	2017/7/12
5250	Head	22.8	4.829	37.101	4.71	35.90	2.53	3.35	±5	2017/7/13
5600	Head	22.8	5.196	36.571	5.07	35.50	2.49	3.02	±5	2017/7/13
5750	Head	22.8	5.357	36.372	5.22	35.40	2.62	2.75	±5	2017/7/13
835	Body	22.7	0.974	55.241	0.97	55.20	0.41	0.07	±5	2017/7/11
1900	Body	22.7	1.510	54.094	1.52	53.30	-0.66	1.49	±5	2017/7/12
2450	Body	22.8	1.997	52.12	1.95	52.70	2.41	-1.10	±5	2017/7/12
5250	Body	22.8	5.312	47.806	5.36	48.90	-0.90	-2.24	±5	2017/7/13
5600	Body	22.8	5.888	46.875	5.77	48.50	2.05	-3.35	±5	2017/7/13
5750	Body	22.8	6.168	46.453	5.94	48.30	3.84	-3.82	±5	2017/7/13

11.3 System Performance Check Results

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

Date	Frequency (MHz)	Tissue Type	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 1g SAR (W/kg)	Targeted 1g SAR (W/kg)	Normalized 1g SAR (W/kg)	Deviation (%)
2017/7/11	835	Head	250	4d091	3857	1210	2.49	9.31	9.96	6.98
2017/7/12	1900	Head	250	5d118	3857	1210	10.70	40.40	42.80	5.94
2017/7/12	2450	Head	250	840	3857	1210	14.30	54.00	57.20	5.93
2017/7/13	5250	Head	100	1113	3857	1210	8.31	76.40	83.10	8.77
2017/7/13	5600	Head	100	1113	3857	1210	8.06	80.80	80.60	-0.25
2017/7/13	5750	Head	100	1113	3857	1210	7.64	80.30	76.40	-4.86
2017/7/11	835	Body	250	4d091	3857	1210	2.58	9.68	10.32	6.61
2017/7/12	1900	Body	250	5d118	3857	1210	10.90	40.80	43.60	6.86
2017/7/12	2450	Body	250	840	3857	1210	13.60	50.90	54.40	6.88
2017/7/13	5250	Body	100	1113	3857	1210	8.12	76.10	81.20	6.70
2017/7/13	5600	Body	100	1113	3857	1210	8.29	79.80	82.90	3.88
2017/7/13	5750	Body	100	1113	3857	1210	7.98	75.20	79.80	6.12

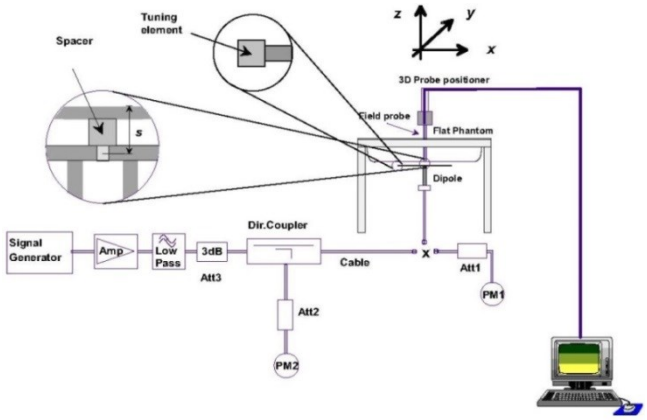


Fig 8.3.1 System Performance Check Setup

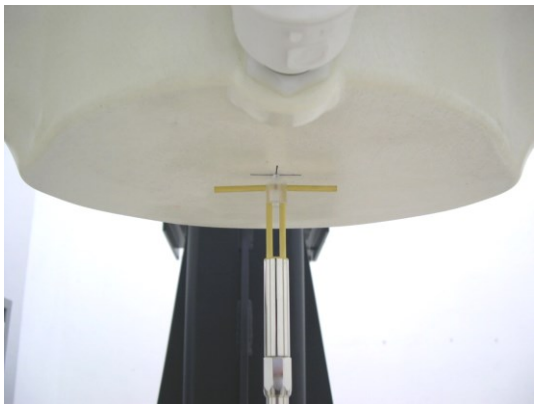


Fig 8.3.2 Setup Photo

12. RF Exposure Positions

12.1 Ear and handset reference point

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

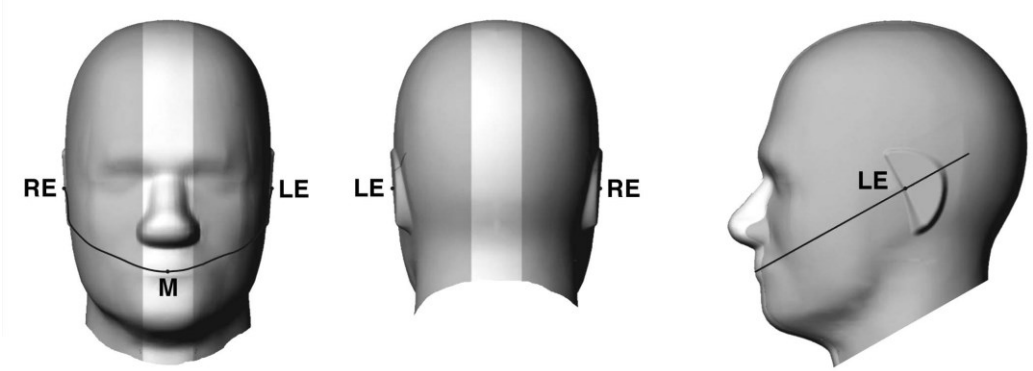


Fig 9.1.1 Front, back, and side views of SAM twin phantom

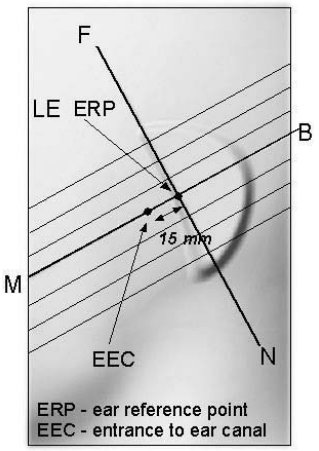


Fig 9.1.2 Close-up side view of phantom showing the ear region.

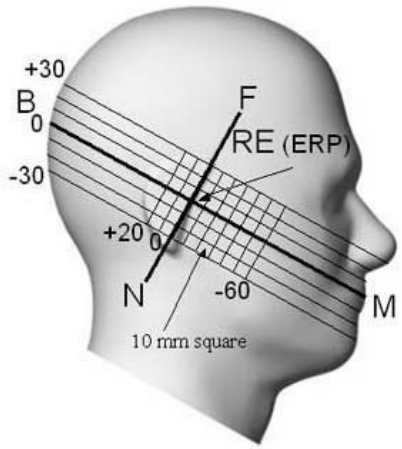


Fig 9.1.3 Side view of the phantom showing relevant markings and seven cross-sectional plane locations

12.2 Definition of the cheek position

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

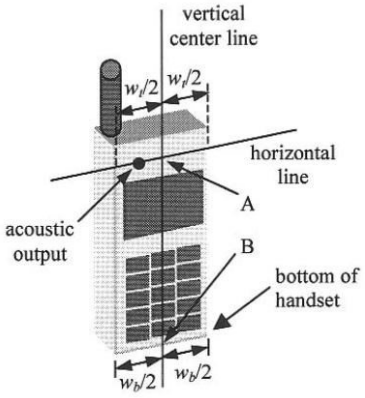


Fig 9.2.1 Handset vertical and horizontal reference lines—"fixed case

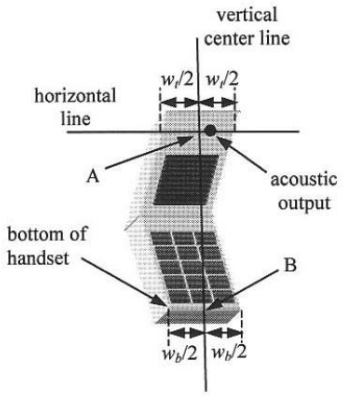


Fig 9.2.2 Handset vertical and horizontal reference lines—"clam-shell case"

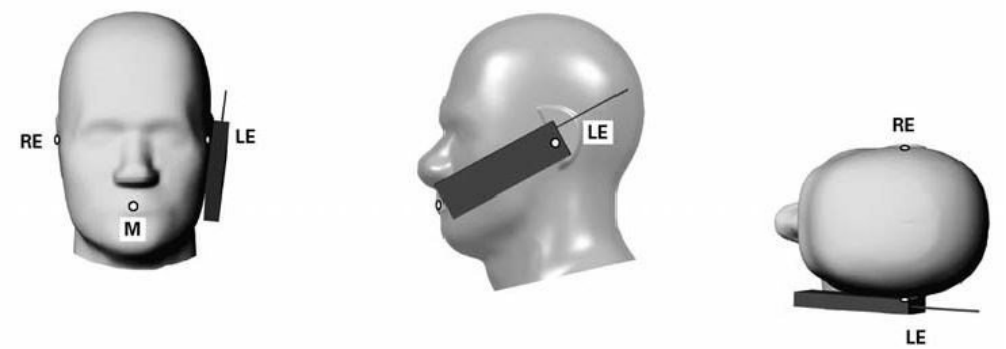


Fig 9.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

12.3 Definition of the tilt position

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

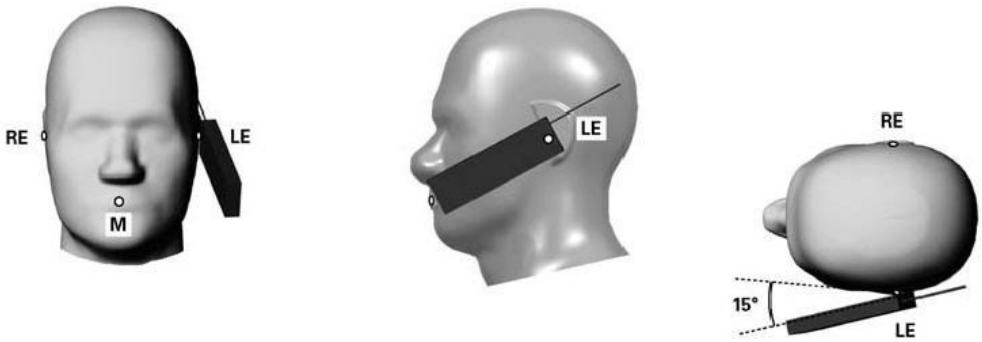


Fig 9.3.1 Tilt position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which define the Reference Plane for handset positioning, are indicated.

12.4 Body Worn Accessory

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

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

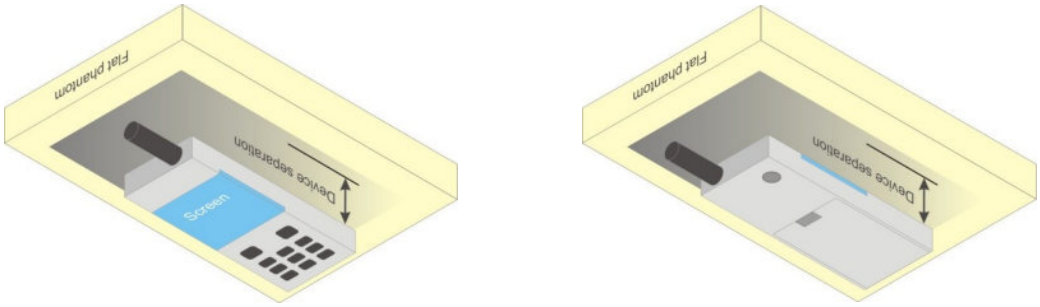


Fig 9.4 Body Worn Position

12.5 Wireless Router

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

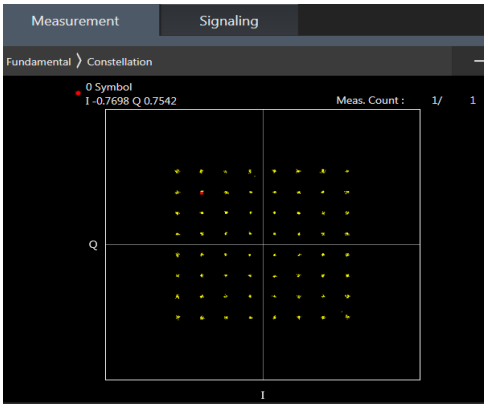
When the user enables the personal wireless router functions for the handset, actual operations include simultaneous transmission of both the WIFI transmitter and another licensed transmitter. Both transmitters often do not transmit at the same transmitting frequency and thus cannot be evaluated for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

13. Conducted RF Output Power (Unit: dBm)

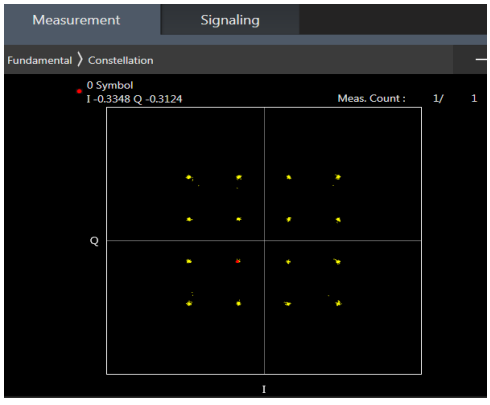
<LTE Conducted Power>

General Note:

1. Anritsu MT8820C base station simulator was used to setup the connection with EUT; the frequency band, channel bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.
2. Per KDB 941225 D05v02r05, when a properly configured base station simulator is used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration is not required.
3. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
4. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05v02r05, for QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
6. Per KDB 941225 D05v02r05, 16QAM/64QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM/64QAM SAR testing is not required.
7. Per KDB 941225 D05v02r05, smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
8. For LTE B5 the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 D05v02r05, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.
9. According to 2017 TCB workshop, for 64QAM and 16QAM should be verified by checking the signal constellation with a call box to avoid incorrect maximum power levels due to MPR and other requirements associated with signal modulation, and the following figure is taken from the "Fundamental Measurement >> Modulation Analysis >> constellation" mode of the device connect to the MT8821C base station, therefore, the device 64QAM and 16QAM signal modulation are correct.



64QAM



16QAM

<Full Power Mode>

<LTE Band 2>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				18700	18900	19100		
Frequency (MHz)				1860	1880	1900		
20	QPSK	1	0	22.84	22.96	22.98	23.5	0
20	QPSK	1	49	22.74	22.92	22.78		
20	QPSK	1	99	22.73	22.86	22.78		
20	QPSK	50	0	21.84	22.08	21.92	22.5	1
20	QPSK	50	24	21.79	22.02	21.89		
20	QPSK	50	50	21.80	21.94	21.87		
20	QPSK	100	0	21.75	22.03	21.90		
20	16QAM	1	0	22.13	22.35	22.33	22.5	1
20	16QAM	1	49	22.13	22.27	22.07		
20	16QAM	1	99	22.07	22.22	22.08		
20	16QAM	50	0	20.79	21.04	20.92	21.5	2
20	16QAM	50	24	20.82	21.01	20.88		
20	16QAM	50	50	20.77	20.94	20.84		
20	16QAM	100	0	20.68	20.98	20.87		
20	64QAM	1	0	22.05	22.09	22.18	22.5	1
20	64QAM	1	49	21.88	22.09	21.93		
20	64QAM	1	99	21.91	22.08	21.93		
20	64QAM	50	0	20.73	21.04	20.89	21.5	2
20	64QAM	50	24	20.82	20.94	20.86		
20	64QAM	50	50	20.77	20.94	20.80		
20	64QAM	100	0	20.69	20.97	20.88		
Channel				18675	18900	19125	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1857.5	1880	1902.5		
15	QPSK	1	0	22.78	23.05	23.02	23.5	0
15	QPSK	1	37	22.63	22.88	22.85		
15	QPSK	1	74	22.78	22.90	22.88		
15	QPSK	36	0	21.75	22.03	22.04	22.5	1
15	QPSK	36	20	21.73	21.96	21.96		
15	QPSK	36	39	21.81	21.97	21.95		
15	QPSK	75	0	21.71	22.01	21.98		
15	16QAM	1	0	22.13	22.40	22.37	22.5	1
15	16QAM	1	37	21.98	22.26	22.22		
15	16QAM	1	74	22.08	22.27	22.18		
15	16QAM	36	0	20.77	21.01	21.00	21.5	2
15	16QAM	36	20	20.71	20.96	20.94		
15	16QAM	36	39	20.78	20.93	20.91		
15	16QAM	75	0	20.67	20.92	20.93		
15	64QAM	1	0	22.01	22.25	22.19	22.5	1
15	64QAM	1	37	21.85	22.09	22.06		
15	64QAM	1	74	21.89	22.09	22.07		
15	64QAM	36	0	20.73	20.99	20.99	21.5	2
15	64QAM	36	20	20.71	20.95	20.93		
15	64QAM	36	39	20.77	20.94	20.9		
15	64QAM	75	0	20.67	20.94	20.93		

Channel				18650	18900	19150	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1855	1880	1905		
10	QPSK	1	0	22.70	22.96	22.93	23.5	0
10	QPSK	1	25	22.67	22.89	22.86		
10	QPSK	1	49	22.72	22.90	22.88		
10	QPSK	25	0	21.71	21.98	21.94	22.5	1
10	QPSK	25	12	21.72	21.97	21.93		
10	QPSK	25	25	21.67	21.91	21.88		
10	QPSK	50	0	21.70	21.98	21.95		
10	16QAM	1	0	21.98	22.24	22.25	22.5	1
10	16QAM	1	25	21.95	22.20	22.19		
10	16QAM	1	49	21.99	22.20	22.18		
10	16QAM	25	0	20.70	20.94	20.89	21.5	2
10	16QAM	25	12	20.68	20.97	20.92		
10	16QAM	25	25	20.66	20.92	20.88		
10	16QAM	50	0	20.70	20.95	20.92		
10	64QAM	1	0	21.92	22.14	22.15	22.5	1
10	64QAM	1	25	21.83	22.04	22.04		
10	64QAM	1	49	21.86	22.02	22.01		
10	64QAM	25	0	20.70	20.96	20.90	21.5	2
10	64QAM	25	12	20.71	20.99	20.95		
10	64QAM	25	25	20.65	20.92	20.88		
10	64QAM	50	0	20.66	20.93	20.90		
Channel				18625	18900	19175	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1852.5	1880	1907.5		
5	QPSK	1	0	22.66	22.96	22.94	23.5	0
5	QPSK	1	12	22.63	22.89	22.87		
5	QPSK	1	24	22.64	22.89	22.85		
5	QPSK	12	0	21.68	21.94	21.89	22.5	1
5	QPSK	12	7	21.71	21.97	21.91		
5	QPSK	12	13	21.63	21.91	21.89		
5	QPSK	25	0	21.66	21.93	21.89		
5	16QAM	1	0	21.97	22.28	22.21	22.5	1
5	16QAM	1	12	21.97	22.22	22.15		
5	16QAM	1	24	21.96	22.21	22.19		
5	16QAM	12	0	20.68	20.93	20.89	21.5	2
5	16QAM	12	7	20.71	20.99	20.90		
5	16QAM	12	13	20.68	20.96	20.89		
5	16QAM	25	0	20.66	20.89	20.89		
5	64QAM	1	0	21.89	22.08	22.08	22.5	1
5	64QAM	1	12	21.79	22.06	22.08		
5	64QAM	1	24	21.76	22.08	22.01		
5	64QAM	12	0	20.69	20.95	20.88	21.5	2
5	64QAM	12	7	20.69	20.93	20.88		
5	64QAM	12	13	20.66	20.91	20.87		
5	64QAM	25	0	20.65	20.92	20.88		

Channel				18615	18900	19185	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1851.5	1880	1908.5		
3	QPSK	1	0	22.63	22.86	22.85	23.5	0
3	QPSK	1	8	22.71	22.99	22.91		
3	QPSK	1	14	22.68	22.86	22.82		
3	QPSK	8	0	21.65	21.90	21.85	22.5	1
3	QPSK	8	4	21.69	21.94	21.90		
3	QPSK	8	7	21.61	21.92	21.83		
3	QPSK	15	0	21.64	21.92	21.85		
3	16QAM	1	0	21.91	22.19	22.13	22.5	1
3	16QAM	1	8	21.97	22.25	22.28		
3	16QAM	1	14	21.92	22.21	22.12		
3	16QAM	8	0	20.72	20.96	20.90	21.5	2
3	16QAM	8	4	20.74	21.02	20.94		
3	16QAM	8	7	20.68	20.95	20.90		
3	16QAM	15	0	20.65	20.91	20.86		
3	64QAM	1	0	21.80	22.00	22.00	22.5	1
3	64QAM	1	8	21.90	22.13	22.13		
3	64QAM	1	14	21.74	21.96	22.03		
3	64QAM	8	0	20.65	20.92	20.87	21.5	2
3	64QAM	8	4	20.69	20.91	20.89		
3	64QAM	8	7	20.63	20.90	20.86		
3	64QAM	15	0	20.65	20.89	20.85		
Channel				18607	18900	19193	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1850.7	1880	1909.3		
1.4	QPSK	1	0	22.58	22.82	22.75	23.5	0
1.4	QPSK	1	3	22.64	22.87	22.82		
1.4	QPSK	1	5	22.55	22.79	22.75		
1.4	QPSK	3	0	22.63	22.85	22.84		
1.4	QPSK	3	1	22.68	22.92	22.87		
1.4	QPSK	3	3	22.68	22.92	22.88		
1.4	QPSK	6	0	21.57	21.84	21.77	22.5	1
1.4	16QAM	1	0	21.83	22.16	22.08	22.5	1
1.4	16QAM	1	3	21.90	22.20	22.15		
1.4	16QAM	1	5	21.86	22.14	22.06		
1.4	16QAM	3	0	21.64	21.88	21.85		
1.4	16QAM	3	1	21.69	21.93	21.89		
1.4	16QAM	3	3	21.67	21.95	21.86		
1.4	16QAM	6	0	20.67	20.93	20.86	21.5	2
1.4	64QAM	1	0	21.76	21.99	21.98	22.5	1
1.4	64QAM	1	3	21.77	22.09	22.05		
1.4	64QAM	1	5	21.70	21.91	21.97		
1.4	64QAM	3	0	21.69	21.86	21.87		
1.4	64QAM	3	1	21.70	21.9	21.87		
1.4	64QAM	3	3	21.70	21.89	21.89		
1.4	64QAM	6	0	20.59	20.83	20.79	21.5	2

