FCC SAR Test Report

FCC ID: VSFMS3A

Project No.	:	1907H013
Equipment	:	Tablet
Brand Name	:	Juniper Systems
Test Model	:	MS3A
Series Model	:	N/A
Date of Receipt	:	Aug. 02, 2019
Date of Test	:	Sep. 19, 2019 ~ Oct. 09, 2019
Issued Date	:	Nov. 25, 2019
Report Version	:	R01
Test Sample	:	Engineering Sample No.: DG2019091637, DG2019091635
Standard(s)	:	Please refer to page 2.
Applicant	:	Juniper Systems
Address	:	1132 W 1700 N Logan, UT 84321 USA
Manufacturer	:	Juniper Systems
Address	:	1132 W 1700 N Logan, UT 84321 USA
Factory	:	Borqs BeiJing Ltd.
Address	:	Tower A, Building B23, Universal Business Park, No. 10 Jiuxianqiao Road, Chaoyang District Beijing, 100015 China

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

Rot . Liang

Prepared by : Rot Liang

Herbort Liu

Approved by : Herbort Liu

Certificate #5123.02

Add: No.3, Jinshagang 1st Road, Shixia, Dalang Town,Dongguan, Guangdong, China.
Tel: +86-769-8318-3000
Web: www.newbtl.com

Standard(s)	:	**FCC 47CFR §2.1093** Radio frequency Radiation Exposure Evaluation: Portable Devices **ANSI Std C95.1-1992** Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz – 300 GHz.(IEEE Std C95.1-1991) **IEEE Std 1528-2013** Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques **KDB616217 D04** SAR for laptop and tablets v01r02 **KDB941225 D01** 3G SAR Procedures v03r01 **KDB941225 D05** SAR for LTE Devices v02r05 **KDB447498 D01** General RF Exposure Guidance v06 **KDB248227 D01** 802. 11 Wi-Fi SAR v02r02 **KDB865664 D01** SAR measurement 100 MHz to 6 GHz v01r04 **KDB865664 D02** RF Exposure Reporting v01r02 **KDB690783 D01** SAR Listings on Grants v01r03

Declaration

BTL represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

BTL's reports apply only to the specific samples tested under conditions. It is manufacture’s responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **BTL** issued reports.

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BTL’s laboratory quality assurance procedures are in compliance with the **ISO/IEC 17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

BTL is not responsible for the sampling stage, so the results only apply to the sample as received.

The information, data and test plan are provided by manufacturer which may affect the validity of results, so it is manufacturer’s responsibility to ensure that the apparatus meets the essential requirements of applied standards and in all the possible configurations as representative of its intended use.

Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

Please note that the measurement uncertainty is provided for informational purpose only and are not use in determining the Pass/Fail results.

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REPORT ISSUED HISTORY

Report Version	Description	Issued Date
R00	Original Issue.	Oct. 15, 2019
R01	Added the NFC function which does not affect the test results, the rest are kept the same.	Nov. 25, 2019

1. RF EMISSIONS MEASUREMENT

1.1 TEST FACILITY

The test facilities used to collect the test data in this report is **SAR room** at the location of No.3,Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China.

1.2 MEASUREMENT UNCERTAINTY

Uncertainty Budget for Frequency range of 300 MHz to 3 GHz (IEEE 1528, IEC/EN 62209-1)

Error Description	Uncertainty Value (± %)	Probability Distribution	Divisor	Ci (1g)	Ci (10g)	Standard Uncertainty (1g)	Standard Uncertainty (10g)	Vi V_{eff}
Measurement System								
Probe Calibration	6.05	Normal	1	1	1	± 6.05 %	± 6.05 %	∞
Axial Isotropy	4.7	Rectangular	$\sqrt{3}$	0.7	0.7	± 1.9 %	± 1.9 %	∞
Hemispherical Isotropy	9.6	Rectangular	$\sqrt{3}$	0.7	0.7	± 3.9 %	± 3.9 %	∞
Boundary Effects	1	Rectangular	$\sqrt{3}$	1	1	± 0.6 %	± 0.6 %	∞
Linearity	4.7	Rectangular	$\sqrt{3}$	1	1	± 2.7 %	± 2.7 %	∞
Detection Limits	1	Rectangular	$\sqrt{3}$	1	1	± 0.6 %	± 0.6 %	∞
Modulation response	2.4	Rectangular	$\sqrt{3}$	1	1	±1.4 %	±1.4 %	∞
Readout Electronics	0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Response Time	0.8	Rectangular	$\sqrt{3}$	1	1	± 0.5%	± 0.5 %	∞
Integration Time	2.6	Rectangular	$\sqrt{3}$	1	1	± 1.5 %	± 1.5 %	∞
RF Ambient – Noise	3	Rectangular	$\sqrt{3}$	1	1	± 1.7 %	± 1.7 %	∞
RF Ambient– Reflections	3	Rectangular	$\sqrt{3}$	1	1	± 1.7 %	± 1.7 %	∞
Probe Positioner	0.4	Rectangular	$\sqrt{3}$	1	1	± 0.2 %	± 0.2 %	∞
Probe Positioning	2.9	Rectangular	$\sqrt{3}$	1	1	± 1.7 %	±1.7 %	∞
Max.SAR Evaluation	4	Rectangular	$\sqrt{3}$	1	1	± 2.3 %	± 2.3 %	∞
Test Sample Related								
Device Positioning	2.6 2.3	Normal	1	1	1	± 2.9 %	± 2.8 %	145
Device Holder	2.2 2.5	Normal	1	1	1	± 2.4 %	± 2.8 %	5
Power Drift	5.0	Rectangular	$\sqrt{3}$	1	1	± 2.9 %	± 2.9 %	∞
Phantom and Setup								
Phantom Production Tolerances	6.1	Rectangular	$\sqrt{3}$	1	1	2.31	2.31	∞
SAR correction	1.9	Rectangular	$\sqrt{3}$	1	0.84	1.10	1.10	
Liquid Conductivity (mea.)	2.5	Rectangular	$\sqrt{3}$	0.78	0.71	1.13	1.13	∞
Liquid Permittivity (mea.)	2.5	Rectangular	$\sqrt{3}$	0.26	0.26	0.38	0.38	∞
Temp. unc. - Conductivity	3.4	Rectangular	$\sqrt{3}$	0.78	0.71	1.53	1.53	∞
Temp. unc. - Permittivity	0.4	Rectangular	$\sqrt{3}$	0.23	0.26	0.05	0.05	∞
Combined Standard Uncertainty (K = 1)						± 10.93 %	± 10.93 %	361
Expanded Uncertainty (K = 2)						**± 21.86 %**	**± 21.86 %**	

Uncertainty Budget for Frequency range of 3 GHz to 6 GHz (IEEE 1528, IEC/EN 62209-1)

Error Description	Uncertainty Value (± %)	Probability Distribution	Divisor	Ci (1g)	Ci (10g)	Standard Uncertainty (1g)	Standard Uncertainty (10g)	Vi V_{eff}
Measurement System								
Probe Calibration	6.65	Normal	1	1	1	± 6.65 %	± 6.65 %	∞
Axial Isotropy	4.7	Rectangular	$\sqrt{3}$	0.7	0.7	± 1.9 %	± 1.9 %	∞
Hemispherical Isotropy	9.6	Rectangular	$\sqrt{3}$	0.7	0.7	± 3.9 %	± 3.9 %	∞
Boundary Effects	2	Rectangular	$\sqrt{3}$	1	1	± 1.2 %	± 1.2 %	∞
Linearity	4.7	Rectangular	$\sqrt{3}$	1	1	± 2.7 %	± 2.7 %	∞
Detection Limits	1	Rectangular	$\sqrt{3}$	1	1	± 0.6 %	± 0.6 %	∞
Modulation response	2.4	Rectangular	$\sqrt{3}$	1	1	±1.4 %	±1.4 %	∞
Readout Electronics	0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Response Time	0.8	Rectangular	$\sqrt{3}$	1	1	± 0.5%	± 0.5 %	∞
Integration Time	2.6	Rectangular	$\sqrt{3}$	1	1	± 1.5 %	± 1.5 %	∞
RF Ambient – Noise	3	Rectangular	$\sqrt{3}$	1	1	± 1.7 %	± 1.7 %	∞
RF Ambient– Reflections	3	Rectangular	$\sqrt{3}$	1	1	± 1.7 %	± 1.7 %	∞
Probe Positioner	0.4	Rectangular	$\sqrt{3}$	1	1	± 0.2 %	± 0.2 %	∞
Probe Positioning	6.7	Rectangular	$\sqrt{3}$	1	1	± 3.9 %	±3.9 %	∞
Max.SAR Evaluation	4	Rectangular	$\sqrt{3}$	1	1	± 2.3 %	± 2.3 %	∞
Test Sample Related								
Device Positioning	2.6 2.3	Normal	1	1	1	± 2.9 %	± 2.8 %	145
Device Holder	2.2 2.5	Normal	1	1	1	± 2.4 %	± 2.8 %	5
Power Drift	5.0	Rectangular	$\sqrt{3}$	1	1	± 2.9 %	± 2.9 %	∞
Phantom and Setup								
Phantom Production Tolerances	6.1	Rectangular	$\sqrt{3}$	1	1	2.31	2.31	∞
SAR correction	1.9	Rectangular	$\sqrt{3}$	1	0.84	1.10	1.10	
Liquid Conductivity (mea.)	2.5	Rectangular	$\sqrt{3}$	0.78	0.71	1.13	1.13	∞
Liquid Permittivity (mea.)	2.5	Rectangular	$\sqrt{3}$	0.26	0.26	0.38	0.38	∞
Temp. unc. - Conductivity	3.4	Rectangular	$\sqrt{3}$	0.78	0.71	1.53	1.53	∞
Temp. unc. - Permittivity	0.4	Rectangular	$\sqrt{3}$	0.23	0.26	0.05	0.05	∞
Combined Standard Uncertainty (K = 1)						± 11.84 %	± 11.80 %	361
Expanded Uncertainty (K = 2)						**± 23.69 %**	**± 23.60 %**	

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Tablet	
Model Name	MS3A	
HW Version	DVT1	
SW Version	MS3A-userdebug 9.1.0.1-20190619 eng.mirror.20190619.093211 test-keys	
Modulation	GSM(GMSK/8PSK), UMTS(QPSK), CDMA(QPSK), LTE(QPSK/16QAM), WiFi(DSSS/OFDM), BT(GFSK/π/4-DQPSK/8-DPSK), RFID, NFC(ASK)	
Operation Frequency Range(s)	Band	TX (MHz)
	GSM850	824~849
	GSM1900	1850~1910
	UMTS B2	1850~1910
	UMTS B4	1710~1755
	UMTS B5	824~849
	LTE B2	1850~1910
	LTE B4	1710~1755
	LTE B5	824~849
	LTE B7	2500~2570
	LTE B12	699~716
	LTE B13	777~787
	LTE B14	788~798
	LTE B17	704~716
	Bluetooth	2400~2483.5
	2.4G WLAN	2400~2483.5
	5.2G WLAN	5150~5250
	5.3G WLAN	5250~5350
	5.6G WLAN	5470~5725
	5.8G WLAN	5725~5850
	RFID(Micro)	917.45~922.55
	RFID(NANO)	917.3~927.3
	NFC	13.56
GPRS/EDGE Multislot Class (12)	Max Number of Timeslots in Uplink:	4
	Max Number of Timeslots in Downlink:	4
	Max Total Timeslot:	5
GSM Device class	Class B	
HSDPA UE Category	14	
HSUPA UE Category	6	
DC-HSDPA UE Category	24	
Power Class	4,tested with power level 5(GSM850)	
	1,tested with power level 0(GSM1900)	
	3, tested with power control “all 1”(UMTS B2/4/5)	
	3, tested with power control “all Max” (LTE B2/4/5/7/12/13/14)	

<table>
<tr><td rowspan="23">Test Channels
(low-mid-high)</td><td colspan="5">128-190-251 (GSM850)</td></tr>
<tr><td colspan="5">512-661-810 (GSM1900)</td></tr>
<tr><td colspan="5">9262-9400-9538 (UMTS B2)</td></tr>
<tr><td colspan="5">1312-1413-1513 (UMTS B4)</td></tr>
<tr><td colspan="5">4132-4182-4233 (UMTS B5)</td></tr>
<tr><td colspan="5">18700-18900-19100 (LTE B2 BW=20MHz)</td></tr>
<tr><td colspan="5">20050-20175-20300 (LTE B4 BW=20MHz)</td></tr>
<tr><td colspan="5">20450-20525-20600 (LTE B5 BW=10MHz)</td></tr>
<tr><td colspan="5">20850-21100-21350 (LTE B7 BW=20MHz)</td></tr>
<tr><td colspan="5">23060-23095-23130 (LTE B12 BW=10MHz)</td></tr>
<tr><td colspan="5">23230 (LTE B13 BW=10MHz)</td></tr>
<tr><td colspan="5">23330 (LTE B14 BW=10MHz)</td></tr>
<tr><td colspan="5">23780-23790-23800 (LTE B17 BW=10MHz)</td></tr>
<tr><td colspan="5">1-2-3 (RFID(Micro))</td></tr>
<tr><td colspan="5">1-2-3 (RFID(NANO))</td></tr>
<tr><td colspan="5">0-39-78 (BT)</td></tr>
<tr><td colspan="5">0-19-39 (BLE)</td></tr>
<tr><td colspan="5">1-6-11 (2.4G WIFI 802.11b/g/n HT20)</td></tr>
<tr><td colspan="5">3-6-9 (2.4G WIFI 802.11n HT40)</td></tr>
<tr><td>Band</td><td>5.2G WIFI</td><td>5.3G WIFI</td><td>5.6G WIFI</td><td>5.8G WIFI</td></tr>
<tr><td>802.11a/n HT20
/ac VHT20</td><td>36-40-44-48</td><td>52-56-60-64</td><td>100-104-108
-112-116-132
-136-140</td><td>149-153-157
-161-165</td></tr>
<tr><td>802.11n HT40
/ac VHT40</td><td>38-46</td><td>54-62</td><td>102-110-118
-126-134</td><td>151-159</td></tr>
<tr><td>802.11ac VHT80</td><td>42</td><td>58</td><td>106-122</td><td>155</td></tr>
<tr><td rowspan="21">Antenna Gain</td><td>Band</td><td>Main Antenna
(dBi)</td><td>Primary BT/WIFI
antenna (dBi)</td><td>Second WIFI
Antenna (dBi)</td><td>RFID Antenna
(dBi)</td></tr>
<tr><td>GSM850</td><td>0.5</td><td>/</td><td>/</td><td>/</td></tr>
<tr><td>GSM1900</td><td>0.5</td><td>/</td><td>/</td><td>/</td></tr>
<tr><td>UMTS B2</td><td>0.5</td><td>/</td><td>/</td><td>/</td></tr>
<tr><td>UMTS B4</td><td>0.5</td><td>/</td><td>/</td><td>/</td></tr>
<tr><td>UMTS B5</td><td>0.5</td><td>/</td><td>/</td><td>/</td></tr>
<tr><td>LTE B2</td><td>0.5</td><td>/</td><td>/</td><td>/</td></tr>
<tr><td>LTE B4</td><td>0.5</td><td>/</td><td>/</td><td>/</td></tr>
<tr><td>LTE B5</td><td>0.5</td><td>/</td><td>/</td><td>/</td></tr>
<tr><td>LTE B7</td><td>1.8</td><td>/</td><td>/</td><td>/</td></tr>
<tr><td>LTE B12</td><td>0.2</td><td>/</td><td>/</td><td>/</td></tr>
<tr><td>LTE B13</td><td>0.2</td><td>/</td><td>/</td><td>/</td></tr>
<tr><td>LTE B14</td><td>0.2</td><td>/</td><td>/</td><td>/</td></tr>
<tr><td>LTE B17</td><td>0.2</td><td>/</td><td>/</td><td>/</td></tr>
<tr><td>Bluetooth</td><td>/</td><td>1.2</td><td>0</td><td>/</td></tr>
<tr><td>WLAN 2.4G</td><td>/</td><td>1.2</td><td>0</td><td>/</td></tr>
<tr><td>WLAN 5.2G</td><td>/</td><td>1.3</td><td>0</td><td>/</td></tr>
<tr><td>WLAN 5.3G</td><td>/</td><td>1.3</td><td>0</td><td>/</td></tr>
<tr><td>WLAN 5.6G</td><td>/</td><td>2.1</td><td>0</td><td>/</td></tr>
<tr><td>WLAN 5.8G</td><td>/</td><td>1.0</td><td>0</td><td>/</td></tr>
<tr><td>RFID(Micro)</td><td>/</td><td>/</td><td>/</td><td>1.2</td></tr>
<tr><td>RFID(NANO)</td><td>/</td><td>/</td><td>/</td><td>0.9</td></tr>
</table>

Other Information			
Battery	Internal battery	Model	2EXL7539
		JSPN	28010
		Power Rating	7.2V, 3.0Ah, 21.6Wh
		Manufacturer	Excell Battery Company
	External battery	Model	2EXL7540
		JSPN	28000
		Power Rating	7.2V, 6.0Ah, 43.2Wh
		Manufacturer	Excell Battery Company

Note: RFID has two modules: Micro and NANO.

