FCC SAR TEST REPORT

APPLICANT	:	**Lenovo(Shanghai) Electronics Technology Co., Ltd.**
EQUIPMENT	:	**Portable Tablet Computer**
BRAND NAME	:	**Lenovo**
Model Name	:	**TB128XU**
FCC ID	:	**O57TB128XU**
STANDARD	:	**FCC 47 CFR Part 2 (2.1093)** **ANSI/IEEE C95.1-1992** **IEEE 1528-2013**

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

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

Si Zhang

Approved by: Si Zhang

ACCREDITED Cert #5145.02

Sporton International Inc. (Kunshan)
No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China

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History of this test report

Report No.	Version	Description	Issued Date
FA230211	Rev. 01	Initial issue of report	Apr. 11, 2022

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **Lenovo(Shanghai) Electronics Technology Co., Ltd., Portable Tablet Computer, TB128XU,** are as follows.

Highest Standalone 1g SAR Summary				
Equipment Class	Frequency Band		Body(Separation 0mm) 1g SAR (W/kg)	Highest Simultaneous Transmission 1g SAR (W/kg)
Licensed	GSM	GSM850	**1.03**	1.57
		GSM1900	1.02	
	WCDMA	Band II	0.92	
		Band V	0.94	
	LTE	Band 2	0.92	
		Band 4	1.01	
		Band 7	0.95	
		Band 26/5	1.00	
		Band 41/38	0.86	
DTS	WLAN	2.4GHz WLAN	0.45	1.48
NII		5GHz WLAN	0.37	1.57
DSS	Bluetooth	Bluetooth	0.19	1.57
Date of Testing:		2022/3/10~2022/3/19		
Remark: This device supports LTE B5 / B38 and B26 / B41. Since the supported frequency span for LTE B5 / B38 falls completely within the supports frequency span for LTE B26 / B41, both LTE bands have the same target power, and both LTE bands share the same transmission path; therefore, SAR was only assessed for B26 / B41.				

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg for Partial-Body 1g SAR) 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

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Testing Laboratory			
Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	SAR06-KS	CN1257	314309

Applicant	
Company Name	Lenovo(Shanghai) Electronics Technology Co., Ltd.
Address	Section 304-305, Building No. 4, # 222, Meiyue Road, China (Shanghai) Pilot Free Trade Zone

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

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 248227 D01 802.11 Wi-Fi SAR v02r02
- FCC KDB 616217 D04 SAR for laptop and tablets v01r02
- 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

4. Equipment Under Test (EUT) Information

4.1 General Information

Product Feature & Specification	
Equipment Name	Portable Tablet Computer
Brand Name	Lenovo
Model Name	TB128XU
FCC ID	O57TB128XU
IMEI Code	Sample 1: 868503060013459 Sample 2: 868503060006933
Wireless Technology and Frequency Range	GSM850: 824 MHz ~ 849 MHz GSM1900: 1850 MHz ~ 1910 MHz WCDMA Band II: 1850 MHz ~ 1910 MHz WCDMA Band V: 824 MHz ~ 849 MHz LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2500 MHz ~ 2570 MHz LTE Band 26: 814 MHz ~ 849 MHz LTE Band 38: 2570 MHz ~ 2620 MHz LTE Band 41: 2496 MHz ~ 2690 MHz WLAN 2.4GHz Band: 2400 MHz ~ 2483.5 MHz WLAN 5.2GHz Band: 5150 MHz ~ 5250 MHz WLAN 5.3GHz Band: 5250 MHz ~ 5350 MHz WLAN 5.5GHz Band: 5470 MHz ~ 5725 MHz WLAN 5.8GHz Band: 5725 MHz ~ 5850 MHz Bluetooth: 2400 MHz ~ 2483.5 MHz
Mode	GSM/GPRS/EGPRS RMC/AMR 12.2Kbps HSDPA HSUPA DC-HSDPA HSPA+ (16QAM uplink) LTE: QPSK, 16QAM,64QAM WLAN 2.4GHz 802.11b/g/n HT20/HT40 WLAN 5GHz 802.11a/n/ac HT20/HT40/VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE
HW Version	Lenovo TB128XU
SW Version	TB128XU_RF01_220301
EUT Stage	Identical Prototype

Remark:
1. This device has voice function, but limited to speakerphone mode.
2. This device does not support DTM operation and supports GPRS/EGPRS mode up to multi-slot class 33.
3. The device employs proximity sensors that detect the presence of the user's body also a finger or hand near the bottom face, edge 1 of the device, reduced power will be active for all WWAN/WLAN bands. (P-sensor can't work at detecting presence of the user's body at other edges of the device.)
4. There are six samples, the different between them refer to the TB128XU_Operational Description of Product Equality Declaration which is exhibit separately. According to the difference, we choose sample 1 to full test and sample 2 to verify the worst case of sample 1. For sample 3/4/5/6, the differences do not affect the test, so sample 3/4/5/6 are not tested.

4.2 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>O57TB128XU</td></tr>
<tr><td>Equipment Name</td><td>Portable Tablet Computer</td></tr>
<tr><td>Operating Frequency Range of each LTE transmission band</td><td>LTE Band 2: 1850 MHz ~ 1910 MHz
LTE Band 4: 1710 MHz ~ 1755 MHz
LTE Band 5: 824 MHz ~ 849 MHz
LTE Band 7: 2500 MHz ~ 2570 MHz
LTE Band 26: 814 MHz ~ 849 MHz
LTE Band 38: 2570 MHz ~ 2620 MHz
LTE Band 41: 2496 MHz ~ 2690 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 26:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz
LTE Band 38: 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 41: 5MHz, 10MHz, 15MHz, 20MHz</td></tr>
<tr><td>uplink modulations used</td><td>QPSK / 16QAM / 64QAM</td></tr>
<tr><td>LTE release</td><td>R10, Cat 6</td></tr>
<tr><td>CA support</td><td>Yes, Downlink only</td></tr>
<tr><td>LTE Voice / Data requirements</td><td>Voice and Data</td></tr>
<tr><td>LTE MPR permanently built-in by design</td><td>Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3
<table>
<tr><th rowspan="2">Modulation</th><th colspan="6">Channel bandwidth / Transmission bandwidth (N_{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>
<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>
<tr><td>256 QAM</td><td colspan="6">≥ 1</td><td>≤ 5</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, Proximity Sensor. Power reduction will be active at bottom face, edge 1 for all WWAN bands.</td></tr>
<tr><td>LTE Carrier Aggregation Combinations</td><td>Inter-Band and Intra-Band possible combinations and the detail power verification please referred to section 13.</td></tr>
<tr><td>LTE Carrier Aggregation Additional Information</td><td>This device supports maximum of 2 carriers in the downlink Additional 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 26

	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	26697	814.7	26705	815.5	26715	816.5	26740	819	26765	821.5
M	26865	831.5	26865	831.5	26865	831.5	26865	831.5	26865	831.5
H	27033	848.3	27025	847.5	27015	846.5	26990	844	26965	841.5

LTE Band 38

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

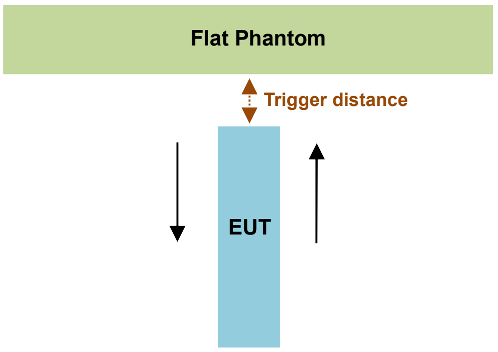
LTE Band 41

	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	39675	2498.5	39700	2501	39725	2503.5	39750	2506
LM	40148	2545.8	40160	2547	40173	2548.3	40185	2549.5
M	40620	2593	40620	2593	40620	2593	40620	2593
HM	41093	2640.3	41080	2639	41068	2637.8	41055	2636.5
H	41565	2687.5	41540	2685	41515	2682.5	41490	2680

5. Proximity Sensor Triggering Test

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

1. Proximity sensor triggering distance testing was performed according to the procedures outlined in KDB 616217 D04 section 6.2, and EUT moving further away from the flat phantom and EUT moving toward the flat phantom were both assessed and the tissue-equivalent medium for highest frequency 5825MHz and lowest 835MHz frequency was used for proximity sensor triggering testing.
2. Capacitive proximity sensor placed coincident with antenna elements at the Bottom Face and Edge 1 of the device are utilized to determine when the device comes in proximity of the user's body at the Bottom Face or Edge 1 side of the device. There is no need to do sensor coverage testing for the proximity sensor is designed to support sufficient detection range and sensitivity to cover regions of the sensors in all applicable directions since the proximity sensor entirely covers the antenna.
3. When the sensor is active, all WWAN/WLAN bands reduced power will be active.
4. The sensors used to detect the proximity of the user's body at the Bottom Face or Edge 1 side for WWAN/WLAN of the device use a detection threshold distance. The data shown in the sections below shows the distance(s).



<WWAN Frequency Bands>

Proximity Sensor Triggering Distance (mm)				
Position	Bottom Face		Edge 1	
	Moving away	Moving towards	Moving away	Moving towards
Minimum	22	23	27	30

<WLAN Frequency Bands>

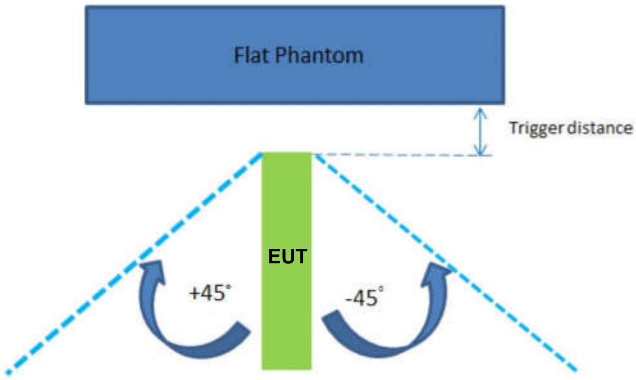
Proximity Sensor Triggering Distance (mm)				
Position	Bottom Face		Edge 1	
	Moving away	Moving towards	Moving away	Moving towards
Minimum	23	18	25	23

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

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

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

The influence of table tilt angles to proximity sensor triggering was determined by positioning each tablet edge that contains a transmitting antenna, perpendicular to the flat phantom, at 27mm at Edge 1 separation for WWAN bands and 23mm at Edge 1 for WLAN Bands.
Rotating the tablet around the edge next to the phantom in ≤ 10° increments until the tablet is ± 45° from the vertical position at 0°, and the maximum output power remains in the reduced mode.



<WWAN Frequency Bands>

The Sensor Trigger Distance (mm)	
Position	Edge 1
Minimum	27

<WLAN Frequency Bands>

The Sensor Trigger Distance (mm)	
Position	Edge 1
Minimum	23

Proximity sensor power reduction

Exposure Position / wireless mode	Bottom Face(1)	Edge 1(1)	Edge 2	Edge 3	Edge 4
GSM850 GPRS 2 Tx slots	8.5 dB	8.5 dB	0 dB	0 dB	0 dB
GSM1900 GPRS 2 Tx slots	9.0 dB	9.0 dB	0 dB	0 dB	0 dB
WCDMA Band II	11.5 dB	11.5 dB	0 dB	0 dB	0 dB
WCDMA Band V	6.0 dB	6.0 dB	0 dB	0 dB	0 dB
LTE Band 2	11.5 dB	11.5 dB	0 dB	0 dB	0 dB
LTE Band 4	10.0 dB	10.0 dB	0 dB	0 dB	0 dB
LTE Band 26/5	5.0 dB	5.0 dB	0 dB	0 dB	0 dB
LTE Band 7	11.0 dB	11.0 dB	0 dB	0 dB	0 dB
LTE Band 41/38	9.0 dB	9.0 dB	0 dB	0 dB	0 dB
WLAN 2.4GHz	10.0 dB	10.0 dB	0 dB	0 dB	0 dB
WLAN 5.2GHz	10.5 dB	10.5 dB	0 dB	0 dB	0 dB
WLAN 5.3GHz	10.0 dB	10.0 dB	0 dB	0 dB	0 dB
WLAN 5.5GHz	11.5 dB	11.5 dB	0 dB	0 dB	0 dB
WLAN 5.8GHz	12.5 dB	12.5 dB	0 dB	0 dB	0 dB

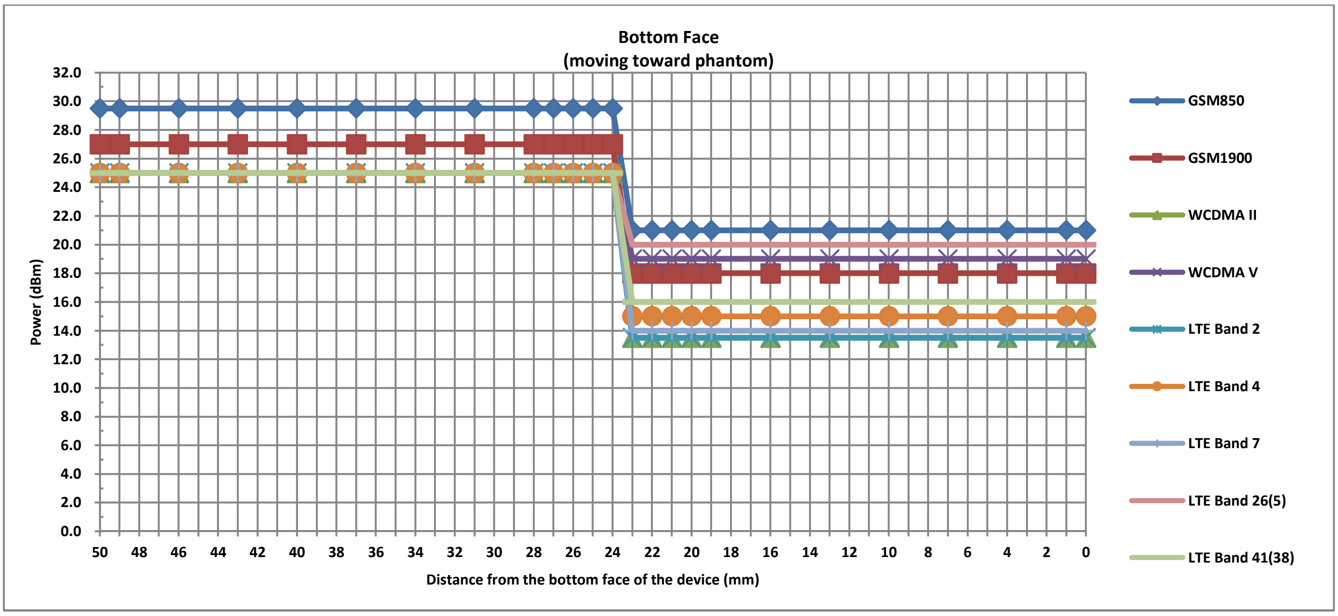
Remark:

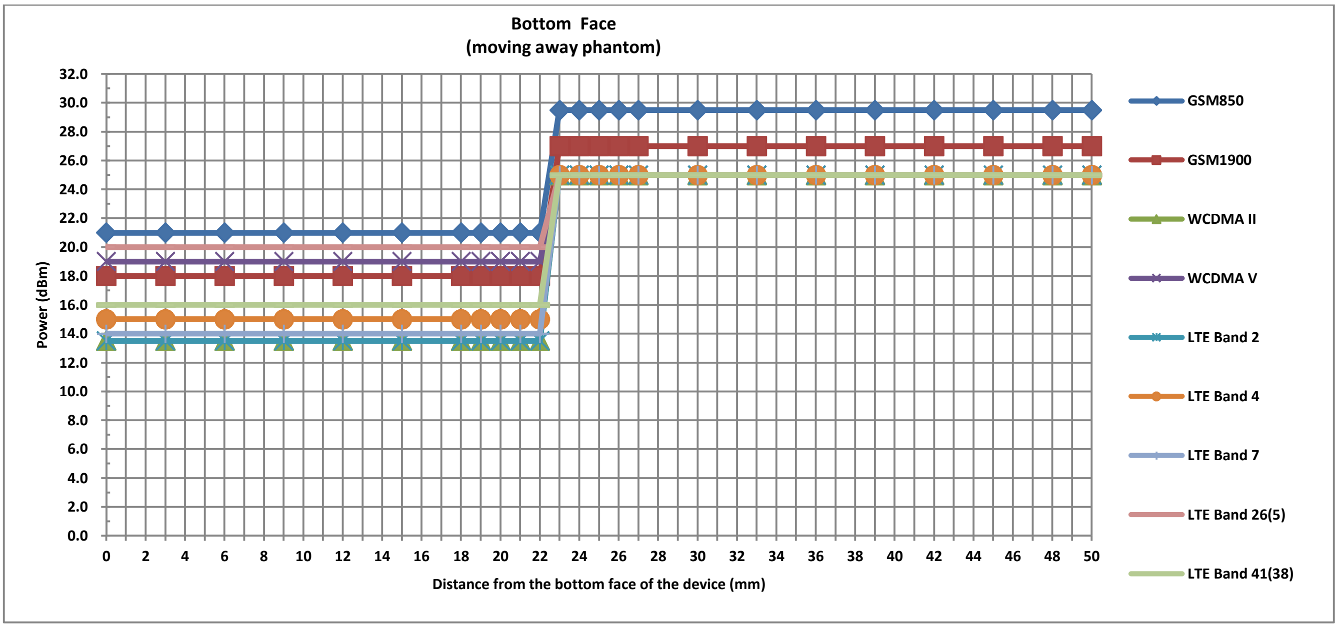
1. (1): Reduced maximum limit applied by activation of proximity sensor.
2. Power reduction is not applicable for Bluetooth.
3. Tests were performed in accordance with KDB 616217 D04 section 6.1, 6.2, 6.3, 6.4 and 6.5 and compliant results are shown and described in exhibit “P-Sensor operational description
4. For verification of compliance of power reduction scheme, additional SAR testing with EUT transmitting at full RF power at a conservative trigger distance was performed:
   For WWAN:
   - Bottom Face: 21 mm
   - Edge 1: 26 mm

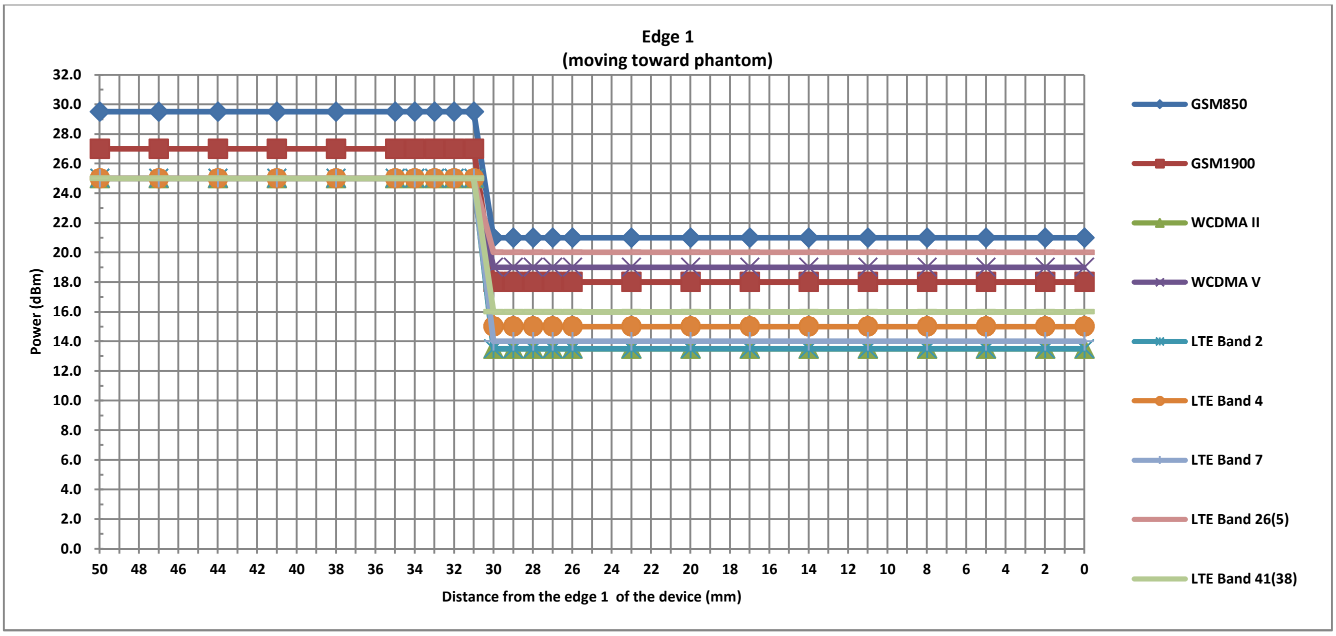
   For WLAN:
   - Bottom Face: 17 mm
   - Edge 1: 22mm

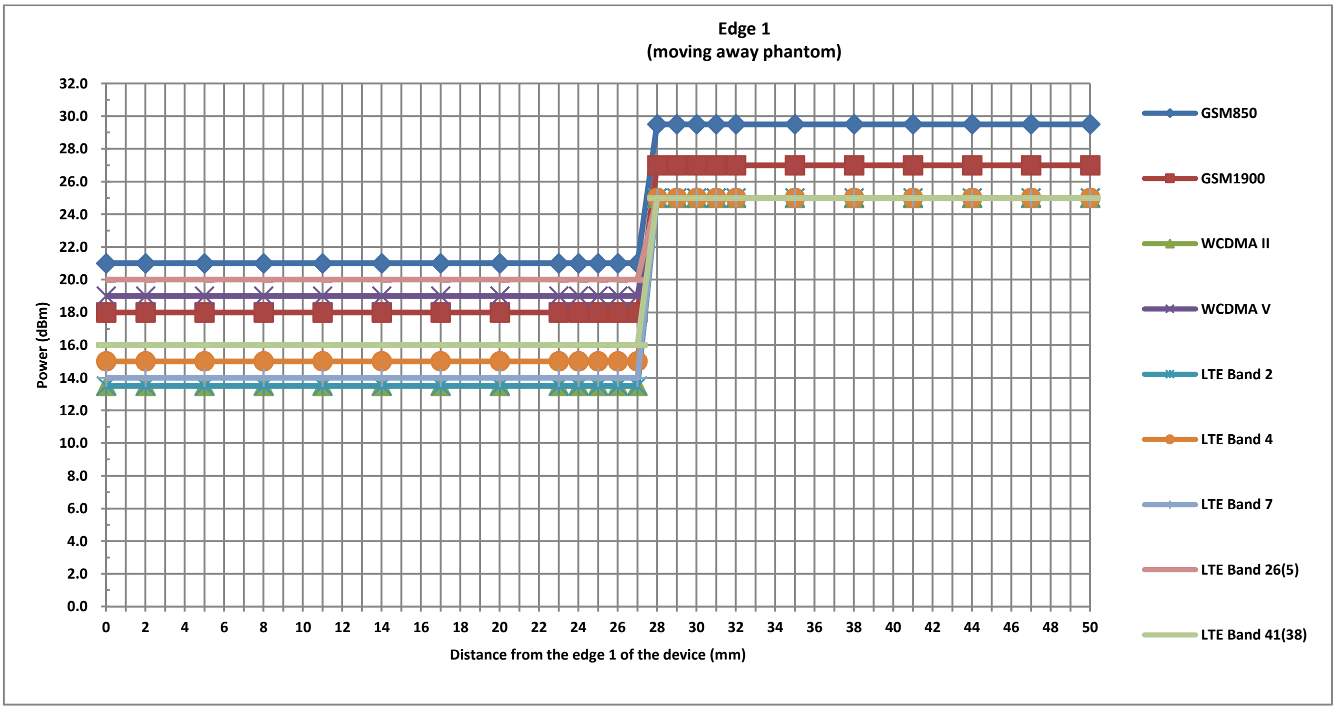
Power Measurement during Sensor Trigger distance testing

Band/Mode	Measured power reduction (dBm)		Reduction Levels
	w/o power back-off	w/ power back-off	(dB)
GSM850 GPRS 4 Tx slots	29.50	21.00	8.5
GSM1900 GPRS 4 Tx slots	27.00	18.00	9.0
WCDMA Band II	25.00	13.50	11.5
WCDMA Band V	25.00	19.00	6.0
LTE Band 2	25.00	13.50	11.5
LTE Band 4	25.00	15.00	10.0
LTE Band 7	25.00	14.00	11.0
LTE Band 26/5	25.00	20.00	5.0
LTE Band 41/38	25.00	16.00	9.0



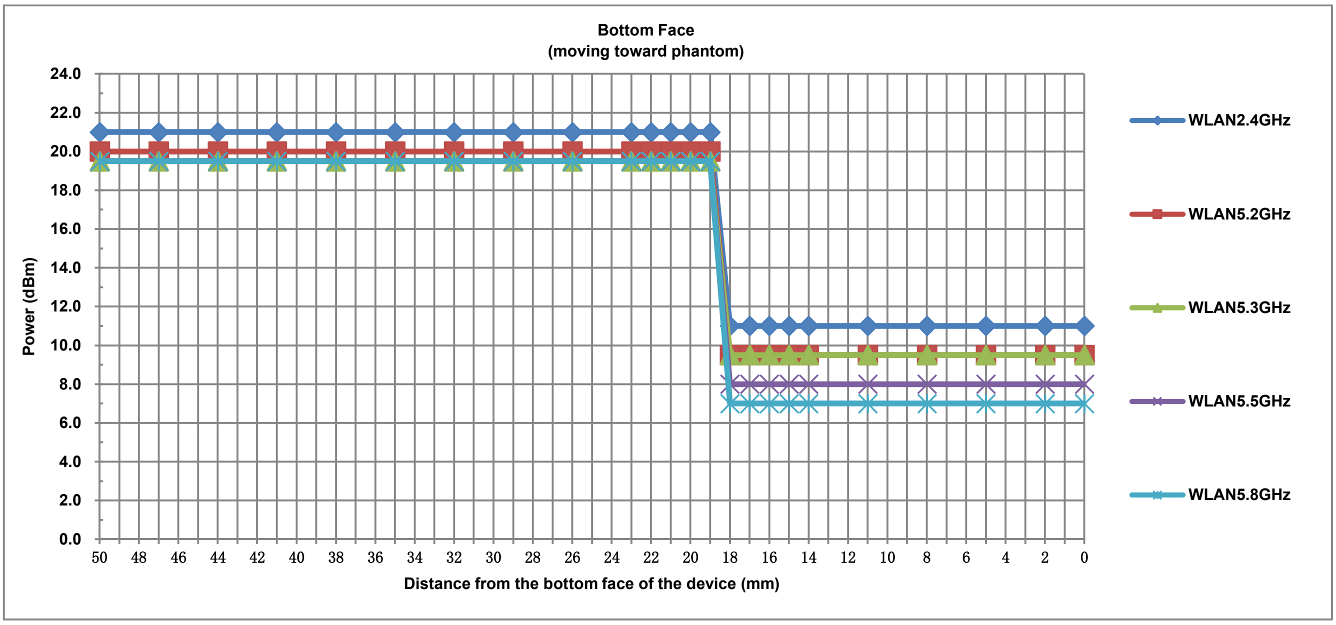


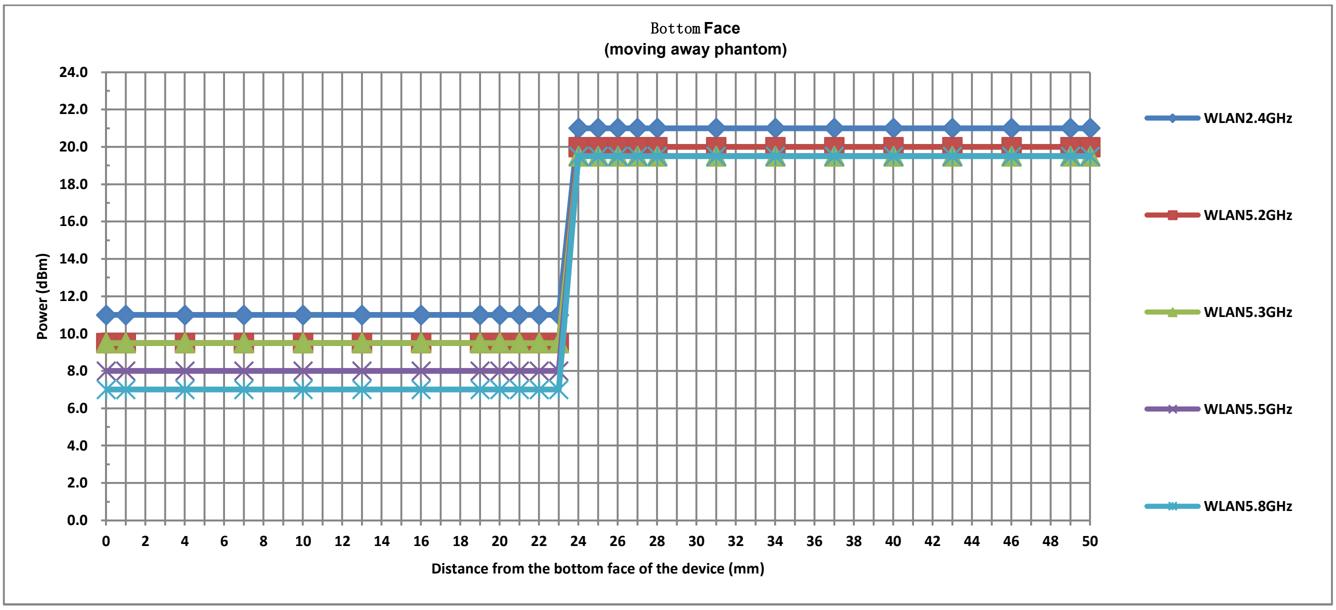

Edge 1
(moving toward phantom)
Power (dBm)
Distance from the edge 1 of the device (mm)
GSM850
GSM1900
WCDMA II
WCDMA V
LTE Band 2
LTE Band 4
LTE Band 7
LTE Band 26(5)
LTE Band 41(38)