<LTE Band 5>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				20450	20525	20600		
Frequency (MHz)				829	836.5	844		
10	QPSK	1	0	22.88	22.97	23.03	23.5	0
10	QPSK	1	25	22.94	23.07	23.02		
10	QPSK	1	49	22.91	22.99	22.91		
10	QPSK	25	0	22	22.13	22.12	22.5	1
10	QPSK	25	12	21.92	22.12	22.09		
10	QPSK	25	25	21.97	22.11	22.06		
10	QPSK	50	0	21.99	22.11	22.08		
10	16QAM	1	0	22.12	22.29	22.33	22.5	1
10	16QAM	1	25	22.21	22.34	22.3		
10	16QAM	1	49	22.3	22.29	22.04		
10	16QAM	25	0	20.92	21.13	21.12	21.5	2
10	16QAM	25	12	20.99	21.15	21.12		
10	16QAM	25	25	20.96	21.11	21.07		
10	16QAM	50	0	20.98	21.13	21.12		
10	64QAM	1	0	22.04	22.12	22.23	22.5	1
10	64QAM	1	25	22.08	22.21	22.18		
10	64QAM	1	49	22.12	22.16	22.12		
10	64QAM	25	0	20.89	21.11	21.11	21.5	2
10	64QAM	25	12	21.01	21.13	21.12		
10	64QAM	25	25	20.97	21.08	21.02		
10	64QAM	50	0	20.99	21.1	21.1		
Channel				20425	20525	20625	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				826.5	836.5	846.5		
5	QPSK	1	0	22.88	23.05	23.03	23.5	0
5	QPSK	1	12	22.83	23	22.99		
5	QPSK	1	24	22.91	23.04	22.89		
5	QPSK	12	0	21.89	22.14	22.06	22.5	1
5	QPSK	12	7	21.91	22.14	22.06		
5	QPSK	12	13	21.97	22.13	22.01		
5	QPSK	25	0	21.88	22.08	22.05		
5	16QAM	1	0	22.08	22.35	22.33	22.5	1
5	16QAM	1	12	22.04	22.33	22.24		
5	16QAM	1	24	22.16	22.3	22.13		
5	16QAM	12	0	20.9	21.09	21.09	21.5	2
5	16QAM	12	7	20.93	21.17	21.09		
5	16QAM	12	13	21.01	21.1	21.01		
5	16QAM	25	0	20.89	21.11	21.05		
5	64QAM	1	0	22.06	22.2	22.18	22.5	1
5	64QAM	1	12	21.98	22.18	22.13		
5	64QAM	1	24	22.07	22.14	22.18		
5	64QAM	12	0	20.91	21.08	21.08	21.5	2
5	64QAM	12	7	20.93	21.11	21.08		
5	64QAM	12	13	20.99	21.07	20.99		
5	64QAM	25	0	20.9	21.1	21.03		

Channel				20415	20525	20635	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				825.5	836.5	847.5		
3	QPSK	1	0	22.85	23.02	22.99	23.5	0
3	QPSK	1	8	22.93	23.12	23.03		
3	QPSK	1	14	22.81	23.02	22.92		
3	QPSK	8	0	21.9	22.07	22.04	22.5	1
3	QPSK	8	4	21.93	22.1	22.03		
3	QPSK	8	7	21.91	22.08	21.98		
3	QPSK	15	0	21.89	22.08	22.02		
3	16QAM	1	0	22.08	22.31	22.24	22.5	1
3	16QAM	1	8	22.19	22.4	22.29		
3	16QAM	1	14	22.07	22.26	22.04		
3	16QAM	8	0	20.96	21.14	21.1	21.5	2
3	16QAM	8	4	20.99	21.15	21.08		
3	16QAM	8	7	20.95	21.12	21.05		
3	16QAM	15	0	20.92	21.09	21.04		
3	64QAM	1	0	21.98	22.15	22.11	22.5	1
3	64QAM	1	8	22.07	22.26	22.2		
3	64QAM	1	14	21.95	22.16	22.16		
3	64QAM	8	0	20.92	21.11	21.03	21.5	2
3	64QAM	8	4	20.91	21.1	21.07		
3	64QAM	8	7	20.89	21.07	21.04		
3	64QAM	15	0	20.88	21.08	20.97		
Channel				20407	20525	20643	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				824.7	836.5	848.3		
1.4	QPSK	1	0	22.75	22.94	22.81	23.5	0
1.4	QPSK	1	3	22.79	23.02	22.87		
1.4	QPSK	1	5	22.71	22.92	22.8		
1.4	QPSK	3	0	22.8	22.97	22.88		
1.4	QPSK	3	1	22.87	23.03	22.93		
1.4	QPSK	3	3	22.84	23.04	22.93		
1.4	QPSK	6	0	21.83	22.02	21.92	22.5	1
1.4	16QAM	1	0	22	22.25	22.05	22.5	1
1.4	16QAM	1	3	22.07	22.31	22.13		
1.4	16QAM	1	5	22.01	22.22	22.04		
1.4	16QAM	3	0	21.81	21.99	21.87		
1.4	16QAM	3	1	21.84	22.05	21.92		
1.4	16QAM	3	3	21.87	22.06	21.94		
1.4	16QAM	6	0	20.89	21.06	21	21.5	2
1.4	64QAM	1	0	21.89	22.12	22.01	22.5	1
1.4	64QAM	1	3	21.91	22.19	22.03		
1.4	64QAM	1	5	21.83	22.09	21.98		
1.4	64QAM	3	0	21.87	22.02	21.95		
1.4	64QAM	3	1	21.87	22.09	21.99		
1.4	64QAM	3	3	21.88	22.09	21.99		
1.4	64QAM	6	0	20.79	20.98	20.88	21.5	2

<Reduced Power Mode for Hotspot On/P-Sensor On>

<LTE Band 2>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				18700	18900	19100		
Frequency (MHz)				1860	1880	1900		
20	QPSK	1	0	20.74	20.84	20.89	21.5	0
20	QPSK	1	49	20.58	20.78	20.66		
20	QPSK	1	99	20.57	20.75	20.6		
20	QPSK	50	0	19.86	20.07	19.95	20.5	1
20	QPSK	50	24	19.8	20.02	19.89		
20	QPSK	50	50	19.78	19.94	19.81		
20	QPSK	100	0	19.72	20.03	19.89		
20	16QAM	1	0	20.15	20.3	20.31	20.5	1
20	16QAM	1	49	20.12	20.19	20.06		
20	16QAM	1	99	20.04	20.19	20.11		
20	16QAM	50	0	18.8	19.04	18.94	19.5	2
20	16QAM	50	24	18.85	19	18.87		
20	16QAM	50	50	18.84	18.94	18.79		
20	16QAM	100	0	18.72	19	18.86		
20	64QAM	1	0	19.97	20.1	20.13	20.5	1
20	64QAM	1	49	19.91	20.01	19.87		
20	64QAM	1	99	19.83	20.03	19.83		
20	64QAM	50	0	18.75	19.03	18.93	19.5	2
20	64QAM	50	24	18.81	18.98	18.87		
20	64QAM	50	50	18.79	18.92	18.79		
20	64QAM	100	0	18.71	19.01	18.87		
Channel				18675	18900	19125	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1857.5	1880	1902.5		
15	QPSK	1	0	20.72	20.91	20.95	21.5	0
15	QPSK	1	37	20.54	20.78	20.78		
15	QPSK	1	74	20.62	20.8	20.76		
15	QPSK	36	0	19.77	20.04	19.99	20.5	1
15	QPSK	36	20	19.76	19.97	19.94		
15	QPSK	36	39	19.81	19.96	19.91		
15	QPSK	75	0	19.71	19.97	19.97		
15	16QAM	1	0	20.13	20.38	20.35	20.5	1
15	16QAM	1	37	19.98	20.28	20.21		
15	16QAM	1	74	20.13	20.23	20.28		
15	16QAM	36	0	18.78	19.01	18.96	19.5	2
15	16QAM	36	20	18.72	19.01	18.97		
15	16QAM	36	39	18.79	18.95	18.87		
15	16QAM	75	0	18.71	18.99	18.94		
15	64QAM	1	0	19.96	20.24	20.16	20.5	1
15	64QAM	1	37	19.79	20.05	20.03		
15	64QAM	1	74	19.89	20.02	20.08		
15	64QAM	36	0	18.74	19.01	18.97	19.5	2
15	64QAM	36	20	18.72	18.97	18.93		
15	64QAM	36	39	18.77	18.95	18.87		
15	64QAM	75	0	18.69	18.96	18.94		

Channel				18650	18900	19150	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1855	1880	1905		
10	QPSK	1	0	20.65	20.87	20.84	21.5	0
10	QPSK	1	25	20.57	20.77	20.76		
10	QPSK	1	49	20.57	20.77	20.7		
10	QPSK	25	0	19.74	19.99	19.94	20.5	1
10	QPSK	25	12	19.73	19.93	19.9		
10	QPSK	25	25	19.68	19.94	19.86		
10	QPSK	50	0	19.69	19.95	19.93		
10	16QAM	1	0	19.98	20.26	20.25	20.5	1
10	16QAM	1	25	19.93	20.21	20.21		
10	16QAM	1	49	20.06	20.23	20.17		
10	16QAM	25	0	18.72	18.95	18.89	19.5	2
10	16QAM	25	12	18.73	18.97	18.91		
10	16QAM	25	25	18.67	18.9	18.86		
10	16QAM	50	0	18.72	18.95	18.91		
10	64QAM	1	0	19.87	20.09	20.09	20.5	1
10	64QAM	1	25	19.77	20.01	20.1		
10	64QAM	1	49	19.86	19.93	19.97		
10	64QAM	25	0	18.71	18.94	18.91	19.5	2
10	64QAM	25	12	18.76	18.98	18.93		
10	64QAM	25	25	18.69	18.91	18.87		
10	64QAM	50	0	18.72	18.92	18.89		
Channel				18625	18900	19175	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1852.5	1880	1907.5		
5	QPSK	1	0	20.61	20.82	20.75	21.5	0
5	QPSK	1	12	20.55	20.75	20.74		
5	QPSK	1	24	20.54	20.78	20.73		
5	QPSK	12	0	19.69	19.92	19.89	20.5	1
5	QPSK	12	7	19.7	19.94	19.91		
5	QPSK	12	13	19.68	19.92	19.87		
5	QPSK	25	0	19.73	19.92	19.88		
5	16QAM	1	0	19.98	20.24	20.18	20.5	1
5	16QAM	1	12	19.93	20.21	20.23		
5	16QAM	1	24	19.93	20.2	20.22		
5	16QAM	12	0	18.71	18.95	18.88	19.5	2
5	16QAM	12	7	18.73	18.95	18.89		
5	16QAM	12	13	18.67	18.94	18.88		
5	16QAM	25	0	18.72	18.89	18.85		
5	64QAM	1	0	19.86	20.09	19.98	20.5	1
5	64QAM	1	12	19.83	19.95	19.96		
5	64QAM	1	24	19.77	20.01	19.97		
5	64QAM	12	0	18.73	18.93	18.87	19.5	2
5	64QAM	12	7	18.7	18.97	18.87		
5	64QAM	12	13	18.65	18.91	18.84		
5	64QAM	25	0	18.71	18.92	18.85		

Channel				18615	18900	19185	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1851.5	1880	1908.5		
3	QPSK	1	0	20.58	20.77	20.71	21.5	0
3	QPSK	1	8	20.67	20.88	20.81		
3	QPSK	1	14	20.52	20.73	20.7		
3	QPSK	8	0	19.69	19.9	19.86	20.5	1
3	QPSK	8	4	19.68	19.91	19.87		
3	QPSK	8	7	19.67	19.88	19.86		
3	QPSK	15	0	19.69	19.93	19.84		
3	16QAM	1	0	19.95	20.23	20.18	20.5	1
3	16QAM	1	8	20.04	20.26	20.18		
3	16QAM	1	14	19.91	20.17	20.09		
3	16QAM	8	0	18.74	18.99	18.91	19.5	2
3	16QAM	8	4	18.75	19.01	18.94		
3	16QAM	8	7	18.71	18.96	18.89		
3	16QAM	15	0	18.69	18.93	18.86		
3	64QAM	1	0	19.81	19.95	19.94	20.5	1
3	64QAM	1	8	19.89	20.1	20.08		
3	64QAM	1	14	19.79	19.96	19.93		
3	64QAM	8	0	18.69	18.91	18.88	19.5	2
3	64QAM	8	4	18.73	18.93	18.87		
3	64QAM	8	7	18.68	18.9	18.84		
3	64QAM	15	0	18.68	18.88	18.85		
Channel				18607	18900	19193	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1850.7	1880	1909.3		
1.4	QPSK	1	0	20.48	20.71	20.67	21.5	0
1.4	QPSK	1	3	20.56	20.78	20.74		
1.4	QPSK	1	5	20.47	20.66	20.63		
1.4	QPSK	3	0	20.51	20.75	20.71		
1.4	QPSK	3	1	20.59	20.77	20.72		
1.4	QPSK	3	3	20.58	20.78	20.72		
1.4	QPSK	6	0	19.61	19.82	19.76	20.5	1
1.4	16QAM	1	0	19.86	20.11	20.06	20.5	1
1.4	16QAM	1	3	19.93	20.21	20.15		
1.4	16QAM	1	5	19.82	20.1	20.06		
1.4	16QAM	3	0	19.62	19.86	19.8		
1.4	16QAM	3	1	19.72	19.95	19.9		
1.4	16QAM	3	3	19.7	19.95	19.88		
1.4	16QAM	6	0	18.68	18.88	18.84	19.5	2
1.4	64QAM	1	0	19.76	19.98	19.95	20.5	1
1.4	64QAM	1	3	19.79	20.09	19.97		
1.4	64QAM	1	5	19.71	19.99	19.9		
1.4	64QAM	3	0	19.66	19.87	19.81		
1.4	64QAM	3	1	19.69	19.92	19.84		
1.4	64QAM	3	3	19.68	19.92	19.83		
1.4	64QAM	6	0	18.6	18.81	18.78	19.5	2

<LTE Carrier Aggregation>

General Note:

This device supports Carrier Aggregation on downlink for inter and intra band. For the device supports bands and bandwidths and configurations are provided as follow table was according to 3GPP.

E-UTRA CA configuration / Bandwidth combination set							
E-UTRA CA configuration	Uplink CA configurations	Component carriers in order of increasing carrier frequency				Maximum aggregated bandwidth [MHz]	Bandwidth combination set
		Channel bandwidths for carrier [MHz]	Channel bandwidths for carrier [MHz]	Channel bandwidths for carrier [MHz]	Channel bandwidths for carrier [MHz]		
CA_7B	-	15	5			20	0
CA_7C	-	15	15	15		40	0
		20	20	20			
		10	20	10		40	1
		15	15, 20	15			
		20	10, 15, 20	20			
		15	10, 15	15		40	2
		20	15, 20	20			
CA_7A-7A	-	5	15			40	0
		10	10, 15				
		15	15, 20				
		20	20				
		5, 10, 15, 20	5, 10, 15, 20			40	1
		5, 10, 15, 20	5, 10			30	2
		10, 15, 20	10, 15, 20			40	3

E-UTRA CA configuration / Bandwidth combination set										
E-UTRA CA Configuration	Uplink CA configurations	E- UTRA Bands	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Maximum aggregated bandwidth [MHz]	Bandwidth combination set
CA_2A-4A	-	2	Yes	Yes	Yes	Yes	Yes	Yes	40	0
		4			Yes	Yes	Yes	Yes		
		2			Yes	Yes			20	1
		4			Yes	Yes				
		2			Yes	Yes	Yes	Yes	40	2
		4			Yes	Yes	Yes	Yes		

LTE Carrier Aggregation Conducted Power (Downlink)

General Note:

i. According to KDB941225 D05A v01r02, Uplink maximum output power measurement with downlink carrier aggregation active should be measured, using the highest output channel measured without downlink carrier aggregation, to confirm that uplink maximum output power with downlink carrier aggregation active remains within the specified tune-up tolerance limits and not more than ¼ dB higher than the maximum output measured without downlink carrier aggregation active.

ii. Uplink maximum output power with downlink carrier aggregation active does not show more than ¼ dB higher than the maximum output power without downlink carrier aggregation active, therefore SAR evaluation with downlink carrier aggregation active can be excluded.

iii. The device supports downlink carrier aggregation only. Uplink carrier aggregation is not supported. For power measurement were control and acknowledge data is sent on uplink channels that operate identical to specifications when downlink carrier aggregation is inactive.

iv. Selected highest measured power when downlink carrier aggregation is inactive for conducted power comparison with downlink carrier aggregation is active, to confirm that when downlink carrier aggregation is active uplink maximum output power remains within the specified tune-up tolerance limits and not more than ¼ dB higher than the maximum output power measured when downlink carrier aggregation inactive.

v. For inter-band CA, the SCC selected highest bandwidth and near the middle of its transmission band. For SCC DL RB size and offset will base on the PCC corresponding RB allocation.

vi. For non-contiguous intra-band CA, the SCC selected to provide maximum separation from the PCC and must remain fully within the downlink transmission band. For SCC DL RB size and offset will base on the PCC corresponding RB allocation.

vii. For Intra-band, contiguous CA, the downlink channels selected to perform the uplink power measurement must satisfy 3GPP channel spacing (5.4.1A of 3GPP TS 36.521 or equivalent) and channel bandwidth (5.4.2A) requirements.

$$\text{Nominal channel spacing} = \left\lfloor \frac{BW_{Channel(1)} + BW_{Channel(2)} - 0.1\left|BW_{Channel(1)} - BW_{Channel(2)}\right|}{0.6} \right\rfloor 0.3 \ \text{[MHz]}$$

<Full Power Mode>

Configure		PCC						SCC				Power	
		LTE Band	BW (MHz)	Freq. (MHz)	Channel	UL# RB	UL RB Offset	LTE Band	BW (MHz)	Freq. (MHz)	Channel	LTE Rel 11 Tx.Power (dBm)	LTE Rel 8 Tx.Power (dBm)
Inter-Band		Band 2	20M	1900	19100	1	0	Band 4	20M	2132.5	2175	22.91	22.98
		Band 4	20M	1745	20300	1	0	Band 2	20M	1960	900	23.10	23.12
Intra-Band	Contiguous	Band 7	15M	2562.5	21375	1	37	Band 7	5M	2691.8	3468	23.48	23.49
		Band 7	20M	2560	21350	1	0	Band 7	20M	2660.2	3152	23.42	23.46
	Non-Contiguous	Band 7	20M	2560	21350	1	0	Band 7	5M	2622.5	2775	23.41	23.46

<Reduced Power Mode for Hotspot On/P-Sensor On>

Configure		PCC						SCC				Power	
		LTE Band	BW (MHz)	Freq. (MHz)	Channel	UL# RB	UL RB Offset	LTE Band	BW (MHz)	Freq. (MHz)	Channel	LTE Rel 11 Tx.Power (dBm)	LTE Rel 8 Tx.Power (dBm)
Inter-Band		Band 2	20M	1900	19100	1	0	Band 4	20M	2132.5	2175	20.81	20.89
		Band 4	20M	1745	20300	1	0	Band 2	20M	1960	900	21.05	21.06
Intra-Band	Contiguous	Band 7	15M	2562.5	21375	1	0	Band 7	5M	2691.8	3468	20.41	20.45
		Band 7	20M	2560	21350	1	0	Band 7	20M	2660.2	3152	20.42	20.44
	Non-Contiguous	Band 7	20M	2560	21350	1	0	Band 7	5M	2622.5	2775	20.41	20.44

<WLAN Conducted Power>

General Note:

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

<Full Power Mode>

<2.4GHz WLAN>

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
2.4GHz WLAN	802.11b 1Mbps	1	2412	**20.49**	20.50	100.00
		6	2437	20.07	20.50	
		11	2462	19.15	20.50	
	802.11g 6Mbps	1	2412	19.24	19.50	93.75
		6	2437	18.84	19.50	
		11	2462	18.02	19.50	
	802.11n-HT20 MCS0	1	2412	18.24	18.50	92.81
		6	2437	17.70	18.50	
		11	2462	16.89	18.50	
	802.11n-HT40 MCS0	3	2422	17.05	18.00	86.77
		6	2437	17.94	18.00	
		9	2452	16.47	18.00	

<5GHz WLAN>

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.2GHz WLAN	802.11a 6Mbps	36	5180	**16.95**	17.50	94.06
		40	5200	16.90	17.50	
		44	5220	16.78	17.50	
		48	5240	16.52	17.50	
	802.11n-HT20 MCS0	36	5180	16.01	16.50	93.84
		40	5200	15.86	16.50	
		44	5220	15.71	16.50	
		48	5240	15.59	16.50	
	802.11n-HT40 MCS0	38	5190	15.72	16.00	88.92
		46	5230	15.36	16.00	
	802.11ac VHT20 MCS0	36	5180	15.07	15.50	93.82
		40	5200	15.09	15.50	
		44	5220	14.81	15.50	
		48	5240	14.67	15.50	
	802.11ac VHT40 MCS0	38	5190	15.69	16.00	87.93
		46	5230	15.42	16.00	
	802.11ac VHT80 MCS0	42	5210	14.17	15.00	79.30

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.3GHz WLAN	802.11a 6Mbps	52	5260	16.68	17.50	94.06
		56	5280	16.82	17.50	
		60	5300	**16.85**	17.50	
		64	5320	16.11	17.50	
	802.11n-HT20 MCS0	52	5260	15.63	16.00	93.84
		56	5280	15.34	16.00	
		60	5300	15.44	16.00	
		64	5320	15.36	16.00	
	802.11n-HT40 MCS0	54	5270	12.85	14.00	88.92
		62	5310	12.79	14.00	
	802.11ac VHT20 MCS0	52	5260	14.59	15.00	93.82
		56	5280	14.51	15.00	
		60	5300	14.40	15.00	
		64	5320	14.54	15.00	
	802.11ac VHT40 MCS0	54	5270	15.51	16.00	87.93
		62	5310	15.40	16.00	
	802.11ac-VHT80 MCS0	58	5290	12.49	14.00	79.30

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.5GHz WLAN	802.11a 6Mbps	100	5500	**16.84**	17.50	94.06
		116	5580	15.62	17.50	
		132	5660	16.23	17.50	
		140	5700	15.99	17.50	
	802.11n-HT20 MCS0	100	5500	15.27	16.00	93.84
		116	5580	15.54	16.00	
		132	5660	15.64	16.00	
		140	5700	15.09	16.00	
	802.11n-HT40 MCS0	102	5510	12.65	13.00	88.92
		110	5550	11.52	13.00	
		134	5670	11.27	13.00	
	802.11ac VHT20 MCS0	100	5500	14.72	15.00	93.82
		116	5580	14.85	15.00	
		132	5660	13.79	15.00	
		140	5700	13.33	15.00	
	802.11ac VHT40 MCS0	102	5510	15.48	16.00	87.93
		110	5550	15.61	16.00	
		134	5670	14.84	16.00	
	802.11ac VHT80 MCS0	106	5530	10.82	12.00	79.30