2.2 STATEMENT OF COMPLIANCE

Mode	Highest Reported Body SAR-1g (W/kg)	Highest Reported Limb SAR-10g (W/kg)
GSM850	0.62	/
GSM1900	1.26	/
UMTS B2	1.27	/
UMTS B4	1.50	/
UMTS B5	0.77	/
LTE B2	1.43	/
LTE B4	1.39	/
LTE B5	0.61	/
LTE B7	1.44	/
LTE B12	0.52	/
LTE B13	0.71	/
LTE B14	0.59	/
Bluetooth	0.01	/
2.4G WIFI	0.09	/
5.2G WIFI	<0.01	/
5.2G WIFI	<0.01	/
5.6G WIFI	<0.01	/
5.8G WIFI	<0.01	/
RFID (Micro)	/	1.15
RFID (NANO)	/	1.42
Note: The highest reported SAR for body and limb are 1.50W/kg and 1.42W/kg respectively.		

Note:
1) The device is in compliance with Specific Absorption Rate(SAR)for general population uncontrolled exposure limits according to the FCC rule §2.1093, the ANSI C95.1:1992/IEEE C95.1:1991, the NCRP Report Number 86 for uncontrolled environment and had been tested in accordance with the measurement methods and procedures specified in IEEE Std 1528-2013.
2) According to TCB workshop October, 2014 RF Exposure Procedures Update (Overlapping LTE Bands):
SAR for LTE B17 (Frequency range: 704-716 MHz) is covered by LTE B12 (Frequency range: 699-716MHz) due to similar frequency range, same maximum tune up limit and same maximum channel bandwidth.
Therefore, SAR test for LTE B17 is not required.

2.3 LABORATORY ENVIRONMENT

Temperature	Min. = 18ºC, Max. = 25ºC
Relative humidity	Min. = 30%, Max. = 70%
Ground system resistance	< 0.5Ω
Ambient noise is checked and found very low and in compliance with requirement of standards. Reflection of surrounding objects is minimized and in compliance with requirement of standards.	

2.4 MAIN TEST INSTRUMENTS

Item	Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. Interval	Note
1	Data Acquisition Electronics	Speag	DAE4	878	Dec. 12, 2018	1 Year	
2	Data Acquisition Electronics	Speag	DAE3	420	Jun. 21, 2019	1 Year	
3	E-field Probe	Speag	EX3DV4	7544	Sep. 09, 2019	1 Year	
4	E-field Probe	Speag	EX3DV4	3685	Mar. 25, 2019	1 Year	
5	E-field Probe	Speag	EX3DV4	3685	Jan. 24, 2019	1 Year	750MHz
6	System Validation Dipole	Speag	D750V3	1095	Jun. 05, 2018	3 Years	
7	System Validation Dipole	Speag	D835V2	4d160	Jun. 05, 2018	3 Years	
8	System Validation Dipole	Speag	D900V2	1d158	Jun. 05, 2018	3 Years	
9	System Validation Dipole	Speag	D1750V2	1101	Jun. 07, 2018	3 Years	
10	System Validation Dipole	Speag	D1900V2	5d179	Jun. 07, 2018	3 Years	
11	System Validation Dipole	Speag	D2450V2	919	Jun. 11, 2018	3 Years	
12	System Validation Dipole	Speag	D2600V2	1067	Jun. 11, 2018	3 Years	
13	System Validation Dipole	Speag	D5GHzV2	1160	Jun. 20, 2018	3 Years	
14	ELI4 Phantom	Speag	ELI4 Phantom V5.0	1222	N/A	N/A	
15	8960 Series 10 Wireless Com Test set	Agilent	E5515E	MY52112163	Aug. 03, 2019	1 Year	
16	Wideband radio communication tester	R&S	CMW500	152372	Mar. 10, 2019	1 Year	
17	CMW500-Wideband Radio Communication Tester	R&S	CMW500	153883	Mar. 10, 2019	1 Year	
18	Power Amplifier	Mini-Circuits	ZHL-42W+	QA1333003	Feb. 25, 2019	1 Year	
19	Power Amplifier	Mini-Circuits	ZVE-8G+	520701341	Feb. 25, 2019	1 Year	
20	DC Source	Iteck	OT6154	M00157	Aug. 03, 2019	1 Year	
21	ENA Network Analyzer	Agilent	E5071C	MY46102965	Mar. 10, 2019	1 Year	
22	MXG Analog Signal Generator	Agilent	N5181A	MY49060710	Aug. 03, 2019	1 Year	
23	Signal Generator	Agilent	E4438C	MY4907131	Mar. 10, 2019	1 Year	
24	Peak Power Analyzer	Keysight	8990B	MY51000506	Nov. 26, 2018	1 Year	
25	Wideband Power Sensor	Keysight	N1923A	MY58310004	Nov. 26, 2018	1 Year	
26	Smart Power Sensor	R&S	NRP-Z21	102209	Mar. 01, 2019	1 Year	
27	Dielectric Assessment Kit	Speag	DAK-3.5	1226	N/A	N/A	
28	Dual directional coupler	Woken	TS-PCC0M-05	107090019	Mar. 10, 2019	1 Year	
29	Coupler	Woken	0110A05601O-10	COM5BNW1A2	Mar. 10, 2019	1 Year	
30	Digital Themometer	LKM	DTM3000	3519	Jul. 08, 2019	1 Year	

Remark:
1. “N/A” denotes no model name, serial No. or calibration specified.
2. * These test equipments have been recalibrated between the test periods. All these test equipments were within the valid period when the tests were performed.
3. 1) Per KDB865664 D01 requirements for dipole calibration, the test laboratory has adopted three-year extended calibration interval. Each measured dipole is expected to evaluate with the following criteria at least on annual interval in Appendix C.
    a) There is no physical damage on the dipole;
    b) System check with specific dipole is within 10% of calibrated value;
    c) The most recent return-loss result , measured at least annually, deviates by no more than 20% from the previous measurement;
    d) The most recent measurement of the real or imaginary parts of the impedance, measured at least annually is within 5Ω from the previous measurement.
   2) Network analyzer probe calibration against air, distilled water and a short block performed before measuring liquid parameters.

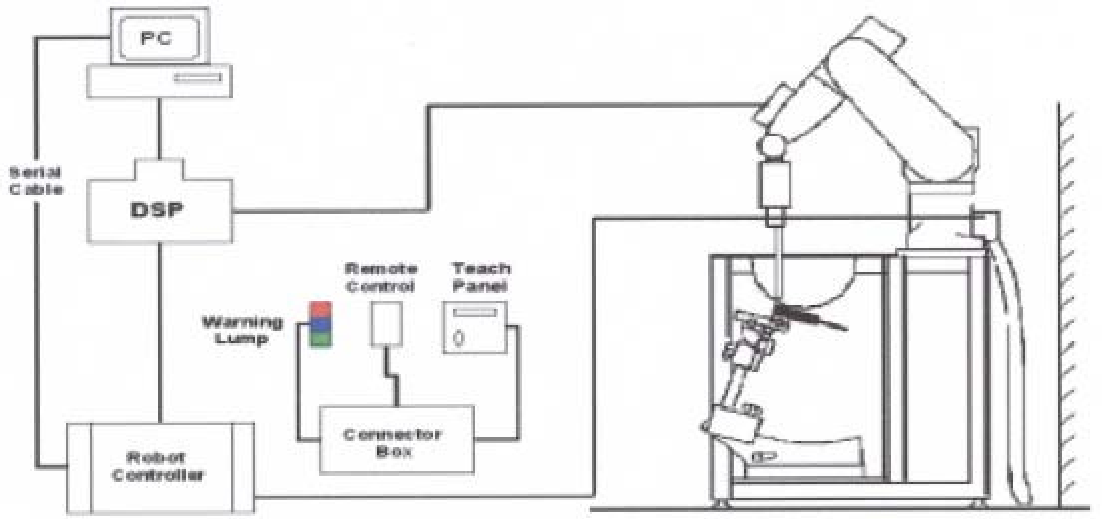
3. SAR MEASUREMENTS SYSTEM CONFIGURATION

3.1 SAR MEASUREMENT SET-UP

The DASY5 system for performing compliance tests consists of the following items:

1. A standard high precision 6-axis robot (Stäubli RX family) with controller and software. An arm extension for accommodating the data acquisition electronics (DAE).
2. A dosimetric probe, i.e. an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
3. A data acquisition electronic (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.
4. A unit to operate the optical surface detector which is connected to the EOC.
5. The Electro-Optical Coupler (EOC) performs the conversion from the optical into a digital electric signal of the DAE. The EOC is connected to the DASY5 measurement server.
6. TheDASY5 measurement server, which performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation. A computer operating Windows.
7. DASY5 software and SEMCAD data evaluation software.
8. Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.
9. The generic twin phantom enabling the testing of left-hand and right-hand usage.
10. The device holder for handheld mobile phones.
11. Tissue simulating liquid mixed according to the given recipes.
12. System validation dipoles allowing to validate the proper functioning of the system.

3.1.1 TEST SETUP LAYOUT



3.2 DASY5 E-FIELD PROBE SYSTEM

The SAR measurements were conducted with the dosimetric probe EX3DV4 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation.

3.2.1 EX3DV4 PROBE SPECIFICATION

Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available
Frequency	10 MHz to 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)
Dynamic Range	10 µW/g to > 100 mW/g Linearity:± 0.2dB
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Distance from probe tip to dipole centers: 1.0 mm

EX3DV4 E-field Probe

3.2.2 E-FIELD PROBE CALIBRATION

Each probe is calibrated according to a dosimetric assessment procedure with accuracy better than ±10%. The spherical isotropy was evaluated and found to be better than ± 0.25dB. The sensitivity parameters (NormX, NormY, NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested.

The free space E-field from amplified probe outputs is determined in a test chamber. This is performed in a TEM cell for frequencies bellow 1 GHz, and in a wave guide above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees.

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The measured free space E-field in the medium correlates to temperature rise in a dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$\mathbf{SAR} = \mathbf{C}\frac{\Delta T}{\Delta t}$$

Where: Δt = Exposure time (30 seconds),

C = Heat capacity of tissue (brain or muscle),

ΔT = Temperature increase due to RF exposure.

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

Where: σ = Simulated tissue conductivity,

ρ = Tissue density (kg/m3).

3.2.3 OTHER TEST EQUIPMENT

3.2.3.1 Device Holder for Transmitters

Construction: Simple but effective and easy-to-use extension for Mounting Device that facilitates the testing of larger devices (e.g., laptops, cameras, etc.) It is light weight and fits easily on the upper part of the Mounting Device in place of the phone positioner. The extension is fully compatible with the Twin SAM, ELI4and SAM v6.0Phantoms.
Material: POM, Acrylic glass, Foam

3.2.3.2 Phantom

Model	ELI4 Phantom	
Construction	Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI is fully compatible with the IEC 62209-2 standard and all known tissue simulating liquids. ELI has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is compatible with all SPEAG dosimetric probes and dipoles.	
Shell Thickness	2±0.1 mm	
Filling Volume	Approx. 30 liters	
Dimensions	Length: 600 mm ; Width: 190mm Height: adjustable feet	
Aailable	Special	

3.2.4 SCANNING PROCEDURE

The DASY5 installation includes predefined files with recommended procedures for measurements and validation. They are read-only document files and destined as fully defined but unmeasured masks. All test positions (head or body-worn) are tested with the same configuration of test steps differing only in the grid definition for the different test positions.

The “reference” and “drift” measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the DUT’s output power and should vary max. ± 5 %.

The “surface check” measurement tests the optical surface detection system of the DASY5 system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above ± 0.1mm). To prevent wrong results tests are only executed when the liquid is free of air bubbles. The difference between the optical surface detection and the actual surface depends on the probe and is specified with each probe. (It does not depend on the surface reflectivity or the probe angle to the surface within ± 30°.)

- Area Scan

The “area scan” measures the SAR above the DUT or verification dipole on a parallel plane to the surface. It is used to locate the approximate location of the peak SAR with 2D spline interpolation. The robot performs a stepped movement along one grid axis while the local electrical field strength is measured by the probe. The probe is touching the surface of the SAM during acquisition of measurement values. The standard scan uses large grid spacing for faster measurement. Standard grid spacing for head measurements is 15 mm in x- and y- dimension (≤2GHz), 12 mm in x- and y- dimension (2-4 GHz) and 10mm in x- and y- dimension (4-6GHz). If a finer resolution is needed, the grid spacing can be reduced. Grid spacing and orientation have no influence on the SAR result. For special applications where the standard scan method does not find the peak SAR within the grid, e.g. mobile phones with flip cover, the grid can be adapted in orientation.

- Zoom Scan

A “zoom scan” measures the field in a volume around the 2D peak SAR value acquired in the previous “coarse” scan. This is a fine grid with maximum scan spatial resolution: Δx_{zoom}, Δy_{zoom}≤2GHz -≤8mm, 2-4GHz -≤5 mm and 4-6 GHz-≤4mm; Δz_{zoom}≤3GHz -≤5 mm, 3-4 GHz-≤4mm and 4-6GHz-≤2mm where the robot additionally moves the probe along the z-axis away from the bottom of the Phantom. DASY is also able to perform repeated zoom scans if more than 1 peak is found during area scan. In this document, the evaluated peak 1g and 10g averaged SAR values are shown in the 2D-graphics in Appendix B. Test results relevant for the specified standard (see chapter 1.4.) are shown in table form in chapter 7.2.

A Z-axis scan measures the total SAR value at the x-and y-position of the maximum SAR value found during the cube scan. The probe is moved away in z-direction from the bottom of the SAM phantom in 2 mm steps. This measurement shows the continuity of the liquid and can - depending in the field strength – also show the liquid depth.

The following table summarizes the area scan and zoom scan resolutions per FCC KDB 865664D01:

Frequency	Maximun Area Scan resolution (Δx_{area}, Δy_{area})	Maximun Zoom Scan spatial resolution (Δx_{Zoom}, Δy_{Zoom})	Maximun Zoom Scan spatial resolution			Minimum zoom scan volume (x,y,z)
			Uniform Grid	Graded Grad		
			$\Delta z_{Zoom}(n)$	$\Delta z_{Zoom}(1)$*	$\Delta z_{Zoom}(n>1)$*	
≤2GHz	≤15mm	≤8mm	≤5mm	≤4mm	≤1.5*Δz_{Zoom}(n-1)	≥30mm
2-3GHz	≤12mm	≤5mm	≤5mm	≤4mm	≤1.5*Δz_{Zoom}(n-1)	≥30mm
3-4GHz	≤12mm	≤5mm	≤4mm	≤3mm	≤1.5*Δz_{Zoom}(n-1)	≥28mm
4-5GHz	≤10mm	≤4mm	≤3mm	≤2.5mm	≤1.5*Δz_{Zoom}(n-1)	≥25mm
5-6GHz	≤10mm	≤4mm	≤2mm	≤2mm	≤1.5*Δz_{Zoom}(n-1)	≥22mm

3.2.5 SPATIAL PEAK SAR EVALUATION

The spatial peak SAR - value for 1 and 10 g is evaluated after the Cube measurements have been done. The basis of the evaluation are the SAR values measured at the points of the fine cube grid consisting of 5 x 5 x 7 points (with 8mm horizontal resolution) or 7 x 7 x 7 points (with 5mm horizontal resolution) or 8 x 8 x 7 points (with 4mm horizontal resolution). The algorithm that finds the maximal averaged volume is separated into three different stages.

- The data between the dipole center of the probe and the surface of the phantom are extrapolated. This data cannot be measured since the center of the dipole is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is about 1 mm (see probe calibration sheet). The extrapolated data from a cube measurement can be visualized by selecting “Graph Evaluated”.
- The maximum interpolated value is searched with a straight-forward algorithm. Around this maximum the SAR - values averaged over the spatial volumes (1g or 10 g) are computed using the 3d-spline interpolation algorithm. If the volume cannot be evaluated (i.e., if a part of the grid was cut off by the boundary of the measurement area) the evaluation will be started on the corners of the bottom plane of the cube.
- All neighboring volumes are evaluated until no neighboring volume with a higher average value is found.

Extrapolation

The extrapolation is based on a least square algorithm [W. Gander, Computer mathematic, p.168-180]. Through the points in the first 3 cm along the z-axis, polynomials of order four are calculated. These polynomials are then used to evaluate the points between the surface and the probe tip. The points, calculated from the surface, have a distance of 1 mm from each other.