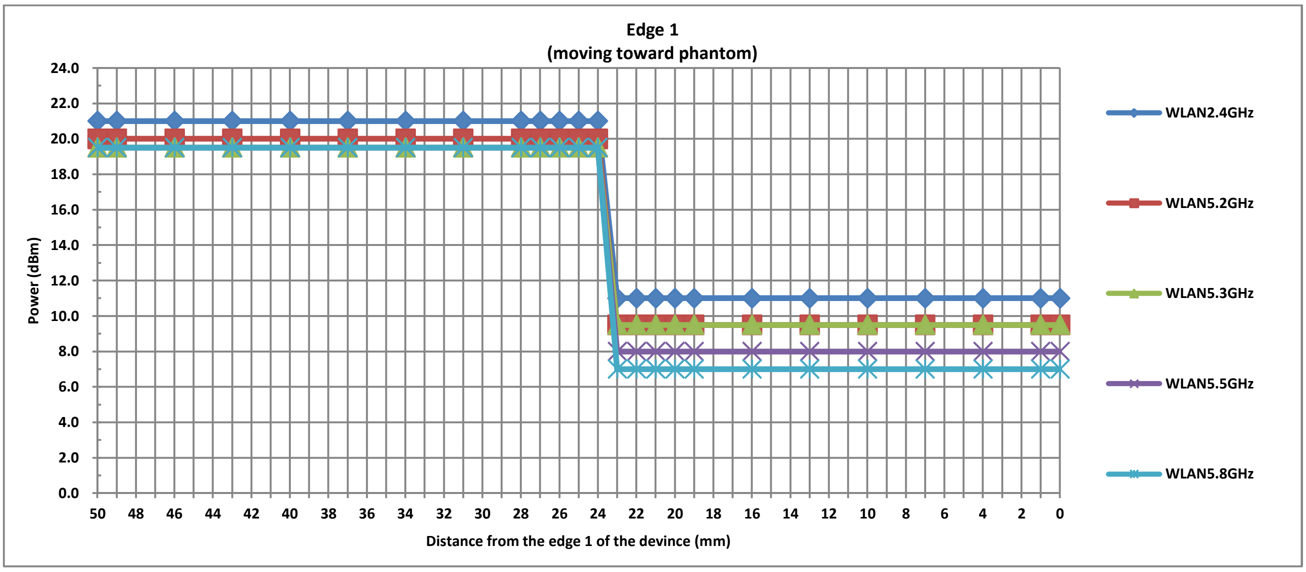

Edge 1
(moving away phantom)
Power (dBm)
Distance from the edge 1 of the device (mm)
GSM850
GSM1900
WCDMA II
WCDMA V
LTE Band 2
LTE Band 4
LTE Band 7
LTE Band 26(5)
LTE Band 41(38)

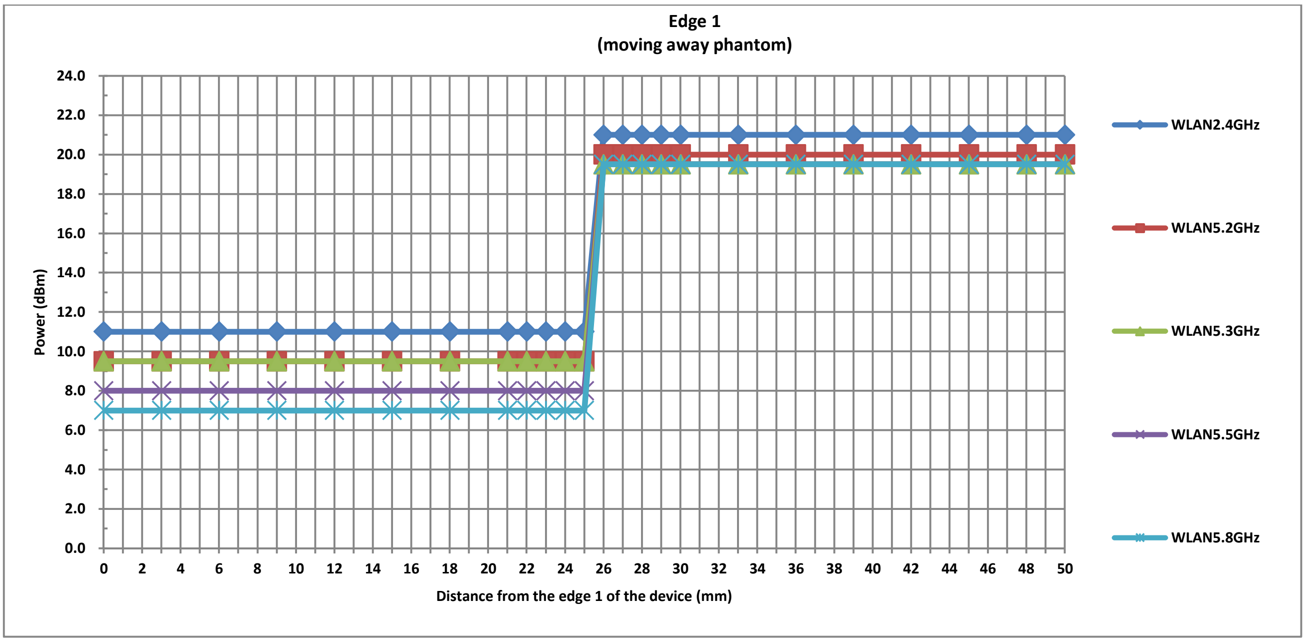
Power Measurement during Sensor Trigger distance testing

Band/Mode	Measured power reduction (dBm)		Reduction Levels
	w/o power back-off	w/ power back-off	(dB)
WLAN 2.4GHz	21.00	11.00	10.0
WLAN 5.2GHz	20.00	9.50	10.5
WLAN 5.3GHz	19.50	9.50	10.0
WLAN 5.5GHz	20.00	8.00	11.5
WLAN 5.8GHz	19.50	7.00	12.5






Edge 1
(moving toward phantom)
Power (dBm)
24.0
22.0
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
50 48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 8 6 4 2 0
Distance from the edge 1 of the devince (mm)
WLAN2.4GHz
WLAN5.2GHz
WLAN5.3GHz
WLAN5.5GHz
WLAN5.8GHz


Edge 1
(moving away phantom)
Power (dBm)
24.0
22.0
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50
Distance from the edge 1 of the device (mm)
WLAN2.4GHz
WLAN5.2GHz
WLAN5.3GHz
WLAN5.5GHz
WLAN5.8GHz

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:

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

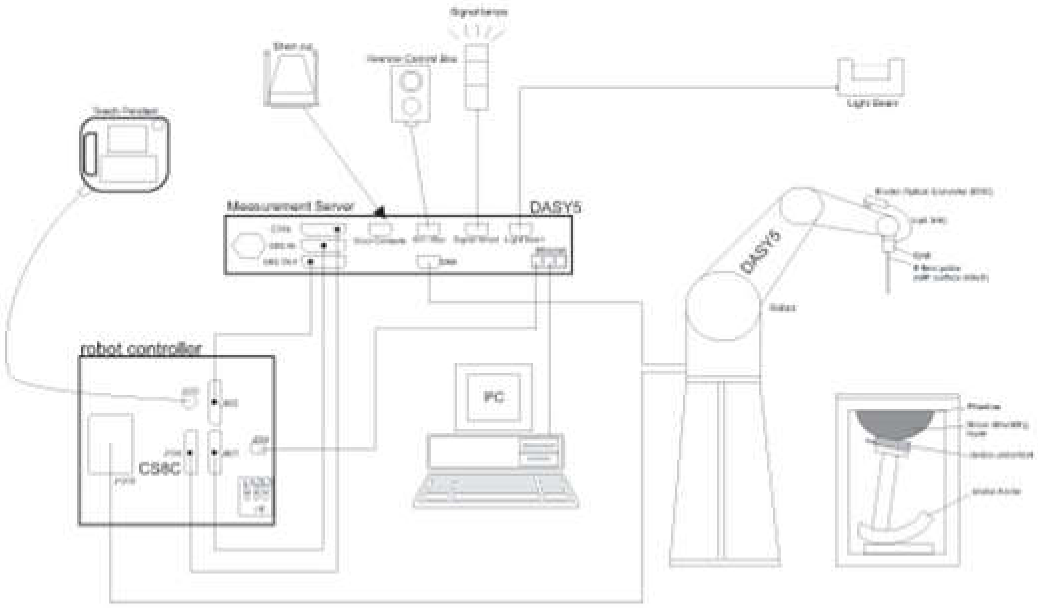
SAR is expressed in units of Watts per kilogram (W/kg)

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

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

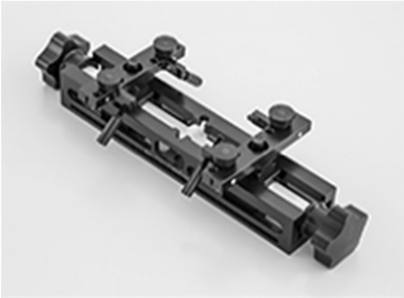
The ELI phantom is intended for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI4 is fully compatible with standard and all known tissue simulating liquids.

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.

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

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.

			$\leq$ 3 GHz	> 3 GHz
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			$\leq$ 2 GHz: $\leq$ 8 mm 2 – 3 GHz: $\leq$ 5 mm*	3 – 4 GHz: $\leq$ 5 mm* 4 – 6 GHz: $\leq$ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		$\leq$ 5 mm	3 – 4 GHz: $\leq$ 4 mm 4 – 5 GHz: $\leq$ 3 mm 5 – 6 GHz: $\leq$ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	$\leq$ 4 mm	3 – 4 GHz: $\leq$ 3 mm 4 – 5 GHz: $\leq$ 2.5 mm 5 – 6 GHz: $\leq$ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		$\geq$ 30 mm	3 – 4 GHz: $\geq$ 28 mm 4 – 5 GHz: $\geq$ 25 mm 5 – 6 GHz: $\geq$ 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 $\leq$ 1.4 W/kg, $\leq$ 8 mm, $\leq$ 7 mm and $\leq$ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.				

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	4d258	2020/5/7	2023/5/6
SPEAG	1750MHz System Validation Kit	D1750V2	1090	2019/3/27	2022/3/25
SPEAG	1900MHz System Validation Kit	D1900V2	5d170	2019/3/26	2022/3/24
SPEAG	2450MHz System Validation Kit	D2450V2	908	2019/3/25	2022/3/23
SPEAG	2600MHz System Validation Kit	D2600V2	1061	2020/11/26	2023/11/25
SPEAG	5000MHz System Validation Kit	D5GHzV2	1113	2019/9/24	2022/9/22
SPEAG	Data Acquisition Electronics	DAE4	1279	2021/9/21	2022/9/20
SPEAG	Dosimetric E-Field Probe	EX3DV4	3857	2021/11/24	2022/11/23
SPEAG	ELI4 Phantom	ELI V8.0	TP-2134	NCR	NCR
SPEAG	Phone Positioner	N/A	N/A	NCR	NCR
Anritsu	Radio Communication Analyzer	MT8821C	6201432831	2021/4/13	2022/4/12
Agilent	ENA Series Network Analyzer	E5071C	MY46106933	2021/7/31	2022/7/30
SPEAG	Dielectric Probe Kit	DAK-3.5	1138	2021/6/9	2022/6/8
Anritsu	Vector Signal Generator	MG3710A	6201682672	2022/1/6	2023/1/5
Rohde & Schwarz	Power Meter	NRVD	102081	2021/8/12	2022/8/11
Rohde & Schwarz	Power Sensor	NRV-Z5	100538	2021/8/12	2022/8/11
Rohde & Schwarz	Power Sensor	NRV-Z5	100539	2021/8/12	2022/8/11
R&S	CBT BLUETOOTH TESTER	CBT	101246	2021/4/12	2022/4/11
EXA	Spectrum Analyzer	FSV7	101631	2021/10/14	2022/10/13
Testo	Thermo-Hygrometer	608-H1	1241332102	2022/1/6	2023/1/5
FLUKE	DIGITAC THERMOMETER	51II	97240029	2021/8/13	2022/8/12
ARRA	Power Divider	A3200-2	N/A	Note 1	
MCL	Attenuation1	BW-S10W5+	N/A	Note 1	
MCL	Attenuation2	BW-S10W5+	N/A	Note 1	
MCL	Attenuation3	BW-S10W5+	N/A	Note 1	
BONN	POWER AMPLIFIER	BLMA 0830-3	087193A	Note 1	
BONN	POWER AMPLIFIER	BLMA 2060-2	087193B	Note 1	
Agilent	Dual Directional Coupler	778D	20500	Note 1	
Agilent	Dual Directional Coupler	11691D	MY48151020	Note 1	

Note:

1. Prior to system verification and validation, the path loss from the signal generator to the system check source and the power meter, which includes the amplifier, cable, attenuator and directional coupler, was measured by the network analyzer. The reading of the power meter was offset by the path loss difference between the path to the power meter and the path to the system check source to monitor the actual power level fed to the system check source.
2. Referring to KDB 865664 D01v01r04, the dipole calibration interval can be extended to 3 years with justification. The dipoles are also not physically damaged, or repaired during the interval.
3. The justification data of dipole can be found in appendix C. The return loss is < -20dB, within 20% of prior calibration, the impedance is within 5 ohm of prior calibration.

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 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. 11.1.