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.8GHz WLAN	802.11a 6Mbps	149	5745	16.43	17.50	94.06
		157	5785	16.03	17.50	
		165	5825	**17.29**	17.50	
	802.11n-HT20 MCS0	149	5745	15.21	16.00	93.84
		157	5785	14.24	16.00	
		165	5825	15.94	16.00	
	802.11n-HT40 MCS0	151	5755	14.42	14.50	88.92
		159	5795	14.23	14.50	
	802.11ac VHT20 MCS0	149	5745	13.44	14.00	93.82
		157	5785	12.83	14.00	
		165	5825	13.67	14.00	
	802.11ac VHT40 MCS0	151	5755	14.37	14.50	87.93
		159	5795	14.14	14.50	
	802.11ac VHT80 MCS0	155	5775	13.53	14.00	79.30

<Reduced Power Mode for Receiver On>

<2.4GHz WLAN>

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
2.4GHz WLAN	802.11b 1Mbps	1	2412	**16.52**	17.00	100.00
		6	2437	15.59	17.00	
		11	2462	15.26	17.00	
	802.11g 6Mbps	1	2412	15.55	16.00	93.75
		6	2437	14.60	16.00	
		11	2462	14.07	16.00	
	802.11n-HT20 MCS0	1	2412	15.38	15.50	92.81
		6	2437	14.37	15.50	
		11	2462	13.88	15.50	
	802.11n-HT40 MCS0	3	2422	14.11	15.00	86.77
		6	2437	14.78	15.00	
		9	2452	13.34	15.00	

<5GHz WLAN>

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.2GHz WLAN	802.11a 6Mbps	36	5180	**14.59**	15.00	94.06
		40	5200	14.52	15.00	
		44	5220	14.54	15.00	
		48	5240	14.44	15.00	
	802.11n-HT20 MCS0	36	5180	13.75	14.00	93.84
		40	5200	13.67	14.00	
		44	5220	13.61	14.00	
		48	5240	13.53	14.00	
	802.11n-HT40 MCS0	38	5190	13.44	14.00	88.92
		46	5230	13.42	14.00	
	802.11ac VHT20 MCS0	36	5180	12.67	14.00	93.82
		40	5200	12.69	14.00	
		44	5220	12.60	14.00	
		48	5240	12.55	14.00	
	802.11ac VHT40 MCS0	38	5190	13.61	14.00	87.93
		46	5230	13.49	14.00	
	802.11ac VHT80 MCS0	42	5210	13.10	14.00	79.30

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.3GHz WLAN	802.11a 6Mbps	52	5260	14.72	15.00	94.06
		56	5280	14.78	15.00	
		60	5300	**14.86**	15.00	
		64	5320	14.58	15.00	
	802.11n-HT20 MCS0	52	5260	13.80	14.00	93.84
		56	5280	13.55	14.00	
		60	5300	13.49	14.00	
		64	5320	13.64	14.00	
	802.11n-HT40 MCS0	54	5270	13.73	14.00	88.92
		62	5310	13.68	14.00	
	802.11ac VHT20 MCS0	52	5260	12.80	14.00	93.82
		56	5280	12.73	14.00	
		60	5300	12.70	14.00	
		64	5320	12.60	14.00	
	802.11ac VHT40 MCS0	54	5270	13.75	14.00	87.93
		62	5310	13.67	14.00	
	802.11ac-VHT80 MCS0	58	5290	13.05	14.00	79.30

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.5GHz WLAN	802.11a 6Mbps	100	5500	**14.68**	15.00	94.06
		116	5580	14.59	15.00	
		132	5660	14.20	15.00	
		140	5700	13.84	15.00	
	802.11n-HT20 MCS0	100	5500	12.91	14.00	93.84
		116	5580	13.49	14.00	
		132	5660	12.71	14.00	
		140	5700	12.85	14.00	
	802.11n-HT40 MCS0	102	5510	12.75	14.00	88.92
		110	5550	13.40	14.00	
		134	5670	12.82	14.00	
	802.11ac VHT20 MCS0	100	5500	11.87	13.00	93.82
		116	5580	12.46	13.00	
		132	5660	11.89	13.00	
		140	5700	11.79	13.00	
	802.11ac VHT40 MCS0	102	5510	12.78	14.00	87.93
		110	5550	13.42	14.00	
		134	5670	12.69	14.00	
	802.11ac VHT80 MCS0	106	5530	13.52	14.00	79.30

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.8GHz WLAN	802.11a 6Mbps	149	5745	14.64	15.00	94.06
		157	5785	14.19	15.00	
		165	5825	**14.80**	15.00	
	802.11n-HT20 MCS0	149	5745	13.27	14.00	93.84
		157	5785	12.75	14.00	
		165	5825	13.40	14.00	
	802.11n-HT40 MCS0	151	5755	13.44	14.00	88.92
		159	5795	13.02	14.00	
	802.11ac VHT20 MCS0	149	5745	12.60	13.00	93.82
		157	5785	11.97	13.00	
		165	5825	12.64	13.00	
	802.11ac VHT40 MCS0	151	5755	13.22	14.00	87.93
		159	5795	12.95	14.00	
	802.11ac VHT80 MCS0	155	5775	12.67	14.00	79.30

14. Bluetooth Exclusions Applied

Mode Band	Average power(dBm)		
	Bluetooth v3.0+EDR	Bluetooth v4.0/4.1/4.2 LE	Bluetooth v5.0 LE
2.4GHz Bluetooth	12.0	8.0	8.0

Note:
Per KDB 447498 D01v06, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:

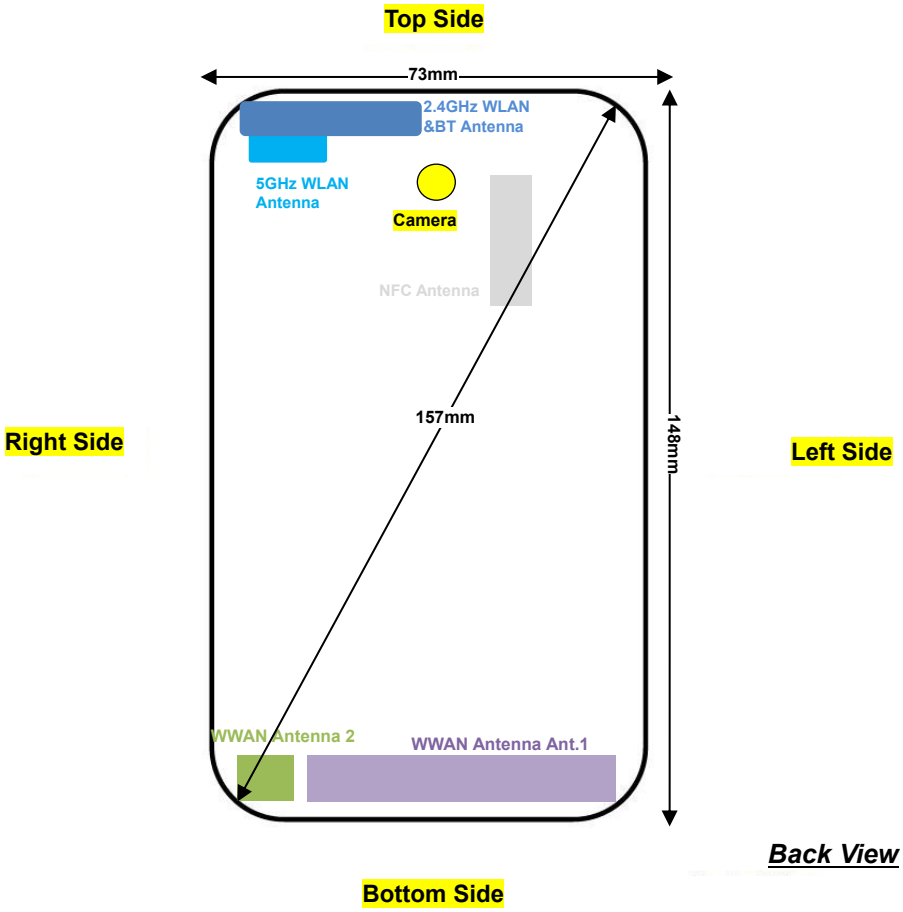
[(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)] ·[√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

Bluetooth Max Power (dBm)	Separation Distance (mm)	Frequency (GHz)	Exclusion Thresholds
12.0	10	2.48	2.5

Note:
Per KDB 447498 D01v06, a distance of 10 mm is applied to determine 1g SAR test exclusion. The test exclusion threshold is 2.5 which is <= 3, SAR testing is not required.

15. Antenna Location



Distance of the Antenna to the EUT surface/edge						
Antennas	Back	Front	Top Side	Bottom Side	Right Side	Left Side
WWAN Antenna 1	≤ 25mm	≤ 25mm	>25mm	≤ 25mm	≤ 25mm	≤ 25mm
WWAN Antenna 2	≤ 25mm	≤ 25mm	>25mm	≤ 25mm	≤ 25mm	>25mm
2.4GHz WLAN & BT	≤ 25mm	≤ 25mm	≤ 25mm	>25mm	≤ 25mm	>25mm
5GHz WLAN	≤ 25mm	≤ 25mm	≤ 25mm	>25mm	≤ 25mm	>25mm

Positions for SAR tests; Hotspot mode						
Antennas	Back	Front	Top Side	Bottom Side	Right Side	Left Side
WWAN Antenna 1	Yes	Yes	No	Yes	Yes	Yes
WWAN Antenna 2	Yes	Yes	No	Yes	Yes	No
2.4GHz WLAN & BT	Yes	Yes	Yes	No	Yes	No
5GHz WLAN	Yes	Yes	Yes	No	Yes	No

General Note:

1. WWAN antenna 1 frequency bands include GSM850/1900, WCDMA Band II/IV/V, LTE Band 2/4/5/12/17/66 and WWAN antenna 2 frequency bands only include LTE Band 7.
2. Referring to KDB 941225 D06 v02r01, when the overall device length and width are ≥ 9cm*5cm, the test distance is 10 mm. SAR must be measured for all sides and surfaces with a transmitting antenna located within 25mm from that surface or edge.

16. SAR Test Results

General Note:

1. Per KDB 447498 D01v06, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
   a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
   b. For SAR testing of WLAN signal with non-100% duty cycle, the measured SAR is scaled-up by the duty cycle scaling factor which is equal to "1/(duty cycle)"
   c. For WWAN: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
   d. For WLAN: Reported SAR(W/kg)= Measured SAR(W/kg)* Duty Cycle scaling factor * Tune-up scaling factor
2. Per KDB 447498 D01v06, for each exposure position, testing of other required channels within the operating mode of a frequency band is not required when the *reported* 1-g or 10-g SAR for the mid-band or highest output power channel is:
   - ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
   - ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
   - ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
3. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.
4. Per KDB 648474 D04v01r03, when the reported SAR for a body-worn accessory measured without a headset connected to the handset is ≤ 1.2 W/kg, SAR testing with a headset connected to the handset is not required.

LTE Note:

1. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
2. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
3. Per KDB 941225 D05v02r05, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
4. Per KDB 941225 D05v02r05, 16QAM/64QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM/64QAM SAR testing is not required.
5. Per KDB 941225 D05v02r05, smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
6. For LTE B5 the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 D05v02r05, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

WLAN Note:

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

16.1 Head SAR

<LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB Offset	Test Position	Power Mode	Ant.	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	LTE Band 5	10M	QPSK	1	25	Right Cheek	Full	1	20525	836.5	23.07	23.5	1.104	0.19	0.282	0.311
	LTE Band 5	10M	QPSK	25	0	Right Cheek	Full	1	20525	836.5	22.13	22.5	1.089	0.14	0.271	0.295
	LTE Band 5	10M	QPSK	1	25	Right Tilted	Full	1	20525	836.5	23.07	23.5	1.104	0.12	0.255	0.282
	LTE Band 5	10M	QPSK	25	0	Right Tilted	Full	1	20525	836.5	22.13	22.5	1.089	0.1	0.235	0.256
01	LTE Band 5	10M	QPSK	1	25	Left Cheek	Full	1	20525	836.5	23.07	23.5	1.104	-0.12	0.452	**0.499**
	LTE Band 5	10M	QPSK	25	0	Left Cheek	Full	1	20525	836.5	22.13	22.5	1.089	-0.12	0.446	0.486
	LTE Band 5	10M	QPSK	1	25	Left Tilted	Full	1	20525	836.5	23.07	23.5	1.104	0.05	0.230	0.254
	LTE Band 5	10M	QPSK	25	0	Left Tilted	Full	1	20525	836.5	22.13	22.5	1.089	0.01	0.244	0.266
02	LTE Band 2	20M	QPSK	1	0	Right Cheek	Full	1	19100	1900	22.98	23.50	1.127	0.09	0.439	**0.495**
	LTE Band 2	20M	QPSK	50	0	Right Cheek	Full	1	18900	1880	22.08	22.50	1.102	0.07	0.350	0.386
	LTE Band 2	20M	QPSK	1	0	Right Tilted	Full	1	19100	1900	22.98	23.50	1.127	0.09	0.098	0.110
	LTE Band 2	20M	QPSK	50	0	Right Tilted	Full	1	18900	1880	22.08	22.50	1.102	0.05	0.078	0.086
	LTE Band 2	20M	QPSK	1	0	Left Cheek	Full	1	19100	1900	22.98	23.50	1.127	0.07	0.234	0.264
	LTE Band 2	20M	QPSK	50	0	Left Cheek	Full	1	18900	1880	22.08	22.50	1.102	0.02	0.195	0.215
	LTE Band 2	20M	QPSK	1	0	Left Tilted	Full	1	19100	1900	22.98	23.50	1.127	0.03	0.072	0.081
	LTE Band 2	20M	QPSK	50	0	Left Tilted	Full	1	18900	1880	22.08	22.50	1.102	0.15	0.061	0.067

<WLAN 2.4GHz SAR>

Plot No.	Band	Mode	Test Position	Power Mode	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Max Area Scan SAR	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WLAN2.4GHz	802.11b 1Mbps	Right Cheek	Reduced	1	2412	16.52	17	1.117	100	1.000	0	0.839	0.510	0.570
	WLAN2.4GHz	802.11b 1Mbps	Right Tilted	Reduced	1	2412	16.52	17	1.117	100	1.000		0.799		
03	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	Reduced	1	2412	16.52	17	1.117	100	1.000	-0.06	1.274	0.814	**0.909**
	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	Reduced	6	2437	15.59	17	1.384	100	1.000	-0.04		0.608	0.841
	WLAN2.4GHz	802.11b 1Mbps	Left Tilted	Reduced	1	2412	16.52	17	1.117	100	1.000	-0.02	1.110	0.738	0.824
	WLAN2.4GHz	802.11b 1Mbps	Left Tilted	Reduced	6	2437	15.59	17	1.384	100	1.000	-0.06		0.574	0.794

<WLAN 5GHz SAR>

Plot No.	Band	Mode	Test Position	Power Mode	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Max Area Scan SAR	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WLAN5.3GHz	802.11a 6Mbps	Right Cheek	Reduced	60	5300	14.86	15	1.033	94.06	1.063	-0.04	1.392	0.533	0.585
	WLAN5.3GHz	802.11a 6Mbps	Right Tilted	Reduced	60	5300	14.86	15	1.033	94.06	1.063		1.388		
	WLAN5.3GHz	802.11a 6Mbps	Left Cheek	Reduced	60	5300	14.86	15	1.033	94.06	1.063	0.12	2.33	0.800	0.878
	WLAN5.3GHz	802.11a 6Mbps	Left Cheek	Reduced	56	5280	14.78	15	1.052	94.06	1.063	0.02		0.710	0.794
04	WLAN5.3GHz	802.11a 6Mbps	Left Tilted	Reduced	60	5300	14.86	15	1.033	94.06	1.063	0.04	2.605	0.879	**0.965**
	WLAN5.3GHz	802.11a 6Mbps	Left Tilted	Reduced	56	5280	14.78	15	1.052	94.06	1.063	0.17		0.735	0.822
	WLAN5.5GHz	802.11a 6Mbps	Right Cheek	Reduced	100	5500	14.68	15	1.076	94.06	1.063	0.1	1.477	0.588	0.673
	WLAN5.5GHz	802.11a 6Mbps	Right Tilted	Reduced	100	5500	14.68	15	1.076	94.06	1.063		1.277		
05	WLAN5.5GHz	802.11a 6Mbps	Left Cheek	Reduced	100	5500	14.68	15	1.076	94.06	1.063	0.05	2.571	0.826	**0.945**
	WLAN5.5GHz	802.11a 6Mbps	Left Cheek	Reduced	116	5580	14.59	15	1.099	94.06	1.063	0.02		0.728	0.850
	WLAN5.5GHz	802.11a 6Mbps	Left Tilted	Reduced	100	5500	14.68	15	1.076	94.06	1.063	0.03	2.229	0.737	0.843
	WLAN5.5GHz	802.11a 6Mbps	Left Tilted	Reduced	116	5580	14.59	15	1.099	94.06	1.063	0.03		0.656	0.766
	WLAN5.8GHz	802.11a 6Mbps	Right Cheek	Reduced	165	5825	14.80	15	1.047	94.06	1.063		1.039		
	WLAN5.8GHz	802.11a 6Mbps	Right Tilted	Reduced	165	5825	14.80	15	1.047	94.06	1.063		0.959		
	WLAN5.8GHz	802.11a 6Mbps	Left Cheek	Reduced	165	5825	14.80	15	1.047	94.06	1.063	0.06	1.788	0.567	0.631
06	WLAN5.8GHz	802.11a 6Mbps	Left Tilted	Reduced	165	5825	14.80	15	1.047	94.06	1.063	0.03	1.929	0.577	**0.642**

16.2 Hotspot SAR

<LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB Offset	Test Position	Gap (mm)	Power Mode	Antenna	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	LTE Band 5	10M	QPSK	1	25	Front	10	Full	1	20525	836.5	23.07	23.5	1.104	-0.03	0.341	0.376
	LTE Band 5	10M	QPSK	25	0	Front	10	Full	1	20525	836.5	22.13	22.5	1.089	0.02	0.266	0.290
07	LTE Band 5	10M	QPSK	1	25	Back	10	Full	1	20525	836.5	23.07	23.5	1.104	-0.07	0.516	**0.570**
	LTE Band 5	10M	QPSK	25	0	Back	10	Full	1	20525	836.5	22.13	22.5	1.089	-0.06	0.437	0.476
	LTE Band 5	10M	QPSK	1	25	Left Side	10	Full	1	20525	836.5	23.07	23.5	1.104	-0.01	0.324	0.358
	LTE Band 5	10M	QPSK	25	0	Left Side	10	Full	1	20525	836.5	22.13	22.5	1.089	-0.02	0.258	0.281
	LTE Band 5	10M	QPSK	1	25	Right side	10	Full	1	20525	836.5	23.07	23.5	1.104	-0.13	0.054	0.060
	LTE Band 5	10M	QPSK	25	0	Right side	10	Full	1	20525	836.5	22.13	22.5	1.089	-0.11	0.044	0.048
	LTE Band 5	10M	QPSK	1	25	Bottom Side	10	Full	1	20525	836.5	23.07	23.5	1.104	-0.1	0.285	0.315
	LTE Band 5	10M	QPSK	25	0	Bottom Side	10	Full	1	20525	836.5	22.13	22.5	1.089	-0.05	0.222	0.242
08	LTE Band 2	20M	QPSK	1	0	Front	10	Reduced	1	19100	1900	20.89	21.5	1.151	-0.16	0.944	**1.086**
	LTE Band 2	20M	QPSK	1	0	Front	10	Reduced	1	18700	1860	20.74	21.5	1.191	-0.19	0.852	1.015
	LTE Band 2	20M	QPSK	1	0	Front	10	Reduced	1	18900	1880	20.84	21.5	1.164	-0.03	0.903	1.051
	LTE Band 2	20M	QPSK	50	0	Front	10	Reduced	1	18900	1880	20.07	20.5	1.104	-0.09	0.765	0.845
	LTE Band 2	20M	QPSK	50	0	Front	10	Reduced	1	18700	1860	19.86	20.5	1.159	-0.12	0.637	0.738
	LTE Band 2	20M	QPSK	50	0	Front	10	Reduced	1	19100	1900	19.95	20.5	1.135	-0.14	0.776	0.881
	LTE Band 2	20M	QPSK	100	0	Front	10	Reduced	1	18900	1880	20.03	20.5	1.114	-0.04	0.780	0.869
	LTE Band 2	20M	QPSK	1	0	Back	10	Reduced	1	19100	1900	20.89	21.5	1.151	-0.13	0.859	0.989
	LTE Band 2	20M	QPSK	1	0	Back	10	Reduced	1	18700	1860	20.74	21.5	1.191	-0.01	0.810	0.965
	LTE Band 2	20M	QPSK	1	0	Back	10	Reduced	1	18900	1880	20.84	21.5	1.164	-0.06	0.841	0.979
	LTE Band 2	20M	QPSK	50	0	Back	10	Reduced	1	18900	1880	20.07	20.5	1.104	0.06	0.709	0.783
	LTE Band 2	20M	QPSK	100	0	Back	10	Reduced	1	18900	1880	20.03	20.5	1.114	-0.01	0.703	0.783
	LTE Band 2	20M	QPSK	1	0	Left Side	10	Reduced	1	19100	1900	20.89	21.5	1.151	-0.02	0.170	0.196
	LTE Band 2	20M	QPSK	50	0	Left Side	10	Reduced	1	18900	1880	20.07	20.5	1.104	0.06	0.139	0.153
	LTE Band 2	20M	QPSK	1	0	Right side	10	Reduced	1	19100	1900	20.89	21.5	1.151	-0.07	0.051	0.059
	LTE Band 2	20M	QPSK	50	0	Right side	10	Reduced	1	18900	1880	20.07	20.5	1.104	0.08	0.042	0.046
	LTE Band 2	20M	QPSK	1	0	Bottom Side	10	Reduced	1	19100	1900	20.89	21.5	1.151	0.06	0.670	0.771
	LTE Band 2	20M	QPSK	50	0	Bottom Side	10	Reduced	1	18900	1880	20.07	20.5	1.104	0.02	0.552	0.609