Interpolation

The interpolation of the points is done with a 3d-Spline. The 3d-Spline is composed of three one-dimensional splines with the "Not a knot"-condition [W. Gander, Computer mathematic, p.141-150] (x, y and z -direction) [Numerical Recipes in C, Second Edition, p.123ff].

Volume Averaging

At First the size of the cube is calculated. Then the volume is integrated with the trapezoidal algorithm. 8000 points (20x20x20) are interpolated to calculate the average.

Advanced Extrapolation

DASY5 uses the advanced extrapolation option which is able to compensate boundary effects on E-field probes.

3.2.6 DATA STORAGE AND EVALUATION

3.2.6.1 Data Storage

The DASY5 software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension “DAE”. The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [mW/g], [mW/cm^2], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

3.2.7 DATA EVALUATION BY SEMCAD

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

Probe parameters:	Sensitivity	Normi, a_{i0}, a_{i1}, a_{i2}
	Conversion factor	$ConvF_i$
	Diode compression point	Dcp_i
Device parameters:	Frequency	f
	Crest factor	cf
Media parameters:	Conductivity	
	Density	

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY5 components. In the direct measuring mode of the multi meter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics.

If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \cdot cf / dcp_i$$

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

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

E-field probes: $E_i = (V_i / Norm_i \cdot ConvF)^{1/2}$

H-field probes: $H_i = (V_i)^{1/2} \cdot (a_{i0} + a_{i1} f + a_{i2} f^2) / f$

With V_i = compensated signal of channel i (i = x, y, z)

$Norm_i$ = sensor sensitivity of channel i (i = x, y, z)

[mV/(V/m)^2] for E-field Probes

ConvF = sensitivity enhancement in solution

aij = sensor sensitivity factors for H-field probes

f = carrier frequency [GHz]

E_i = electric field strength of channel i in V/m

H_i = magnetic field strength of channel i in A/m

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

$$E_{tot} = (E_X^2 + E_Y^2 + E_Z^2)^{1/2}$$

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

$$SAR = (E_{tot})^2 \cdot \boldsymbol{\sigma} / (\boldsymbol{\rho} \cdot 1000)$$

With SAR = local specific absorption rate in mW/g

E_{tot} = total field strength in V/m

= conductivity in [mho/m] or [Siemens/m]

= equivalent tissue density in g/cm^3

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid. The power flow density is calculated assuming the excitation field to be a free space field.

$$P_{pwe} = E_{tot}^2 / 3770 \text{ or } P_{pwe} = H_{tot}^2 \cdot 37.7$$

With P_{pwe} = equivalent power density of a plane wave in mW/cm^2

E_{tot} = total field strength in V/m

H_{tot} = total magnetic field strength in A/m

4. SYSTEM VERIFICATION PROCEDURE

4.1 TISSUE VERIFICATION

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine of the dielectic parameter are within the tolerances of the specified target values. The measured conductivity and relative permittivity should be within ± 5% of the target values.

The following materials are used for producing the tissue-equivalent materials.

Tissue Type	Bactericide	DGBE	HEC	NaCl	Sucrose	Triton X-100	Water	Diethylene Glycol Mono-hexylether
Head 750	0.2	-	0.2	1.5	56.0	-	42.1	-
Head 835	0.2	-	0.2	1.5	57.0	-	41.1	-
Head 900	0.2	-	0.2	1.4	58.0	-	40.2	-
Head 1750	-	47.0	-	0.4	-	-	52.6	-
Head 1900	-	44.5	-	0.2	-	-	55.3	-
Head 2450	-	45.0	-	0.1	-	-	54.9	-
Head 2600	-	45.1	-	0.1	-	-	54.8	-
Head 5G	-	-	-	-	-	17.2	65.5	17.3

Salt: 99+% Pure Sodium Chloride; Sugar: 98+% Pure Sucrose; Water: De-ionized, 16M + resistivity HEC: Hydroxyethyl Cellulose; DGBE: 99+% Di(ethylene glycol) butyl ether,[2-(2-butoxyethoxy)ethanol] Triton X-100(ultra pure): Polyethylene glycol mono [4-(1,1,3,3-tetramethylbutyl)phenyl]ether

Tissue Verification									
Tissue Type	Frequency (MHz)	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (εr)	Targeted Conductivity (σ)	Targeted Permittivity (εr)	Deviation Conductivity (σ) (%)	Deviation Permittivity (εr) (%)	Date
Head	750	22.4	0.895	41.493	0.89	41.9	0.56	-0.97	Sep. 21, 2019
Head	835	22.5	0.934	42.907	0.90	41.5	3.78	3.39	Sep. 22, 2019
Head	900	22.4	0.947	41.444	0.97	41.5	-2.37	-0.13	Sep. 30, 2019
Head	1750	22.3	1.398	39.355	1.37	40.1	2.04	-1.86	Sep. 21, 2019
Head	1750	22.4	1.399	39.346	1.37	40.1	2.12	-1.88	Oct. 09, 2019
Head	1900	22.4	1.380	39.598	1.40	40.0	-1.43	-1.01	Sep. 19, 2019
Head	1900	22.5	1.379	39.607	1.40	40.0	-1.50	-0.98	Oct. 09, 2019
Head	2450	22.4	1.874	38.304	1.80	39.2	4.11	-2.29	Sep. 23, 2019
Head	2600	22.5	2.048	37.722	1.96	39.0	4.49	-3.28	Oct. 09, 2019
Head	5200	22.3	4.700	36.164	4.66	36.0	0.86	0.46	Sep. 27, 2019
Head	5300	22.3	4.813	35.914	4.76	35.9	1.11	0.04	Sep. 27, 2019
Head	5500	22.3	5.037	35.468	4.96	35.6	1.55	-0.37	Sep. 27, 2019
Head	5600	22.3	5.155	35.239	5.07	35.5	1.68	-0.74	Sep. 27, 2019
Head	5800	22.3	5.408	34.799	5.27	35.3	2.62	-1.42	Sep. 27, 2019

Note:
1) The dielectric parameters of the tissue-equivalent liquid should be measured under similar ambient conditions and within 2 °C of the conditions expected during the SAR evaluation to satisfy protocol requirements.
2) KDB 865664 was ensured to be applied for probe calibration frequencies greater than or equal to 50MHz of the EUT frequencies.
3) The above measured tissue parameters were used in the DASY software to perform interpolation via the DASY software to determine actual dielectric parameters at the test frequencies. The SAR test plots may slightly differ from the table above since the DASY rounds to three significant digits.

4.2 SYSTEM CHECK

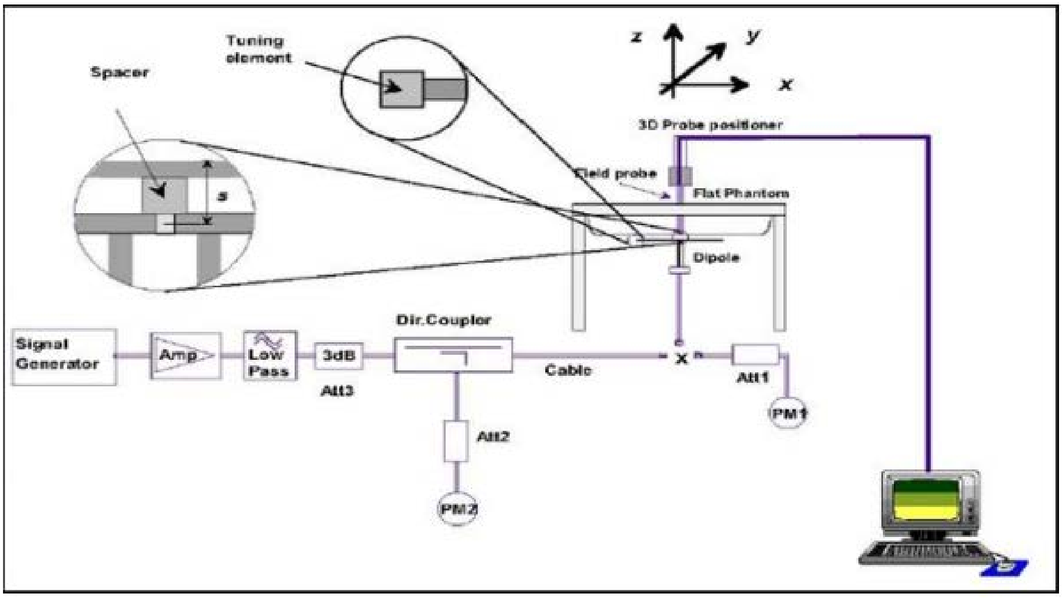
The system check is performed for verifying the accuracy of the complete measurement system and performance of the software. The system check is performed with tissue equivalent material according to IEEE P1528 (described above). The following table shows system check results for all frequency bands and tissue liquids used during the tests.

System Check	Date	Frequency (MHz)	Targeted SAR (W/kg)		Measured SAR (W/kg)		normalized SAR-1g (W/kg)		Deviation (%)		Dipole S/N
			1g	10g	1g	10g	1g	10g	1g	10g	
Head	Sep. 21, 2019	750	8.47	5.64	2.21	1.47	8.84	5.88	4.37	4.26	1095
Head	Sep. 22, 2019	835	9.23	6.00	2.34	1.51	9.36	6.04	1.41	0.67	4d160
Head	Sep. 30, 2019	900	10.50	6.73	2.51	1.60	10.04	6.40	-4.38	-4.90	1d158
Head	Sep. 21, 2019	1750	37.00	19.90	9.02	4.96	36.08	19.84	-2.49	-0.30	1101
Head	Oct. 09, 2019	1750	37.00	19.90	9.08	5.01	36.32	20.04	-1.84	0.70	1101
Head	Sep. 19, 2019	1900	39.50	20.70	10.00	5.35	40.00	21.40	1.27	3.38	5d179
Head	Oct. 09, 2019	1900	39.50	20.70	9.54	5.36	38.16	21.44	-3.39	3.57	5d179
Head	Sep. 23, 2019	2450	52.10	24.60	12.60	6.28	50.40	25.12	-3.26	2.11	919
Head	Sep. 20, 2019	2600	56.10	25.30	13.90	6.24	55.60	24.96	-0.89	-1.34	1067
Head	Sep. 27, 2019	5200	75.30	21.70	7.56	2.19	75.60	21.90	0.40	0.92	1160
Head	Sep. 27, 2019	5300	76.80	22.10	7.52	2.17	75.20	21.70	-2.08	-1.81	1160
Head	Sep. 27, 2019	5500	80.80	23.00	7.72	2.21	77.20	22.10	-4.46	-3.91	1160
Head	Sep. 27, 2019	5600	78.60	22.50	7.85	2.22	78.50	22.20	-0.13	-1.33	1160
Head	Sep. 27, 2019	5800	77.90	22.10	7.47	2.11	74.70	21.10	-4.11	-4.52	1160

4.3 SYSTEM CHECK PROCEDURE

The system check is performed by using a system check dipole which is positioned parallel to the planar part of the SAM phantom at the reference point. The distance of the dipole to the SAM phantom is determined by a plexiglass spacer. The dipole is connected to the signal source consisting of signal generator and amplifier via a directional coupler, N-connector cable and adaption to SMA. It is fed with a power of 250mW (below 3GHz) or 100mW (3-6GHz). To adjust this power a power meter is used.
The power sensor is connected to the cable before the system check to measure the power at this point and do adjustments at the signal generator. At the outputs of the directional coupler both return loss as well as forward power are controlled during the system check to make sure that emitted power at the dipole is kept constant. This can also be checked by the power drift measurement after the test.

System check results have to be equal or near the values determined during dipole calibration (target SAR in table above) with the relevant liquids and test system (±10 %).



5. SAR MEASUREMENT VARIABILITY AND UNCERTAINTY

5.1 SAR MEASUREMENT VARIABILITY

Per KDB865664 D01 SAR measurement 100 MHz to 6 GHz, SAR measurement variability must be assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. The additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.
2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.
3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

The same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds.

The detailed repeated measurement results are shown in Section 7.2.

6. OPERATIONAL CONDITIONS DURING TEST

6.1 TEST CONFIGURATION

6.1.1 GSM TEST CONFIGURATION

SAR tests for GSM850 and GSM1900, a communication link is set up with a base station by air link.
Using 8960 Series the power lever is set to “5”and “0” in SAR of GSM850 and GSM1900. The tests in the band of GSM850 and GSM1900 are performed in the mode of GPRS/EGPRS function. Since the GPRS class is 12 for this EUT, it has at most 4 timeslots in uplink and at most 4 timeslots in downlink, the maximum total timeslot is 5. The EGPRS class is 12 for this EUT, it has at most 4 timeslots in uplink, and at most 4 timeslots in downlink, the maximum total timeslot is 5.

When SAR tests for EGPRS mode is necessary, GMSK modulation should be used to minimize SAR measurement error due to higher peak-to-average power (PAR) ratios inherent in 8PSK.

According to specification 3GPP TS 51.010, the maximum power of the GSM can do the power reduction for the multi-slot.

The allowed power reduction in the multi-slot configuration is as following:

Number of timeslots in uplink assignment		Reduction of maximum output power (dB)		
Band	Time Slots	GPRS (GMSK)	EGPRS (GMSK)	EGPRS (8PSK)
GSM850	1 TX slot	0.0	0.0	6.4
	2 TX slots	3.0	3.0	9.4
	3 TX slots	4.8	4.8	11.2
	4 TX slots	6.0	6.0	12.4
GSM1900	1 TX slot	0.0	0.0	4.3
	2 TX slots	3.0	3.0	7.3
	3 TX slots	4.8	4.8	9.1
	4 TX slots	6.0	6.0	10.3

6.1.2 UMTS TEST CONFIGURATION

1. Output Power Verification

Maximum output power is verified on the High, Middle and Low channels according to the procedures description in section 5.2 of 3GPP TS 34.121, using the appropriate RMC or AMR with TPC (transmit power control) set to all "1s" for WCDMA/HSDPA or by applying the required inner loop power control procedures to maintain maximum output power while HSUPA is active. Result for all applicable physical channel configurations (DPCCH, DPDCHn and spreading codes, HSDPA, HSPA)
Should be tabulated in the SAR report .All configuration that are not supported by the DUT or cannot be measured due to technical or equipment limitation should be clearly identified.

2. WCDMA

(1).Head SAR Measurements
SAR for next to ear head exposure is measured using a 12.2 kbps RMC with TPC bits configured to all "1s". The 3G SAR test reduction procedure is applied to AMR configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for 12.2 kbps AMR with 3.4kbps SRB(signaling radio bearer) using the highest reported SAR configuration in 12.2 kbps RMC for head exposure.

(2).Body SAR Measurements
SAR for body-worn accessory is measured using the 12.2 kbps RMC with the TPC bits configured to all "1s". The 3G SAR test reduction procedure is applied to other spreading codes and multiple DPDCHn configurations supported by handset with 12.2 kbps RMC as the primary mode.

3. HSDPA

SAR for body exposure configurations is measured according to the "Body SAR Measurements" procedures of 3G device. 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 or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2W/kg, SAR measurement is not required for the secondary mode. This is referred to as the 3G SAR test reduction procedure in the following SAR test guidance, where the primary mode is identified in the applicable wireless mode test procedures and the secondary mode is wireless mode being considered for SAR test reduction by that procedure. When the 3G SAR test reduction procedure is not satisfied, it is identified as "otherwise" in the applicable procedures; SAR measurement is required for the secondary mode.

Per KDB941225 D01, the 3G SAR test reduction procedure is applied to HSDPA body configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for HSDPA using the HSDPA body SAR procedures for the highest reported SAR body exposure configuration in 12.2 kbps RMC.

HSDPA should be configured according to UE category of a test device. The number of HS-DSCH/HS-PDSCHs, HAPRQ processes, minimum inter-TTI interval, transport block sizes and RV coding sequence are defined by the H-set. To maintain a consistent test configuration and stable transmission condition, QPSK is used in the H-set for SAR testing. HS-DPCCH should be configured with a CQI feedback cycle of 4ms with a CQI repetition factor of 2 to maintain a constant rate of active CQI slots. The β_c and β_d gain factors for DPCCH and DPDCH were set according to the values in the below table, β_{hs} for HS-DPCCH is set automatically to the correct value when ΔACK, ΔNACK, ΔCQI = 8. The variation of the β_c / β_d ratio causes a power reduction at sub-tests 2 - 4.