Fig 11.1 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								
750	41.1	57.0	0.2	1.4	0.2	0	0.89	41.9
835	40.3	57.9	0.2	1.4	0.2	0	0.90	41.5
1800, 1900, 2000	55.2	0	0	0.3	0	44.5	1.40	40.0
2450	55.0	0	0	0	0	45.0	1.80	39.2
2600	54.8	0	0	0.1	0	45.1	1.96	39.0

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	22.8	0.921	40.880	0.90	41.50	2.33	-1.49	±5	2022/3/10
1750	Head	22.7	1.341	39.554	1.37	40.10	-2.12	-1.36	±5	2022/3/10
1900	Head	22.9	1.423	39.322	1.40	40.00	1.64	-1.69	±5	2022/3/11
2450	Head	22.6	1.805	38.557	1.80	39.20	0.28	-1.64	±5	2022/3/11
2600	Head	22.6	1.924	38.250	1.96	39.00	-1.84	-1.92	±5	2022/3/12
5250	Head	22.9	4.587	36.209	4.71	35.90	-2.61	0.86	±5	2022/3/17
5600	Head	22.9	4.964	35.704	5.07	35.50	-2.09	0.57	±5	2022/3/18
5750	Head	22.9	5.137	35.513	5.22	35.40	-1.59	0.32	±5	2022/3/19

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 (%)
2022/3/10	835	Head	50	4d258	3857	1279	0.490	9.44	9.8	3.81
2022/3/10	1750	Head	50	1090	3857	1279	1.750	36.40	35	-3.85
2022/3/11	1900	Head	50	5d170	3857	1279	1.990	39.00	39.8	2.05
2022/3/11	2450	Head	50	908	3857	1279	2.470	52.80	49.4	-6.44
2022/3/12	2600	Head	50	1061	3857	1279	2.680	56.60	53.6	-5.30
2022/3/17	5250	Head	50	1113	3857	1279	3.770	80.50	75.4	-6.34
2022/3/18	5600	Head	50	1113	3857	1279	3.880	83.40	77.6	-6.95
2022/3/19	5750	Head	50	1113	3857	1279	3.740	80.00	74.8	-6.50

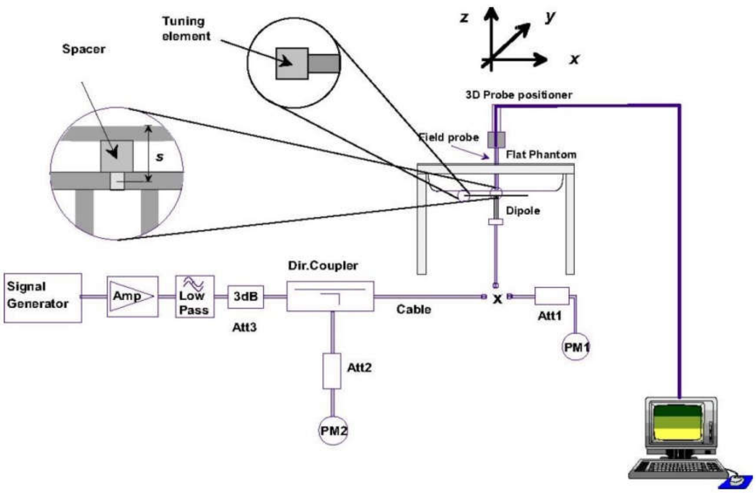


Fig 8.3.1 System Performance Check Setup

Fig 8.3.2 Setup Photo

12. RF Exposure Positions

12.1 Ear and handset reference point

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

<EUT Setup Photos>

Please refer to Appendix D for the test setup photos.

13. GSM/UMTS/LTE Output Power (Unit: dBm)

The detailed conducted power table can refer to Appendix E.

<GSM Conducted Power>

1. Per KDB 447498 D01v06, the maximum output power channel is used for SAR testing and for further SAR test reduction.
2. Per KDB 941225 D01v03r01, for SAR test reduction for GSM / GPRS / EDGE modes is determined by the source-based time-averaged output power including tune-up tolerance. The mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested. Therefore, the GPRS (4Tx slots) for GSM850/GSM1900 is considered as the primary mode.
3. Other configurations of GSM / GPRS / EDGE are considered as secondary modes. The 3G SAR test reduction procedure is applied, when the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ ¼ dB higher than the primary mode, SAR measurement is not required for the secondary mode

<WCDMA Conducted Power>

1. The following tests were conducted according to the test requirements outlines in 3GPP TS 34.121 specification.
2. The procedures in KDB 941225 D01v03r01 are applied for 3GPP Rel. 6 HSPA to configure the device in the required sub-test mode(s) to determine SAR test exclusion.
3. For HSPA+ devices supporting 16 QAM in the uplink, power measurements procedure is according to the configurations in Table C.11.1.4 of 3GPP TS 34.121-1.
4. For DC-HSDPA, the device was configured according to the H-Set 12, Fixed Reference Channel (FRC) configuration in Table C.8.1.12 of 3GPP TS 34.121-1, with the primary and the secondary serving HS-DSCH Cell enabled during the power measurement.

A summary of these settings are illustrated below:

HSDPA Setup Configuration:

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

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

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

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

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

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

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

Setup Configuration

HSUPA Setup Configuration:

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

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

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1)	β_{ec}	β_{ed} (Note 4) (Note 5)	β_{ed} (SF)	β_{ed} (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2) (Note 6)	AG Index (Note 5)	E-TFCI
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed}1: 47/15 β_{ed}2: 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15	0	-	-	5/15	5/15	47/15	4	1	1.0	0.0	12	67

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

Setup Configuration

DC-HSDPA 3GPP release 8 Setup Configuration:

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

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

C.8.1.12 Fixed Reference Channel Definition H-Set 12

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

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

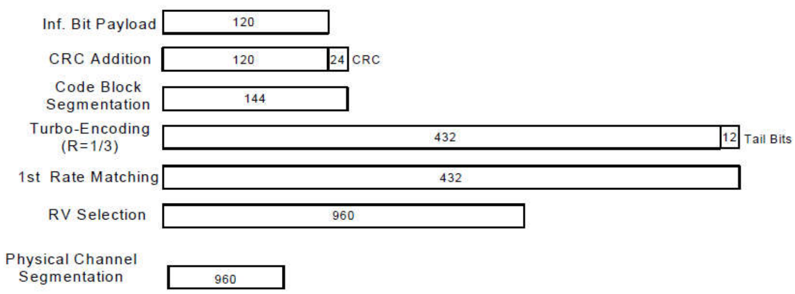


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

Setup Configuration

HSPA+ 3GPP release 7 (uplink category 7) 16QAM, Setup Configuration:

a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.
b. The RF path losses were compensated into the measurements.
c. A call was established between EUT and Base Station with following setting * :
   i. Call Configs = 5.2E:HSPA+:UL with 16QAM
   ii. Set the Gain Factors (β_c and β_d) and parameters (AG Index) were set according to each specific sub-test in the following table, C11.1.4, quoted from the TS 34.121-1 s5.2E
   iii. Set Channel Parms
   iv. Set Cell Power = -86 dBm
   v. Set Channel Type = HSPA
   vi. Set UE Target Power =21 dBm
   vii. Power Ctrl Mode= All Up Bits
   viii. Set Manual Uplink DPCH Bc/Bd = Manual
   ix. Set Manual Uplink DPCH Bc and Bd=15,15(for 34.121-1 v8.10.0 table C11.1.4 sub-test 1)
   x. Set HSPA Conn DL Channel Levels
   xi. Set HS-SCCH Configs
   xii. Set RB Test Mode Setup
   xiii. Set Common HSUPA Parameters
   xiv. Set Serving Grant
   xv. Confirm that E-TFCI is equal to the target E-TFCI of 105 for sub-test 1, and other subtest's E-TFCI
d. The transmitted maximum output power was recorded.

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

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

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

Setup Configuration

<WCDMA Conducted Power>

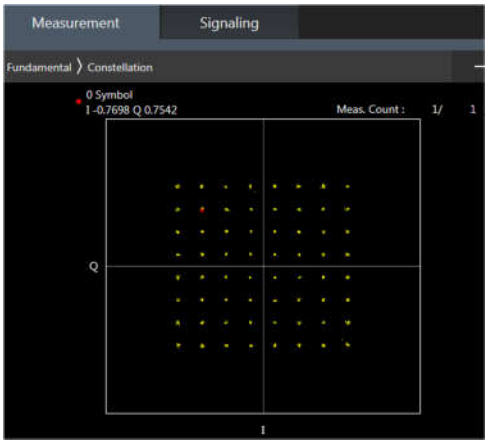
General Note:

1. Per KDB 941225 D01v03r01, for SAR testing is measured using a 12.2 kbps RMC with TPC bits configured to all "1's".
2. Per KDB 941225 D01v03r01, RMC 12.2kbps setting is used to evaluate SAR. The maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA / DC-HSDPA / HSPA+ is ≤ ¼ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA / DC-HSDPA / HSPA+ to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA / HSPA+, and according to the following RF output power, the output power results of the secondary modes (HSDPA / HSUPA / DC-HSDPA / HSPA+) are less than ¼ dB higher than the primary modes; therefore, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA / HSPA+.

<LTE Conducted Power>

General Note:

1. Anritsu MT8820C base station simulator was used to setup the connection with EUT; the frequency band, channel bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.
2. Per KDB 941225 D05v02r05, when a properly configured base station simulator is used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration is not required.
3. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
4. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05v02r05, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
6. Per KDB 941225 D05v02r05, 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM SAR testing is not required.
7. Per KDB 941225 D05v02r05, Smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
8. For LTE B4 / B5 / B26 / B38 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. LTE band 5/38 SAR test was covered by Band 26/41; according to April 2015 TCB workshop, SAR test for overlapping LTE bands can be reduced if
   a. the maximum output power, including tolerance, for the smaller band is ≤ the larger band to qualify for the SAR test exclusion
   b. the channel bandwidth and other operating parameters for the smaller band are fully supported by the larger band
10. According to 2017 TCB workshop, for 64 QAM and 16 QAM 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

<TDD LTE SAR Measurement>

TDD LTE configuration setup for SAR measurement

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

a. 3GPP TS 36.211 section 4.2 for Type 2 Frame Structure and Table 4.2-2 for uplink-downlink configurations
b. "special subframe S" contains both uplink and downlink transmissions, it has been taken into consideration to determine the transmission duty factor according to the worst case uplink and downlink cyclic prefix requirements for UpPTS
c. Establishing connections with base station simulators ensure a consistent means for testing SAR and recommended for evaluating SAR. The Anritsu MT8820C (firmware: #22.52#004) was used for LTE output power measurements and SAR testing.

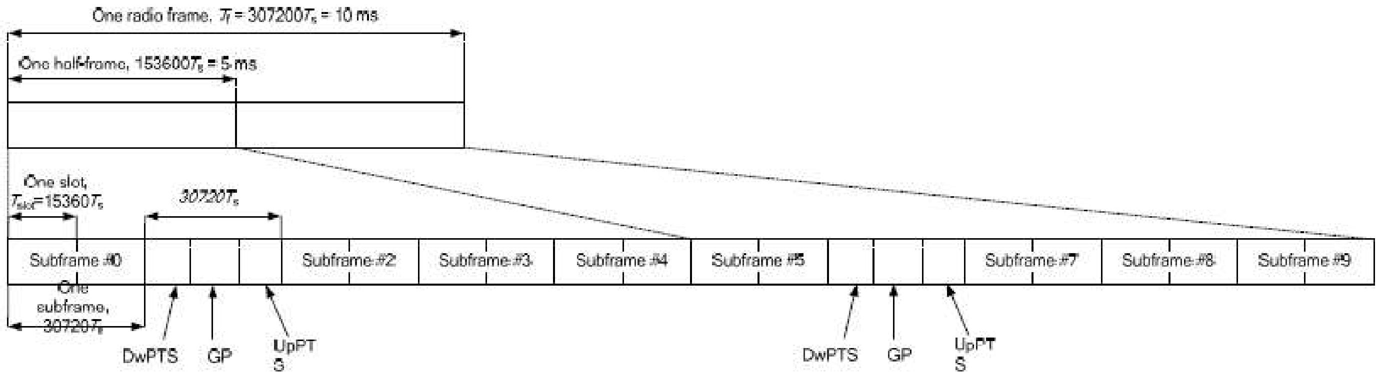


Figure 4.2-1: Frame structure type 2 (for 5 ms switch-point periodicity).

Table 4.2-2: Uplink-downlink configurations.

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

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

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

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

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

The highest duty factor is resulted from:

For LTE Band 41 Power class 3

i. Uplink-downlink configuration: 0. In a half-frame consisted of 5 subfames, uplink operation is in 3 uplink subframes and 1 special subframe.
ii. special subframe configuration: 5-9 for normal cyclic prefix in downlink, 4-7 for extended cyclic prefix in downlink
iii. for special subframe with extended cyclic prefix in uplink, the total uplink duty factor in one half-frame is: (3+0.167)/5 = 63.3%
iv. for special subframe with normal cyclic prefix in uplink, the total uplink duty factor in one half-frame is: (3+0.143)/5 = 62.9%
v. For TDD LTE SAR measurement, the duty cycle 1:1.59 (62.9 %) was used perform testing and considering the theoretical duty cycle of 63.3% for extended cyclic prefix in the uplink, and the theoretical duty cycle of 62.9% for normal cyclic prefix in uplink, a scaling factor of extended cyclic prefix 63.3%/62.9% = 1.006 is applied to scale-up the measured SAR result. The scaled TDD LTE SAR = measured SAR (W/kg)* Tune-up Scaling Factor* scaling factor for extended cyclic prefix.

<LTE Carrier Aggregation>

General Note:

1. 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.
2. In applying the existing power measurement procedures of KDB 941225 D05A for DL CA SAR test exclusion, only the subset with the largest number of combinations of frequency bands and CCs in each row need combination, and for this device that all the configurations were choose to power measurement.
3. All permutations exist. No restrictions on Pcell & Scell combinations.

2CC Downlink Carrier Aggregation		
Number	Combination	Covered by Measurement Superset
2CC #1	CA_7A-7A	
2CC #2	CA_7C	
2CC #3	CA_38C	
2CC #4	CA_41C	
2CC #5	CA_41A-41A	

LTE Carrier Aggregation Conducted Power (Downlink)

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 two carrier aggregation. 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.

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.