<WLAN SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Power Mode	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Max Area Scan SAR	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WLAN2.4GHz	802.11b 1Mbps	Front	10	Full	1	2412	20.49	20.5	1.002	100	1.000	0.02	0.653	0.420	0.421
09	WLAN2.4GHz	802.11b 1Mbps	Back	10	Full	1	2412	20.49	20.5	1.002	100	1.000	-0.07	0.786	0.539	**0.540**
	WLAN2.4GHz	802.11b 1Mbps	Right side	10	Full	1	2412	20.49	20.5	1.002	100	1.000		0.156		
	WLAN2.4GHz	802.11b 1Mbps	Top side	10	Full	1	2412	20.49	20.5	1.002	100	1.000		0.448		
	WLAN5.2GHz	802.11a 6Mbps	Front	10	Full	36	5180	16.95	17.5	1.135	94.06	1.063	-0.01	0.2	0.080	0.096
10	WLAN5.2GHz	802.11a 6Mbps	Back	10	Full	36	5180	16.95	17.5	1.135	94.06	1.063	-0.06	0.660	0.303	**0.366**
	WLAN5.2GHz	802.11a 6Mbps	Right side	10	Full	36	5180	16.95	17.5	1.135	94.06	1.063		0.191		
	WLAN5.2GHz	802.11a 6Mbps	Top side	10	Full	36	5180	16.95	17.5	1.135	94.06	1.063		0.219		
	WLAN5.8GHz	802.11a 6Mbps	Front	10	Full	165	5825	17.29	17.5	1.050	94.06	1.063	0.03	0.345	0.124	0.138
11	WLAN5.8GHz	802.11a 6Mbps	Back	10	Full	165	5825	17.29	17.5	1.050	94.06	1.063	0.01	1.744	0.746	**0.832**
	WLAN5.8GHz	802.11a 6Mbps	Back	10	Full	149	5745	16.43	17.5	1.279	94.06	1.063	-0.09		0.601	0.817
	WLAN5.8GHz	802.11a 6Mbps	Right Side	10	Full	165	5825	17.29	17.5	1.050	94.06	1.063	0.11	0.510	0.208	0.232
	WLAN5.8GHz	802.11a 6Mbps	Top side	10	Full	165	5825	17.29	17.5	1.050	94.06	1.063		0.369		

16.3 Body Worn Accessory SAR

<LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB Offset	Test Position	Gap (mm)	Power Mode	Antenna	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	LTE Band 5	10M	QPSK	1	25	Front	10	Full	1	20525	836.5	23.07	23.5	1.104	-0.03	0.341	0.376
	LTE Band 5	10M	QPSK	25	0	Front	10	Full	1	20525	836.5	22.13	22.5	1.089	0.02	0.266	0.290
07	LTE Band 5	10M	QPSK	1	25	Back	10	Full	1	20525	836.5	23.07	23.5	1.104	-0.07	0.516	**0.570**
	LTE Band 5	10M	QPSK	25	0	Back	10	Full	1	20525	836.5	22.13	22.5	1.089	-0.06	0.437	0.476
08	LTE Band 2	20M	QPSK	1	0	Front	10	Reduced	1	19100	1900	20.89	21.5	1.151	-0.16	0.944	**1.086**
	LTE Band 2	20M	QPSK	1	0	Front	10	Reduced	1	18700	1860	20.74	21.5	1.191	-0.19	0.852	1.015
	LTE Band 2	20M	QPSK	1	0	Front	10	Reduced	1	18900	1880	20.84	21.5	1.164	-0.03	0.903	1.051
	LTE Band 2	20M	QPSK	50	0	Front	10	Reduced	1	18900	1880	20.07	20.5	1.104	-0.09	0.765	0.845
	LTE Band 2	20M	QPSK	50	0	Front	10	Reduced	1	18700	1860	19.86	20.5	1.159	-0.12	0.637	0.738
	LTE Band 2	20M	QPSK	50	0	Front	10	Reduced	1	19100	1900	19.95	20.5	1.135	-0.14	0.776	0.881
	LTE Band 2	20M	QPSK	100	0	Front	10	Reduced	1	18900	1880	20.03	20.5	1.114	-0.04	0.780	0.869
	LTE Band 2	20M	QPSK	1	0	Back	10	Reduced	1	19100	1900	20.89	21.5	1.151	-0.13	0.859	0.989
	LTE Band 2	20M	QPSK	1	0	Back	10	Reduced	1	18700	1860	20.74	21.5	1.191	-0.01	0.810	0.965
	LTE Band 2	20M	QPSK	1	0	Back	10	Reduced	1	18900	1880	20.84	21.5	1.164	-0.06	0.841	0.979
	LTE Band 2	20M	QPSK	50	0	Back	10	Reduced	1	18900	1880	20.07	20.5	1.104	0.06	0.709	0.783
	LTE Band 2	20M	QPSK	100	0	Back	10	Reduced	1	18900	1880	20.03	20.5	1.114	-0.01	0.703	0.783

<WLAN SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Power Mode	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Max Area Scan SAR	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WLAN2.4GHz	802.11b 1Mbps	Front	10	Full	1	2412	20.49	20.5	1.002	100	1.000	0.02	0.653	0.420	0.421
09	WLAN2.4GHz	802.11b 1Mbps	Back	10	Full	1	2412	20.49	20.5	1.002	100	1.000	-0.07	0.786	0.539	**0.540**
	WLAN5.2GHz	802.11a 6Mbps	Front	10	Full	36	5180	16.95	17.5	1.135	94.06	1.063	-0.01	0.2	0.080	0.096
10	WLAN5.2GHz	802.11a 6Mbps	Back	10	Full	36	5180	16.95	17.5	1.135	94.06	1.063	-0.06	0.660	0.303	**0.366**
	WLAN5.3GHz	802.11a 6Mbps	Front	10	Full	60	5300	16.85	17.5	1.161	94.06	1.063	0.12	0.311	0.132	0.163
12	WLAN5.3GHz	802.11a 6Mbps	Back	10	Full	60	5300	16.85	17.5	1.161	94.06	1.063	-0.09	1.333	0.578	**0.714**
	WLAN5.5GHz	802.11a 6Mbps	Front	10	Full	100	5500	16.84	17.5	1.164	94.06	1.063	0.1	0.422	0.171	0.212
13	WLAN5.5GHz	802.11a 6Mbps	Back	10	Full	100	5500	16.84	17.5	1.164	94.06	1.063	-0.08	1.61	0.671	**0.830**
	WLAN5.5GHz	802.11a 6Mbps	Back	10	Full	132	5660	16.23	17.5	1.340	94.06	1.063	-0.08		0.531	0.756
	WLAN5.8GHz	802.11a 6Mbps	Front	10	Full	165	5825	17.29	17.5	1.050	94.06	1.063	0.03	0.345	0.124	0.138
11	WLAN5.8GHz	802.11a 6Mbps	Back	10	Full	165	5825	17.29	17.5	1.050	94.06	1.063	0.01	1.744	0.746	**0.832**
	WLAN5.8GHz	802.11a 6Mbps	Back	10	Full	149	5745	16.43	17.5	1.279	94.06	1.063	-0.09		0.601	0.817

16.4 Repeated SAR Measurement

No.	Band	Mode	BW (MHz)	Modulation	RB Size	RB Offset	Test Position	Gap (mm)	Power Mode	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Ratio	Reported 1g SAR (W/kg)
1st	WLAN2.4GHz	802.11b 1Mbps	-	-	-	-	Left Cheek	0	Reduced	1	2412	16.52	17	1.117	100	1.000	-0.06	0.814	1	0.909
2nd	WLAN2.4GHz	802.11b 1Mbps	-	-	-	-	Left Cheek	0	Reduced	1	2412	16.52	17	1.117	100	1.000	0.05	0.801	1.016	0.895
1st	WLAN5.3GHz	802.11a 6Mbps	-	-	-	-	Left Tilted	0	Reduced	60	5300	14.86	15	1.033	94.06	1.063	0.04	0.879	1	0.965
2nd	WLAN5.3GHz	802.11a 6Mbps	-	-	-	-	Left Tilted	0	Reduced	60	5300	14.86	15	1.033	94.06	1.063	0.11	0.865	1.016	0.950
1st	WLAN5.5GHz	802.11a 6Mbps	-	-	-	-	Left Cheek	0	Reduced	100	5500	14.68	15	1.076	94.06	1.063	0.05	0.826	1	0.945
2nd	WLAN5.5GHz	802.11a 6Mbps	-	-	-	-	Left Cheek	0	Reduced	100	5500	14.68	15	1.076	94.06	1.063	0.1	0.811	1.018	0.928
1st	LTE Band 2	-	20M	QPSK	1RB	0Offset	Front	10	Reduced	19100	1900	20.89	21.5	1.151	-	-	-0.16	0.944	1	1.086
2nd	LTE Band 2	-	20M	QPSK	1RB	0Offset	Front	10	Reduced	19100	1900	20.89	21.5	1.151	-	-	0.05	0.940	1.004	1.082

General Note:

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

17. Simultaneous Transmission Analysis

No.	Simultaneous Transmission Configurations	Portable Handset			Note
		Head	Body-worn	Hotspot	
1.	GSM Voice + WLAN2.4GHz	Yes	Yes		
2.	GPRS/EDGE + WLAN2.4GHz	Yes	Yes	Yes	WLAN Hotspot
3.	WCDMA + WLAN2.4GHz	Yes	Yes	Yes	WLAN Hotspot
4.	LTE + WLAN2.4GHz	Yes	Yes	Yes	WLAN Hotspot
5.	GSM Voice + WLAN5.3/5.5GHz	Yes	Yes		
6.	GPRS/EDGE + WLAN5.3/5.5GHz	Yes	Yes		WLAN Direct (GC only)
7.	WCDMA + WLAN5.3/5.5GHz	Yes	Yes		WLAN Direct (GC only)
8.	LTE + WLAN5.3/5.5GHz	Yes	Yes		WLAN Direct (GC only)
9.	GSM Voice + WLAN5.2/5.8GHz	Yes	Yes		
10.	GPRS/EDGE + WLAN5.2/5.8GHz	Yes	Yes	Yes	WLAN Hotspot/Direct(GC/GO)
11.	WCDMA + WLAN5.2/5.8GHz	Yes	Yes	Yes	WLAN Hotspot/Direct(GC/GO)
12.	LTE + WLAN5.2/5.8GHz	Yes	Yes	Yes	WLAN Hotspot/Direct(GC/GO)
13.	GSM Voice + Bluetooth		Yes		
14.	GPRS/EDGE + Bluetooth		Yes	Yes	BT Tethering
15.	WCDMA + Bluetooth		Yes	Yes	BT Tethering
16.	LTE + Bluetooth		Yes	Yes	BT Tethering

General Note:

1. This device supports VoIP in GPRS, EGPRS, WCDMA and LTE (e.g. for 3rd-party VoIP), LTE supports VoLTE operation.
2. EUT will choose each GSM, WCDMA, and LTE according to the network signal condition; therefore, they will not operate simultaneously at any moment.
3. This device 2.4GHz WLAN/ 5.2GHz WLAN/5.8GHz WLAN support hotspot operation, and 5.2GHz WLAN/5.8GHz WLAN supports WLAN Direct (GC/GO), and 5.3GHz / 5.5GHz supports WLAN Direct (GC 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 though they have independent antenna.
5. WLAN 2.4GHz and Bluetooth share the same antenna so can't transmit simultaneously.
6. According to the EUT character, WLAN 5GHz and Bluetooth can't transmit simultaneously.
7. Chose the worst zoom scan SAR of WLAN correspondingly for co-located with WWAN analysis.
8. The reported SAR summation is calculated based on the same configuration and test position.
9. Per KDB 447498 D01v06, simultaneous transmission SAR is compliant if,
   i) Scalar SAR summation < 1.6W/kg.
   ii) SPLSR = (SAR1 + SAR2)^1.5 / (min. separation distance, mm), and the peak separation distance is determined from the square root of [(x1-x2)2 + (y1-y2)2 + (z1-z2)2], where (x1, y1, z1) and (x2, y2, z2) are the coordinates of the extrapolated peak SAR locations in the zoom scan.
   iii) If SPLSR ≤ 0.04, simultaneously transmission SAR measurement is not necessary.
   iv) Simultaneously transmission SAR measurement, and the reported multi-band SAR < 1.6W/kg.
   v) The SPLSR calculated results please refer to section 17.2.
10. For simultaneous transmission analysis, Bluetooth SAR is estimated per KDB 447498 D01v06 based on the formula below.
   i) (*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)]·[√f(GHz)/*x*] W/kg for *test separation distances* ≤ 50 mm; where *x* = 7.5 for 1-g SAR, and *x* = 18.75 for 10-g SAR.
   ii) When the minimum separation distance is < 5mm, the distance is used 5mm to determine SAR test exclusion.
   iii) 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the *test separation distances* is > 50 mm.

Bluetooth Max Power (dBm)	Exposure Position	Hotspot & Body worn
	Test separation	10 mm
12	Estimated SAR (W/kg)	0.336

17.1 Head Exposure Conditions

WWAN Band		Exposure Position	1	2	3	1+2 Summed 1g SAR (W/kg)	1+3 Summed 1g SAR (W/kg)
			WWAN	2.4GHz WLAN	5GHz WLAN		
			1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)		
GSM	GSM850	Right Cheek	0.233	0.570	0.673	0.80	0.91
		Right Tilted	0.195	0.909	0.965	1.10	1.16
		Left Cheek	0.354	0.909	0.945	1.26	1.30
		Left Tilted	0.166	0.824	0.965	0.99	1.13
	GSM1900	Right Cheek	0.136	0.570	0.673	0.71	0.81
		Right Tilted	0.030	0.909	0.965	0.94	1.00
		Left Cheek	0.075	0.909	0.945	0.98	1.02
		Left Tilted	0.026	0.824	0.965	0.85	0.99
WCDMA	Band V	Right Cheek	0.226	0.570	0.673	0.80	0.90
		Right Tilted	0.177	0.909	0.965	1.09	1.14
		Left Cheek	0.272	0.909	0.945	1.18	1.22
		Left Tilted	0.136	0.824	0.965	0.96	1.10
	Band IV	Right Cheek	0.127	0.570	0.673	0.70	0.80
		Right Tilted	0.046	0.909	0.965	0.96	1.01
		Left Cheek	0.107	0.909	0.945	1.02	1.05
		Left Tilted	0.030	0.824	0.965	0.85	1.00
	Band II	Right Cheek	0.138	0.570	0.673	0.71	0.81
		Right Tilted	0.052	0.909	0.965	0.96	1.02
		Left Cheek	0.072	0.909	0.945	0.98	1.02
		Left Tilted	0.072	0.824	0.965	0.90	1.04

WWAN Band		Exposure Position	1	2	3	1+2 Summed 1g SAR (W/kg)	1+3 Summed 1g SAR (W/kg)
			WWAN	2.4GHz WLAN	5GHz WLAN		
			1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)		
LTE	Band 12	Right Cheek	0.339	0.570	0.673	0.91	1.01
		Right Tilted	0.220	0.909	0.965	1.13	1.19
		Left Cheek	0.425	0.909	0.945	1.33	1.37
		Left Tilted	0.215	0.824	0.965	1.04	1.18
	Band 66	Right Cheek	0.381	0.570	0.673	0.95	1.05
		Right Tilted	0.091	0.909	0.965	1.00	1.06
		Left Cheek	0.281	0.909	0.945	1.19	1.23
		Left Tilted	0.099	0.824	0.965	0.92	1.06
	Band 7	Right Cheek	0.335	0.570	0.673	0.91	1.01
		Right Tilted	0.112	0.909	0.965	1.02	1.08
		Left Cheek	0.276	0.909	0.945	1.19	1.22
		Left Tilted	0.160	0.824	0.965	0.98	1.13
	Band 5	Right Cheek	0.311	0.570	0.673	0.88	0.98
		Right Tilted	0.282	0.909	0.965	1.19	1.25
		Left Cheek	0.499	0.909	0.945	1.41	1.44
		Left Tilted	0.266	0.824	0.965	1.09	1.23
	Band 2	Right Cheek	0.495	0.570	0.673	1.07	1.17
		Right Tilted	0.110	0.909	0.965	1.02	1.08
		Left Cheek	0.264	0.909	0.945	1.17	1.21
		Left Tilted	0.081	0.824	0.965	0.91	1.05

17.2 Hotspot Exposure Conditions

WWAN Band		Exposure Position	1	2	3	4	1+2			1+3			1+4		
			WWAN	2.4GHz WLAN	5GHz WLAN	Bluetooth									
			1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	Estimated 1g SAR (W/kg)	Summed 1g SAR (W/kg)	SPLSR	Case No	Summed 1g SAR (W/kg)	SPLSR	Case No	Summed 1g SAR (W/kg)	SPLSR	Case No
GSM	GSM850	Front	0.599	0.421	0.138	0.336	1.02			0.74			0.94		
		Back	0.897	0.540	0.832	0.336	1.44			**1.73**	**0.02**	**#3**	1.23		
		Left Side	0.613				0.61			0.61			0.61		
		Right Side	0.079	0.540	0.232	0.336	0.62			0.31			0.42		
		Top Side		0.540	0.832	0.336	0.54			0.83			0.34		
		Bottom Side	0.375				0.38			0.38			0.38		
	GSM1900	Front	1.026	0.421	0.138	0.336	1.45			1.16			1.36		
		Back	0.755	0.540	0.832	0.336	1.30			**1.59**			1.09		
		Left Side	0.166				0.17			0.17			0.17		
		Right Side	0.036	0.540	0.232	0.336	0.58			0.27			0.37		
		Top Side		0.540	0.832	0.336	0.54			0.83			0.34		
		Bottom Side	0.664				0.66			0.66			0.66		
WCDMA	Band V	Front	0.431	0.421	0.138	0.336	0.85			0.57			0.77		
		Back	0.666	0.540	0.832	0.336	1.21			1.50			1.00		
		Left Side	0.531				0.53			0.53			0.53		
		Right Side	0.101	0.540	0.232	0.336	0.64			0.33			0.44		
		Top Side		0.540	0.832	0.336	0.54			0.83			0.34		
		Bottom Side	0.273				0.27			0.27			0.27		
	Band IV	Front	1.157	0.421	0.138	0.336	**1.58**			1.30			**1.49**		
		Back	1.080	0.540	0.832	0.336	**1.62**	**0.02**	**#1**	**1.91**	**0.02**	**#4**	1.42		
		Left Side	0.288				0.29			0.29			0.29		
		Right Side	0.033	0.540	0.232	0.336	0.57			0.27			0.37		
		Top Side		0.540	0.832	0.336	0.54			0.83			0.34		
		Bottom Side	1.073				1.07			1.07			1.07		
	Band II	Front	1.029	0.421	0.138	0.336	1.45			1.17			1.37		
		Back	1.125	0.540	0.832	0.336	**1.67**	**0.02**	**#2**	**1.96**	**0.02**	**#5**	1.46		
		Left Side	0.189				0.19			0.19			0.19		
		Right Side	0.049	0.540	0.232	0.336	0.59			0.28			0.39		
		Top Side		0.540	0.832	0.336	0.54			0.83			0.34		
		Bottom Side	1.023				1.02			1.02			1.02		

WWAN Band		Exposure Position	1	2	3	4	1+2			1+3			1+4		
			WWAN	2.4GHz WLAN	5GHz WLAN	Bluetooth									
			1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	Estimated 1g SAR (W/kg)	Summed 1g SAR (W/kg)	SPLSR	Case No	Summed 1g SAR (W/kg)	SPLSR	Case No	Summed 1g SAR (W/kg)	SPLSR	Case No
LTE	Band 12	Front	0.621	0.421	0.138	0.336	1.04			0.76			0.96		
		Back	0.777	0.540	0.832	0.336	1.32			**1.61**	**0.01**	**#6**	1.11		
		Left Side	0.309				0.31			0.31			0.31		
		Right Side	0.253	0.540	0.232	0.336	0.79			0.49			0.59		
		Top Side		0.540	0.832	0.336	0.54			0.83			0.34		
		Bottom Side	0.302				0.30			0.30			0.30		
	Band 66	Front	1.038	0.421	0.138	0.336	1.46			1.18			1.37		
		Back	0.998	0.540	0.832	0.336	1.54			**1.83**	**0.02**	**#7**	1.33		
		Left Side	0.233				0.23			0.23			0.23		
		Right Side	0.035	0.540	0.232	0.336	0.58			0.27			0.37		
		Top Side		0.540	0.832	0.336	0.54			0.83			0.34		
		Bottom Side	1.017				1.02			1.02			1.02		
	Band 7	Front	0.563	0.421	0.138	0.336	0.98			0.70			0.90		
		Back	0.473	0.540	0.832	0.336	1.01			1.31			0.81		
		Right Side	0.230	0.540	0.232	0.336	0.77			0.46			0.57		
		Top Side		0.540	0.832	0.336	0.54			0.83			0.34		
		Bottom Side	1.152				1.15			1.15			1.15		
	Band 5	Front	0.376	0.421	0.138	0.336	0.80			0.51			0.71		
		Back	0.570	0.540	0.832	0.336	1.11			1.40			0.91		
		Left Side	0.358				0.36			0.36			0.36		
		Right Side	0.060	0.540	0.232	0.336	0.60			0.29			0.40		
		Top Side		0.540	0.832	0.336	0.54			0.83			0.34		
		Bottom Side	0.315				0.32			0.32			0.32		
	Band 2	Front	1.086	0.421	0.138	0.336	1.51			1.22			1.42		
		Back	0.989	0.540	0.832	0.336	1.53			**1.82**	**0.02**	**#8**	1.33		
		Left Side	0.196				0.20			0.20			0.20		
		Right Side	0.059	0.540	0.232	0.336	0.60			0.29			0.40		
		Top Side		0.540	0.832	0.336	0.54			0.83			0.34		
		Bottom Side	0.771				0.77			0.77			0.77		