Sub-test	β_c	β_d	β_d (SF)	β_c / β_d	β_{hs} (1)	CM(dB)(2)	MPR (dB)
1	2/15	15/15	64	2/15	4/15	0.0	0
2	12/15(3)	15/15(3)	64	12/15(3)	24/15	1.0	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: ΔACK, ΔNACK and ΔCQI = 8 $A_{hs} = \beta_{hs}/\beta_c = 30/15$ $\beta_{hs} = 30/15 * \beta_c$
Note 2 : CM=1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$. For all other combinations of DPDCH,DPCCH 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 3 : For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1,TF1) to $\beta_c = 11/15$ and $\beta_d = 15/15$

The measurements were performed with a Fixed Reference Channel (FRC) and H-Set 1 QPSK.

Settings of required H-Set 1 QPSK acc. to 3GPP 34.121

Parameter	Value
Nominal average inf. bit rate	534 kbit/s
Inter-TTI Distance	3 TTI"s
Number of HARQ Processes	2 Processes
Information Bit Payload	3202 Bits
MAC-d PDU size	336 Bits
Number Code Blocks	1 Block
Binary Channel Bits Per TTI	4800 Bits
Total Available SMLs in UE	19200 SMLs
Number of SMLs per HARQ Process	9600 SMLs
Coding Rate	0.67
Number of Physical Channel Codes	5

HSDPA UE category

HS-DSCH Category	Maximum HS-DSCH Codes Received	Minimum Inter-TTI Interval	Maximum HS-DSCH Transport Block Bits/HS-DSCH TTI	Total Soft Channel Bits
1	5	3	7298	19200
2	5	3	7298	28800
3	5	2	7298	28800
4	5	2	7298	38400
5	5	1	7298	57600
6	5	1	7298	67200
7	10	1	14411	115200
8	10	1	14411	134400
9	15	1	25251	172800
10	15	1	27952	172800
11	5	2	3630	14400
12	5	1	3630	28800
13	15	1	34800	259200
14	15	1	42196	259200
15	15	1	23370	345600
16	15	1	27952	345600

4. HSUPA

SAR for Body exposure configurations is measured according to the “Body SAR Measurements” procedures of 3G device. 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 or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2W/kg, SAR measurement is not required for the secondary mode.

Per KDB941225 D01, the 3G SAR test reduction procedures is applied to HSPA (HSUPA/HSDPA with RMC) body configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for HSPA using the HSPA body SAR procedures for the highest reported body exposure SAR configuration in 12.2 kbps RMC.

Due to inner loop power control requirements in HSUPA, a commercial communication test set should be used for the output power and SAR tests. The 12.2 kbps RMC, FRC H-set 1 and E-DCH configurations for HSDPA should be configured according to the values indicated below as well as other applicable procedures described in the “WCDMA Handset“ and „Release 5 HSDPA Data Device” sections of 3G device.

Subtests for WCDMA Release 6 HSUPA

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (1)	β_{ec}	β_{ed}	β_{ec} (SF)	β_{ed} (code)	CM (2) (dB)	MPR (dB)	AG (4) Index	E-TFCI
1	11/15 (3)	15/15 (3)	64	11/15 (3)	22/15	209/225	1039/225	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_{ed1}:47/15 β_{ed2}:47/15	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 (4)	15/15 (4)	64	15/15 (4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: ΔACK, ΔNACK and ΔCQI = 8 $A_{hs} = \beta_{hs}/\beta_c = 30/15$ $\beta_{hs} = 30/15 * \beta_c$

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

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

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

Note 5 : Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Table 5.1g

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

HSUPA UE category

UE E-DCH Category	Maximum E-DCH Codes Transmitted	Number of HARQ Processes	E-DCH TTI(ms)	Minimum Speading Factor	Maximum E-DCH Transport Block Bits	Max Rate (Mbps)
1	1	4	10	4	7110	0.7296
2	2	8	2	4	2798	1.4592
	2	4	10	4	14484	
3	2	4	10	4	14484	1.4592
4	2	8	2	2	5772	2.9185
	2	4	10	2	20000	2.00
5	2	4	10	2	20000	2.00
6 (No DPDCH)	4	8	10	2SF2&2SF4	11484	5.76
	4	4	2		20000	2.00
7 (No DPDCH)	4	8	2	2SF2&2SF4	22996	?
	4	4	10		20000	?

NOTE: When 4 codes are transmitted in parallel, two codes shall be transmitted with SF2 and two with SF4.UE categories 1 to 6 support QPSK only. UE category 7 supports QPSK and 16QAM.(TS25.306-7.3.0).

5. DC-HSDPA

SAR is required for Rel. 8 DC-HSDPA when SAR is required for Rel.5 HSDPA; otherwise, the 3G SAR test reduction procedure is applied to DC-HSDPA with 12.2 kbps RMC as the primary mode.
Power is measured for DC-HSDPA according to the H-Set 12, FRC configuration in Table C.8.1.12 of 3GPP TS 34.121-1 to determine SAR test reduction. A primary and a Second serving HS-DSCH cell are required to perform the power measurement and for the results to be acceptable.

The following tests were completed according to procedures in section 7.3.13 of 3GPP TS 34.108 v9.5.0. A summary of these settings are illustrated below:

Downlink Physical Channels are set as per 3GPP TS34.121-1 v9.0.0 E.5.0
Levels for HSDPA connection setup

Parameter During Connection setup	**Unit**	**Value**
P-CPICH_Ec/Ior	dB	-10
P-CCPCH and SCH_Ec/Ior	dB	-12
PICH _Ec/Ior	dB	-15
HS-PDSCH	dB	off
HS-SCCH_1	dB	off
DPCH_Ec/Ior	dB	-5
OCNS_Ec/Ior	dB	-3.1

Call is set up as per 3GPP TS34.108 v9.5.0 sub clause 7.3.13
The configurations of the fixed reference channels for HSDPA RF tests are described in 3GPP TS 34.121, annex C for FDD and 3GPP TS 34.122.
The measurements were performed with a Fixed Reference Channel (FRC) H-Set 12 with QPSK

Parameter	Value
Nominal average inf. bit rate	60 kbit/s
Inter-TTI Distance	1 TTI"s
Number of HARQ Processes	6 Processes
Information Bit Payload	120 Bits
Number Code Blocks	1 Block
Binary Channel Bits Per TTI	960 Bits
Total Available SMLs in UE	19200 SMLs
Number of SMLs per HARQ Process	3200 SMLs
Coding Rate	0.15
Number of Physical Channel Codes	1

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 above.
2.Maximum number of transmission is limited to 1,i.e.,retransmission is not allowed. The redundancy and constellation version 0 shall be used.

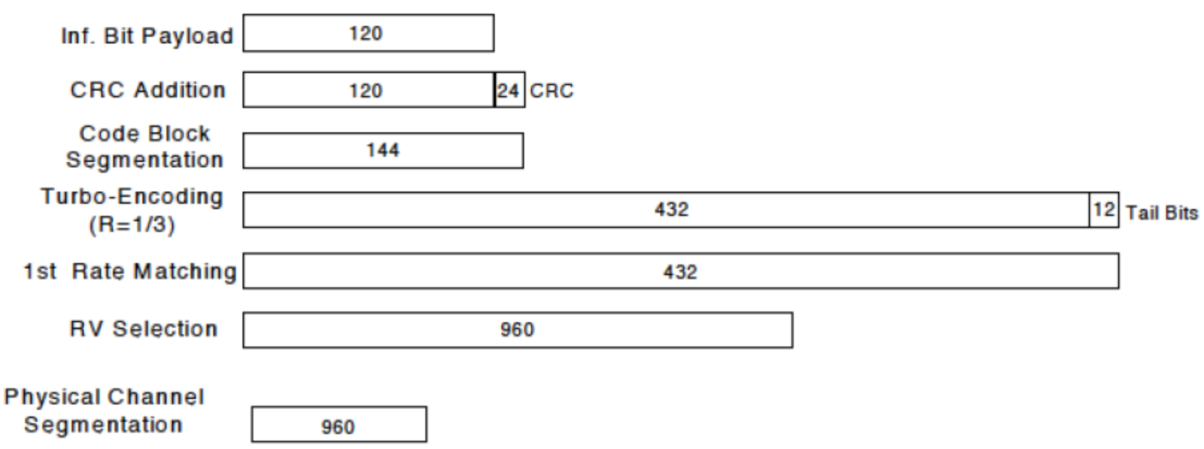


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

The following 4 Sub-tests for HSDPA were completed according to Release 5 procedures. A summary of subtest settings are illustrated below:

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (1)	CM(dB)(2)	MPR (dB)
1	2/15	15/15	64	2/15	4/15	0.0	0
2	12/15(3)	15/15(3)	64	12/15(3)	24/15	1.0	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: ΔACK, ΔNACK and ΔCQI=8 $A_{hs}=\beta_{hs}/\beta_c=30/15$ $\beta_{hs}=30/15*\beta_c$
Note 2: CM=1 for $\beta_c/\beta_d=12/15$, $\beta_{hs}/\beta_c=24/15$. For all other combinations of DPDCH, DPCCH 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 3: For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1,TF1) to $\beta_c=11/15$ and $\beta_d=15/15$

Up commands are set continuously to set the UE to Max power.
Note:
1.The Dual Carriers transmission only applies to HSDPA physical channels
2.The Dual Carriers belong to the same Node and are on adjacent carriers.
3.The Dual Carriers do not support MIMO to serve UEs configured for dual cell operation
4.The Dual Carriers operate in the same frequency band .
5.The device doesn't support the modulation of 16QAM in uplink but 64QAM in downlink for DC-HSDPA mode.
6.The device doesn’t support carrier aggregation for it just can operate in Release 8.

6.1.3 LTE TEST CONFIGURATION

SAR for LTE band exposure configurations is measured according to the procedures of KDB 941225 D05 SAR for LTE Devices. The CMW500 Wide Band Radio Communication Tester was used for LTE output power measurements and SAR testing. Closed loop power control was used so the UE transmits with maximum output power during SAR testing. SAR test were performed with the same number of RB and RB offsets transmitting on all TTI frames (Maximum TTI)

1. Spectrum Plots for RB configurations

A properly configured base station simulator was used for LTE output power measurements and SAR testing. Therefore, spectrum plots for RB configurations were not required to be included in this report.

2. MPR

When MPR is implemented permanently within the UE, regardless of network requirements, only those RB configurations allowed by 3GPP for the channel bandwidth and modulation combinations may be tested with MPR active. Configurations with RB allocations less than the RB thresholds required by 3GPP must be tested without MPR.

The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS36.101:

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3

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

3. A-MPR

A-MPR (Additional MPR) has been disabled for all SAR tests by using Network Signaling Value of “NS_01”on the base station simulator.

4. LTE procedures for SAR testing

A) Largest channel bandwidth standalone SAR test requirements

i) QPSK with 1 RB allocation

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. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel. When the reported SAR of a required test channel is > 1.45 W/kg, SAR is required for all three RB offset configurations for that required test channel.

ii) QPSK with 50% RB allocation

The procedures required for 1 RB allocation in i) are applied to measure the SAR for QPSK with 50% RB allocation

iii) QPSK with 100% RB allocation

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 in i) and ii) 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.

iv) Higher order modulations

For each modulation besides QPSK; e.g., 16-QAM, 64-QAM, apply the QPSK procedures in above sections to determine the QAM configurations that may need SAR measurement. For each configuration identified as required for testing, SAR is required only when the highest maximum output power for the configuration in the higher order modulation is > ½ dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is > 1.45 W/kg.

B) Other channel bandwidth standalone SAR test requirements

For the other channel bandwidths used by the device in a frequency band, apply all the procedures required for the largest channel bandwidth in section A) to determine the channels and RB configurations that need SAR testing and only measure SAR when the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is > ½ dB higher than the equivalent channel configurations in the largest channel bandwidth configuration or the reported SAR of a configuration for the largest channel bandwidth is > 1.45 W/kg.

6.1.4 WIFI TEST CONFIGURATION

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

2.4G

Mode	802.11b	802.11g	802.11n HT20	802.11n HT40
Duty cycle	100%			
Crest factor	1			

5G

Mode	802.11a	802.11n HT20	802.11n HT40	802.11ac VHT20	802.11ac VHT40	802.11ac VHT80
Duty cycle	100%					
Crest factor	1					

For WiFi SAR testing, a communication link is set up with the test mode software for WiFi mode test. During the test, at the each test frequency channel, the EUT is operated at the RF continuous emission mode. The RF signal utilized in SAR measurement has 100% duty cycle and its crest factor is 1. The test procedures in KDB 248227 D01 are applied.

6.1.4.1 2.4G SAR Test Requirements

802.11b DSSS SAR Test Requirements
SAR is measured for 2.4 GHz 802.11b DSSS using either a fixed test position or, when applicable, the initial test position procedure. SAR test reduction is determined according to the following:
1) When the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.
2) When the reported SAR is > 0.8 W/kg, SAR is required for that exposure configuration using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.

2.4 GHz 802.11g/n OFDM SAR Test Exclusion Requirements
When SAR measurement is required for 2.4 GHz 802.11g/n OFDM configurations, the measurement and test reduction procedures for OFDM are applied. SAR is not required for the following 2.4 GHz OFDM conditions.
1) When KDB Publication 447498 SAR test exclusion applies to the OFDM configuration.
2) 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.

SAR Test Requirements for OFDM configurations
When SAR measurement is required for 2.4 GHz 802.11g/n OFDM configurations, each standalone
And frequency aggregated band is considered separately for SAR test reduction. In applying the initial test configuration and subsequent test configuration procedures, the 802.11 transmission configuration with the highest specified maximum output power and the channel within a test configuration with the highest measured maximum output power should be clearly distinguished to apply the procedures.

6.1.4.2 5G SAR Test Requirements

✧ **U-NII-1 and U-NII-2A Band**

For devices that operate in both U-NII-1 and U-NII-2A bands, when the same maximum output power is specified for both bands, begin SAR measurement in U-NII-2A band by applying the OFDM SAR requirements. If the highest reported SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band for that configuration (802.11 mode and exposure condition); otherwise, both bands are tested independently for SAR. When different maximum output power is specified for the bands, begin SAR measurement in the band with higher specified maximum output power. The highest reported SAR for the tested configuration is adjusted by the ratio of lower to higher specified maximum output power for the two bands. When the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for the band with lower maximum output power in that test configuration; otherwise, both bands are tested independently for SAR.

✧ **U-NII-2C, U-NII-3 Bands**

The frequency range covered by these bands is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. When Terminal Doppler Weather Radar (TDWR) restriction applies, the channels at 5.60 – 5.65 GHz in U-NII-2C band must be disabled with acceptable mechanisms and documented in the equipment certification.
Unless band gap channels are permanently disabled, they must be considered for SAR testing.
To maintain SAR measurement accuracy and to facilitate test reduction, the channels in U-NII-2C band above 5.65 GHz may be grouped with the 5.8 GHz channels in U-NII-3 or §15.247 band to enable two SAR probe calibration frequency points to cover the bands, including the band gap channels.11 When band gap channels are supported and the bands are not aggregated for SAR testing, band gap channels must be considered independently in each band according to the normally required OFDM SAR measurement and probe calibration frequency points requirements.

6.1.4.3 OFDM transmission mode and SAR test channel selection

For the 2.4GHz and 5GHz bands, when the same maximum output power was specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration with the largest channel bandwidth, lowest order modulation and lowest data rate. When the maximum output power of a channel is the same for equivalent OFDM configurations (for example 802.11a, 802.11n and 802.11ac, or 802.11g and 802.11n, with the same channel bandwidth, modulation, and data rate, etc.), the lower order 802.11 mode (i.e.802.11a then 802.11n and 802.11ac, or 802.11g then 802.11n) is used for SAR measurement. When the maximum output power are the same for multiple test channels, either according to the default or additional power measurement requirements, SAR is measured using the channel closest to the middle of the frequency band or aggregated band. When there are multiple channels with the same maximum output power, SAR is measured using the higher number channel.

6.1.4.4 Initial test configuration procedure

For OFDM, in both 2.4G and 5GHz bands, an initial test configuration is determined for each frequency band and aggregated band, according to the transmission mode with the highest maximum output power specified for SAR measurements. When the same maximum output power is specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration(s) with the largest channel bandwidth, lowest order modulation, and lowest data rate. If the average RF output powers of the highest identical transmission modes are within 0.25 dB of each other, mid channel of the transmission mode with highest average RF output powers is the initial test channel. Otherwise, the channel of the transmission mode with the highest average RF output power will be the initial test configuration.
When the reported SAR is ≤ 0.8 W/kg, no additional measurements on other test channels are required. Otherwise, SAR is evaluated using the subsequent highest average RF output channel until the reported SAR result is ≤1.2 W/kg or all channels are measured. When there are multiple untested channels having the same subsequent highest average RF output power, the channel with higher frequency from the lowest 802.11 mode is considered for SAR measurement.