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

14. WiFi/Bluetooth Output Power (Unit: dBm)

General Note:

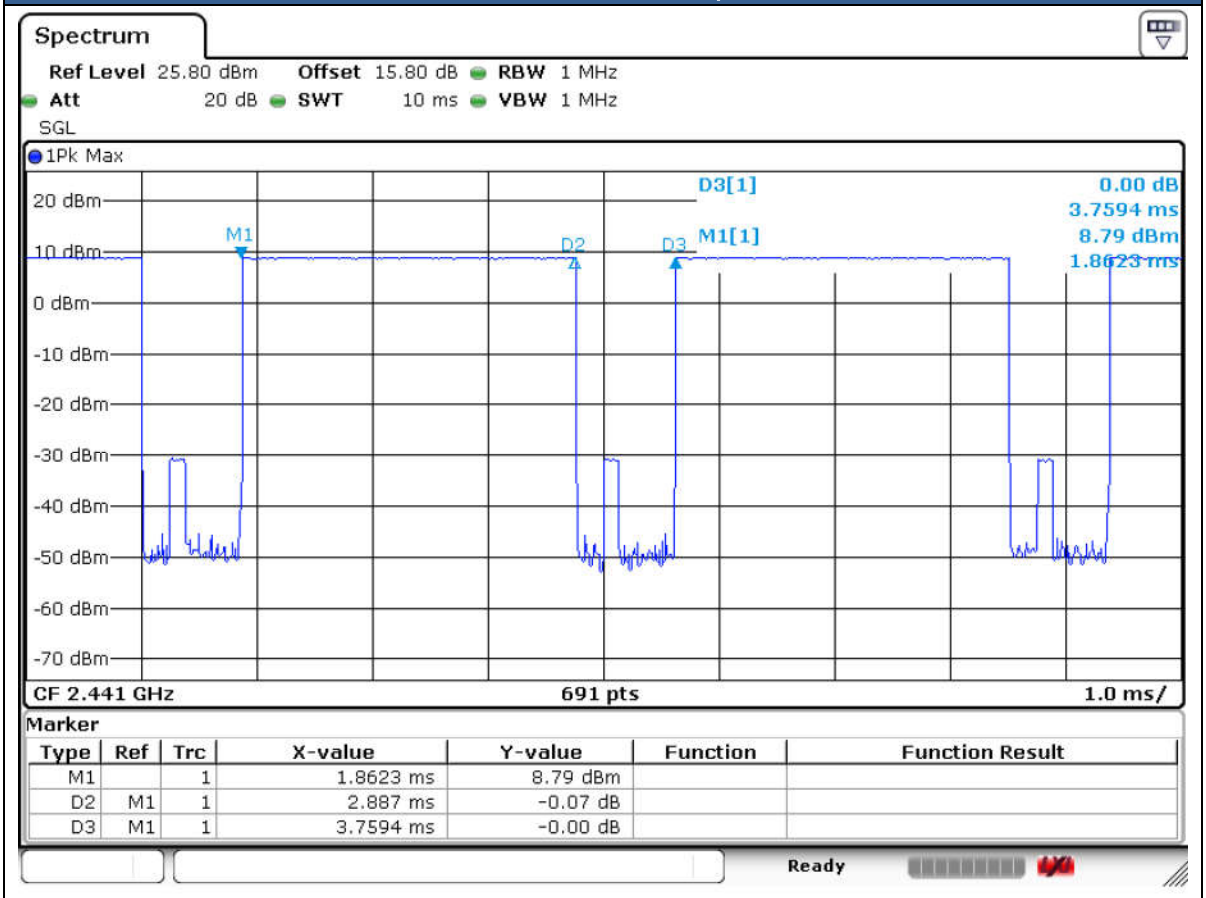
1. Per KDB 248227 D01v02r02, SAR test reduction is determined according to 802.11 transmission mode configurations and certain exposure conditions with multiple test positions. In the 2.4 GHz band, separate SAR procedures are applied to DSSS and OFDM configurations to simplify DSSS test requirements.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

<2.4GHz Bluetooth>

General Note:

1. For 2.4GHz Bluetooth SAR testing was selected 1Mbps, due to its highest average power.
2. The Bluetooth duty cycle is 76.79 % as following figure, according to 2016 Oct. TCB workshop for Bluetooth SAR scaling need further consideration and the theoretical duty cycle is 100%, therefore the actual duty cycle will be scaled up to the theoretical value of Bluetooth reported SAR calculation

Bluetooth time-domain plot



15. Antenna Location

The detailed antenna location information can refer to SAR Test Setup Photos.

<SAR test exclusion table>

General Note:

1. The below table, when the distance is < 50 mm exclusion threshold is "Ratio", when the distance is > 50 mm exclusion threshold is "mW"
2. Maximum power is the source-based time-average power and represents the maximum RF output power among production units
3. Per KDB 447498 D01v06, for larger devices, the test separation distance of adjacent edge configuration is determined by the closest separation between the antenna and the user.
4. Per KDB 447498 D01v06, standalone SAR test exclusion threshold is applied; If the test separation distance is < 5mm, 5mm is used to determine SAR exclusion threshold.
5. 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
6. Per KDB 447498 D01v06, at 100 MHz to 6 GHz and for *test separation distances* > 50 mm, the SAR test exclusion threshold is determined according to the following
   a) [Threshold at 50 mm in step 1) + (test separation distance - 50 mm)·(f(MHz)/150)] mW, at 100 MHz to 1500 MHz
   b) [Threshold at 50 mm in step 1) + (test separation distance - 50 mm)·10] mW at > 1500 MHz and ≤ 6 GHz

Exposure Position	Wireless Interface	GPRS 850 4Tx slots	GPRS 1900 4Tx slots	WCDMA Band V	WCDMA Band II	LTE Band 5	LTE Band 26	LTE Band 4	LTE Band 2	LTE Band 7	LTE Band 38	LTE Band 41	BT Ant 3	2.4GHz WLAN ANT 3	5GHz WLAN ANT 3
	Calculated Frequency	848	1909	846	1907	848	848	1754	1909	2567	2617	2687	2480	2462	5825
	Maximum power (dBm)	29.50	27.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	10.50	21.00	20.00
	Maximum rated power(mW)	891.25	501.19	316.23	316.23	316.23	316.23	316.23	316.23	316.23	316.23	316.23	11.22	125.89	100.00
Bottom Face	Separation distance(mm)	5.0											5.0	5.0	5.0
	exclusion threshold	164.1	138.5	58.2	87.3	58.2	58.2	83.8	87.4	101.3	102.3	103.7	3.5	39.5	48.3
	Testing required?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Edge 1	Separation distance(mm)	5.0											5.0	5.0	5.0
	exclusion threshold	164.1	138.5	58.2	87.3	58.2	58.2	83.8	87.4	101.3	102.3	103.7	3.5	39.5	48.3
	Testing required?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Edge 2	Separation distance(mm)	154.6								133.2			86.64	86.64	86.64
	exclusion threshold	754.0	1155.0	753.0	1155.0	754.0	754.0	1159.0	1155.0	1140.0	1139.0	1138.0	462.0	462.0	429.0
	Testing required?	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No
Edge 3	Separation distance(mm)	152.1											152.1	152.1	152.1
	exclusion threshold	740.0	1130.0	739.0	1130.0	740.0	740.0	1134.0	1130.0	1115.0	1114.0	1113.0	1116.0	1117.0	1083.0
	Testing required?	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No
Edge 4	Separation distance(mm)	48.0								95.1			137.8	137.8	137.8
	exclusion threshold	17.1	14.4	6.1	9.1	6.1	6.1	8.7	9.1	10.6	10.7	10.8	973.0	974.0	940.0
	Testing required?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No

16. SAR Test Results

General Note:

1. Per KDB 447498 D01v06, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
   a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
   b. For SAR testing of WLAN signal with non-100% duty cycle, the measured SAR is scaled-up by the duty cycle scaling factor which is equal to "1/(duty cycle)"
   c. For WWAN: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
   d. For WLAN/Bluetooth: Reported SAR(W/kg)= Measured SAR(W/kg)* Duty Cycle scaling factor * Tune-up scaling factor
   e. For TDD LTE SAR measurement, the duty cycle 1:1.59 (62.9 %) was used perform testing and considering the theoretical duty cycle of 63.3% for extended cyclic prefix in the uplink, and the theoretical duty cycle of 62.9% for normal cyclic prefix in uplink, a scaling factor of extended cyclic prefix 63.3%/62.9% = 1.006 is applied to scale-up the measured SAR result. The Reported TDD LTE SAR = measured SAR (W/kg)* Tune-up Scaling Factor* scaling factor for extended cyclic prefix.
2. Per KDB 447498 D01v06, for each exposure position, testing of other required channels within the operating mode of a frequency band is not required when the *reported* 1-g or 10-g SAR for the mid-band or highest output power channel is:
   · ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
   · ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
   · ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
3. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.
4. The device employs proximity sensors that detect the presence of the user's body also a finger or hand near the bottom face, edge 1 of the device, reduced power will be active for all WWAN/WLAN bands. (P-sensor can't work at detecting presence of the user's body at other edges of the device.)
5. There are six samples, the different between them refer to the TB128XU_Operational Description of Product Equality Declaration which is exhibit separately. According to the difference, we choose sample 1 to full test and sample 2 to verify the worst case of sample 1. For sample 3/4/5/6, the differences do not affect the test, so sample 3/4/5/6 are not tested.
6. For distance SAR and non-distance SAR, always chose higher SAR to do co-located analysis.

GSM Note:

1. Per KDB 941225 D01v03r01, for SAR test reduction for GSM / GPRS / EDGE modes is determined by the source-based time-averaged output power including tune-up tolerance. The mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested. Therefore, the GPRS (4Tx slots) for GSM850/GSM1900 is considered as the primary mode.
2. Other configurations of GSM / GPRS / EDGE are considered as secondary modes. The 3G SAR test reduction procedure is applied, when the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ ¼ dB higher than the primary mode, SAR measurement is not required for the secondary mode

UMTS Note:

1. Per KDB 941225 D01v03r01, for SAR testing is measured using a 12.2 kbps RMC with TPC bits configured to all "1's".
2. Per KDB 941225 D01v03r01, RMC 12.2kbps setting is used to evaluate SAR. The maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA / DC-HSDPA / HSPA+. is ≤ ¼ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA / DC-HSDPA / HSPA+. to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA / DC-HSDP / HSPA+.A, and according to the following RF output power, the output power results of the secondary modes (HSUPA, HSDPA, DC-HSDPA / HSPA+.) are less than ¼ dB higher than the primary modes; therefore, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA / HSPA+.

LTE Note:

1. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
2. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
3. Per KDB 941225 D05v02r05, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
4. Per KDB 941225 D05v02r05, 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM SAR testing is not required.
5. Per KDB 941225 D05v02r05, Smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
6. For LTE B4 / B5 / B26 / B38 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.
7. LTE band 5/38 SAR test was covered by Band 26/41; according to April 2015 TCB workshop, SAR test for overlapping LTE bands can be reduced if
   a. the maximum output power, including tolerance, for the smaller band is ≤ the larger band to qualify for the SAR test exclusion
   b. the channel bandwidth and other operating parameters for the smaller band are fully supported by the larger band

WLAN Note:

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

16.1 Body SAR

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Antenna	Power Reduction	Ch.	Freq. (MHz)	Sample	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
835MHz																			
	GSM850	-	-	-	-	GPRS (4 Tx slots)	Bottom Face	0mm	Ant1	Reduced	189	836.4	1	20.53	21	1.114	0.14	0.753	0.839
	GSM850	-	-	-	-	GPRS (4 Tx slots)	Bottom Face	0mm	Ant1	Reduced	128	824.2	1	20.49	21	1.125	0.05	0.842	0.947
1	GSM850	-	-	-	-	GPRS (4 Tx slots)	Bottom Face	0mm	Ant1	Reduced	251	848.8	1	20.43	21	1.140	0.09	0.907	**1.034**
	GSM850	-	-	-	-	GPRS (4 Tx slots)	Edge1	0mm	Ant1	Reduced	189	836.4	1	20.53	21	1.114	0.12	0.422	0.470
	GSM850	-	-	-	-	GPRS (4 Tx slots)	Edge2	0mm	Ant1	Full power	189	836.4	1	29.03	29.5	1.114	0.03	0.087	0.097
	GSM850	-	-	-	-	GPRS (4 Tx slots)	Edge3	0mm	Ant1	Full power	189	836.4	1	29.03	29.5	1.114	0.01	0.125	0.139
	GSM850	-	-	-	-	GPRS (4 Tx slots)	Edge4	0mm	Ant1	Full power	189	836.4	1	29.03	29.5	1.114	-0.16	0.194	0.216
	GSM850	-	-	-	-	GPRS (4 Tx slots)	Bottom Face	21mm	Ant1	Full power	189	836.4	1	29.03	29.5	1.114	-0.09	0.262	0.292
	GSM850	-	-	-	-	GPRS (4 Tx slots)	Edge1	26mm	Ant1	Full power	189	836.4	1	29.03	29.5	1.114	-0.02	0.086	0.096
	GSM850	-	-	-	-	GPRS (4 Tx slots)	Bottom Face	0mm	Ant1	Reduced	251	848.8	2	20.43	21	1.140	0.02	0.866	0.987
	WCDMA V	-	-	-	-	RMC 12.2Kbps	Bottom Face	0mm	Ant1	Reduced	4182	836.4	1	18.39	19	1.151	0.07	0.733	0.844
	WCDMA V	-	-	-	-	RMC 12.2Kbps	Bottom Face	0mm	Ant1	Reduced	4132	826.4	1	18.28	19	1.180	-0.05	0.654	0.772
2	WCDMA V	-	-	-	-	RMC 12.2Kbps	Bottom Face	0mm	Ant1	Reduced	4233	846.6	1	18.36	19	1.159	0.09	0.811	**0.940**
	WCDMA V	-	-	-	-	RMC 12.2Kbps	Edge1	0mm	Ant1	Reduced	4182	836.4	1	18.39	19	1.151	0.03	0.296	0.341
	WCDMA V	-	-	-	-	RMC 12.2Kbps	Edge4	0mm	Ant1	Full power	4182	836.4	1	24.13	25	1.222	0.07	0.17	0.208
	WCDMA V	-	-	-	-	RMC 12.2Kbps	Bottom Face	21mm	Ant1	Full power	4182	836.4	1	24.13	25	1.222	-0.06	0.259	0.316
	WCDMA V	-	-	-	-	RMC 12.2Kbps	Edge1	26mm	Ant1	Full power	4182	836.4	1	24.13	25	1.222	0.16	0.096	0.117
3	LTE Band 26	15M	QPSK	1	0	-	Bottom Face	0mm	Ant1	Reduced	26865	831.5	1	19.22	20	1.197	0	0.835	**0.999**
	LTE Band 26	15M	QPSK	36	0	-	Bottom Face	0mm	Ant1	Reduced	26865	831.5	1	19.16	20	1.213	0.17	0.683	0.829
	LTE Band 26	15M	QPSK	75	0	-	Bottom Face	0mm	Ant1	Reduced	26865	831.5	1	19.05	20	1.245	0.16	0.695	0.865
	LTE Band 26	15M	QPSK	1	0	-	Edge1	0mm	Ant1	Reduced	26865	831.5	1	19.22	20	1.197	-0.03	0.366	0.438
	LTE Band 26	15M	QPSK	36	0	-	Edge1	0mm	Ant1	Reduced	26865	831.5	1	19.16	20	1.213	-0.14	0.301	0.365
	LTE Band 26	15M	QPSK	1	0	-	Edge4	0mm	Ant1	Full power	26865	831.5	1	24.15	25	1.216	-0.03	0.199	0.242
	LTE Band 26	15M	QPSK	36	0	-	Edge4	0mm	Ant1	Full power	26865	831.5	1	23.08	24	1.236	0.01	0.16	0.198
	LTE Band 26	15M	QPSK	1	0	-	Bottom Face	21mm	Ant1	Full power	26865	831.5	1	24.15	25	1.216	0.06	0.247	0.300
	LTE Band 26	15M	QPSK	1	0	-	Edge1	26mm	Ant1	Full power	26865	831.5	1	24.15	25	1.216	-0.1	0.078	0.095
1750MHz																			
	LTE Band 4	20M	QPSK	1	0	-	Bottom Face	0mm	Ant1	Reduced	20175	1732.5	1	13.59	15	1.384	-0.12	0.426	0.589
	LTE Band 4	20M	QPSK	50	0	-	Bottom Face	0mm	Ant1	Reduced	20175	1732.5	1	13.55	15	1.396	0.06	0.33	0.461
4	LTE Band 4	20M	QPSK	1	0	-	Edge1	0mm	Ant1	Reduced	20175	1732.5	1	13.59	15	1.384	-0.06	0.731	**1.011**
	LTE Band 4	20M	QPSK	50	0	-	Edge1	0mm	Ant1	Reduced	20175	1732.5	1	13.55	15	1.396	0.08	0.639	0.892
	LTE Band 4	20M	QPSK	100	0	-	Edge1	0mm	Ant1	Reduced	20175	1732.5	1	13.58	15	1.387	0.08	0.52	0.721
	LTE Band 4	20M	QPSK	1	0	-	Edge4	0mm	Ant1	Full power	20175	1732.5	1	23.69	25	1.352	0.03	0.54	0.730
	LTE Band 4	20M	QPSK	50	0	-	Edge4	0mm	Ant1	Full power	20175	1732.5	1	22.76	24	1.330	0.05	0.442	0.588
	LTE Band 4	20M	QPSK	1	0	-	Bottom Face	21mm	Ant1	Full power	20175	1732.5	1	23.69	25	1.352	0.13	0.215	0.291
	LTE Band 4	20M	QPSK	1	0	-	Edge1	26mm	Ant1	Full power	20175	1732.5	1	23.69	25	1.352	0.06	0.159	0.215
	LTE Band 4	20M	QPSK	1	0	-	Edge1	0mm	Ant1	Reduced	20175	1732.5	2	13.59	15	1.384	0.03	0.673	0.931