17.3 Body-Worn Accessory Exposure Conditions

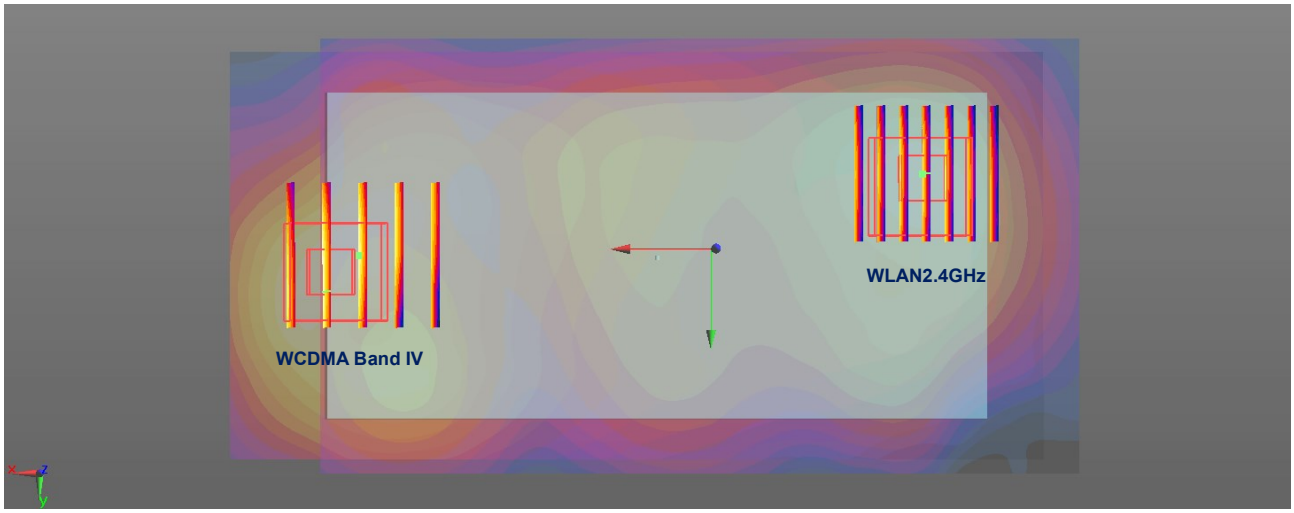
WWAN Band		Exposure Position	1	2	3	4	1+2			1+3			1+4		
			WWAN	2.4GHz WLAN	5GHz WLAN	Bluetooth	Summed 1g SAR (W/kg)	SPLSR	Case No	Summed 1g SAR (W/kg)	SPLSR	Case No	Summed 1g SAR (W/kg)	SPLSR	Case No
			1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	Estimated 1g SAR (W/kg)									
GSM	GSM850	Front	0.599	0.421	0.212	0.336	1.02			0.81			0.94		
		Back	0.897	0.540	0.832	0.336	1.44			**1.73**	**0.02**	**#3**	1.23		
	GSM1900	Front	1.026	0.421	0.212	0.336	1.45			1.24			1.36		
		Back	0.755	0.540	0.832	0.336	1.30			**1.59**			1.09		
WCDMA	Band V	Front	0.431	0.421	0.212	0.336	0.85			0.64			0.77		
		Back	0.666	0.540	0.832	0.336	1.21			1.50			1.00		
	Band IV	Front	1.157	0.421	0.212	0.336	**1.58**			1.37			**1.49**		
		Back	1.080	0.540	0.832	0.336	**1.62**	**0.02**	**#1**	**1.91**	**0.02**	**#4**	1.42		
	Band II	Front	1.029	0.421	0.212	0.336	1.45			1.24			1.37		
		Back	1.125	0.540	0.832	0.336	**1.67**	**0.02**	**#2**	**1.96**	**0.02**	**#5**	1.46		
LTE	Band 12	Front	0.621	0.421	0.212	0.336	1.04			0.83			0.96		
		Back	0.777	0.540	0.832	0.336	1.32			**1.61**	**0.01**	**#6**	1.11		
	Band 66	Front	1.038	0.421	0.212	0.336	1.46			1.25			1.37		
		Back	0.998	0.540	0.832	0.336	1.54			**1.83**	**0.02**	**#7**	1.33		
	Band 7	Front	0.563	0.421	0.212	0.336	0.98			0.78			0.90		
		Back	0.473	0.540	0.832	0.336	1.01			1.31			0.81		
	Band 5	Front	0.376	0.421	0.212	0.336	0.80			0.59			0.71		
		Back	0.570	0.540	0.832	0.336	1.11			1.40			0.91		
	Band 2	Front	1.086	0.421	0.212	0.336	1.51			1.30			1.42		
		Back	0.989	0.540	0.832	0.336	1.53			**1.82**	**0.02**	**#8**	1.33		

17.4 SPLSR Evaluation and Analysis

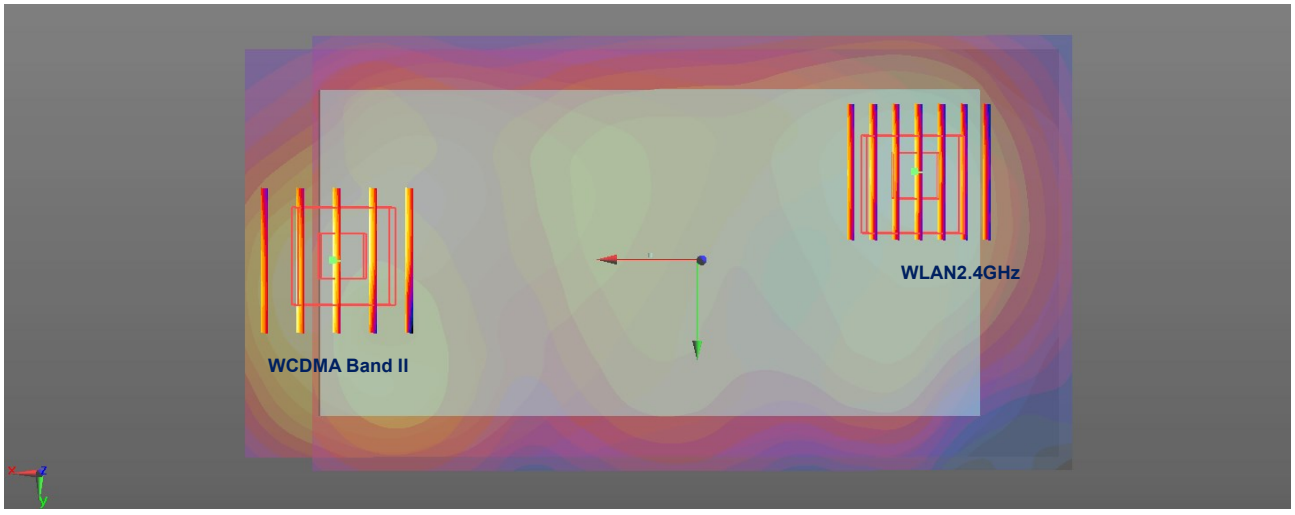
General Note:

1. When standalone SAR is measured for both antennas in the pair, the peak location separation distance is computed by the square root of [(x1−x2)2 + (y1−y2)2 + (z1−z2)2], where (x1, y1, z1) and (x2, y2, z2) are the coordinates in the area scans or extrapolated peak SAR locations in the zoom scans, as appropriate.
2. SPLSR = (SAR1 + SAR2)1.5 / (min. separation distance, mm). If SPLSR ≤ 0.04, simultaneously transmission SAR measurement is not necessary.

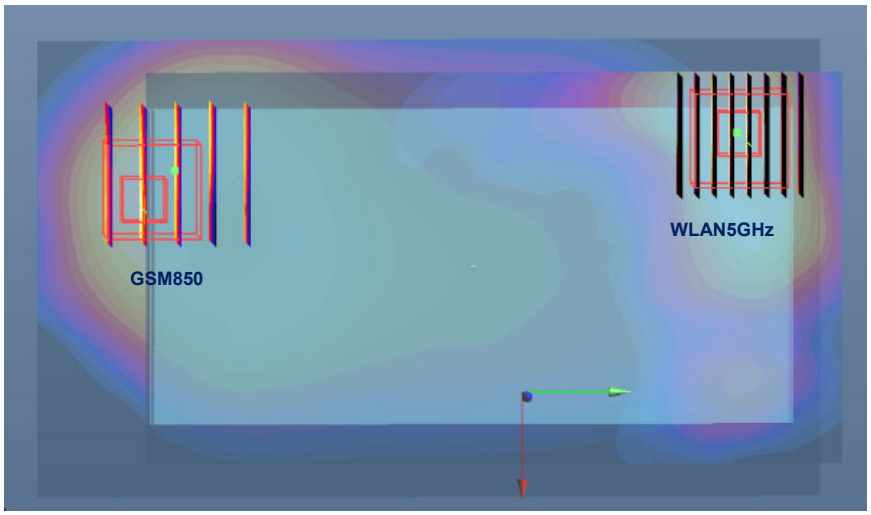
Case #1	Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
	WCDMA Band IV	Back	1.080	10	0.0745	0.008	-0.176	135.23	1.62	0.02	Not required
	WLAN2.4GHz		0.540	10	-0.0582	-0.018	-0.177				



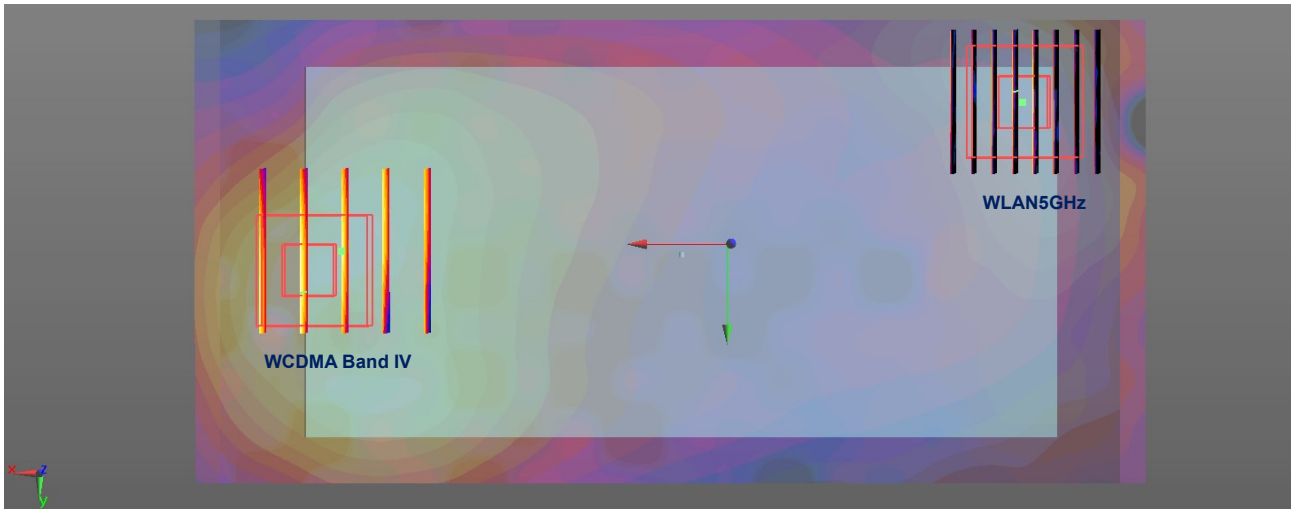
Case #2	Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
	WCDMA Band II	Back	1.125	10	0.0705	0.0015	-0.177	130.17	1.67	0.02	Not required
	WLAN2.4GHz		0.540	10	-0.0582	-0.018	-0.177				



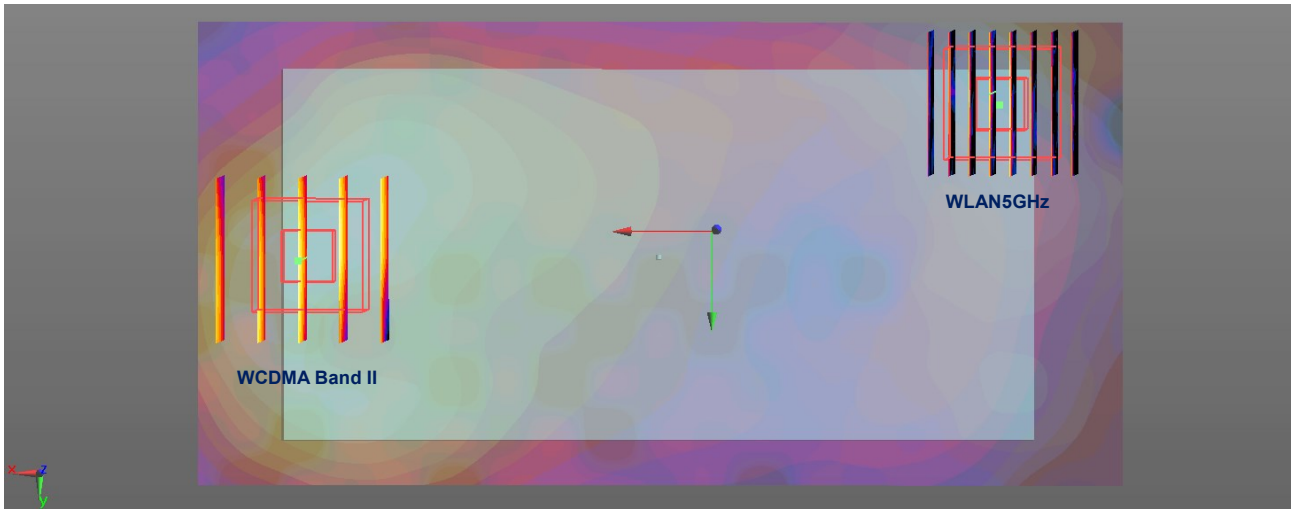
Case	Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
#3	GSM850	Back	0.897	10	-0.0315	-0.0765	-0.206	143.25	1.73	0.02	Not required
	WLAN5GHz		0.832	10	-0.064	0.063	-0.204				



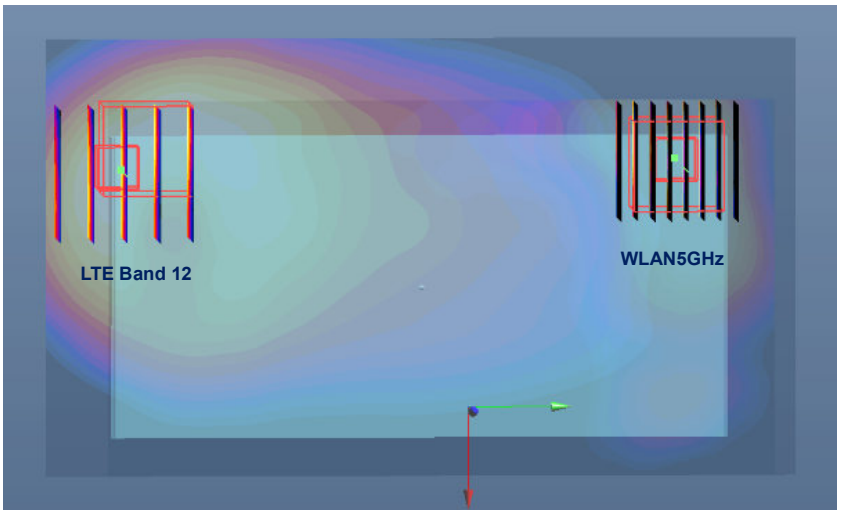
Case	Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
#4	WCDMA Band IV	Back	1.080	10	0.0745	0.008	-0.176	151.63	1.91	0.02	Not required
	WLAN5GHz		0.832	10	-0.064	0.063	-0.204				



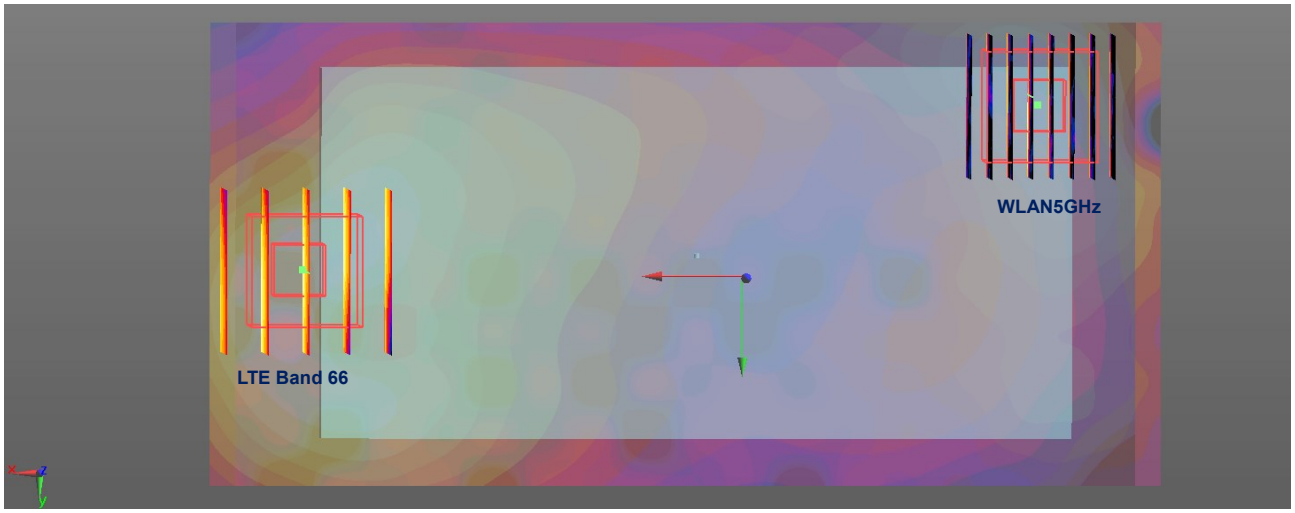
Case #5	Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
	WCDMA Band II	Back	1.125	10	0.0705	0.0015	-0.177	150.34	1.96	0.02	Not required
	WLAN5GHz		0.832	10	-0.064	0.063	-0.204				



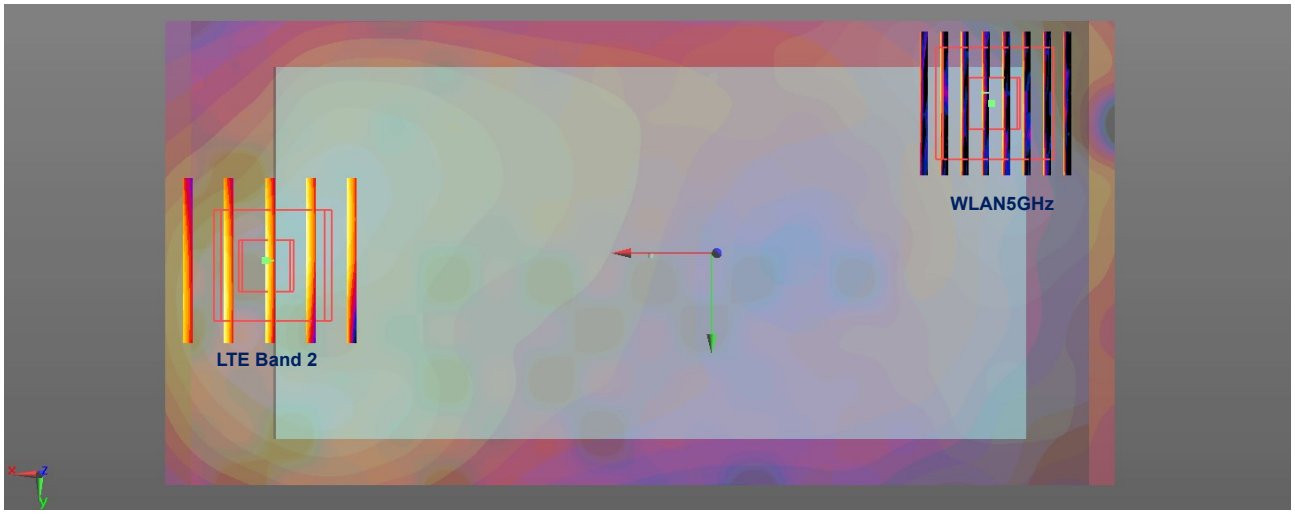
Case #6	Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
	LTE Band 12	Back	0.777	10	-0.0455	-0.072	-0.205	136.27	1.61	0.01	Not required
	WLAN5GHz		0.832	10	-0.064	0.063	-0.204				



	Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case #7	LTE Band 66	Back	0.998	10	0.077	0.003	-0.177	155.60	1.83	0.02	Not required
	WLAN5GHz		0.832	10	-0.064	0.063	-0.204				



	Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case #8	LTE Band 2	Back	0.989	10	0.0665	-0.0015	-0.176	148.24	1.82	0.02	Not required
	WLAN5GHz		0.832	10	-0.064	0.063	-0.204				



Test Engineer: Nick Hu

18. Uncertainty Assessment

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

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

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

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

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

(b) κ is the coverage factor

Table 18.1. Standard Uncertainty for Assumed Distribution

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

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

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

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

Error Description	Uncertainty Value (±%)	Probability	Divisor	(Ci) 1g	(Ci) 10g	Standard Uncertainty (1g) (±%)	Standard Uncertainty (10g) (±%)
Measurement System							
Probe Calibration	6.55	N	1	1	1	6.6	6.6
Axial Isotropy	4.7	R	1.732	0.7	0.7	1.9	1.9
Hemispherical Isotropy	9.6	R	1.732	0.7	0.7	3.9	3.9
Boundary Effects	2.0	R	1.732	1	1	1.2	1.2
Linearity	4.7	R	1.732	1	1	2.7	2.7
System Detection Limits	1.0	R	1.732	1	1	0.6	0.6
Modulation Response	3.2	R	1.732	1	1	1.8	1.8
Readout Electronics	0.3	N	1	1	1	0.3	0.3
Response Time	0.0	R	1.732	1	1	0.0	0.0
Integration Time	2.6	R	1.732	1	1	1.5	1.5
RF Ambient Noise	3.0	R	1.732	1	1	1.7	1.7
RF Ambient Reflections	3.0	R	1.732	1	1	1.7	1.7
Probe Positioner	0.4	R	1.732	1	1	0.2	0.2
Probe Positioning	6.7	R	1.732	1	1	3.9	3.9
Max. SAR Eval.	4.0	R	1.732	1	1	2.3	2.3
Test Sample Related							
Device Positioning	3.0	N	1	1	1	3.0	3.0
Device Holder	3.6	N	1	1	1	3.6	3.6
Power Drift	5.0	R	1.732	1	1	2.9	2.9
Power Scaling	0.0	R	1.732	1	1	0.0	0.0
Phantom and Setup							
Phantom Uncertainty	6.6	R	1.732	1	1	3.8	3.8
SAR correction	0.0	R	1.732	1	0.84	0.0	0.0
Liquid Conductivity Repeatability	0.2	N	1	0.78	0.71	0.1	0.1
Liquid Conductivity (target)	5.0	R	1.732	0.78	0.71	2.3	2.0
Liquid Conductivity (mea.)	2.5	R	1.732	0.78	0.71	1.1	1.0
Temp. unc. - Conductivity	3.4	R	1.732	0.78	0.71	1.5	1.4
Liquid Permittivity Repeatability	0.15	N	1	0.23	0.26	0.0	0.0
Liquid Permittivity (target)	5.0	R	1.732	0.23	0.26	0.7	0.8
Liquid Permittivity (mea.)	2.5	R	1.732	0.23	0.26	0.3	0.4
Temp. unc. - Permittivity	0.83	R	1.732	0.23	0.26	0.1	0.1
Combined Std. Uncertainty						12.5%	12.5%
Coverage Factor for 95 %						K=2	K=2
Expanded STD Uncertainty						25.1%	25.0%

Table 18.3. Uncertainty Budget for frequency range 3 GHz to 6 GHz

19. References

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

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

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

[4] SPEAG DASY System Handbook

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

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

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

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

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

[10] FCC KDB 941225 D05A v01r02, “Rel. 10 LTE SAR Test Guidance and KDB Inquiries”, Oct 2015

[11] FCC KDB 941225 D06 v02r01, "SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities", Oct 2015.

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

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

Appendix A. Plots of System Performance Check

The plots are shown as follows.