6.2 TEST POSITION

6.2.1 BODY TEST CONFIGURATION

The overall diagonal dimension of the display section of a tablet is 25.58cm>20cm, per FCC KDB 616217, the back surface and edges of the tablet should be tested for SAR compliance with the Tablet touching the phantom. SAR evaluation for the front surface of tablet display screens is generally not necessary. The SAR Exclusion Threshold in KDB 447498 D01 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 adjacent the phantom and the edge containing the antenna positioned perpendicular to the phantom.

SAR test reduction and exclusion guidance

(1)The SAR exclusion threshold for distances<50mm is defined by the following equation:

$$\frac{\text{(max. power of channel, including tune-up tolerance, mW)}}{\text{(min. test separation distance, mm)}} \cdot \sqrt{\text{Frequency (GHz)}} \leq 3.0$$

When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

(2)The SAR exclusion threshold for distances>50mm is defined by the following equation, as illustrated in KDB 447498 D01 Appendix B:

a) at 100 MHz to1500 MHz

[Power allowed at numeric Threshold at 50 mm in step 1) + (test separation distance - 50 mm) · (f $_{(MHz)}$/150)] mW

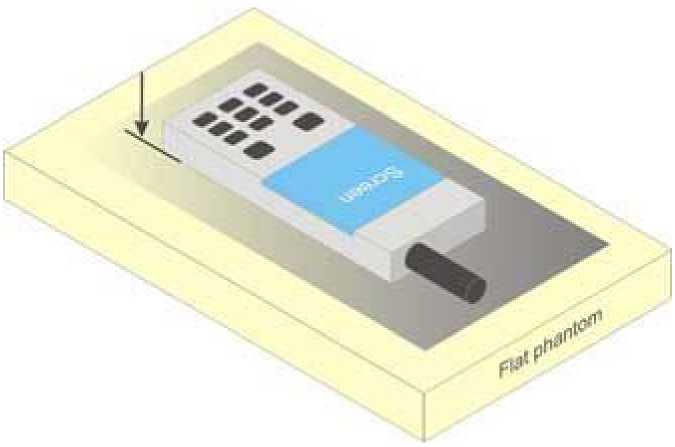
b) at >1500MHz and ≤6GHz

[Power allowed at numeric Threshold at 50 mm in step 1) + (test separation distance - 50 mm) ·10] mW

The location of the antenna inside EUT and standalone SAR test exclusion, please refer to Appendix E.

6.2.2 HAND-HELD TEST CONFIGURATION

The device shall be placed directly against the flat phantom as shown in Figure, for those sides of the device that are in contact with the hand during intended use. Since RFID is only used in hand-held scenarios, RFID tests limb SAR. The Limb SAR limit is 4.0 W/kg.



7. TEST RESULT

7.1 CONDUCTED POWER RESULTS

7.1.1 CONDUCTED POWER MEASUREMENTS OF GSM

GSM850		Max Burst Average Power (dBm)				Max Frame Average Power (dBm)			
		Max. Tune-up	Channel/Frequency(MHz)			Max. Tune-up	Channel/Frequency(MHz)		
			128/ 824.2	190/ 836.6	251/ 848.8		128/ 824.2	190/ 836.6	251/ 848.8
GPRS/EDGE (GMSK)	1 Tx Slot	33.00	32.04	32.03	32.13	23.81	22.85	22.84	22.94
	2 Tx Slot	30.00	**29.03**	**28.85**	**28.86**	23.87	**22.90**	**22.72**	**22.73**
	3 Tx Slot	28.00	27.08	27.13	27.19	23.58	22.66	22.71	22.77
	4 Tx Slot	26.00	25.87	25.89	25.97	22.82	22.69	22.71	22.79
EDGE (8PSK)	1 Tx Slot	26.00	25.69	25.51	25.72	16.81	16.50	16.32	16.53
	2 Tx Slot	24.00	23.35	23.05	23.32	17.87	17.22	16.92	17.19
	3 Tx Slot	22.00	21.55	21.47	21.81	17.58	17.13	17.05	17.39
	4 Tx Slot	21.00	20.28	20.20	20.44	17.82	17.10	17.02	17.26
GSM1900		Max Burst Average Power (dBm)				Max Frame Average Power (dBm)			
		Max. Tune-up	Channel/Frequency(MHz)			Max. Tune-up	Channel/Frequency(MHz)		
			512/ 1850.2	661/ 1880	810/ 1909.8		512/ 1850.2	661/ 1880	810/ 1909.8
GPRS/EDGE (GMSK)	1 Tx Slot	30.00	29.54	29.68	29.82	20.81	20.35	20.49	20.63
	2 Tx Slot	27.00	**25.81**	**25.88**	**25.85**	20.87	**19.68**	**19.75**	**19.72**
	3 Tx Slot	25.00	23.98	24.04	24.06	20.58	19.56	19.62	19.64
	4 Tx Slot	23.00	22.54	22.99	22.89	19.82	19.36	19.81	19.71
EDGE (8PSK)	1 Tx Slot	26.00	25.23	25.21	25.31	16.81	16.04	16.02	16.12
	2 Tx Slot	24.00	22.99	22.84	22.88	17.87	16.86	16.71	16.75
	3 Tx Slot	22.00	21.17	21.09	21.36	17.58	16.75	16.67	16.94
	4 Tx Slot	21.00	19.95	19.97	20.18	17.82	16.77	16.79	17.00

Note:
1) The conducted power of GSM is measured with RMS detector.
2) Frame-averaged output power was calculated from the measured burst-averaged output power by converting the slot powers into linear units and calculating the energy over 8 time slots.
3) The frame-averaged power is linearly proportion to the slot number configured and it is linearly scaled the maximum burst-averaged power based on time slots. The calculated method is shown as below:
Frame-averaged power=10 x log (Burst-averaged power mW x Slot used/8).
4) The tested channel results are marks in bold.

7.1.2 CONDUCTED POWER MEASUREMENTS OF UMTS

Band	UMTS B2 Average Conducted Power(dBm)				UMTS B4 Average Conducted Power(dBm)			
Tx Channel	Max. Tune-up	9262	9400	9538	Max. Tune-up	1312	1413	1513
Frequency(MHz)		1852.4	1880	1907.6		1712.4	1732.6	1752.6
RMC 12.2K	22.50	**22.02**	**21.95**	**22.03**	22.50	**21.78**	**21.76**	**21.72**
RMC 64K	22.50	21.95	21.96	21.99	22.50	21.83	21.80	21.71
RMC 144K	22.50	22.01	21.89	21.98	22.50	21.77	21.75	21.72
RMC 384K	22.50	22.00	21.94	22.01	22.50	21.84	21.71	21.73
HSDPA Subtest-1	21.50	21.01	20.90	20.94	21.50	20.82	20.73	20.69
HSDPA Subtest-2	21.50	21.00	20.93	21.03	21.50	20.81	20.76	20.73
HSDPA Subtest-3	21.00	20.54	20.47	20.50	21.00	20.24	20.23	20.19
HSDPA Subtest-4	21.00	20.49	20.43	20.51	21.00	20.29	20.24	20.32
HSUPA Subtest-1	21.00	20.83	20.87	20.92	21.00	20.66	20.72	20.63
HSUPA Subtest-2	20.00	19.04	18.96	19.06	20.00	18.77	18.81	18.80
HSUPA Subtest-3	20.50	20.03	19.91	20.02	20.50	19.81	19.78	19.64
HSUPA Subtest-4	20.00	19.03	18.91	19.02	20.00	18.78	18.82	18.81
HSUPA Subtest-5	21.50	21.01	20.99	21.00	21.50	20.84	20.77	20.73
DC-HSDPA Subtest-1	21.50	21.01	20.90	20.94	21.50	20.82	20.73	20.69
DC-HSDPA Subtest-2	21.50	21.00	20.93	21.03	21.50	20.81	20.76	20.73
DC-HSDPA Subtest-3	21.00	20.54	20.47	20.50	21.00	20.24	20.23	20.19
DC-HSDPA Subtest-4	21.00	20.49	20.43	20.51	21.00	20.29	20.24	20.32

Band	UMTS B5 Average Conducted Power(dBm)			
Tx Channel	Max. Tune-up	4132	4182	4233
Frequency(MHz)		826.4	836.4	846.6
RMC 12.2K	22.00	**21.55**	**21.49**	**21.47**
RMC 64K	22.00	21.54	21.44	21.47
RMC 144K	22.00	21.53	21.42	21.48
RMC 384K	22.00	21.55	21.45	21.47
HSDPA Subtest-1	21.00	20.48	20.49	20.42
HSDPA Subtest-2	21.00	20.57	20.48	20.45
HSDPA Subtest-3	20.50	20.01	19.96	19.94
HSDPA Subtest-4	20.50	20.07	19.98	20.04
HSUPA Subtest-1	20.50	20.44	20.40	20.34
HSUPA Subtest-2	19.50	18.62	18.53	18.44
HSUPA Subtest-3	20.00	19.52	19.60	19.52
HSUPA Subtest-4	19.50	18.55	18.62	18.52
HSUPA Subtest-5	21.00	20.63	20.47	20.45
DC-HSDPA Subtest-1	21.00	20.48	20.49	20.42
DC-HSDPA Subtest-2	21.00	20.57	20.48	20.45
DC-HSDPA Subtest-3	20.50	20.01	19.96	19.94
DC-HSDPA Subtest-4	20.50	20.07	19.98	20.04

Note:
1) The conducted power of UMTS is measured with RMS detector.
2) Note: Per KDB941225 D01, 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 or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode.
3) The tested channel results are marks in bold.

7.1.3 CONDUCTED POWER MEASUREMENTS OF LTE

1. Conducted power measurement of LTE B2

LTE B2/BW=1.4M		Average Conducted Power(dBm)				LTE B2/BW=3M		Average Conducted Power(dBm)			
Modulation	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)			Modulation	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)		
			18607/ 1850.7	18900/ 1880	19193/ 1909.3				18615/ 1851.5	18900/ 1880	19185/ 1908.5
QPSK	1/0	20.00	19.22	19.02	19.02	QPSK	1/0	20.00	19.25	19.18	19.09
	1/2	20.00	19.32	19.09	19.01		1/7	20.00	19.34	19.27	19.10
	1/5	20.00	19.25	19.02	18.98		1/14	20.00	19.21	19.17	18.99
	3/0	20.00	19.20	19.01	18.91		8/0	19.00	18.23	18.16	18.05
	3/1	20.00	19.31	19.11	19.02		8/3	19.00	18.24	18.16	18.08
	3/3	20.00	19.19	19.02	18.94		8/7	19.00	18.23	18.14	18.00
	6/0	19.00	18.19	18.04	17.95		15/0	19.00	18.20	18.15	18.04
16QAM	1/0	19.00	18.29	18.33	18.41	16QAM	1/0	19.00	18.18	18.68	18.28
	1/2	19.00	18.34	18.38	18.47		1/7	19.00	18.26	18.74	18.25
	1/5	19.00	18.30	18.32	18.38		1/14	19.00	18.15	18.67	18.15
	3/0	19.00	18.45	18.29	18.28		8/0	18.00	17.42	17.41	17.22
	3/1	19.00	18.51	18.32	18.38		8/3	18.00	17.41	17.39	17.29
	3/3	19.00	18.44	18.26	18.28		8/7	18.00	17.40	17.35	17.15
	6/0	18.00	17.43	17.36	17.00		15/0	18.00	17.32	17.35	17.12
LTE B2/BW=5M		Average Conducted Power(dBm)				LTE B2/BW=10M		Average Conducted Power(dBm)			
Modulation	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)			Modulation	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)		
			18625/ 1852.5	18900/ 1880	19175/ 1907.5				18650/ 1855	18900/ 1880	19150/ 1905
QPSK	1/0	20.00	19.41	19.21	19.25	QPSK	1/0	20.00	19.57	19.51	19.30
	1/12	20.00	19.40	19.25	19.17		1/24	20.00	19.25	19.21	19.18
	1/24	20.00	19.34	19.23	19.12		1/49	20.00	19.38	19.51	19.02
	12/0	19.00	18.30	18.21	18.18		25/0	19.00	18.32	18.20	18.25
	12/6	19.00	18.27	18.20	18.14		25/12	19.00	18.18	18.24	18.11
	12/13	19.00	18.23	18.20	18.07		25/25	19.00	18.20	18.23	18.13
	25/0	19.00	18.28	18.20	18.14		50/0	19.00	18.18	18.25	18.13
16QAM	1/0	19.00	18.51	18.88	18.41	16QAM	1/0	19.00	18.53	18.91	18.48
	1/12	19.00	18.52	18.91	18.33		1/24	19.00	18.22	18.64	18.28
	1/24	19.00	18.46	18.84	18.25		1/49	19.00	18.32	18.93	18.11
	12/0	18.00	17.42	17.49	17.35		25/0	18.00	17.36	17.37	17.38
	12/6	18.00	17.40	17.47	17.31		25/12	18.00	17.26	17.36	17.33
	12/13	18.00	17.35	17.46	17.27		25/25	18.00	17.24	17.36	17.32
	25/0	18.00	17.33	17.42	17.17		50/0	18.00	17.27	17.36	17.26

LTE B2/BW=15M		Average Conducted Power(dBm)				LTE B2/BW=20M		Average Conducted Power(dBm)			
Modula-tion	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)			Modula-tion	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)		
			18675/ 1857.5	18900/ 1880	19125/ 1902.5				18700/ 1860	18900/ 1880	19100/ 1900
QPSK	1/0	20.00	19.48	19.45	19.47	QPSK	1/0	20.00	**19.58**	**19.55**	**19.45**
	1/37	20.00	19.12	19.18	19.15		1/50	20.00	19.11	18.66	19.19
	1/74	20.00	19.18	19.31	19.07		1/99	20.00	19.28	19.43	19.04
	36/0	19.00	18.23	18.99	18.23		50/0	19.00	**18.26**	**18.28**	**18.38**
	36/19	19.00	18.23	18.20	18.19		50/25	19.00	18.22	18.22	18.21
	36/39	19.00	18.16	18.19	18.03		50/50	19.00	18.14	18.25	18.06
	75/0	19.00	18.19	18.21	18.15		100/0	19.00	18.23	**18.24**	18.16
16QAM	1/0	19.00	18.39	18.89	18.99	16QAM	1/0	19.00	18.98	18.88	18.80
	1/37	19.00	18.12	18.69	18.65		1/50	19.00	18.71	17.47	18.70
	1/74	19.00	18.13	18.80	18.57		1/99	19.00	18.67	18.83	18.33
	36/0	18.00	17.34	17.78	17.34		50/0	18.00	17.37	17.44	17.44
	36/19	18.00	17.24	17.41	17.30		50/25	18.00	17.34	17.42	17.27
	36/39	18.00	17.26	17.41	17.17		50/50	18.00	17.22	17.39	17.21
	75/0	18.00	17.29	17.38	17.34		100/0	18.00	17.36	17.40	17.32

Note: The tested channel results are marks in bold.