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Antenna	Power Reduction	Ch.	Freq. (MHz)	Sample	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
1900MHz																			
5	GSM1900	-	-	-	-	GPRS (4 Tx slots)	Bottom Face	0mm	Ant1	Reduced	661	1880	1	16.93	18	1.279	0.07	0.795	1.017
	GSM1900	-	-	-	-	GPRS (4 Tx slots)	Bottom Face	0mm	Ant1	Reduced	512	1850.2	1	16.79	18	1.321	-0.14	0.573	0.757
	GSM1900	-	-	-	-	GPRS (4 Tx slots)	Bottom Face	0mm	Ant1	Reduced	810	1909.8	1	16.83	18	1.309	0.05	0.781	1.022
	GSM1900	-	-	-	-	GPRS (4 Tx slots)	Edge1	0mm	Ant1	Reduced	661	1880	1	16.93	18	1.279	0.07	0.584	0.747
	GSM1900	-	-	-	-	GPRS (4 Tx slots)	Edge4	0mm	Ant1	Full power	661	1880	1	25.52	27	1.406	0.06	0.307	0.432
	GSM1900	-	-	-	-	GPRS (4 Tx slots)	Bottom Face	21mm	Ant1	Full power	661	1880	1	25.52	27	1.406	-0.18	0.354	0.498
	GSM1900	-	-	-	-	GPRS (4 Tx slots)	Edge1	26mm	Ant1	Full power	661	1880	1	25.52	27	1.406	0.1	0.281	0.395
	GSM1900	-	-	-	-	GPRS (4 Tx slots)	Bottom Face	0mm	Ant1	Reduced	810	1909.8	2	16.83	18	1.309	0.06	0.73	0.956
6	WCDMA II	-	-	-	-	RMC 12.2Kbps	Bottom Face	0mm	Ant1	Reduced	9400	1852.4	1	12.55	13.5	1.245	0.11	0.735	0.915
	WCDMA II	-	-	-	-	RMC 12.2Kbps	Bottom Face	0mm	Ant1	Reduced	9262	1852.4	1	12.53	13.5	1.250	0.06	0.726	0.908
	WCDMA II	-	-	-	-	RMC 12.2Kbps	Bottom Face	0mm	Ant1	Reduced	9538	1907.6	1	12.44	13.5	1.276	0.1	0.67	0.855
	WCDMA II	-	-	-	-	RMC 12.2Kbps	Edge1	0mm	Ant1	Reduced	9400	1880	1	12.55	13.5	1.245	-0.09	0.609	0.758
	WCDMA II	-	-	-	-	RMC 12.2Kbps	Edge4	0mm	Ant1	Full power	9400	1880	1	23.88	25	1.294	0.01	0.418	0.541
	WCDMA II	-	-	-	-	RMC 12.2Kbps	Bottom Face	21mm	Ant1	Full power	9400	1852.4	1	23.88	25	1.294	0.16	0.394	0.510
	WCDMA II	-	-	-	-	RMC 12.2Kbps	Edge1	26mm	Ant1	Full power	9400	1852.4	1	23.88	25	1.294	0.09	0.286	0.370
	LTE Band 2	20M	QPSK	1	0	-	Bottom Face	0mm	Ant1	Reduced	18900	1880	1	11.98	13.5	1.419	0.11	0.599	0.850
7	LTE Band 2	20M	QPSK	1	0	-	Bottom Face	0mm	Ant1	Reduced	18700	1860	1	11.85	13.5	1.462	-0.08	0.626	0.915
	LTE Band 2	20M	QPSK	1	0	-	Bottom Face	0mm	Ant1	Reduced	19100	1900	1	11.91	13.5	1.442	-0.16	0.586	0.845
	LTE Band 2	20M	QPSK	50	0	-	Bottom Face	0mm	Ant1	Reduced	18900	1880	1	11.93	13.5	1.435	0.06	0.466	0.669
	LTE Band 2	20M	QPSK	100	0	-	Bottom Face	0mm	Ant1	Reduced	18900	1880	1	11.89	13.5	1.449	0.03	0.448	0.649
	LTE Band 2	20M	QPSK	1	0	-	Edge1	0mm	Ant1	Reduced	18900	1880	1	11.98	13.5	1.419	0.15	0.446	0.633
	LTE Band 2	20M	QPSK	50	0	-	Edge1	0mm	Ant1	Reduced	18900	1880	1	11.93	13.5	1.435	0.05	0.36	0.517
	LTE Band 2	20M	QPSK	1	0	-	Edge4	0mm	Ant1	Full power	18900	1880	1	23.36	25	1.459	0.14	0.378	0.551
	LTE Band 2	20M	QPSK	50	0	-	Edge4	0mm	Ant1	Full power	18900	1880	1	22.41	24	1.442	0.11	0.303	0.437
	LTE Band 2	20M	QPSK	1	0	-	Bottom Face	21mm	Ant1	Full power	18900	1880	1	23.36	25	1.459	0.07	0.336	0.490
	LTE Band 2	20M	QPSK	1	0	-	Edge1	26mm	Ant1	Full power	18900	1880	1	23.36	25	1.459	0.19	0.284	0.414

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Antenna	Power Reduction	Ch.	Freq. (MHz)	Sample	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
2600MHz																				
8	LTE Band 7	20M	QPSK	1	0	Bottom Face	0mm	Ant2	Reduced	21100	2535	1	13.09	14	1.233	-	-	0.08	0.774	**0.954**
	LTE Band 7	20M	QPSK	1	0	Bottom Face	0mm	Ant2	Reduced	20850	2510	1	13.04	14	1.247	-	-	0.07	0.742	0.926
	LTE Band 7	20M	QPSK	1	0	Bottom Face	0mm	Ant2	Reduced	21350	2560	1	12.99	14	1.262	-	-	-0.16	0.753	0.95
	LTE Band 7	20M	QPSK	50	0	Bottom Face	0mm	Ant2	Reduced	21100	2535	1	13.07	14	1.239	-	-	0.06	0.58	0.719
	LTE Band 7	20M	QPSK	100	0	Bottom Face	0mm	Ant2	Reduced	21100	2535	1	12.86	14	1.300	-	-	-0.14	0.591	0.768
	LTE Band 7	20M	QPSK	1	0	Edge1	0mm	Ant2	Reduced	21100	2535	1	13.09	14	1.233	-	-	0.07	0.315	0.388
	LTE Band 7	20M	QPSK	50	0	Edge1	0mm	Ant2	Reduced	21100	2535	1	13.07	14	1.239	-	-	0.07	0.234	0.29
	LTE Band 7	20M	QPSK	1	0	Edge4	0mm	Ant2	Full power	21100	2535	1	24.17	25	1.211	-	-	0.02	0.18	0.218
	LTE Band 7	20M	QPSK	50	0	Edge4	0mm	Ant2	Full power	21100	2535	1	23.17	24	1.211	-	-	0.11	0.154	0.186
	LTE Band 7	20M	QPSK	1	0	Bottom Face	21mm	Ant2	Full power	21100	2535	1	24.17	25	1.211	-	-	-0.17	0.345	0.418
	LTE Band 7	20M	QPSK	1	0	Edge1	26mm	Ant2	Full power	21100	2535	1	24.17	25	1.211	-	-	-0.08	0.191	0.231
	LTE Band 7	20M	QPSK	1	0	Bottom Face	0mm	Ant2	Reduced	21100	2535	2	13.09	14	1.233	-	-	0.01	0.764	0.942
9	LTE Band 41	20M	QPSK	1	0	Bottom Face	0mm	Ant2	Reduced	40620	2593	1	15.55	16	1.109	62.9	1.006	-0.12	0.767	**0.856**
	LTE Band 41	20M	QPSK	1	0	Bottom Face	0mm	Ant2	Reduced	39750	2506	1	15.44	16	1.138	62.9	1.006	-0.03	0.735	0.841
	LTE Band 41	20M	QPSK	1	0	Bottom Face	0mm	Ant2	Reduced	40185	2549.5	1	15.51	16	1.119	62.9	1.006	0.19	0.744	0.838
	LTE Band 41	20M	QPSK	1	0	Bottom Face	0mm	Ant2	Reduced	41055	2636.5	1	15.32	16	1.169	62.9	1.006	-0.12	0.721	0.848
	LTE Band 41	20M	QPSK	1	0	Bottom Face	0mm	Ant2	Reduced	41490	2680	1	15.43	16	1.140	62.9	1.006	0.08	0.735	0.843
	LTE Band 41	20M	QPSK	50	0	Bottom Face	0mm	Ant2	Reduced	40620	2593	1	15.46	16	1.132	62.9	1.006	-0.19	0.589	0.671
	LTE Band 41	20M	QPSK	50	0	Bottom Face	0mm	Ant2	Reduced	39750	2506	1	15.33	16	1.167	62.9	1.006	0.12	0.643	0.755
	LTE Band 41	20M	QPSK	50	0	Bottom Face	0mm	Ant2	Reduced	40185	2549.5	1	15.34	16	1.164	62.9	1.006	0.05	0.638	0.747
	LTE Band 41	20M	QPSK	50	0	Bottom Face	0mm	Ant2	Reduced	41055	2636.5	1	15.31	16	1.172	62.9	1.006	0.03	0.578	0.682
	LTE Band 41	20M	QPSK	50	0	Bottom Face	0mm	Ant2	Reduced	41490	2680	1	15.45	16	1.135	62.9	1.006	0.16	0.547	0.625
	LTE Band 41	20M	QPSK	100	0	Bottom Face	0mm	Ant2	Reduced	40620	2593	1	15.28	16	1.180	62.9	1.006	-0.16	0.604	0.717
	LTE Band 41	20M	QPSK	1	0	Edge1	0mm	Ant2	Reduced	40620	2593	1	15.55	16	1.109	62.9	1.006	-0.01	0.27	0.301
	LTE Band 41	20M	QPSK	50	0	Edge1	0mm	Ant2	Reduced	40620	2593	1	15.46	16	1.132	62.9	1.006	0.04	0.217	0.247
	LTE Band 41	20M	QPSK	1	0	Edge4	0mm	Ant2	Full power	40620	2593	1	24.31	25	1.172	62.9	1.006	-0.1	0.118	0.139
	LTE Band 41	20M	QPSK	50	0	Edge4	0mm	Ant2	Full power	40620	2593	1	23.34	24	1.164	62.9	1.006	-0.12	0.102	0.119
	LTE Band 41	20M	QPSK	1	0	Bottom Face	21mm	Ant2	Full power	40620	2593	1	24.31	25	1.172	62.9	1.006	0.03	0.179	0.211
	LTE Band 41	20M	QPSK	1	0	Edge1	26mm	Ant2	Full power	40620	2593	1	24.31	25	1.172	62.9	1.006	0.04	0.096	0.113