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2017.7.11

System Check_Head_835MHz

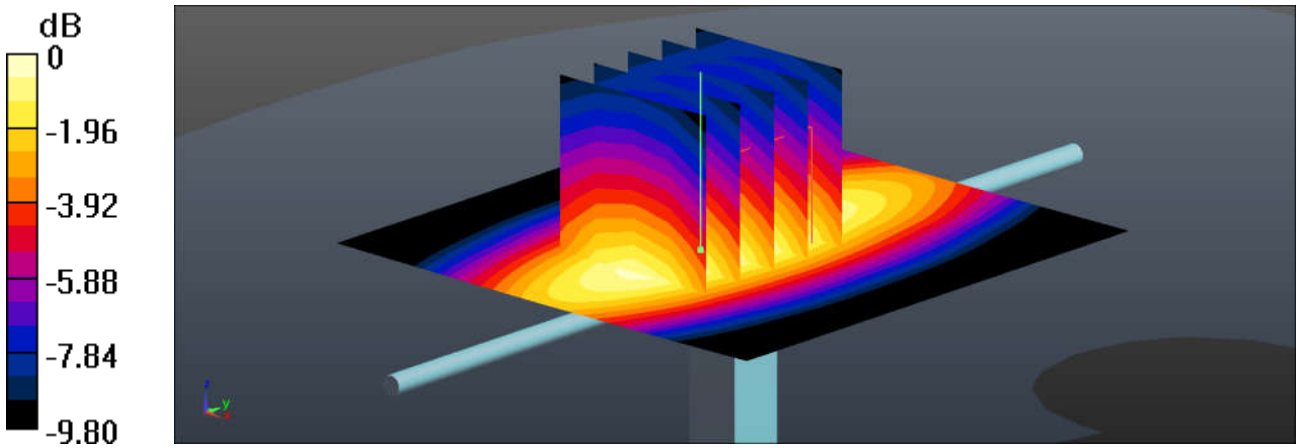
DUT: D835V2 - SN:4d091

Communication System: UID 0, CW (0); Frequency: 835 MHz;Duty Cycle: 1:1
Medium: HSL_835 Medium parameters used: f = 835 MHz; σ = 0.906 S/m; ε_r = 41.772; ρ = 1000 kg/m^3
Ambient Temperature：23.3 ℃; Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(9.73, 9.73, 9.73); Calibrated: 2017.5.26;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM3; Type: SAM; Serial: TP-1542
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 3.58 W/kg

Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 57.79 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 3.68 W/kg
SAR(1 g) = 2.49 W/kg; SAR(10 g) = 1.64 W/kg
Maximum value of SAR (measured) = 3.27 W/kg



0 dB = 3.27 W/kg = 5.48 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2017.7.12

System Check_Head_1900MHz

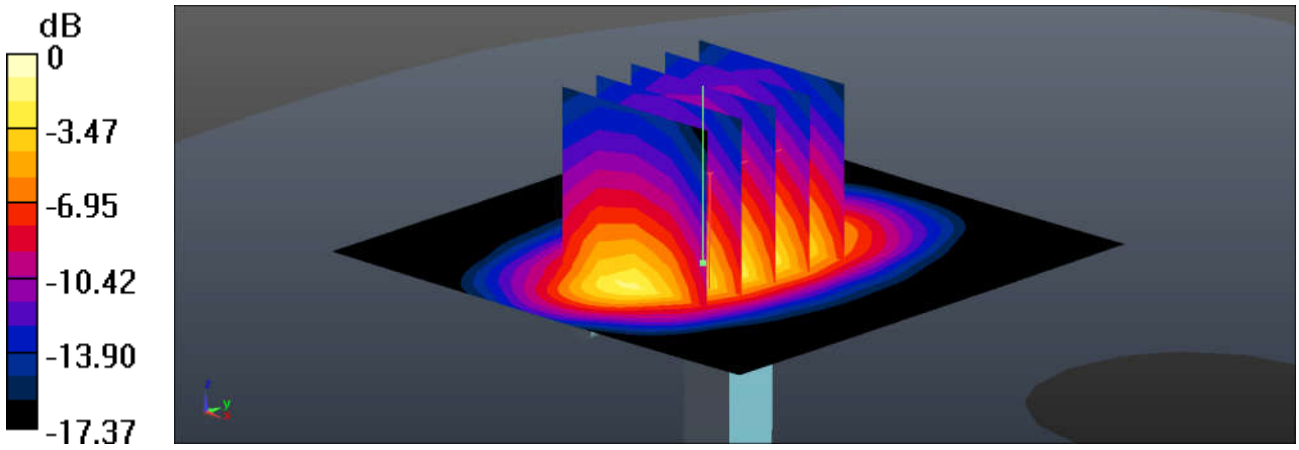
DUT: D1900V2 - SN:5d118

Communication System: UID 0, CW (0); Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: HSL_1900 Medium parameters used: f = 1900 MHz; σ = 1.426 S/m; ε_r = 39.361; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(8.29, 8.29, 8.29); Calibrated: 2017.5.26;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM3; Type: SAM; Serial: TP-1542
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 15.7 W/kg

Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.854 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 18.6 W/kg
SAR(1 g) = 10.7 W/kg; SAR(10 g) = 5.75 W/kg
Maximum value of SAR (measured) = 15.0 W/kg



0 dB = 15.0 W/kg = 11.76 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2017.7.12

System Check_Head_2450MHz

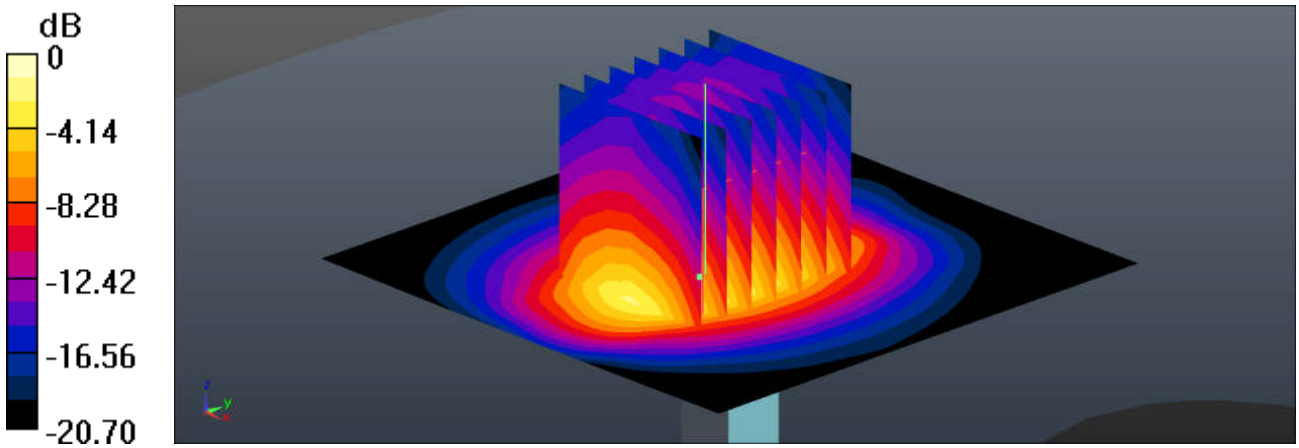
DUT: D2450V2 - SN:840

Communication System: UID 0, CW (0); Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: HSL_2450 Medium parameters used: f = 2450 MHz; σ = 1.872 S/m; ε_r = 38.239; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(7.71, 7.71, 7.71); Calibrated: 2017.5.26;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM3; Type: SAM; Serial: TP-1542
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Pin=250mW/Area Scan (71x71x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 21.4 W/kg

Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 87.69 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 28.1 W/kg
SAR(1 g) = 14.3 W/kg; SAR(10 g) = 6.88 W/kg
Maximum value of SAR (measured) = 21.4 W/kg



0 dB = 21.4 W/kg = 13.30 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2017.7.13

System Check_Head_5250MHz

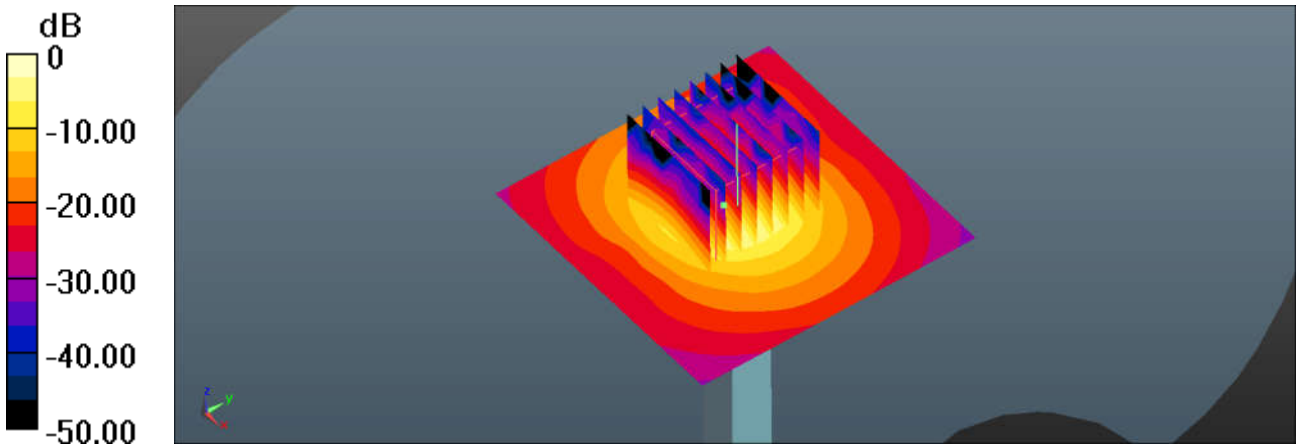
DUT: D5GHzV2-SN:1113

Communication System: UID 0, CW (0); Frequency: 5250 MHz;Duty Cycle: 1:1
Medium: HSL_5000 Medium parameters used: f = 5250 MHz; σ = 4.829 S/m; ε_r = 37.101; ρ = 1000 kg/m^3
Ambient Temperature：23.3 ℃; Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(5.39, 5.39, 5.39); Calibrated: 2017.5.26;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM2; Type: SAM; Serial: TP-1644
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Pin=100mW/Area Scan (71x71x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 20.4 W/kg

Pin=100mW/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 42.29 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 34.6 W/kg
SAR(1 g) = 8.31 W/kg; SAR(10 g) = 2.36 W/kg
Maximum value of SAR (measured) = 19.9 W/kg



0 dB = 19.9 W/kg = 12.99 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2017.7.13

System Check_Head_5600MHz

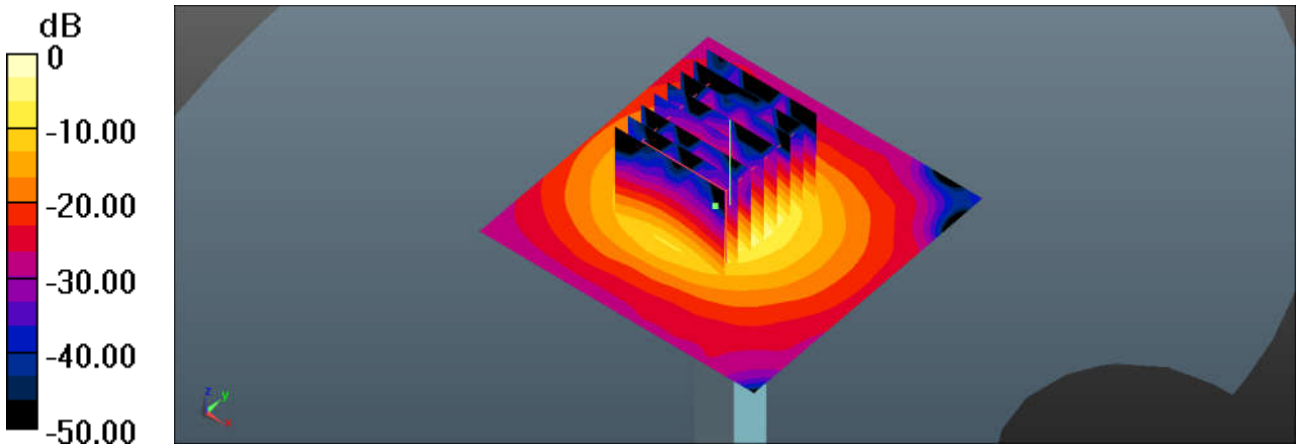
DUT: D5GHzV2-SN:1113

Communication System: UID 0, CW (0); Frequency: 5600 MHz;Duty Cycle: 1:1
Medium: HSL_5000 Medium parameters used: f = 5600 MHz; σ = 5.196 S/m; ε_r = 36.571; ρ = 1000 kg/m^3
Ambient Temperature：23.3 ℃; Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(5.04, 5.04, 5.04); Calibrated: 2017.5.26;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM2; Type: SAM; Serial: TP-1644
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Pin=100mW/Area Scan (71x71x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 20.3 W/kg

Pin=100mW/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 39.90 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 35.2 W/kg
SAR(1 g) = 8.06 W/kg; SAR(10 g) = 2.28 W/kg
Maximum value of SAR (measured) = 19.9 W/kg



0 dB = 19.9 W/kg = 12.99 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2017.7.13

System Check_Head_5750MHz

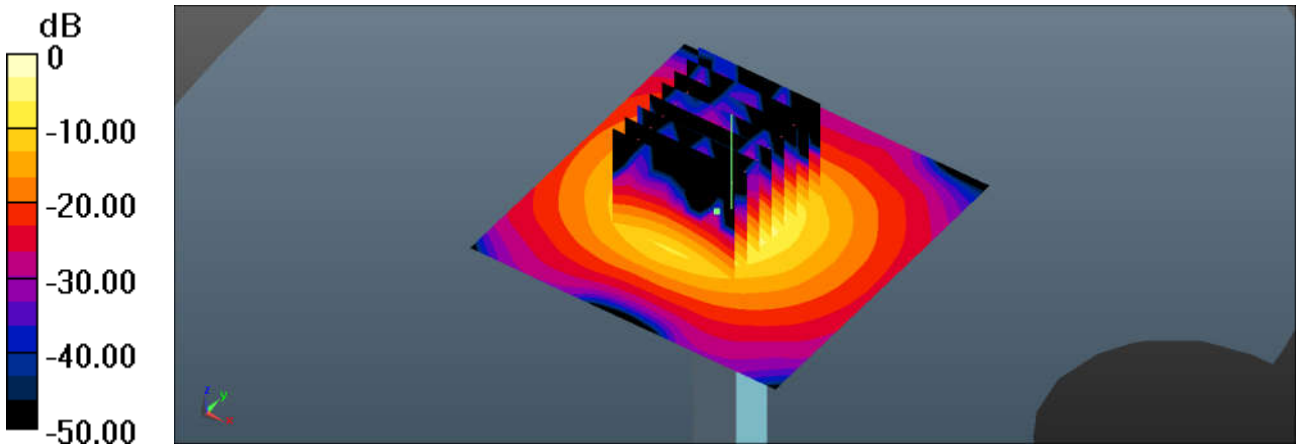
DUT: D5GHzV2-SN:1113

Communication System: UID 0, CW (0); Frequency: 5750 MHz;Duty Cycle: 1:1
Medium: HSL_5000 Medium parameters used: f = 5750 MHz; σ = 5.357 S/m; ε_r = 36.372; ρ = 1000 kg/m^3
Ambient Temperature：23.3 ℃; Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(5.34, 5.34, 5.34); Calibrated: 2017.5.26;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM2; Type: SAM; Serial: TP-1644
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Pin=100mW/Area Scan (71x71x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 18.4 W/kg

Pin=100mW/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 38.53 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 34.9 W/kg
SAR(1 g) = 7.64 W/kg; SAR(10 g) = 2.16 W/kg
Maximum value of SAR (measured) = 19.0 W/kg



0 dB = 19.0 W/kg = 12.79 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2017.7.11

System Check_Body_835MHz

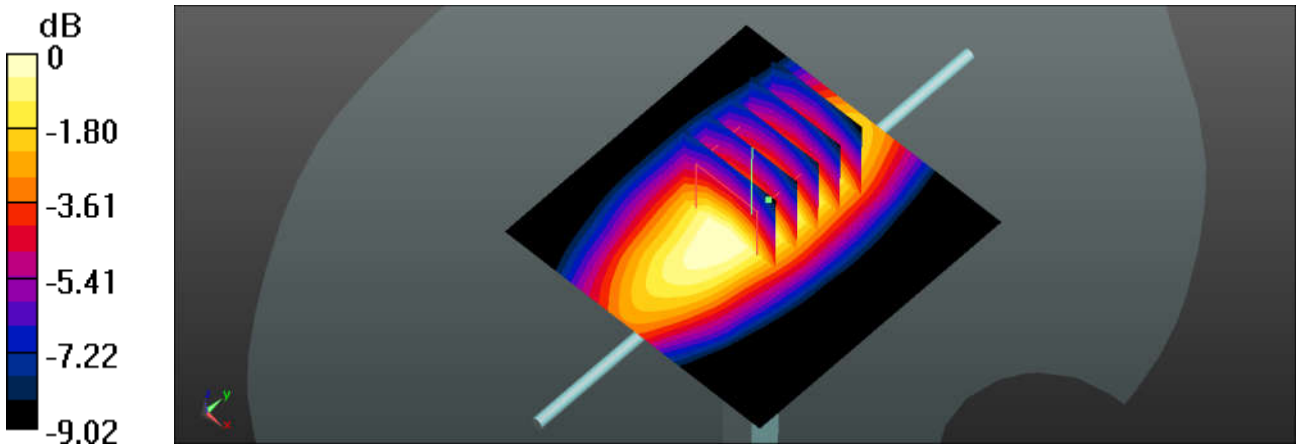
DUT: D835V2 - SN:4d091

Communication System: UID 0, CW (0); Frequency: 835 MHz;Duty Cycle: 1:1
Medium: MSL_835 Medium parameters used: f = 835 MHz; σ = 0.974 S/m; ε_r = 55.241; ρ = 1000 kg/m^3
Ambient Temperature：23.3 ℃; Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(9.72, 9.72, 9.72); Calibrated: 2017.5.26;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM2; Type: SAM; Serial: TP-1644
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 6.84 W/kg

Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 73.29 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 4.29 W/kg
SAR(1 g) = 2.58 W/kg; SAR(10 g) = 1.72 W/kg
Maximum value of SAR (measured) = 3.29 W/kg



0 dB = 3.29 W/kg = 8.18 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2017.7.12

System Check_Body_1900MHz

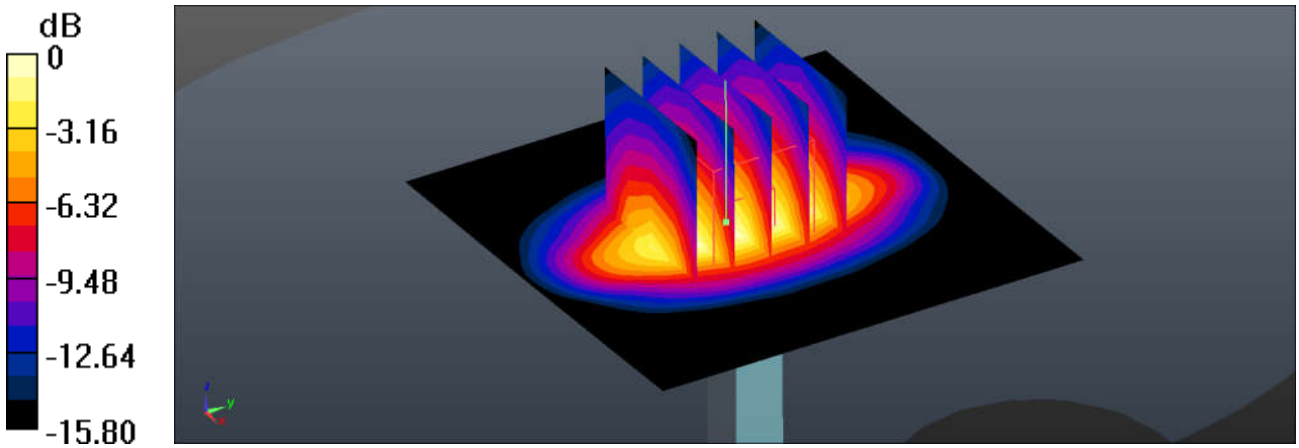
DUT: D1900V2 - SN:5d118

Communication System: UID 0, CW (0); Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: MSL_1900 Medium parameters used: f = 1900 MHz; σ = 1.51 S/m; ε_r = 54.094; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(8.08, 8.08, 8.08); Calibrated: 2017.5.26;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM2; Type: SAM; Serial: TP-1644
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 15.7 W/kg

Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 90.59 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 14.9 W/kg
SAR(1 g) = 10.9 W/kg; SAR(10 g) = 5.58 W/kg
Maximum value of SAR (measured) = 12.6 W/kg



0 dB = 12.6 W/kg = 11.93 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2017.7.12

System Check_Body_2450MHz

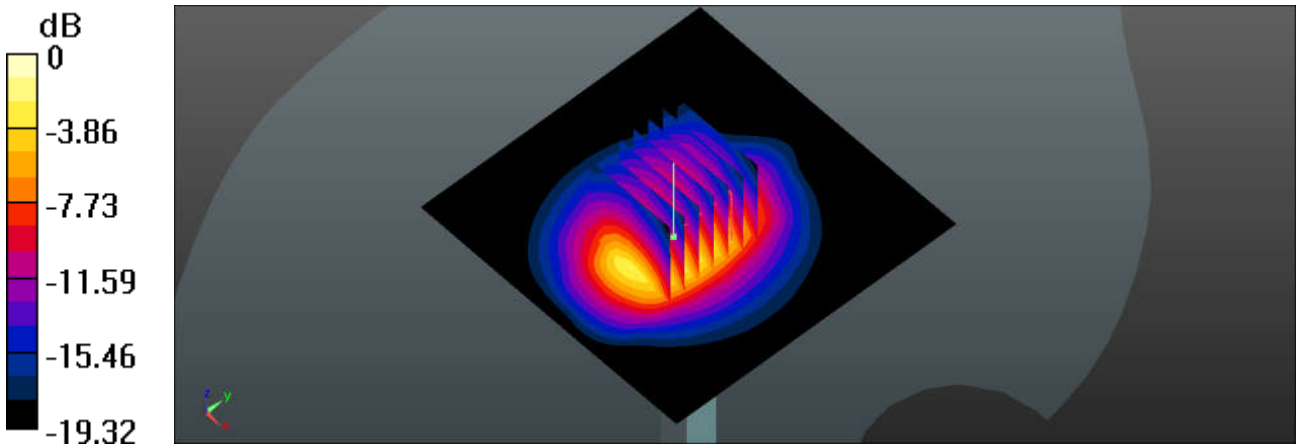
DUT: D2450V2 - SN:840

Communication System: UID 0, CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: MSL_2450 Medium parameters used: f = 2450 MHz; σ = 1.997 S/m; ε_r = 52.12; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(7.7, 7.7, 7.7); Calibrated: 2017.5.26;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM2; Type: SAM; Serial: TP-1644
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Pin=250mW/Area Scan (81x81x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 20.5 W/kg

Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 85.68 V/m; Power Drift = -0.19 dB
Peak SAR (extrapolated) = 26.0 W/kg
SAR(1 g) = 13.6 W/kg; SAR(10 g) = 6.584 W/kg
Maximum value of SAR (measured) = 20.2 W/kg



0 dB = 20.2 W/kg = 13.05 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2017.7.13