2. Conducted power measurement of LTE B4

LTE B4/BW=1.4M		Average Conducted Power(dBm)			
Modula-tion	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)		
			19957/ 1710.7	20175/ 1732.5	20393/ 1754.3
QPSK	1/0	21.00	20.14	20.25	19.95
	1/2	21.00	20.24	20.24	20.01
	1/5	21.00	20.11	20.22	19.93
	3/0	21.00	20.09	20.07	19.95
	3/1	21.00	20.16	20.16	20.00
	3/3	21.00	20.11	20.11	19.95
	6/0	20.00	19.22	19.17	18.96
16QAM	1/0	20.00	19.19	19.24	19.31
	1/2	20.00	19.22	19.34	19.38
	1/5	20.00	19.21	19.26	19.32
	3/0	20.00	19.32	19.21	19.15
	3/1	20.00	19.39	19.24	19.23
	3/3	20.00	19.32	19.22	19.15
	6/0	19.00	18.36	18.36	17.91

LTE B4/BW=3M		Average Conducted Power(dBm)			
Modula-tion	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)		
			19965/ 1711.5	20175/ 1732.5	20385/ 1753.5
QPSK	1/0	21.00	20.27	20.30	20.07
	1/7	21.00	20.34	20.36	20.14
	1/14	21.00	20.22	20.25	20.04
	8/0	20.00	19.27	19.25	19.11
	8/3	20.00	19.28	19.29	19.10
	8/7	20.00	19.23	19.26	19.07
	15/0	20.00	19.22	19.26	19.10
16QAM	1/0	20.00	19.17	19.63	19.14
	1/7	20.00	19.25	19.69	19.19
	1/14	20.00	19.13	19.62	19.09
	8/0	19.00	18.43	18.34	18.18
	8/3	19.00	18.43	18.40	18.23
	8/7	19.00	18.38	18.34	18.17
	15/0	19.00	18.37	18.36	18.10

LTE B4/BW=5M		Average Conducted Power(dBm)			
Modula-tion	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)		
			19975/ 1712.5	20175/ 1732.5	20375/ 1752.5
QPSK	1/0	21.00	20.40	20.32	20.16
	1/12	21.00	20.38	20.31	20.21
	1/24	21.00	20.33	20.29	20.12
	12/0	20.00	19.30	19.29	19.15
	12/6	20.00	19.30	19.32	19.16
	12/13	20.00	19.25	19.28	19.13
	25/0	20.00	19.26	19.31	19.11
16QAM	1/0	20.00	19.52	19.82	19.26
	1/12	20.00	19.48	19.85	19.25
	1/24	20.00	19.40	19.82	19.20
	12/0	19.00	18.44	18.50	18.26
	12/6	19.00	18.44	18.50	18.25
	12/13	19.00	18.40	18.48	18.22
	25/0	19.00	18.34	18.39	18.10

LTE B4/BW=10M		Average Conducted Power(dBm)			
Modula-tion	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)		
			20000/ 1715	20175/ 1732.5	20350/ 1750
QPSK	1/0	21.00	20.34	20.37	20.23
	1/24	21.00	20.17	20.29	20.11
	1/49	21.00	20.19	20.30	20.10
	25/0	20.00	19.27	19.35	19.26
	25/12	20.00	19.29	19.32	19.23
	25/25	20.00	19.25	19.27	19.20
	50/0	20.00	19.22	19.31	19.25
16QAM	1/0	20.00	19.27	19.73	19.30
	1/24	20.00	19.14	19.59	19.19
	1/49	20.00	19.13	19.64	19.17
	25/0	19.00	18.42	18.42	18.39
	25/12	19.00	18.33	18.38	18.37
	25/25	19.00	18.29	18.36	18.33
	50/0	19.00	18.34	18.35	18.32

LTE B4/BW=15M		Average Conducted Power(dBm)				LTE B4/BW=20M		Average Conducted Power(dBm)			
Modula-tion	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)			Modula-tion	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)		
			20025/ 1717.5	20175/ 1732.5	20325/ 1747.5				20050/ 1720	20175/ 1732.5	20300/ 1745
QPSK	1/0	21.00	20.40	20.43	20.49	QPSK	1/0	21.00	**20.41**	**20.42**	**20.42**
	1/37	21.00	20.14	20.24	20.19		1/50	21.00	20.16	19.26	20.09
	1/74	21.00	20.22	20.33	20.19		1/99	21.00	20.25	20.26	20.05
	36/0	20.00	19.31	19.38	19.40		50/0	20.00	**19.33**	**19.41**	**19.27**
	36/19	20.00	19.23	19.33	19.26		50/25	20.00	19.31	19.33	19.25
	36/39	20.00	19.32	19.27	19.23		50/50	20.00	19.26	19.32	19.11
	75/0	20.00	19.36	19.33	19.32		100/0	20.00	**19.36**	19.35	19.23
16QAM	1/0	20.00	19.34	19.80	19.84	16QAM	1/0	20.00	19.95	19.87	19.79
	1/37	20.00	19.10	19.61	19.60		1/50	20.00	19.71	18.38	19.54
	1/74	20.00	19.17	19.63	19.54		1/99	20.00	19.80	19.76	19.55
	36/0	19.00	18.43	18.61	18.42		50/0	19.00	18.47	18.47	18.45
	36/19	19.00	18.37	18.43	18.28		50/25	19.00	18.46	18.44	18.43
	36/39	19.00	18.38	18.44	18.25		50/50	19.00	18.38	18.35	18.27
	75/0	19.00	18.42	18.41	18.41		100/0	19.00	18.45	18.40	18.42

Note: The tested channel results are marks in bold.

3. Conducted power measurement of LTE B5

LTE B5/BW=1.4M		Average Conducted Power(dBm)				LTE B5/BW=3M		Average Conducted Power(dBm)			
Modula-tion	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)			Modula-tion	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)		
			20407/ 824.7	20525/ 836.5	20643/ 848.3				20415/ 825.5	20525/ 836.5	20635/ 847.5
QPSK	1/0	24.00	23.01	23.30	23.29	QPSK	1/0	24.00	23.24	23.35	23.41
	1/2	24.00	23.08	23.34	23.31		1/7	24.00	23.28	23.44	23.46
	1/5	24.00	23.03	23.31	23.27		1/14	24.00	23.18	23.37	23.36
	3/0	24.00	22.92	23.12	23.26		8/0	23.00	22.19	22.36	22.38
	3/1	24.00	23.04	23.19	23.31		8/3	23.00	22.20	22.35	22.38
	3/3	24.00	23.07	23.21	23.29		8/7	23.00	22.16	22.33	22.32
	6/0	23.00	22.07	22.21	22.21		15/0	23.00	22.21	22.36	22.37
16QAM	1/0	23.00	22.13	22.24	22.66	16QAM	1/0	23.00	22.51	22.36	22.38
	1/2	23.00	22.20	22.25	22.68		1/7	23.00	22.61	22.41	22.43
	1/5	23.00	22.14	22.23	22.63		1/14	23.00	22.52	22.34	22.25
	3/0	23.00	22.09	22.36	22.52		8/0	22.00	21.30	21.41	21.57
	3/1	23.00	22.19	22.44	22.56		8/3	22.00	21.37	21.47	21.57
	3/3	23.00	22.17	22.42	22.55		8/7	22.00	21.33	21.42	21.51
	6/0	22.00	21.28	21.46	21.18		15/0	22.00	21.28	21.34	21.52
LTE B5/BW=5M		**Average Conducted Power(dBm)**				**LTE B5/BW=10M**		**Average Conducted Power(dBm)**			
Modula-tion	**RB Size/ Offset**	**Max. Tune-up**	**Channel/Frequency(MHz)**			**Modula-tion**	**RB Size/ Offset**	**Max. Tune-up**	**Channel/Frequency(MHz)**		
			20425/ 826.5	**20525/ 836.5**	**20625/ 846.5**				**20450/ 829**	**20525/ 836.5**	**20600/ 844**
QPSK	1/0	24.00	23.26	23.42	23.54	QPSK	1/0	24.00	**23.37**	**23.43**	**23.55**
	1/12	24.00	23.27	23.51	23.49		1/24	24.00	23.22	23.34	23.46
	1/24	24.00	23.19	23.46	23.49		1/49	24.00	23.34	23.35	23.37
	12/0	23.00	22.25	22.36	22.46		25/0	23.00	22.22	22.33	22.42
	12/6	23.00	22.25	22.39	22.44		25/12	23.00	22.35	22.41	**22.49**
	12/13	23.00	22.21	22.36	22.37		25/25	23.00	22.32	22.40	22.41
	25/0	23.00	22.26	22.38	22.42		50/0	23.00	22.28	22.35	22.35
16QAM	1/0	23.00	22.72	22.48	22.73	16QAM	1/0	23.00	22.57	22.40	22.28
	1/12	23.00	22.77	22.54	22.71		1/24	23.00	22.59	22.34	22.39
	1/24	23.00	22.75	22.51	22.57		1/49	23.00	22.71	22.34	22.27
	12/0	22.00	21.47	21.50	21.65		25/0	22.00	21.34	21.51	21.50
	12/6	22.00	21.44	21.54	21.62		25/12	22.00	21.46	21.54	21.60
	12/13	22.00	21.45	21.52	21.56		25/25	22.00	21.44	21.50	21.51
	25/0	22.00	21.39	21.39	21.54		50/0	22.00	21.41	21.45	21.45

Note: The tested channel results are marks in bold.

4. Conducted power measurement of LTE B7

LTE B7/BW=5M		Average Conducted Power(dBm)				LTE B7/BW=10M		Average Conducted Power(dBm)			
Modula-tion	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)			Modula-tion	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)		
			20775/ 2502.5	21100/ 2535	21425/ 2567.5				20800/ 2505	21100/ 2535	21400/ 2565
QPSK	1/0	23.00	22.11	22.23	22.20	QPSK	1/0	23.00	21.98	22.17	22.18
	1/12	23.00	22.16	22.31	22.28		1/24	23.00	21.98	22.17	22.17
	1/24	23.00	22.08	22.22	22.20		1/49	23.00	21.90	22.14	22.14
	12/0	22.00	21.09	21.17	21.24		25/0	22.00	21.05	21.15	21.20
	12/6	22.00	21.10	21.21	21.24		25/12	22.00	21.00	21.20	21.25
	12/13	22.00	21.10	21.19	21.24		25/25	22.00	21.09	21.18	21.22
	25/0	22.00	21.09	21.19	21.25		50/0	22.00	21.09	21.21	21.20
16QAM	1/0	22.00	21.19	21.35	21.75	16QAM	1/0	22.00	20.98	21.54	21.31
	1/12	22.00	21.23	21.41	21.85		1/24	22.00	20.96	21.59	21.30
	1/24	22.00	21.16	21.36	21.74		1/49	22.00	20.88	21.59	21.23
	12/0	21.00	20.21	20.36	20.44		25/0	21.00	20.18	20.29	20.43
	12/6	21.00	20.23	20.39	20.47		25/12	21.00	20.17	20.32	20.43
	12/13	21.00	20.21	20.38	20.47		25/25	21.00	20.26	20.33	20.40
	25/0	21.00	20.11	20.28	20.36		50/0	21.00	20.26	20.29	20.39
LTE B7/BW=15M		Average Conducted Power(dBm)				LTE B7/BW=20M		Average Conducted Power(dBm)			
Modula-tion	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)			Modula-tion	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)		
			20825/ 2507.5	21100/ 2535	21375/ 2562.5				20850/ 2510	21100/ 2535	21350/ 2560
QPSK	1/0	23.00	21.98	22.15	22.35	QPSK	1/0	23.00	22.10	22.20	22.36
	1/37	23.00	21.99	22.18	22.40		1/50	23.00	**22.11**	**22.42**	**22.46**
	1/74	23.00	21.37	22.09	22.31		1/99	23.00	21.27	22.25	22.29
	36/0	22.00	20.96	21.13	21.35		50/0	22.00	**21.29**	**21.41**	**21.49**
	36/19	22.00	21.13	21.18	21.38		50/25	22.00	21.27	21.39	21.46
	36/39	22.00	21.08	21.17	21.37		50/50	22.00	21.21	21.39	21.47
	75/0	22.00	21.11	21.18	21.38		100/0	22.00	21.21	21.33	**21.41**
16QAM	1/0	22.00	20.96	21.60	21.71	16QAM	1/0	22.00	21.75	21.74	21.88
	1/37	22.00	20.99	21.64	21.80		1/50	22.00	21.82	21.85	21.89
	1/74	22.00	20.47	21.59	21.71		1/99	22.00	21.03	21.84	21.82
	36/0	21.00	20.11	20.31	20.41		50/0	21.00	20.46	20.53	20.52
	36/19	21.00	20.24	20.36	20.44		50/25	21.00	20.45	20.53	20.57
	36/39	21.00	20.24	20.34	20.39		50/50	21.00	20.42	20.50	20.54
	75/0	21.00	20.22	20.29	20.46		100/0	21.00	20.42	20.50	20.53

Note: The tested channel results are marks in bold.

5. Conducted power measurement of LTE B12

LTE B12/BW=1.4M		Average Conducted Power(dBm)				LTE B12/BW=3M		Average Conducted Power(dBm)			
Modula -tion	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)			Modula -tion	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)		
			23017/ 699.7	23095/ 707.5	23173/ 715.3				23025/ 700.5	23095/ 707.5	23165/ 714.5
QPSK	1/0	24.00	23.09	23.45	23.13	QPSK	1/0	24.00	23.21	23.60	23.18
	1/2	24.00	23.20	23.49	23.15		1/7	24.00	23.50	23.53	23.32
	1/5	24.00	23.24	23.38	22.87		1/14	24.00	23.75	23.42	22.96
	3/0	24.00	23.18	23.33	23.00		8/0	23.00	22.70	22.59	22.13
	3/1	24.00	23.19	23.41	23.10		8/3	23.00	22.81	22.52	22.21
	3/3	24.00	23.30	23.37	23.12		8/7	23.00	22.79	22.38	22.16
	6/0	23.00	22.56	22.47	22.17		15/0	23.00	22.74	22.44	22.09
16QAM	1/0	23.00	22.49	22.50	22.39	16QAM	1/0	23.00	22.56	22.52	21.96
	1/2	23.00	22.61	22.51	22.47		1/7	23.00	22.88	22.49	22.03
	1/5	23.00	22.60	22.38	22.32		1/14	23.00	22.80	22.32	21.87
	3/0	23.00	22.35	22.41	22.22		8/0	22.00	21.75	21.61	21.19
	3/1	23.00	22.47	22.49	22.35		8/3	22.00	21.87	21.56	21.28
	3/3	23.00	22.52	22.44	22.29		8/7	22.00	21.81	21.42	21.25
	6/0	22.00	21.46	21.59	21.04		15/0	22.00	21.81	21.44	21.11
LTE B12/BW=5M		Average Conducted Power(dBm)				LTE B12/BW=10M		Average Conducted Power(dBm)			
Modula -tion	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)			Modula -tion	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)		
			23035/ 701.5	23095/ 707.5	23155/ 713.5				23060/ 704	23095/ 707.5	23130/ 711
QPSK	1/0	24.00	23.32	23.77	23.39	QPSK	1/0	24.00	23.19	**23.80**	**23.68**
	1/12	24.00	23.70	23.54	23.31		1/24	24.00	**23.76**	23.48	23.18
	1/24	24.00	23.72	23.32	23.14		1/49	24.00	23.32	23.13	22.83
	12/0	23.00	22.76	22.62	22.15		25/0	23.00	22.76	22.74	22.28
	12/6	23.00	22.83	22.50	22.15		25/12	23.00	**22.80**	22.48	22.18
	12/13	23.00	22.82	22.36	22.08		25/25	23.00	22.63	22.24	22.04
	25/0	23.00	22.78	22.46	22.14		50/0	23.00	22.65	22.40	22.23
16QAM	1/0	23.00	22.79	22.71	22.37	16QAM	1/0	23.00	22.19	22.61	22.86
	1/12	23.00	22.89	22.55	22.29		1/24	23.00	22.73	22.34	22.43
	1/24	23.00	22.79	22.32	22.34		1/49	23.00	22.33	21.98	22.28
	12/0	22.00	21.93	21.70	21.24		25/0	22.00	21.85	21.80	21.35
	12/6	22.00	21.93	21.56	21.26		25/12	22.00	21.90	21.54	21.26
	12/13	22.00	21.91	21.41	21.18		25/25	22.00	21.73	21.30	21.13
	25/0	22.00	21.80	21.46	21.23		50/0	22.00	21.72	21.45	21.30

Note: The tested channel results are marks in bold.

6. Conducted power measurement of LTE B13

LTE B13/BW=5M		Average Conducted Power(dBm)				LTE B13/BW=10M		Average Conducted Power(dBm)	
Modula-tion	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)			Modula-tion	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)
			23205/ 779.5	23230/ 782	23255/ 784.5				23230/ 782
QPSK	1/0	24.00	23.43	23.54	23.67	QPSK	1/0	24.00	23.43
	1/12	24.00	23.52	23.61	23.61		1/24	24.00	**23.74**
	1/24	24.00	23.55	23.55	23.43		1/49	24.00	23.36
	12/0	23.00	22.36	22.49	22.51		25/0	23.00	22.46
	12/6	23.00	22.43	22.54	22.49		25/12	23.00	**22.56**
	12/13	23.00	22.44	22.53	22.43		25/25	23.00	22.45
	25/0	23.00	22.42	22.47	22.44		50/0	23.00	22.48
16QAM	1/0	23.00	22.78	22.55	22.68	16QAM	1/0	23.00	22.22
	1/12	23.00	22.99	22.66	22.70		1/24	23.00	22.39
	1/24	23.00	22.96	22.61	22.54		1/49	23.00	22.28
	12/0	22.00	21.51	21.57	21.62		25/0	22.00	21.50
	12/6	22.00	21.61	21.63	21.60		25/12	22.00	21.60
	12/13	22.00	21.65	21.59	21.55		25/25	22.00	21.56
	25/0	22.00	21.55	21.48	21.55		50/0	22.00	21.52

Note: The tested channel results are marks in bold.