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power Reduction	Ch.	Freq. (MHz)	Sample	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
WIFI/BT																	
10	WLAN2.4GHz	802.11b 1Mbps	Bottom Face	0mm	Ant3	Reduced	1	2412	1	9.46	11	1.426	98.33	1.017	-0.07	0.308	**0.447**
	WLAN2.4GHz	802.11b 1Mbps	Edge1	0mm	Ant3	Reduced	1	2412	1	9.46	11	1.426	98.33	1.017	0.18	0.162	0.235
	WLAN2.4GHz	802.11b 1Mbps	Bottom Face	17mm	Ant3	Full power	1	2412	1	19.51	21	1.409	98.33	1.017	0.05	0.054	0.077
	WLAN2.4GHz	802.11b 1Mbps	Edge1	22mm	Ant3	Full power	1	2412	1	19.51	21	1.409	98.33	1.017	0.1	0.025	0.036
	WLAN2.4GHz	802.11b 1Mbps	Bottom Face	0mm	Ant3	Reduced	1	2412	2	9.46	11	1.426	98.33	1.017	0.03	0.266	0.386
11	Bluetooth	-	Bottom Face	0mm	Ant3	Full power	78	2480	1	6.57	7.5	1.240	76.79	1.302	-0.05	0.117	**0.189**
	Bluetooth	-	Edge1	0mm	Ant3	Full power	78	2480	1	6.57	7.5	1.240	76.79	1.302	0.01	0.105	0.169
12	WLAN5.2GHz	802.11ac-VHT80 MCS0	Bottom Face	0mm	Ant3	Reduced	42	5210	1	7.66	9.5	1.528	92.73	1.078	0.07	0.204	**0.336**
	WLAN5.2GHz	802.11ac-VHT80 MCS0	Edge1	0mm	Ant3	Reduced	42	5210	1	7.66	9.5	1.528	92.73	1.078	0.02	0.12	0.198
	WLAN5.2GHz	802.11a 6Mbps	Bottom Face	17mm	Ant3	Full power	36	5180	1	18.52	20	1.406	98.28	1.018	0.11	0.141	0.202
	WLAN5.2GHz	802.11a 6Mbps	Edge1	22mm	Ant3	Full power	36	5180	1	18.52	20	1.406	98.28	1.018	0.04	0.057	0.082
	WLAN5.2GHz	802.11ac-VHT80 MCS0	Bottom Face	0mm	Ant3	Reduced	42	5210	2	7.66	9.5	1.528	92.73	1.078	0.08	0.201	0.331
13	WLAN5.3GHz	802.11ac-VHT80 MCS0	Bottom Face	0mm	Ant3	Reduced	58	5290	1	7.89	9.5	1.450	92.73	1.078	0.16	0.222	**0.347**
	WLAN5.3GHz	802.11ac-VHT80 MCS0	Edge1	0mm	Ant3	Reduced	58	5290	1	7.89	9.5	1.450	92.73	1.078	0.15	0.143	0.223
	WLAN5.3GHz	802.11a 6Mbps	Bottom Face	17mm	Ant3	Full power	60	5300	1	18.04	19.5	1.400	98.28	1.018	-0.11	0.144	0.205
	WLAN5.3GHz	802.11a 6Mbps	Edge1	22mm	Ant3	Full power	60	5300	1	18.04	19.5	1.400	98.28	1.018	0.05	0.051	0.073
	WLAN5.3GHz	802.11ac-VHT80 MCS0	Bottom Face	0mm	Ant3	Reduced	58	5290	2	7.89	9.5	1.450	92.73	1.078	0.08	0.198	0.309
	WLAN5.5GHz	802.11ac-VHT80 MCS0	Bottom Face	0mm	Ant3	Reduced	106	5530	1	7.12	8.5	1.374	92.73	1.078	0.18	0.235	0.348
14	WLAN5.5GHz	802.11ac-VHT80 MCS0	Edge1	0mm	Ant3	Reduced	106	5530	1	7.12	8.5	1.374	92.73	1.078	-0.09	0.247	**0.366**
	WLAN5.5GHz	802.11a 6Mbps	Bottom Face	17mm	Ant3	Full power	100	5500	1	18.40	20	1.445	98.28	1.018	0.02	0.123	0.181
	WLAN5.5GHz	802.11a 6Mbps	Edge1	22mm	Ant3	Full power	100	5500	1	18.40	20	1.445	98.28	1.018	-0.15	0.043	0.063
	WLAN5.5GHz	802.11ac-VHT80 MCS0	Edge1	0mm	Ant3	Reduced	106	5530	2	7.12	8.5	1.374	92.73	1.078	0.01	0.242	0.358
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Bottom Face	0mm	Ant3	Reduced	155	5775	1	5.58	7	1.387	92.73	1.078	-0.04	0.154	0.23
15	WLAN5.8GHz	802.11ac-VHT80 MCS0	Edge1	0mm	Ant3	Reduced	155	5775	1	5.58	7	1.387	92.73	1.078	-0.08	0.222	**0.332**
	WLAN5.8GHz	802.11a 6Mbps	Bottom Face	17mm	Ant3	Full power	157	5785	1	18.02	19.5	1.406	98.28	1.018	0.07	0.086	0.123
	WLAN5.8GHz	802.11a 6Mbps	Edge1	22mm	Ant3	Full power	157	5785	1	18.02	19.5	1.406	98.28	1.018	0.06	0.033	0.047
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Edge1	0mm	Ant3	Reduced	155	5775	2	5.58	7	1.387	92.73	1.078	0.06	0.199	0.298

16.2 Repeated SAR Measurement

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Sample	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Ratio	Reported 1g SAR (W/kg)
1st	GSM850	-	-	-	-	GPRS (4 Tx slots)	Bottom Face	0mm	1	Reduced	251	848.8	20.43	21	1.140		1.000	0.09	0.907	1	1.034
2nd	GSM850	-	-	-	-	GPRS (4 Tx slots)	Bottom Face	0mm	1	Reduced	251	848.8	20.43	21	1.140		1.000	0.03	0.904	1.003	1.031

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	Body
1.	WWAN + 2.4GHz WLAN	Yes
2.	WWAN + 5GHz WLAN	Yes
3.	WWAN + Bluetooth	Yes
4.	WWAN + Bluetooth + 5GHz WLAN	Yes

General Note:

1. EUT will choose each GSM, WCDMA and LTE according to the network signal condition; therefore, they will not operate simultaneously at any moment.
2. 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.
3. WLAN 2.4GHz and Bluetooth share the same antenna so cannot transmit simultaneously.
4. According to the EUT character, WLAN 5GHz and Bluetooth can transmit simultaneously.
5. The reported SAR summation is calculated based on the same configuration and test position.
6. All licensed modes share the same antenna part and cannot transmit simultaneously.
7. 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 for 1g SAR, simultaneously transmission SAR measurement is not necessary.
   iv) Simultaneously transmission SAR measurement, and the reported multi-band 1g SAR < 1.6W/kg.
   v) The SPLSR calculated results please refer to section 17.2.

17.1 Body Accessory Exposure Conditions

WWAN Band	Exposure Position	1	2	3	4	1+2	1+3+4
		WWAN	WLAN2.4GHz	WLAN5GHz	Bluetooth	Summed	Summed
		1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)
GSM850 Ant1	Bottom Face at 0mm	1.034	0.447	0.348	0.189	1.48	1.57
	Edge1 at 0mm	0.470	0.235	0.366	0.169	0.71	1.01
	Edge2 at 0mm	0.097				0.10	0.10
	Edge3 at 0mm	0.139				0.14	0.14
	Edge4 at 0mm	0.216				0.22	0.22
GSM1900 Ant1	Bottom Face at 0mm	1.022	0.447	0.348	0.189	1.47	1.56
	Edge1 at 0mm	0.747	0.235	0.366	0.169	0.98	1.28
	Edge4 at 0mm	0.432				0.43	0.43
WCDMA II Ant1	Bottom Face at 0mm	0.915	0.447	0.348	0.189	1.36	1.45
	Edge1 at 0mm	0.758	0.235	0.366	0.169	0.99	1.29
	Edge4 at 0mm	0.541				0.54	0.54
WCDMA V Ant1	Bottom Face at 0mm	0.940	0.447	0.348	0.189	1.39	1.48
	Edge1 at 0mm	0.341	0.235	0.366	0.169	0.58	0.88
	Edge4 at 0mm	0.208				0.21	0.21
LTE Band 2 Ant1	Bottom Face at 0mm	0.915	0.447	0.348	0.189	1.36	1.45
	Edge1 at 0mm	0.633	0.235	0.366	0.169	0.87	1.17
	Edge4 at 0mm	0.551				0.55	0.55
LTE Band 4 Ant1	Bottom Face at 0mm	0.589	0.447	0.348	0.189	1.04	1.13
	Edge1 at 0mm	1.011	0.235	0.366	0.169	1.25	1.55
	Edge4 at 0mm	0.730				0.73	0.73
LTE Band 7 Ant2	Bottom Face at 0mm	0.954	0.447	0.348	0.189	1.40	1.49
	Edge1 at 0mm	0.388	0.235	0.366	0.169	0.62	0.92
	Edge4 at 0mm	0.218				0.22	0.22
LTE Band 26 Ant1	Bottom Face at 0mm	0.999	0.447	0.348	0.189	1.45	1.54
	Edge1 at 0mm	0.438	0.235	0.366	0.169	0.67	0.97
	Edge4 at 0mm	0.242				0.24	0.24
LTE Band 41 Ant2	Bottom Face at 0mm	0.856	0.447	0.348	0.189	1.30	1.39
	Edge1 at 0mm	0.301	0.235	0.366	0.169	0.54	0.84
	Edge4 at 0mm	0.139				0.14	0.14

Test Engineer : Martin Li, Varus Wang, Ricky Gu, Light Wang, Damon Zhu

18. Uncertainty Assessment

Per KDB 865664 D01 SAR measurement 100MHz to 6GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg. The expanded SAR measurement uncertainty must be ≤ 30%, for a confidence interval of k = 2. If these conditions are met, extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval. For this device, the highest measured 1-g SAR is less 1.5W/kg. Therefore, the measurement uncertainty table is not required in this report.

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 865664 D01 v01r04, "SAR Measurement Requirements for 100 MHz to 6 GHz", Aug 2015.

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

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

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

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

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

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

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

------THE END------

Appendix A. Plots of System Performance Check

The plots are shown as follows.

System Check_Head_835MHz

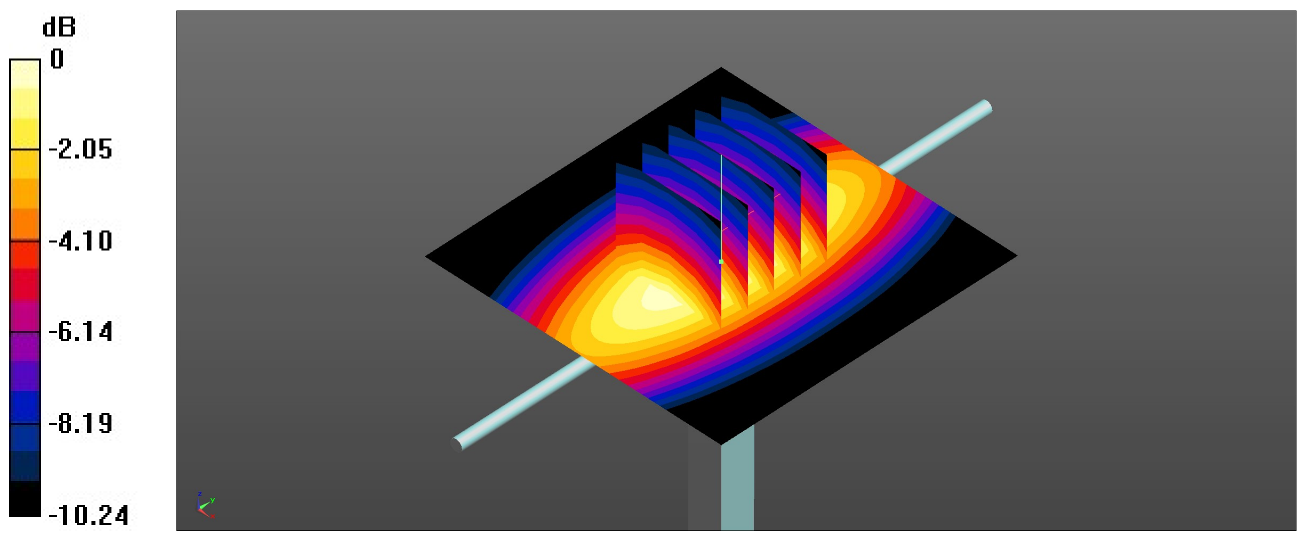
DUT: D835V2 - SN:4d258

Communication System: UID 0, CW (0); Frequency: 835 MHz;Duty Cycle: 1:1
Medium: HSL_835 Medium parameters used: f = 835 MHz; σ = 0.921 S/m; ε_r = 40.88; ρ = 1000 kg/m^3
Ambient Temperature：23.3 ℃; Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(9.18, 9.18, 9.18); Calibrated: 2021/11/24
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2021/9/21
- Phantom: ELI Phantom; Type: ELI V8.0; Serial: TP-2134
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Pin=50mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.656 W/kg

Pin=50mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.69 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.729 W/kg
SAR(1 g) = 0.490 W/kg; SAR(10 g) = 0.326 W/kg
Maximum value of SAR (measured) = 0.648 W/kg



0 dB = 0.648 W/kg = -1.88 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2022/3/10

System Check_Head_1750MHz

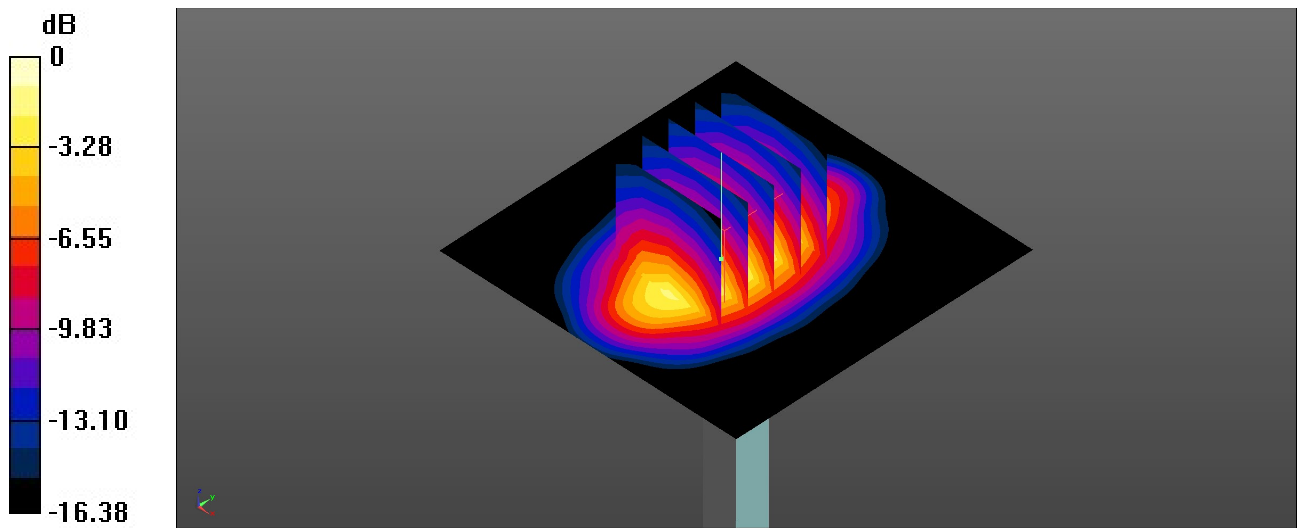
DUT: D1750V2 - SN:1090

Communication System: UID 0, CW (0); Frequency: 1750 MHz;Duty Cycle: 1:1
Medium: HSL_1750 Medium parameters used: f = 1750 MHz; σ = 1.341 S/m; ε_r = 39.554; ρ = 1000 kg/m^3
Ambient Temperature：23.1 ℃; Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(8.13, 8.13, 8.13); Calibrated: 2021/11/24
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2021/9/21
- Phantom: ELI Phantom; Type: ELI V8.0; Serial: TP-2134
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Pin=50mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 2.70 W/kg

Pin=50mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 45.71 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 3.12 W/kg
SAR(1 g) = 1.75 W/kg; SAR(10 g) = 0.947 W/kg
Maximum value of SAR (measured) = 2.65 W/kg



0 dB = 2.65 W/kg = 4.23 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2022/3/11