System Check_Body_5250MHz

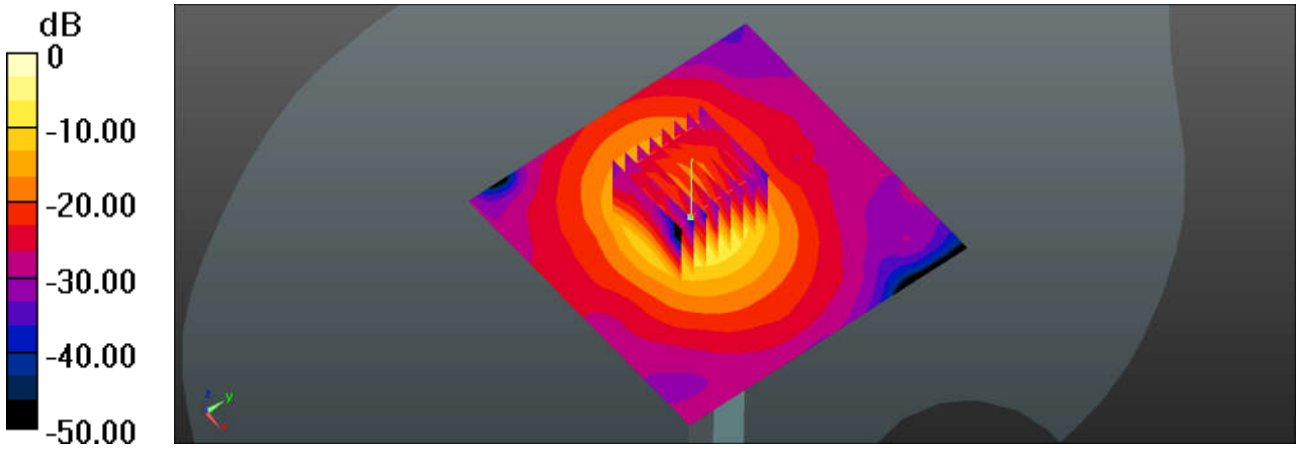
DUT: D5GHzV2 - SN:1113

Communication System: UID 0, CW (0); Frequency: 5200 MHz;Duty Cycle: 1:1
Medium: MSL_5000 Medium parameters used: f = 5200 MHz; σ = 5.312 S/m; ε_r = 47.806; ρ = 1000 kg/m^3
Ambient Temperature：23.3 ℃; Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(4.72, 4.72, 4.72); Calibrated: 2017.5.26;
- Sensor-Surface: 1.4mm (Mechanical SurfaceDetection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM3; Type: SAM; Serial: TP-1542
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Pin=100mW/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 30.5 W/kg

Pin=100mW/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 42.71 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 25.45 W/kg
SAR(1 g) = 8.12 W/kg; SAR(10 g) = 2.03 W/kg
Maximum value of SAR (measured) = 22.8 W/kg



0 dB = 22.8 W/kg = 15.51 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2017.7.13

System Check_Body_5600MHz

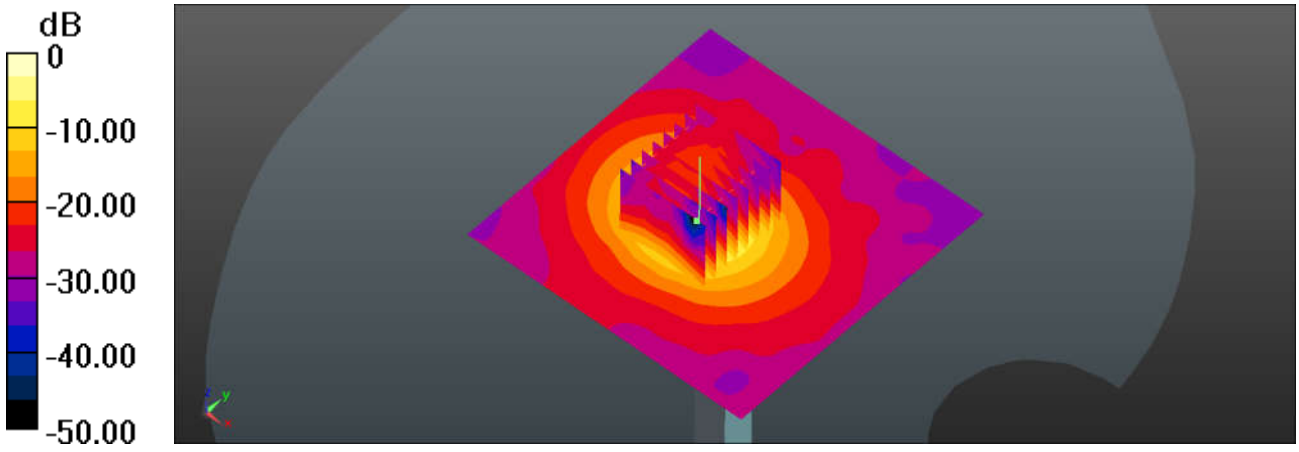
DUT: D5GHzV2 - SN:1113

Communication System: UID 0, CW (0); Frequency: 5600 MHz;Duty Cycle: 1:1
Medium: MSL_5000 Medium parameters used: f = 5600 MHz; σ = 5.888 S/m; ε_r = 46.875; ρ = 1000 kg/m^3
Ambient Temperature：23.3 ℃; Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(4.01, 4.01, 4.01); Calibrated: 2017.5.26;
- Sensor-Surface: 1.4mm (Mechanical SurfaceDetection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM3; Type: SAM; Serial: TP-1542
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Pin=100mW/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 34.6 W/kg

Pin=100mW/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 43.54 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 30.8 W/kg
SAR(1 g) = 8.29 W/kg; SAR(10 g) = 2.15 W/kg
Maximum value of SAR (measured) = 24.9 W/kg



0 dB = 24.9 W/kg = 16.22 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2017.7.13

System Check_Body_5750MHz

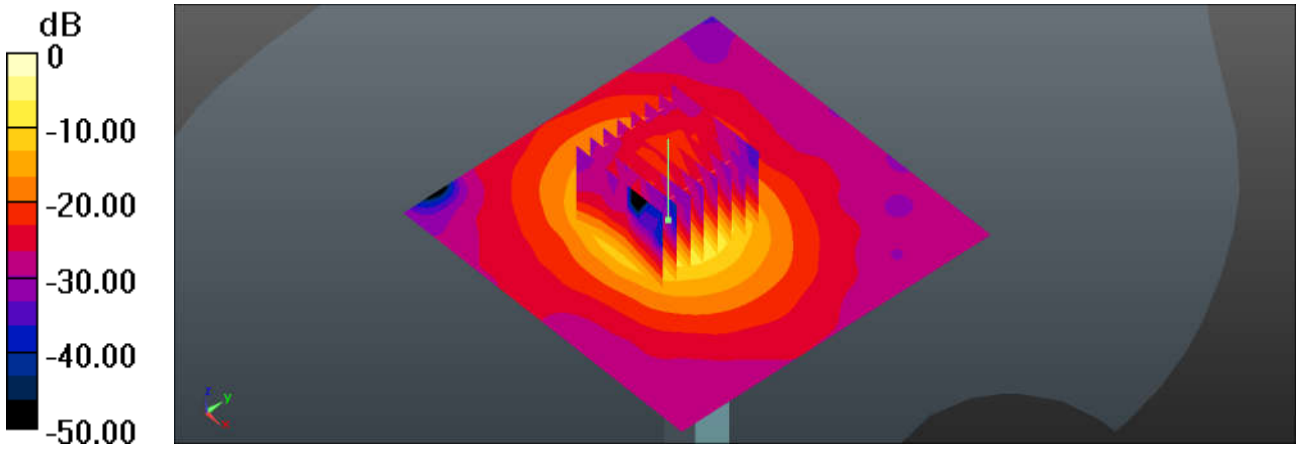
DUT: D5GHzV2 - SN:1113

Communication System: UID 0, CW (0); Frequency: 5800 MHz;Duty Cycle: 1:1
Medium: MSL_5000 Medium parameters used: f = 5800 MHz; σ = 6.168 S/m; ε_r = 46.453; ρ= 1000 kg/m^3
Ambient Temperature：23.3 ℃; Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(4.31, 4.31, 4.31); Calibrated: 2017.5.26;
- Sensor-Surface: 1.4mm (Mechanical SurfaceDetection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM3; Type: SAM; Serial: TP-1542
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Pin=100mW/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 31.2 W/kg

Pin=100mW/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 40.35 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 27.7 W/kg
SAR(1 g) = 7.98 W/kg; SAR(10 g) = 1.96 W/kg
Maximum value of SAR (measured) = 21.8 W/kg



0 dB = 21.8 W/kg = 15.89 dBW/kg

Appendix B. Plots of High SAR Measurement

The plots are shown as follows.

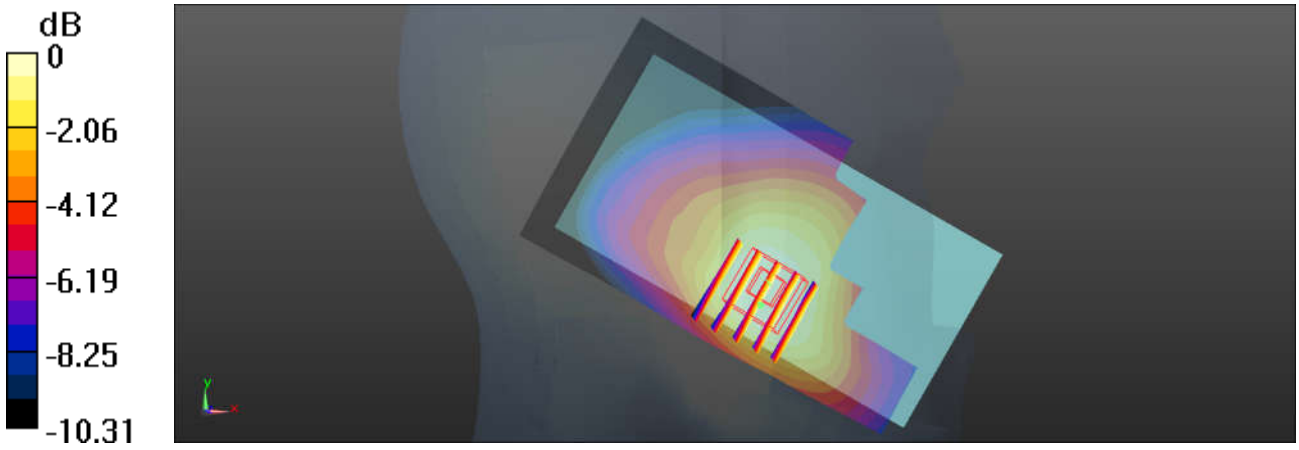
01_LTE Band 5_10M_QPSK_1RB_25Offset_Left Cheek_0mm_Ch20525

Communication System: UID 0, FDD_LTE (0); Frequency: 836.5 MHz;Duty Cycle: 1:1
Medium: HSL_835 Medium parameters used: f = 836.5 MHz; σ = 0.907 S/m; ε_r = 41.755; ρ = 1000 kg/m^3
Ambient Temperature：23.3 ℃； Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(9.73, 9.73, 9.73); Calibrated: 2017.5.26;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM3; Type: SAM; Serial: TP-1542
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch20525/Area Scan (61x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.521 W/kg

Ch20525/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.808 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 0.563 W/kg
SAR(1 g) = 0.452 W/kg; SAR(10 g) = 0.343 W/kg
Maximum value of SAR (measured) = 0.509 W/kg



0 dB = 0.509 W/kg = -2.93 dBW/kg

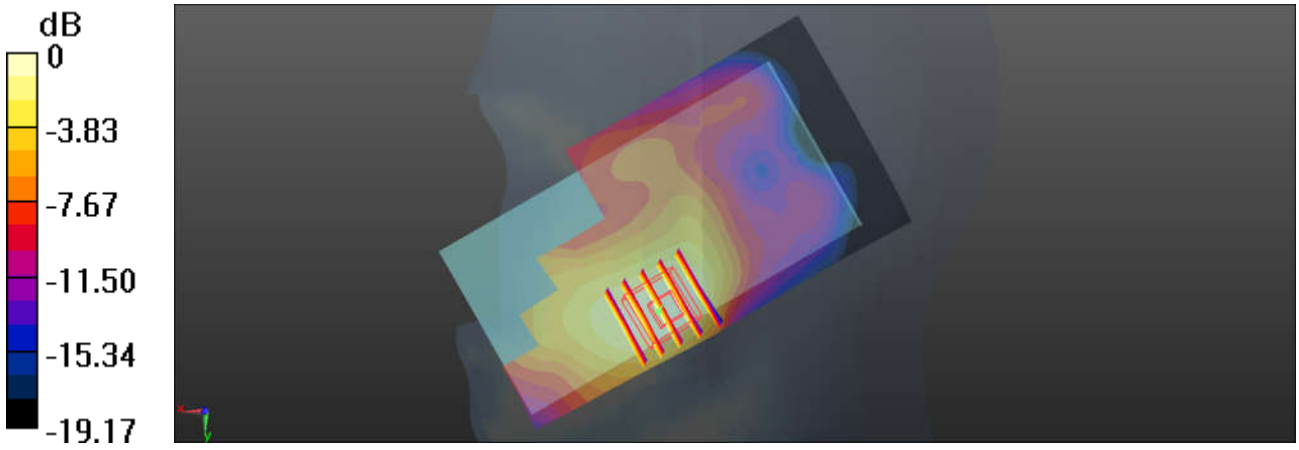
02_LTE Band 2_20M_QPSK_1RB_0Offset_Right Cheek_0mm_Ch19100

Communication System: UID 0, FDD_LTE (0); Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: HSL_1900 Medium parameters used: f = 1900 MHz; σ = 1.426 S/m; ε_r = 39.361; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃； Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(8.29, 8.29, 8.29); Calibrated: 2017.5.26;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM3; Type: SAM; Serial: TP-1542
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch19100/Area Scan (61x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.584 W/kg

Ch19100/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.109 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.671 W/kg
SAR(1 g) = 0.439 W/kg; SAR(10 g) = 0.272 W/kg
Maximum value of SAR (measured) = 0.551 W/kg



0 dB = 0.551 W/kg = -2.59 dBW/kg

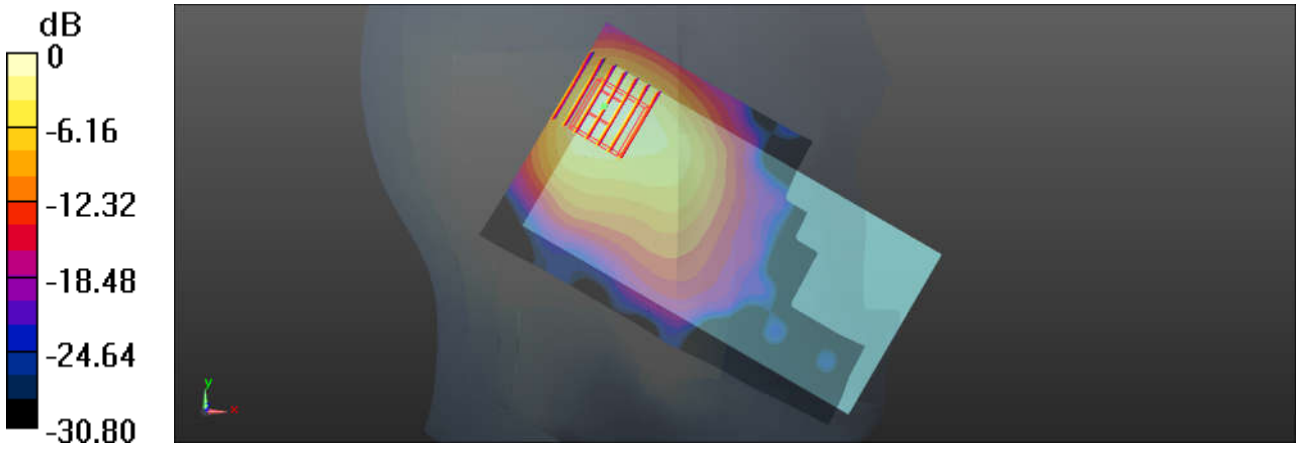
03_WLAN2.4GHz_802.11b 1Mbps_Left Cheek_0mm_Ch1

Communication System: UID 0, WIFI (0); Frequency: 2412 MHz;Duty Cycle: 1:1
Medium: HSL_2450 Medium parameters used: f = 2412 MHz; σ = 1.829 S/m; ε_r = 38.388; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃； Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(7.71, 7.71, 7.71); Calibrated: 2017.5.26;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM3; Type: SAM; Serial: TP-1542
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch1/Area Scan (81x141x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 1.27 W/kg

Ch1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 17.00 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 1.69 W/kg
SAR(1 g) = 0.814 W/kg; SAR(10 g) = 0.386 W/kg
Maximum value of SAR (measured) = 1.26 W/kg



0 dB = 1.26 W/kg = 1.00 dBW/kg

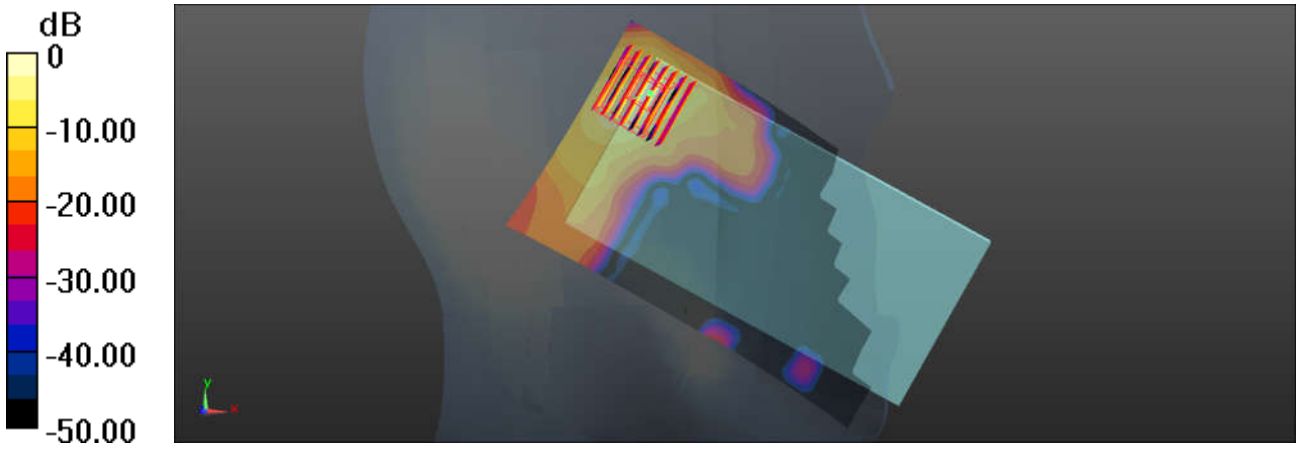
04_WLAN5.3GHz_802.11a 6Mbps_Left Tilted_0mm_Ch60

Communication System: UID 0, WIFI (0); Frequency: 5300 MHz;Duty Cycle: 1:1.063
Medium: HSL_5000 Medium parameters used: f = 5300 MHz; σ = 4.882 S/m; ε_r = 37.037; ρ = 1000 kg/m^3
Ambient Temperature：23.3 ℃； Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(5.39, 5.39, 5.39); Calibrated: 2017.5.26;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM2; Type: SAM; Serial: TP-1644
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch60/Area Scan (91x171x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 2.60 W/kg

Ch60/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 4.593 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 4.37 W/kg
SAR(1 g) = 0.879 W/kg; SAR(10 g) = 0.226 W/kg
Maximum value of SAR (measured) = 2.47 W/kg



0 dB = 2.47 W/kg = 3.93 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2017.7.13

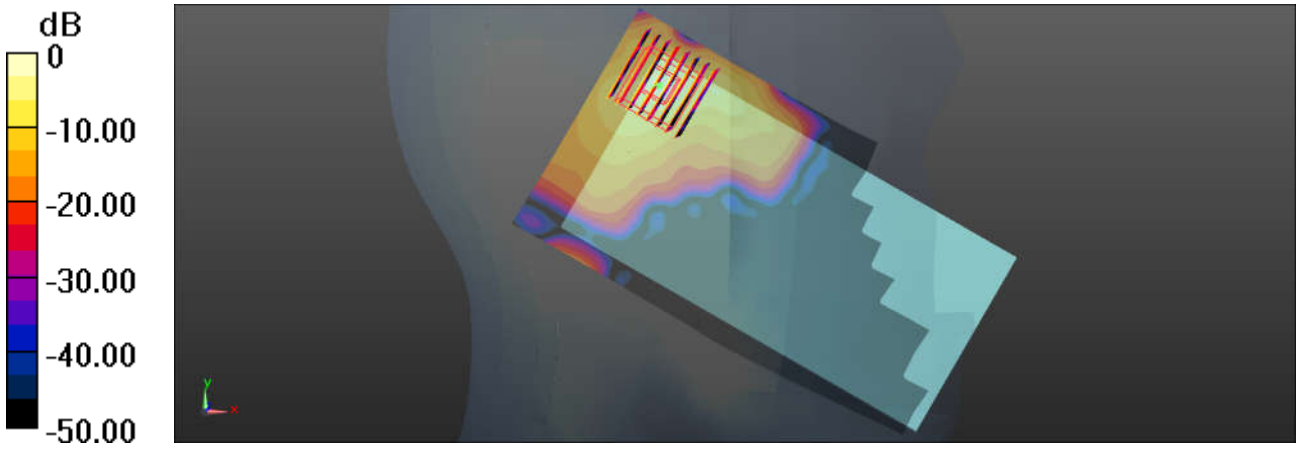
05_WLAN5.5GHz_802.11a 6Mbps_Left Cheek_0mm_Ch100

Communication System: UID 0, WIFI (0); Frequency: 5500 MHz;Duty Cycle: 1:1.063
Medium: HSL_5000 Medium parameters used: f = 5500 MHz; σ = 5.086 S/m; ε_r = 36.726; ρ = 1000 kg/m^3
Ambient Temperature：23.3 ℃； Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(5.04, 5.04, 5.04); Calibrated: 2017.5.26;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM2; Type: SAM; Serial: TP-1644
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch100/Area Scan (91x171x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 2.57 W/kg

Ch100/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 5.599 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 4.41 W/kg
SAR(1 g) = 0.826 W/kg; SAR(10 g) = 0.198 W/kg
Maximum value of SAR (measured) = 2.27 W/kg