7. Conducted power measurement of LTE B14

LTE B14/BW=5M		Average Conducted Power(dBm)				LTE B14/BW=10M		Average Conducted Power(dBm)	
Modula-tion	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)			Modula-tion	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)
			23305/ 790.5	23330/ 793	23355/ 795.5				23330/ 793
QPSK	1/0	24.00	23.52	23.57	23.62	QPSK	1/0	24.00	23.34
	1/12	24.00	23.58	23.60	23.63		1/24	24.00	**23.69**
	1/24	24.00	23.54	23.53	23.51		1/49	24.00	23.45
	12/0	23.00	22.50	22.54	22.51		25/0	23.00	22.52
	12/6	23.00	22.54	22.54	22.52		25/12	23.00	**22.53**
	12/13	23.00	22.53	22.53	22.48		25/25	23.00	22.51
	25/0	23.00	22.51	22.52	22.49		50/0	23.00	22.52
16QAM	1/0	23.00	22.98	22.57	22.68	16QAM	1/0	23.00	22.30
	1/12	23.00	22.63	22.66	22.73		1/24	23.00	22.39
	1/24	23.00	22.74	22.63	22.64		1/49	23.00	22.34
	12/0	22.00	21.67	21.61	21.68		25/0	22.00	21.62
	12/6	22.00	21.71	21.65	21.68		25/12	22.00	21.64
	12/13	22.00	21.71	21.64	21.63		25/25	22.00	21.59
	25/0	22.00	21.61	21.55	21.59		50/0	22.00	21.56

Note: The tested channel results are marks in bold.

8. Conducted power measurement of LTE B17

LTE B17/BW=5M		Average Conducted Power(dBm)				LTE B17/BW=10M		Average Conducted Power(dBm)			
Modula-tion	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)			Modula-tion	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)		
			23755/ 706.5	23790/ 710	23825/ 713.5				23780/ 709	23790/ 710	23800/ 711
QPSK	1/0	24.00	23.69	23.64	23.29	QPSK	1/0	24.00	23.77	23.58	23.59
	1/12	24.00	23.66	23.48	23.21		1/24	24.00	23.39	23.30	23.30
	1/24	24.00	23.50	23.25	23.31		1/49	24.00	23.15	23.16	23.28
	12/0	23.00	22.68	22.37	22.16		25/0	23.00	22.56	22.53	22.41
	12/6	23.00	22.56	22.26	22.20		25/12	23.00	22.37	22.22	22.19
	12/13	23.00	22.51	22.21	22.08		25/25	23.00	22.20	22.16	22.19
	25/0	23.00	22.60	22.22	22.17		50/0	23.00	22.34	22.23	22.27
16QAM	1/0	23.00	22.62	22.58	22.68	16QAM	1/0	23.00	22.83	22.47	22.39
	1/12	23.00	22.57	22.45	22.61		1/24	23.00	22.62	22.23	22.08
	1/24	23.00	22.49	22.24	22.63		1/49	23.00	22.38	22.05	22.00
	12/0	22.00	21.75	21.51	21.33		25/0	22.00	21.63	21.67	21.48
	12/6	22.00	21.66	21.36	21.32		25/12	22.00	21.46	21.35	21.27
	12/13	22.00	21.61	21.32	21.24		25/25	22.00	21.27	21.28	21.22
	25/0	22.00	21.62	21.26	21.26		50/0	22.00	21.43	21.33	21.31

Note: The tested channel results are marks in bold.

7.1.4 CONDUCTED POWER MEASUREMENTS OF BT

BT	Average Conducted Power(dBm)			
	Max. Tune up	CH0 2402MHz	CH39 2441MHz	CH78 2480MHz
DH5	10.00	9.62	8.57	9.35
2DH5	6.50	6.32	4.87	6.44
3DH5	7.50	7.30	5.77	7.34

BT	Average Conducted Power(dBm)			
	Max. Tune up	CH0 2402MHz	CH19 2441MHz	CH39 2480MHz
BLE(1M)	0.00	-1.24	-1.49	-1.51
BLE(2M)	0.00	-1.47	-1.52	-1.47

Note: The Average conducted power of BT is measured with RMS detector.

7.1.5 CONDUCTED POWER MEASUREMENTS OF WIFI

1. Conducted power measurement results of WiFi 2.4G

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Max. Tune up	Average Power(dBm)
2.4G WIFI_1TX _ANT 1	802.11b	1	2412	1	15.00	**14.94**
		6	2437		15.00	**14.01**
		11	2462		15.00	**14.45**
	802.11g	1	2412	6	15.00	14.84
		6	2437		15.00	14.84
		11	2462		15.00	14.18
	802.11n HT20	1	2412	6.5	15.00	14.46
		6	2437		15.00	14.52
		11	2462		15.00	14.70
	802.11n HT40	3	2422	13.5	13.00	12.84
		6	2437		13.00	12.31
		9	2452		13.00	12.06

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Max. Tune up	Average Power(dBm)
2.4G WIFI_1TX _ANT 2	802.11b	1	2412	1	15.00	**14.31**
		6	2437		15.00	**14.90**
		11	2462		15.00	**14.52**
	802.11g	1	2412	6	15.00	14.48
		6	2437		15.00	14.58
		11	2462		15.00	14.34
	802.11n HT20	1	2412	6.5	15.00	14.23
		6	2437		15.00	14.36
		11	2462		15.00	14.98
	802.11n HT40	3	2422	13.5	13.00	12.70
		6	2437		13.00	12.48
		9	2452		13.00	12.13

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	ANT 1 Average Power (dBm)	ANT 2 Average Power (dBm)	Max. Tune up	Total Average Power (dBm)
2.4G WIFI_2TX_ ANT 1+2	**802.11b**	1	2412	1	14.58	14.50	18.00	17.55
		6	2437		14.84	14.81	18.00	17.84
		11	2462		14.36	14.32	18.00	17.35
	802.11g	3	2422	6	14.85	14.59	18.00	17.73
		6	2437		14.87	14.78	18.00	17.84
		9	2452		14.38	14.33	18.00	17.37
	802.11n HT20	1	2412	13	14.51	14.25	18.00	17.39
		6	2437		14.59	14.63	18.00	17.62
		11	2462		14.76	14.20	18.00	17.50
	802.11n HT40	3	2422	27	12.40	12.08	16.00	15.25
		6	2437		12.00	12.90	16.00	15.48
		9	2452		12.79	12.30	16.00	15.56

Note:
1) The Average conducted power of WiFi 2.4GHz is measured with RMS detector.
2) Per KDB248227 D01, for WiFi 2.4GHz, the highest measured maximum output power Channel for DSSS modes (802.11b) was selected for SAR measurement. SAR for OFDM modes (2.4GHz 802.11g/n) was not required When the highest reported SAR for DSSS is adjusted by the ratio of OFDM modes (802.11g/n) to DSSS modes (802.11b) specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.
3) The tested channel results are marks in bold.

2. Conducted power measurement results of WiFi 5.2G

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Max. Tune-up	Average Power(dBm)
5.2G WIFI_1TX _ANT 1	802.11a	36	5180	6	14.00	13.26
		40	5200		14.00	13.62
		44	5220		14.00	13.42
		48	5240		14.00	13.20
	802.11n HT20	36	5180	MCS0	12.00	11.91
		40	5200		12.00	11.41
		44	5220		12.00	11.16
		48	5240		12.00	11.01
	802.11n HT40	38	5190	MCS0	11.00	10.75
		46	5230		11.00	10.11
	802.11ac VHT20	36	5180	MCS0	12.00	11.90
		40	5200		12.00	11.42
		44	5220		12.00	11.16
		48	5240		12.00	11.03
	802.11ac VHT40	38	5190	MCS0	11.00	10.79
		46	5230		11.00	10.14
	802.11ac VHT80	42	5210	MCS0	8.00	7.86

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Max. Tune-up	Average Power(dBm)
5.2G WIFI_1TX _ANT 2	802.11a	36	5180	6	14.00	13.15
		40	5200		14.00	13.88
		44	5220		14.00	13.11
		48	5240		14.00	13.04
	802.11n HT20	36	5180	MCS0	12.00	11.75
		40	5200		12.00	11.60
		44	5220		12.00	11.67
		48	5240		12.00	11.60
	802.11n HT40	38	5190	MCS0	11.00	10.72
		46	5230		11.00	10.53
	802.11ac VHT20	36	5180	MCS0	12.00	11.92
		40	5200		12.00	11.57
		44	5220		12.00	11.83
		48	5240		12.00	11.78
	802.11ac VHT40	38	5190	MCS0	11.00	10.82
		46	5230		11.00	10.55
	802.11ac VHT80	42	5210	MCS0	8.00	7.88

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	ANT 1 Average Power (dBm)	ANT 2 Average Power (dBm)	Max. Tune-up	Total Average Power (dBm)
5.2G WIFI_ 2TX_ ANT 1+2	802.11a	36	5180	6	13.88	13.94	17.00	16.92
		40	5200		12.48	13.53	17.00	16.05
		44	5220		12.57	13.81	17.00	16.24
		48	5240		11.94	13.72	16.00	15.93
	802.11n HT20	36	5180	MCS8	11.76	11.83	15.00	14.81
		40	5200		10.30	11.41	15.00	13.90
		44	5220		10.24	11.66	15.00	14.02
		48	5240		9.85	11.65	15.00	13.85
	802.11n HT40	38	5190	MCS8	10.17	10.46	14.00	13.33
		46	5230		8.59	10.22	13.00	12.49
	802.11ac VHT20	36	5180	MCS8	11.79	11.70	15.00	14.76
		40	5200		10.36	11.34	14.00	13.89
		44	5220		10.23	11.71	15.00	14.04
		48	5240		9.83	11.64	14.00	13.84
	802.11ac VHT40	38	5190	MCS8	10.19	10.41	14.00	13.31
		46	5230		8.55	10.26	13.00	12.50
	802.11ac VHT80	42	5210	MCS8	6.31	7.59	11.00	10.01

Note: The Average conducted power of WiFi 5.2G is measured with RMS detector.

2. Conducted power measurement results of WiFi 5.3G

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Max. Tune-up	Average Power(dBm)
5.3G WIFI_1TX _ANT 1	802.11a	52	5260	6	14.00	13.06
		56	5280		14.00	13.69
		60	5300		14.00	**13.84**
		64	5320		14.00	13.20
	802.11n HT20	52	5260	MCS0	12.00	11.67
		56	5280		12.00	11.52
		60	5300		12.00	11.49
		64	5320		11.00	10.89
	802.11n HT40	54	5270	MCS0	11.00	10.18
		62	5310		11.00	10.41
	802.11ac VHT20	52	5260	MCS0	12.00	11.69
		56	5280		12.00	11.53
		60	5300		12.00	11.50
		64	5320		11.00	10.94
	802.11ac VHT40	54	5270	MCS0	11.00	10.29
		62	5310		11.00	10.36
	802.11ac VHT80	58	5290	MCS0	8.00	7.43

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Max. Tune-up	Average Power(dBm)
5.3G WIFI_1TX _ANT 2	802.11a	52	5260	6	14.00	13.48
		56	5280		14.00	**13.89**
		60	5300		14.00	13.19
		64	5320		14.00	13.82
	802.11n HT20	52	5260	MCS0	12.00	11.06
		56	5280		12.00	11.36
		60	5300		12.00	11.72
		64	5320		12.00	11.28
	802.11n HT40	54	5270	MCS0	11.00	10.66
		62	5310		11.00	10.34
	802.11ac VHT20	52	5260	MCS0	12.00	11.22
		56	5280		12.00	11.61
		60	5300		12.00	10.98
		64	5320		12.00	11.58
	802.11ac VHT40	54	5270	MCS0	11.00	10.60
		62	5310		11.00	10.29
	802.11ac VHT80	58	5290	MCS0	8.00	7.26

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	ANT 1 Average Power (dBm)	ANT 2 Average Power (dBm)	Max. Tune-up	Total Average Power (dBm)
5.3G WIFI_ 2TX_ ANT 1+2	802.11a	52	5260	6	11.61	13.17	16.00	15.47
		56	5280		12.85	13.69	17.00	16.30
		60	5300		13.53	13.83	17.00	16.69
		64	5320		13.97	13.55	17.00	16.78
	802.11n HT20	52	5260	MCS8	9.55	11.05	14.00	13.37
		56	5280		10.45	11.42	14.00	13.97
		60	5300		11.37	11.84	15.00	14.62
		64	5320		11.83	11.46	15.00	14.66
	802.11n HT40	54	5270	MCS8	8.94	10.28	13.50	12.67
		62	5310		10.11	9.92	13.50	13.03
	802.11ac VHT20	52	5260	MCS8	8.54	11.00	13.00	12.95
		56	5280		10.53	11.50	15.00	14.05
		60	5300		11.45	11.82	15.00	14.65
		64	5320		11.93	11.39	15.00	14.68
	802.11ac VHT40	54	5270	MCS8	8.86	10.26	13.50	12.63
		62	5310		10.15	9.92	13.50	13.05
	802.11ac VHT80	58	5290	MCS8	7.35	7.87	11.00	10.63

Note:
1) The Average conducted power of WiFi 5.3G is measured with RMS detector.
2) The tested channel results are marks in bold.

2. Conducted power measurement results of WiFi 5.6G

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Max. Tune-up	Average Power(dBm)
5.6G WIFI_1TX _ANT 1	802.11a	100	5500	6	13.00	12.80
		104	5520		13.00	11.99
		108	5540		13.00	12.30
		112	5560		13.00	12.64
		116	5580		13.00	12.72
		132	5660		13.00	12.70
		136	5680		13.00	12.35
		140	5700		13.00	**12.82**
	802.11n HT20	100	5500	MCS0	12.00	11.45
		104	5520		12.00	11.69
		108	5540		12.00	11.09
		112	5560		12.00	11.42
		116	5580		12.00	11.47
		132	5660		12.00	11.35
		136	5680		12.00	10.94
		140	5700		12.00	11.54
	802.11n HT40	102	5510	MCS0	11.00	10.45
		110	5550		11.00	10.88
		118	5590		11.00	10.19
		126	5630		11.00	10.67
		134	5670		11.00	10.04
	802.11ac VHT20	100	5500	MCS0	12.00	11.43
		104	5520		12.00	11.73
		108	5540		12.00	11.08
		112	5560		12.00	11.44
		116	5580		12.00	11.46
		132	5660		12.00	11.36
		136	5680		12.00	10.97
		140	5700		12.00	11.57
	802.11ac VHT40	102	5510	MCS0	11.00	10.25
		110	5550		11.00	10.92
		118	5590		11.00	10.13
		126	5630		11.00	10.53
		134	5670		11.00	10.01
	802.11ac VHT80	106	5530	MCS0	8.00	7.66
		122	5610		8.00	7.71

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Max. Tune-up	Average Power(dBm)
5.6G WIFI_1TX _ANT 2	**802.11a**	100	5500	6	13.00	**12.91**
		104	5520		13.00	12.78
		108	5540		13.00	12.46
		112	5560		13.00	12.27
		116	5580		13.00	12.24
		132	5660		13.00	12.64
		136	5680		13.00	12.39
		140	5700		13.00	12.28
	802.11n HT20	100	5500	MCS0	12.00	11.41
		104	5520		12.00	11.20
		108	5540		12.00	11.82
		112	5560		12.00	11.71
		116	5580		12.00	11.65
		132	5660		12.00	11.03
		136	5680		12.00	11.84
		140	5700		12.00	11.59
	802.11n HT40	102	5510	MCS0	11.00	10.38
		110	5550		11.00	10.82
		118	5590		11.00	10.76
		126	5630		11.00	10.86
		134	5670		11.00	10.01
	802.11ac VHT20	100	5500	MCS0	12.00	11.70
		104	5520		12.00	11.49
		108	5540		12.00	11.18
		112	5560		12.00	11.05
		116	5580		12.00	11.02
		132	5660		12.00	11.42
		136	5680		12.00	11.18
		140	5700		12.00	11.97
	802.11ac VHT40	102	5510	MCS0	11.00	10.43
		110	5550		11.00	10.94
		118	5590		11.00	10.76
		126	5630		11.00	10.91
		134	5670		11.00	10.04
	802.11ac VHT80	106	5530	MCS0	8.00	7.36
		122	5610		8.00	7.68

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	ANT 1 Average Power (dBm)	ANT 2 Average Power (dBm)	Max. Tune-up	Total Average Power (dBm)
5.6G WIFI_ 2TX_ ANT 1+2	802.11a	100	5500	6	11.62	12.87	15.50	15.30
		104	5520		11.93	12.72	15.50	15.35
		108	5540		12.28	12.41	15.50	15.36
		112	5560		12.44	12.26	15.50	15.36
		116	5580		12.57	12.18	15.50	15.39
		132	5660		11.52	12.48	15.50	15.04
		136	5680		10.84	12.27	15.00	14.62
		140	5700		10.67	12.02	15.00	14.41
	802.11n HT20	100	5500	MCS8	10.52	11.78	14.50	14.21
		104	5520		10.61	11.48	14.50	14.08
		108	5540		10.97	11.14	14.50	14.07
		112	5560		11.42	11.00	14.50	14.23
		116	5580		11.49	11.06	14.50	14.29
		132	5660		10.42	11.35	14.50	13.92
		136	5680		10.86	11.03	14.50	13.96
		140	5700		10.43	11.90	14.50	14.24
	802.11n HT40	102	5510	MCS8	9.20	10.19	14.00	12.73
		110	5550		10.82	10.75	14.00	13.80
		118	5590		10.97	10.55	14.00	13.78
		126	5630		10.47	10.65	14.00	13.57
		134	5670		9.78	10.82	14.00	13.34
	802.11ac VHT20	100	5500	MCS8	10.52	11.87	14.50	14.26
		104	5520		10.69	11.48	14.50	14.11
		108	5540		11.05	11.14	14.50	14.11
		112	5560		11.32	11.08	14.50	14.21
		116	5580		11.47	11.13	14.50	14.31
		132	5660		10.27	11.35	14.50	13.85
		136	5680		9.90	11.11	14.50	13.56
		140	5700		9.44	10.95	14.50	13.27
	802.11ac VHT40	102	5510	MCS8	9.13	10.28	14.00	12.75
		110	5550		10.86	10.78	14.00	13.83
		118	5590		10.92	10.57	14.00	13.76
		126	5630		10.61	10.67	14.00	13.65
		134	5670		9.84	10.77	14.00	13.34
	802.11ac VHT80	106	5530	MCS8	6.88	7.33	11.00	10.12
		122	5610		7.13	6.56	11.00	9.86

Note:
1) The Average conducted power of WiFi 5.6G is measured with RMS detector.
2) The tested channel results are marks in bold.