System Check_Head_1900MHz

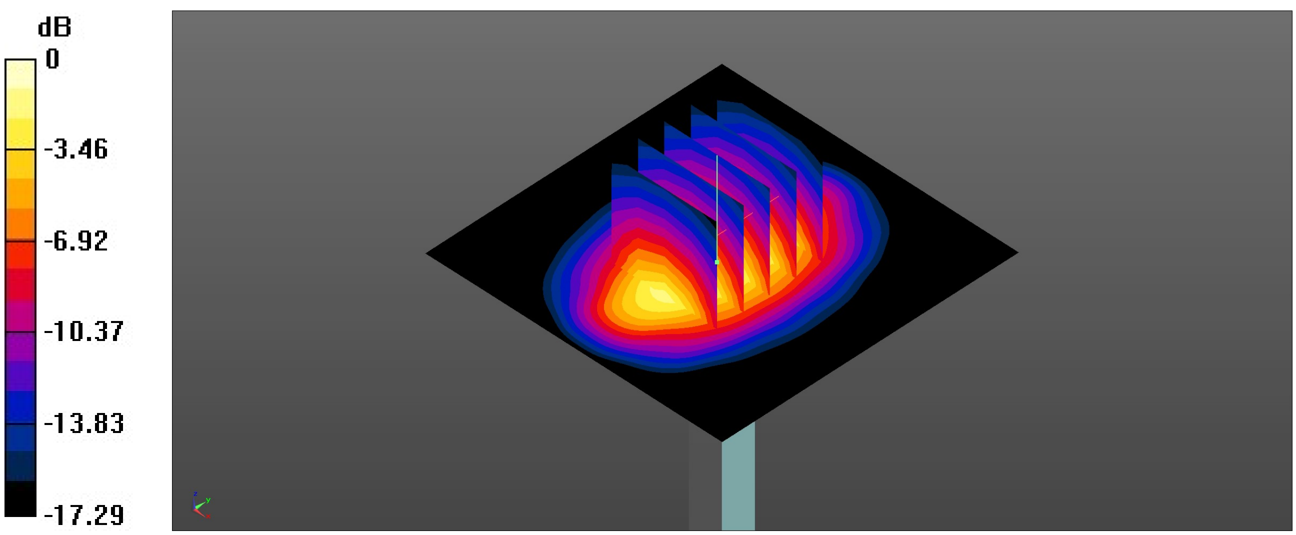
DUT: D1900V2 - SN:5d170

Communication System: UID 0, CW (0); Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: HSL_1900 Medium parameters used: f = 1900 MHz; σ = 1.423 S/m; ε_r = 39.322; ρ = 1000 kg/m^3
Ambient Temperature：23.1 ℃; Liquid Temperature：22.9 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(7.86, 7.86, 7.86); Calibrated: 2021/11/24
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2021/9/21
- Phantom: ELI Phantom; Type: ELI V8.0; Serial: TP-2134
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Pin=50mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 3.10 W/kg

Pin=50mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 46.97 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 3.67 W/kg
SAR(1 g) = 1.99 W/kg; SAR(10 g) = 1.05 W/kg
Maximum value of SAR (measured) = 3.07 W/kg



0 dB = 3.07 W/kg = 4.87 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2022/3/11

System Check_Head_2450MHz

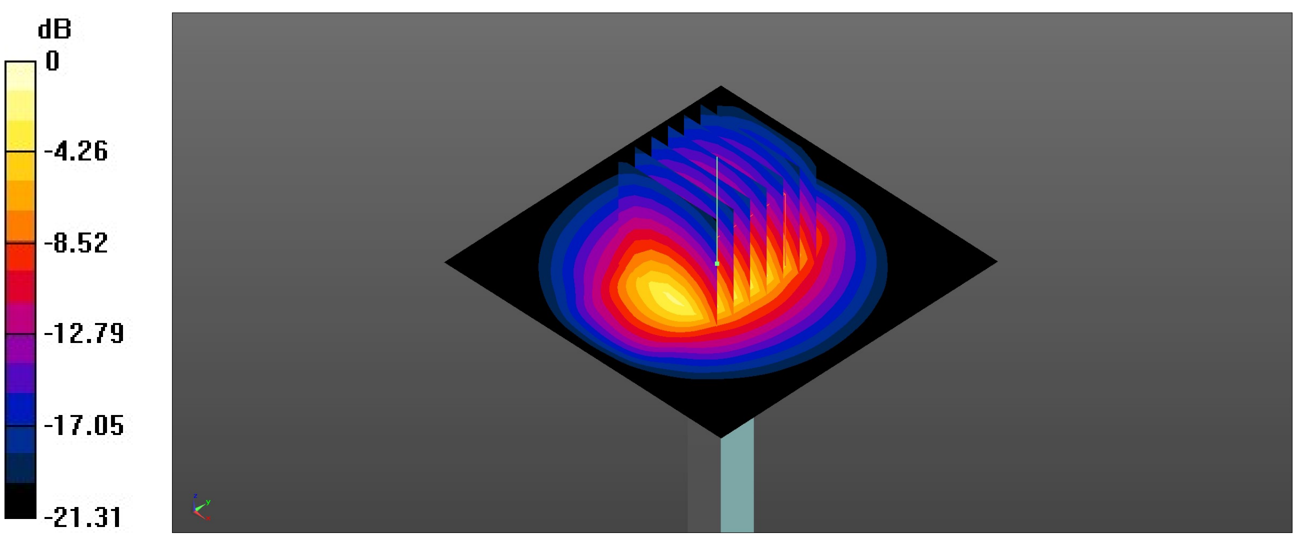
DUT: D2450V2 - SN:908

Communication System: UID 0, CW (0); Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: HSL_2450 Medium parameters used: f = 2450 MHz; σ = 1.805 S/m; ε_r = 38.557; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.6 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(7.53, 7.53, 7.53); Calibrated: 2021/11/24
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2021/9/21
- Phantom: ELI Phantom; Type: ELI V8.0; Serial: TP-2134
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Pin=50mW/Area Scan (71x71x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 3.88 W/kg

Pin=50mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 48.67 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 4.75 W/kg
SAR(1 g) = 2.47 W/kg; SAR(10 g) = 1.14 W/kg
Maximum value of SAR (measured) = 3.92 W/kg



0 dB = 3.92 W/kg = 5.93 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2022/3/12

System Check_Head_2600MHz

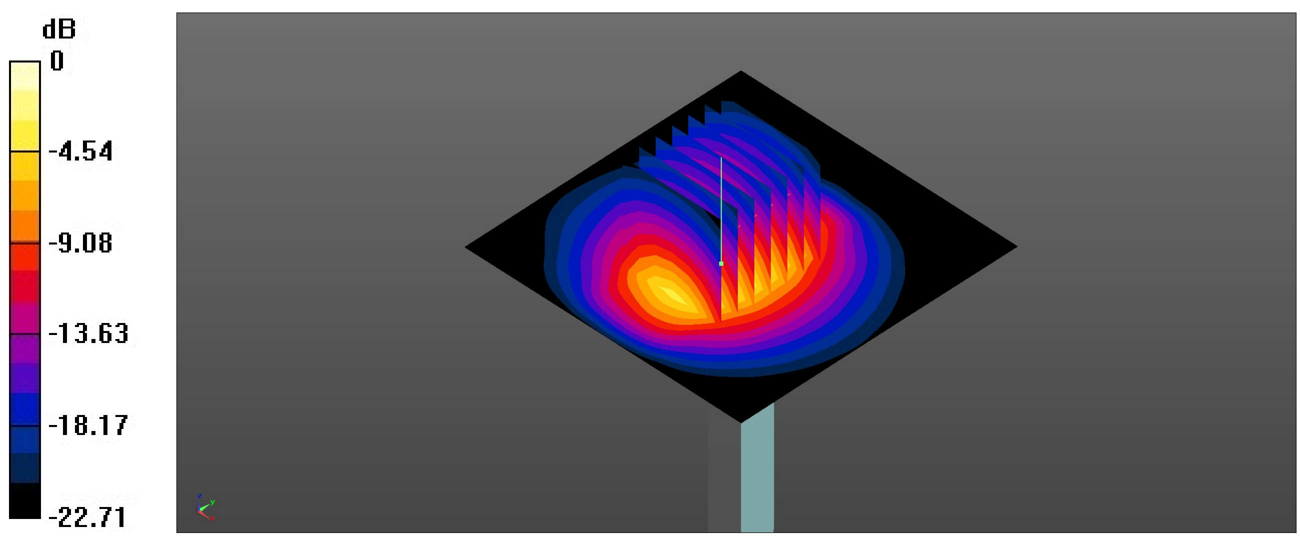
DUT: D2600V2 - SN:1061

Communication System: UID 0, CW (0); Frequency: 2600 MHz;Duty Cycle: 1:1
Medium: HSL_2600 Medium parameters used: f = 2600 MHz; σ = 1.924 S/m; ε_r = 38.25; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.6 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(7.28, 7.28, 7.28); Calibrated: 2021/11/24
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2021/9/21
- Phantom: ELI Phantom; Type: ELI V8.0; Serial: TP-2134
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Pin=50mW/Area Scan (71x71x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 4.04 W/kg

Pin=50mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 45.51 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 5.18 W/kg
SAR(1 g) = 2.68 W/kg; SAR(10 g) = 1.23 W/kg
Maximum value of SAR (measured) = 4.21 W/kg



0 dB = 4.21 W/kg = 6.24 dBW/kg

System Check_Head_5250MHz

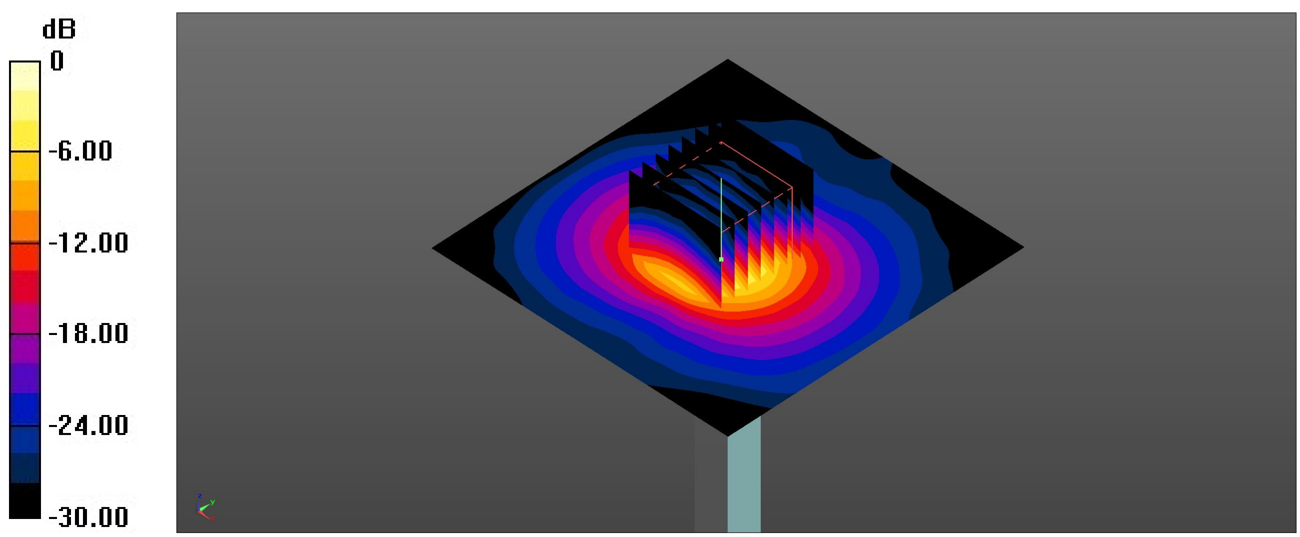
DUT: D5GHzV2 - SN:1113

Communication System: UID 0, CW (0); Frequency: 5250 MHz;Duty Cycle: 1:1
Medium: HSL_5000 Medium parameters used: f = 5250 MHz; σ = 4.587 S/m; ε_r = 36.209; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.9 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(5.05, 5.05, 5.05); Calibrated: 2021/11/24
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2021/9/21
- Phantom: ELI Phantom; Type: ELI V8.0; Serial: TP-2134
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Pin=50mW/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 7.26 W/kg

Pin=50mW/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 40.64 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 12.6 W/kg
SAR(1 g) = 3.77 W/kg; SAR(10 g) = 1.09 W/kg
Maximum value of SAR (measured) = 7.89 W/kg



0 dB = 7.89 W/kg = 8.97 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab   Date: 2022/3/18

System Check_Head_5600MHz

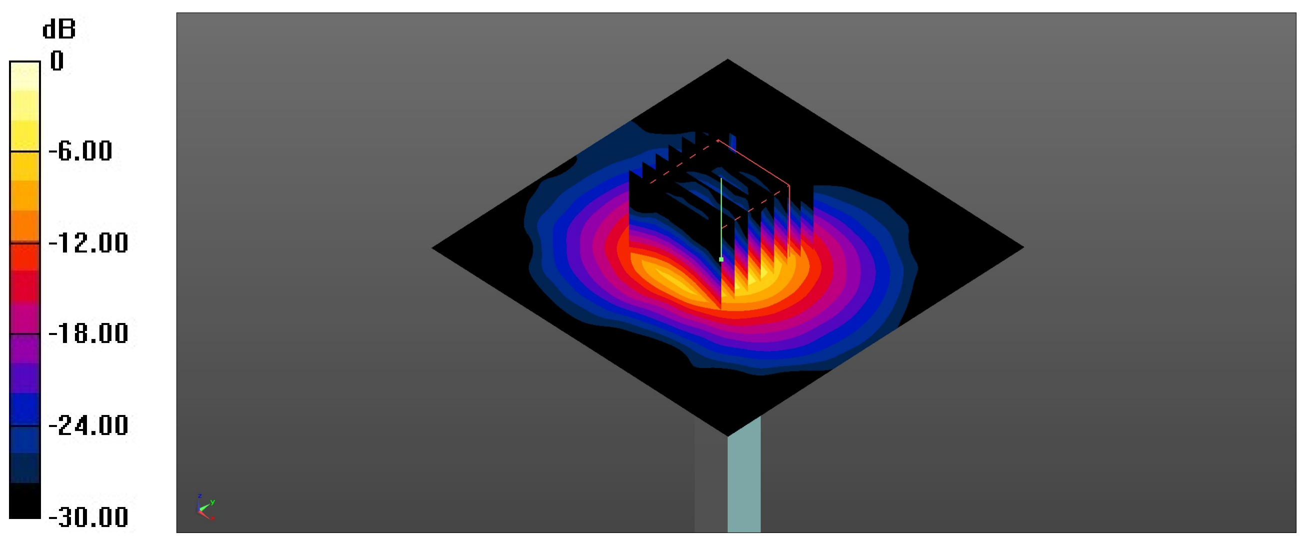
DUT: D5GHzV2 - SN:1113

Communication System: UID 0, CW (0); Frequency: 5600 MHz;Duty Cycle: 1:1
Medium: HSL_5000 Medium parameters used: f = 5600 MHz; σ = 4.964 S/m; ε_r = 35.704; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.9 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(4.69, 4.69, 4.69); Calibrated: 2021/11/24
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2021/9/21
- Phantom: ELI Phantom; Type: ELI V8.0; Serial: TP-2134
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Pin=50mW/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 8.66 W/kg

Pin=50mW/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 43.18 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 15.9 W/kg
SAR(1 g) = 3.88 W/kg; SAR(10 g) = 1.13 W/kg
Maximum value of SAR (measured) = 9.22 W/kg



0 dB = 9.22 W/kg = 9.65 dBW/kg