0 dB = 2.27 W/kg = 3.56 dBW/kg

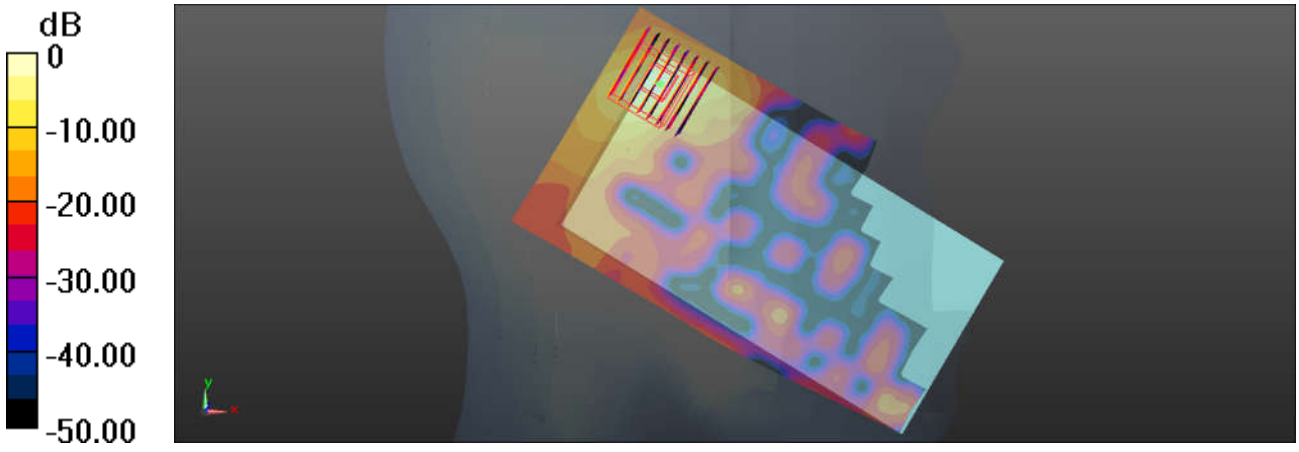
06_WLAN5.8GHz_802.11a 6Mbps_Left Tilted_0mm_Ch165

Communication System: UID 0, WIFI (0); Frequency: 5825 MHz;Duty Cycle: 1:1.063
Medium: HSL_5000 Medium parameters used: f = 5825 MHz; σ = 5.44 S/m; ε_r = 36.25; ρ = 1000 kg/m^3
Ambient Temperature：23.3 ℃； Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(5.34, 5.34, 5.34); Calibrated: 2017.5.26;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM2; Type: SAM; Serial: TP-1644
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch165/Area Scan (91x171x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.93 W/kg

Ch165/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 2.153 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 3.53 W/kg
SAR(1 g) = 0.577 W/kg; SAR(10 g) = 0.125 W/kg
Maximum value of SAR (measured) = 1.74 W/kg



0 dB = 1.74 W/kg = 2.41 dBW/kg

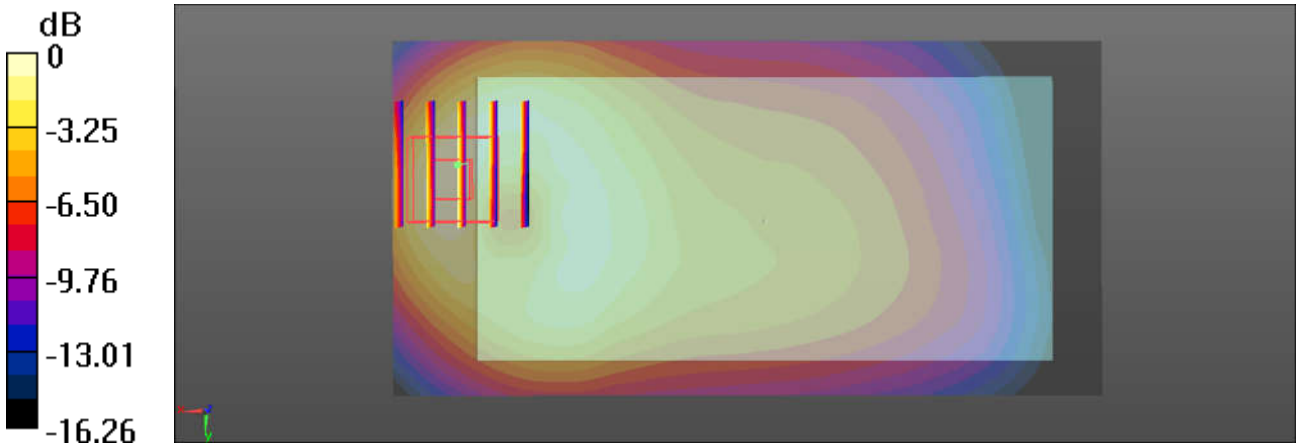
07_LTE Band 5_20M_QPSK_1RB_25Offset_Back_10mm_Ch20525

Communication System: UID 0, FDD_LTE (0); Frequency: 836.5 MHz;Duty Cycle: 1:1
Medium: MSL_835 Medium parameters used: f = 836.5 MHz; σ = 0.976 S/m; ε_r = 55.229; ρ = 1000 kg/m^3
Ambient Temperature：23.3 ℃； Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(9.72, 9.72, 9.72); Calibrated: 2017.5.26;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM2; Type: SAM; Serial: TP-1644
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch20525/Area Scan (121x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.730 W/kg

Ch20525/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.24 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.876 W/kg
SAR(1 g) = 0.516 W/kg; SAR(10 g) = 0.296 W/kg
Maximum value of SAR (measured) = 0.706 W/kg



0 dB = 0.706 W/kg = -1.51 dBW/kg

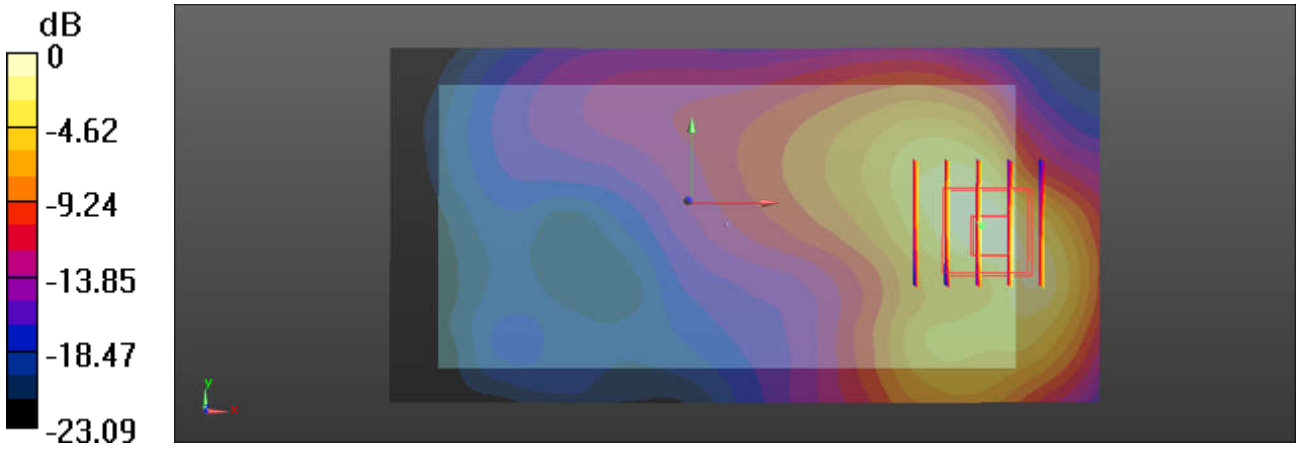
08_LTE Band 2_20M_QPSK_1RB_0Offset_Front_10mm_Ch19100

Communication System: UID 0, FDD_LTE (0); Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: MSL_1900 Medium parameters used: f = 1900 MHz; σ = 1.536 S/m; ε_r = 51.652; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃； Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(8.08, 8.08, 8.08); Calibrated: 2017.5.26;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM2; Type: SAM; Serial: TP-1644
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch19100/Area Scan (121x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.30 W/kg

Ch19100/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.871 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 1.63 W/kg
SAR(1 g) = 0.944 W/kg; SAR(10 g) = 0.499 W/kg
Maximum value of SAR (measured) = 1.29 W/kg



0 dB = 1.29 W/kg = 1.11 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2017.7.12

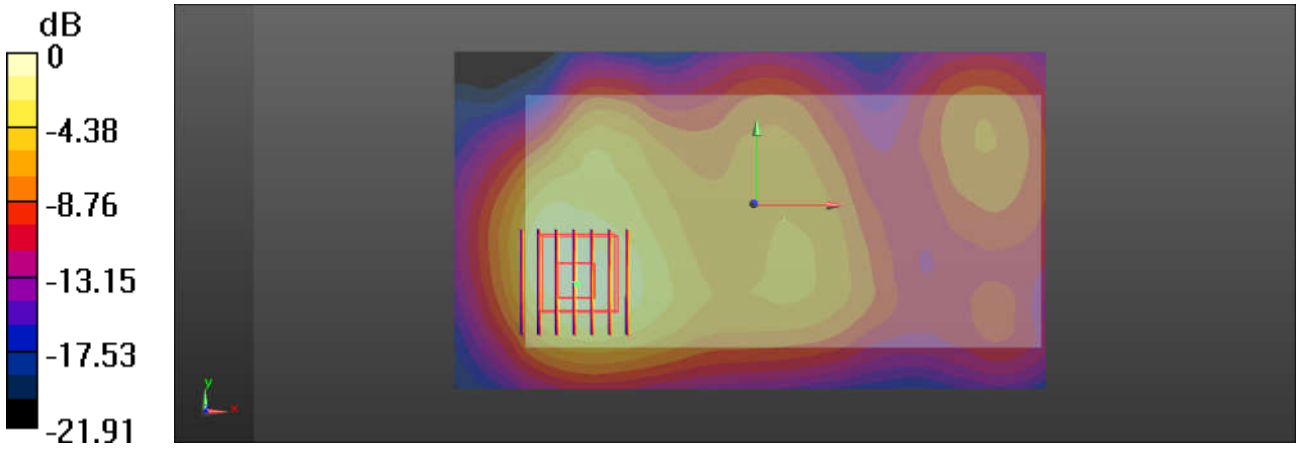
09_WLAN2.4GHz _802.11b 1Mbps_Back_10mm_Ch1

Communication System: UID 0, WIFI (0); Frequency: 2412 MHz;Duty Cycle: 1:1
Medium: MSL_2450 Medium parameters used: f = 2412 MHz; σ = 1.944 S/m; ε_r = 52.272; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃； Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(7.7, 7.7, 7.7); Calibrated: 2017.5.26;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM2; Type: SAM; Serial: TP-1644
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch1/Area Scan (141x81x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.786 W/kg

Ch1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.23 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 1.01 W/kg
SAR(1 g) = 0.539 W/kg; SAR(10 g) = 0.278 W/kg
Maximum value of SAR (measured) = 0.830 W/kg



0 dB = 0.830 W/kg = -0.81 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2017.7.13

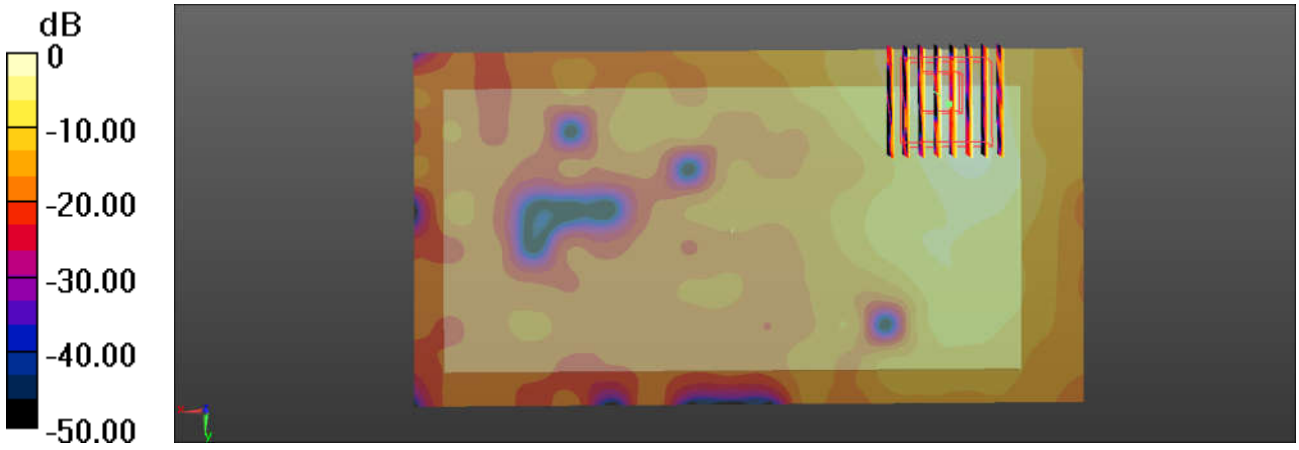
10_WLAN5.2GHz_802.11a 6Mbps_Back_10mm_Ch36

Communication System: UID 0, WIFI (0); Frequency: 5180 MHz;Duty Cycle: 1:1.063
Medium: MSL_5000 Medium parameters used: f = 5180 MHz; σ = 5.457 S/m; ε_r = 47.207; ρ = 1000 kg/m^3
Ambient Temperature：23.3 ℃； Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(4.72, 4.72, 4.72); Calibrated: 2017.5.26;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM3; Type: SAM; Serial: TP-1542
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch36/Area Scan (171x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.660 W/kg

Ch36/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 0.8040 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 1.26 W/kg
SAR(1 g) = 0.303 W/kg; SAR(10 g) = 0.096 W/kg
Maximum value of SAR (measured) = 0.750 W/kg



0 dB = 0.750 W/kg = -1.25 dBW/kg

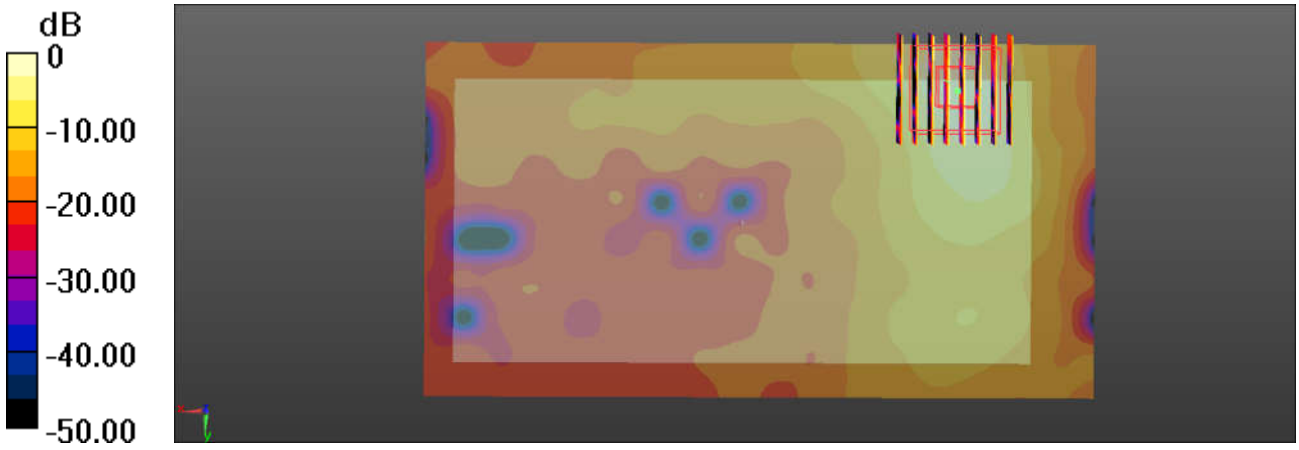
11_WLAN5.8GHz_802.11a MCS0_Back_10mm_Ch165

Communication System: UID 0, WIFI (0); Frequency: 5825 MHz;Duty Cycle: 1:1.063
Medium: MSL_5000 Medium parameters used: f = 5825 MHz; σ = 6.21 S/m; ε_r = 46.386; ρ = 1000 kg/m^3
Ambient Temperature：23.3 ℃； Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(4.31, 4.31, 4.31); Calibrated: 2017.5.26;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM3; Type: SAM; Serial: TP-1542
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch165/Area Scan (171x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.77 W/kg

Ch165/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 0 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 3.41 W/kg
SAR(1 g) = 0.746 W/kg; SAR(10 g) = 0.228 W/kg
Maximum value of SAR (measured) = 1.89 W/kg



0 dB = 1.89 W/kg = 2.76 dBW/kg

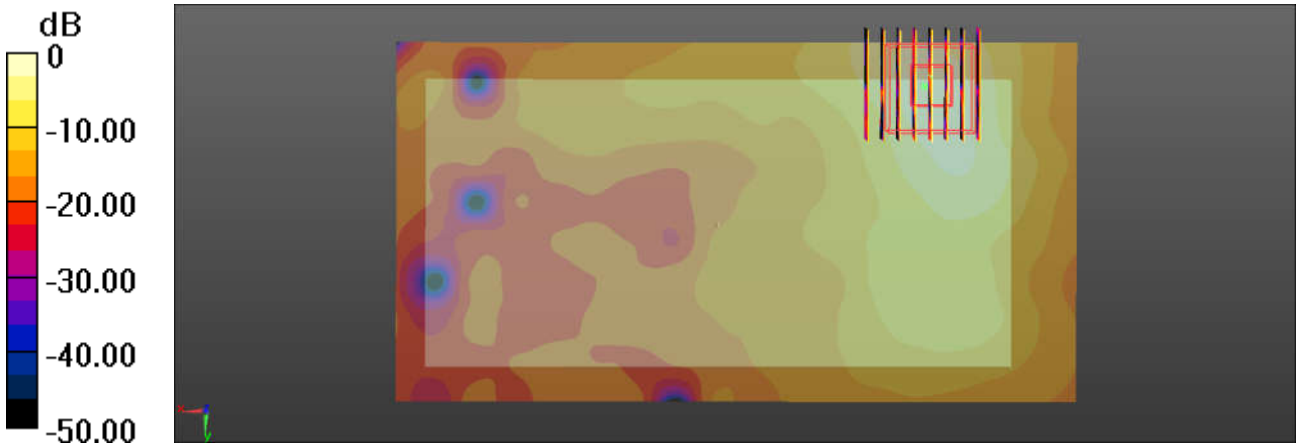
12_WLAN5.3GHz_802.11a 6Mbps_Back_10mm_Ch60

Communication System: UID 0, WIFI (0); Frequency: 5300 MHz;Duty Cycle: 1:1.063
Medium: MSL_5000 Medium parameters used: f = 5300 MHz; σ = 5.613 S/m; ε_r = 47.002; ρ = 1000 kg/m^3
Ambient Temperature：23.3 ℃； Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(4.72, 4.72, 4.72); Calibrated: 2017.5.26;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM3; Type: SAM; Serial: TP-1542
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch60/Area Scan (171x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.33 W/kg

Ch60/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 2.108 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 2.38 W/kg
SAR(1 g) = 0.578 W/kg; SAR(10 g) = 0.188 W/kg
Maximum value of SAR (measured) = 1.41 W/kg



0 dB = 1.41 W/kg = 1.49 dBW/kg

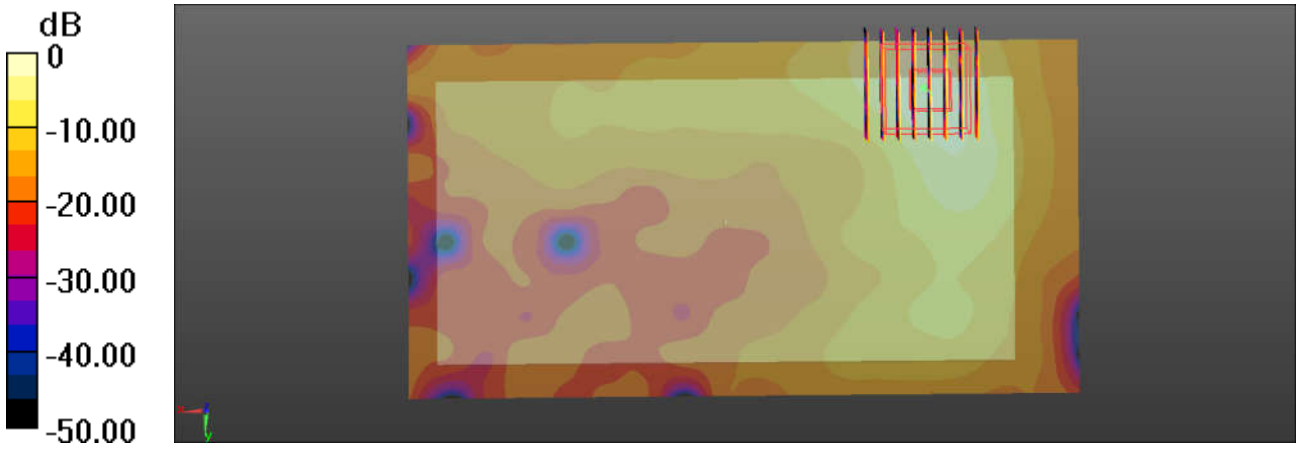
13_WLAN5.8GHz_802.11a 6Mbps_Back_10mm_Ch100

Communication System: UID 0, WIFI (0); Frequency: 5500 MHz;Duty Cycle: 1:1.063
Medium: MSL_5000 Medium parameters used: f = 5500 MHz; σ = 5.873 S/m; ε_r = 46.633; ρ = 1000 kg/m^3
Ambient Temperature：23.3 ℃； Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(4.01, 4.01, 4.01); Calibrated: 2017.5.26;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2017.5.25
- Phantom: SAM3; Type: SAM; Serial: TP-1542
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch100/Area Scan (171x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.61 W/kg

Ch100/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 1.733 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 2.84 W/kg
SAR(1 g) = 0.671 W/kg; SAR(10 g) = 0.211 W/kg
Maximum value of SAR (measured) = 1.71 W/kg



0 dB = 1.71 W/kg = 2.33 dBW/kg

Appendix C. DASY Calibration Certificate

The DASY calibration certificates are shown as follows.

In Collaboration with
s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com Http://www.chinattl.cn

中国认可
国际互认
校准
CALIBRATION
CNAS L0570

Client **Sporton-CN** **Certificate No: Z16-97223**

CALIBRATION CERTIFICATE

Object D835V2 - SN: 4d091

Calibration Procedure(s) FD-Z11-003-01
Calibration Procedures for dipole validation kits

Calibration date: November 22, 2016

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	27-Jun-16 (CTTL, No.J16X04777)	Jun-17
Power sensor NRP-Z91	101547	27-Jun-16 (CTTL, No.J16X04777)	Jun-17
Reference Probe EX3DV4	SN 7433	26-Sep-16(SPEAG,No.EX3-7433_Sep16)	Sep-17
DAE4	SN 771	02-Feb-16(CTTL-SPEAG,No.Z16-97011)	Feb-17
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
Signal Generator E4438C	MY49071430	01-Feb-16 (CTTL, No.J16X00893)	Jan-17
Network Analyzer E5071C	MY46110673	26-Jan-16 (CTTL, No.J16X00894)	Jan-17

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Qi Dianyuan	SAR Project Leader	
Approved by:	Lu Bingsong	Deputy Director of the laboratory	

Issued: November 26, 2016

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com Http://www.chinattl.cn

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORMx,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) For hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz)", February 2005
c) IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
d) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor k=2, which for a normal distribution Corresponds to a coverage probability of approximately 95%.