2. Conducted power measurement results of WiFi 5.8G

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Max. Tune-up	Average Power(dBm)
5.8G WIFI_1TX _ANT 1	802.11a	149	5745	6	13.00	12.06
		153	5765		13.00	**12.58**
		157	5785		13.00	12.45
		161	5805		13.00	12.02
		165	5825		13.00	12.54
	802.11n HT20	149	5745	MCS0	12.00	11.83
		153	5765		12.00	11.34
		157	5785		12.00	11.16
		161	5805		12.00	11.74
		165	5825		12.00	11.18
	802.11n HT40	151	5755	MCS0	11.00	10.54
		159	5795		11.00	10.15
	802.11ac VHT20	149	5745	MCS0	12.00	11.81
		153	5765		12.00	11.44
		157	5785		12.00	11.23
		161	5805		12.00	11.73
		165	5825		12.00	11.21
	802.11ac VHT40	151	5755	MCS0	11.00	10.64
		159	5795		11.00	10.18
	802.11ac VHT80	155	5775	MCS0	8.00	7.62

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Max. Tune-up	Average Power(dBm)
5.8G WIFI_1TX _ANT 2	**802.11a**	149	5745	6	13.00	12.22
		153	5765		13.00	**12.95**
		157	5785		13.00	12.78
		161	5805		13.00	12.80
		165	5825		13.00	12.14
	802.11n HT20	149	5745	MCS0	12.00	11.61
		153	5765		12.00	11.33
		157	5785		12.00	11.13
		161	5805		12.00	11.24
		165	5825		12.00	11.58
	802.11n HT40	151	5755	MCS0	11.00	10.46
		159	5795		11.00	10.13
	802.11ac VHT20	149	5745	MCS0	12.00	11.88
		153	5765		12.00	11.74
		157	5785		12.00	11.52
		161	5805		12.00	11.46
		165	5825		12.00	11.89
	802.11ac VHT40	151	5755	MCS0	8.00	7.58
		159	5795		8.00	7.35
	802.11ac VHT80	155	5775	MCS0	8.00	7.58

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	ANT 1 Average Power (dBm)	ANT 2 Average Power (dBm)	Max. Tune-up	Total Average Power (dBm)
5.8G WIFI_ 2TX_ ANT 1+2	802.11a	149	5745	6	12.70	12.98	16.00	15.85
		153	5765		12.38	11.81	16.00	15.11
		157	5785		12.03	10.49	15.00	14.34
		161	5805		12.97	10.86	15.50	15.05
		165	5825		12.08	9.95	15.00	14.15
	802.11n HT20	149	5745	MCS8	11.52	11.79	15.00	14.67
		153	5765		11.21	10.52	14.50	14
		157	5785		11.99	10.41	14.50	14.28
		161	5805		11.68	9.45	14.50	13.72
		165	5825		11.92	9.82	14.50	14.01
	802.11n HT40	151	5755	MCS8	10.35	10.21	14.00	13.29
		159	5795		10.91	8.88	14.00	13.02
	802.11ac VHT20	149	5745	MCS8	11.63	11.85	15.00	14.75
		153	5765		11.23	10.59	14.50	13.93
		157	5785		11.94	10.57	14.50	14.32
		161	5805		11.61	9.48	14.50	13.68
		165	5825		11.88	9.87	14.50	14.00
	802.11ac VHT40	151	5755	MCS8	10.34	10.22	13.50	13.29
		159	5795		10.88	8.89	13.50	13.01
	802.11ac VHT80	155	5775	MCS8	7.26	6.18	10.00	9.76

Note:
1) The Average conducted power of WiFi 5.8G is measured with RMS detector.
2) The tested channel results are marks in bold.

7.1.6 CONDUCTED POWER MEASUREMENTS OF RFID

Mode	Channel	Frequency (MHz)	Max. Tune up	Average Power(dBm)
RFID (Micro)	1	917.5	24.50	**24.13**
	2	920	23.50	**23.34**
	3	922.5	25.50	**25.49**

Mode	Channel	Frequency (MHz)	Max. Tune up	Average Power(dBm)
RFID (NANO)	1	917.4	21.50	**21.03**
	2	922.3	21.00	**20.54**
	3	927.2	18.00	**17.98**

Note: The tested channel results are marks in bold.

7.2 SAR TEST RESULTS

General Notes:

1) Per KDB447498 D01, all measurement SAR results are scaled to the maximum tune-up tolerance limit to demonstrate compliant.
2) Per KDB447498 D01, 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. When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel must be used.
3) Per KDB865664 D01, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥ 0.8W/kg; if the deviation among the repeated measurement is ≤ 20%, and the measured SAR < 1.45W/kg, only one repeated measurement is required.
4) Per KDB865664 D02, SAR plot is only required for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination; Plots are also required when the measured SAR is > 1.5 W/kg, or > 7.0 W/kg for occupational exposure. The published RF exposure KDB procedures may require additional plots; for example, to support SAR to peak location separation ratio test exclusion and/or volume scan post-processing.

GSM Notes:

Per KDB941225 D01, SAR test reduction for GPRS and EDGE modes is determined by the source-based time-averaged output power specified for production units, including tune-up tolerance. The data 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.

UMTS Notes:

Per KDB941225 D01, 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 or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode.

LTE notes:

1) The LTE test configurations are determined according to KDB941225 D05 SAR for LTE Devices. The general test procedures used for SAR testing can be found in Section 6.1.3.
2) A-MPR was disabled for all SAR test by setting NS_01 on the base station simulator. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI)

WLAN Notes:

1. For exposure conditions with multiple test positions, such as handset operating next to the ear, devices with hotspot mode, procedures for initial test position can be applied. Using the transmission mode determined by the DSSS procedure or initial test configuration, area scans are measured for all positions in an exposure condition. The test position with the highest extrapolated (peak) SAR is used as the initial test position. When the reported SAR of the initial test position is ≤ 0.4 W/kg, further SAR measurement is not required for the other (remaining) test positions. Otherwise, SAR is evaluated at the subsequent highest peak SAR position until the reported SAR result is ≤ 0.8 W/kg or all test positions are measured.
2. Justification for test configurations for WLAN per KDB Publication 248227 for 2.4GHZ WIFI single transmission chain operations, the highest measured maximum output power Channel for DSSS was selected for SAR measurement. SAR for OFDM modes (2.4GHz 802.11g/n) was not required due to the maximum allowed powers and the highest reported DSSS SAR. See Section 6.1.4 for more information.
3. Justification for test configurations for WLAN per KDB Publication 248227 for 5GHZ WIFI single transmission chain operations, the initial test configuration was selected according to the transmission mode with the highest maximum allowed power. Other transmission modes were not investigated since the highest reported SAR for initial test configuration adjusted by the ratio of maximum output powers is less than 1.2 W/kg. See Section 6.1.4 for more information.

7.2.1 SAR MEASUREMENT RESULT

Report 10g SAR is only used to calculate Hand-Held synchronous calculations.

1. SAR measurement result of GSM

Test No.	Band	Mode	Channel	Test Position	Separation Distance (cm)	Maximum Tune-up (dBm)	Conducted Power (dBm)	Power Drift (dB)	SAR 1g (W/kg)	SAR 10g (W/kg)	Reported 1g SAR	Reported 10g SAR
T01	GSM 850	GPRS 2TX	190	Rear Face	0	30	28.85	0.02	0.327	0.263	0.426	0.343
T02	GSM 850	GPRS 2TX	190	Left Side	0	30	28.85	0.09	0.031	0.025	0.040	0.033
T03	GSM 850	GPRS 2TX	190	Right Side	0	30	28.85	-0.06	**0.475**	**0.332**	**0.619**	**0.433**
T04	GSM 850	GPRS 2TX	190	Top Side	0	30	28.85	0.12	0.090	0.072	0.117	0.094
T05	GSM 850	GPRS 2TX	190	Bottom Side	0	30	28.85	-0.05	0.185	0.135	0.241	0.176
T06	GSM 850	GPRS 2TX	128	Right Side	0	30	29.03	-0.02	0.470	0.322	0.588	0.403
T07	GSM 850	GPRS 2TX	251	Right Side	0	30	28.86	0.07	0.322	0.225	0.419	0.293
T09	GSM 1900	GPRS 2TX	661	Rear Face	0	27	25.88	0.01	0.247	0.157	0.320	0.203
T10	GSM 1900	GPRS 2TX	661	Left Side	0	27	25.88	0.05	0.064	0.030	0.083	0.039
T11	GSM 1900	GPRS 2TX	661	Right Side	0	27	25.88	0.03	0.871	0.452	1.127	0.585
T12	GSM 1900	GPRS 2TX	661	Top Side	0	27	25.88	-0.05	0.050	0.015	0.065	0.019
T13	GSM 1900	GPRS 2TX	661	Bottom Side	0	27	25.88	0.09	0.044	0.011	0.057	0.014
T14	GSM 1900	GPRS 2TX	512	Right Side	0	27	25.81	0.04	**0.955**	**0.505**	**1.256**	**0.664**
T15	GSM 1900	GPRS 2TX	810	Right Side	0	27	25.85	0.09	0.911	0.476	1.187	0.620
T16	GSM 1900	GPRS 2TX	512	Right Side (1st Repeated)	0	27	25.81	0.02	0.947	0.501	1.246	0.659

Note: The value with boldface is the maximum SAR Value of each test band.

2. SAR measurement result of UMTS

Test No.	Band	Mode	Channel	Test Position	Separation Distance (cm)	Maximum Tune-up (dBm)	Conducted Power (dBm)	Power Drift (dB)	SAR 1g (W/kg)	SAR 10g (W/kg)	Reported 1g SAR	Reported 10g SAR
T17	UMTS B2	RMC12.2K	9400	Rear Face	0	22.5	21.95	0.07	0.326	0.19	0.370	0.216
T18	UMTS B2	RMC12.2K	9400	Right Side	0	22.5	21.95	0.05	**1.120**	**0.566**	**1.271**	**0.642**
T19	UMTS B2	RMC12.2K	9400	Bottom Side	0	22.5	21.95	0.01	0.02	0.009	0.023	0.010
T20	UMTS B2	RMC12.2K	9262	Right Side	0	22.5	22.02	-0.06	1.110	0.583	1.240	0.651
T21	UMTS B2	RMC12.2K	9538	Right Side	0	22.5	22.03	-0.03	1.040	0.542	1.159	0.604
T22	UMTS B2	RMC12.2K	9400	Right Side (1st Repeated)	0	22.5	21.95	-0.02	1.080	0.563	1.226	0.639
T23	UMTS B4	RMC12.2K	1413	Rear Face	0	22.5	21.76	-0.08	0.859	0.536	1.019	0.636
T24	UMTS B4	RMC12.2K	1413	Right Side	0	22.5	21.76	-0.03	1.130	0.625	1.340	0.741
T25	UMTS B4	RMC12.2K	1413	Bottom Side	0	22.5	21.76	0.01	0.096	0.056	0.114	0.066
T26	UMTS B4	RMC12.2K	1312	Right Side	0	22.5	21.78	0.04	0.746	0.468	0.881	0.552
T27	UMTS B4	RMC12.2K	1513	Right Side	0	22.5	21.72	0.03	**1.250**	**0.681**	**1.496**	**0.815**
T28	UMTS B4	RMC12.2K	1513	Right Side (1st Repeated)	0	22.5	21.72	0.01	1.180	0.675	1.412	0.808
T29	UMTS B5	RMC12.2K	4182	Rear Face	0	22.5	21.49	-0.05	0.543	0.409	0.685	0.516
T30	UMTS B5	RMC12.2K	4182	Left Side	0	22.5	21.49	0.07	0.045	0.035	0.057	0.044
T31	UMTS B5	RMC12.2K	4182	Right Side	0	22.5	21.49	0.01	0.601	0.411	0.758	0.519
T32	UMTS B5	RMC12.2K	4182	Top Side	0	22.5	21.49	-0.07	0.099	0.075	0.125	0.095
T33	UMTS B5	RMC12.2K	4182	Bottom Side	0	22.5	21.49	-0.02	0.336	0.240	0.424	0.303
T34	UMTS B5	RMC12.2K	4132	Right Side	0	22.5	21.55	0	**0.615**	**0.428**	**0.765**	**0.533**
T35	UMTS B5	RMC12.2K	4233	Right Side	0	22.5	21.47	0.14	0.567	0.394	0.719	0.499

Note: The value with boldface is the maximum SAR Value of each test band.

3. SAR measurement result of LTE

Test No.	Band	Mode	Channel	RB	offset	Test Position	Separation Distance (cm)	Maximum Tune-up (dBm)	Conducted Power (dBm)	Power Drift (dB)	SAR 1g (W/kg)	SAR 10g (W/kg)	Reported 1g SAR	Reported 10g SAR
T36	LTE B2	QPSK20M	18700	1	0	Rear Face	0	20	19.58	0.01	0.522	0.313	0.575	0.345
T37	LTE B2	QPSK20M	18700	1	0	Right Side	0	20	19.58	0.13	1.290	0.639	1.421	0.704
T38	LTE B2	QPSK20M	18700	1	0	Bottom Side	0	20	19.58	0.02	0.036	0.020	0.040	0.022
T39	LTE B2	QPSK20M	19100	50	0	Rear Face	0	19	18.38	-0.05	0.232	0.138	0.268	0.159
T40	LTE B2	QPSK20M	19100	50	0	Right Side	0	19	18.38	-0.1	0.869	0.448	1.002	0.517
T41	LTE B2	QPSK20M	19100	50	0	Bottom Side	0	19	18.38	0.01	0.027	0.015	0.031	0.017
T42	LTE B2	QPSK20M	18900	1	0	Right Side	0	20	19.55	0.01	**1.290**	**0.635**	**1.431**	**0.704**
T43	LTE B2	QPSK20M	19100	1	0	Right Side	0	20	19.45	0.01	1.250	0.613	1.419	0.696
T44	LTE B2	QPSK20M	18700	50	0	Right Side	0	19	18.26	0.05	0.847	0.427	1.004	0.506
T161	LTE B2	QPSK20M	18900	50	0	Right Side	0	19	18.28	-0.07	0.855	0.436	1.009	0.515
T162	LTE B2	QPSK20M	18900	100	0	Right Side	0	19	18.24	0.1	0.824	0.430	0.982	0.512
T163	LTE B2	QPSK20M	18900	1	0	Right Side (1st Repeated)	0	20	19.55	-0.09	1.260	0.627	1.398	0.695
T45	LTE B4	QPSK20M	20175	1	0	Rear Face	0	21	20.42	0.05	0.853	0.494	0.975	0.565
T46	LTE B4	QPSK20M	20175	1	0	Right Side	0	21	20.42	0.02	1.140	0.587	1.303	0.671
T47	LTE B4	QPSK20M	20175	1	0	Bottom Side	0	21	20.42	-0.08	0.082	0.048	0.094	0.055
T48	LTE B4	QPSK20M	20175	50	0	Rear Face	0	20	19.41	-0.12	0.696	0.403	0.797	0.462
T49	LTE B4	QPSK20M	20175	50	0	Right Side	0	20	19.41	0.01	0.963	0.479	1.103	0.549
T50	LTE B4	QPSK20M	20175	50	0	Bottom Side	0	20	19.41	0.06	0.060	0.032	0.069	0.037
T170	LTE B4	QPSK20M	20050	1	0	Rear Face	0	21	20.41	0.02	0.821	0.483	0.940	0.553
T171	LTE B4	QPSK20M	20300	1	0	Rear Face	0	21	20.42	-0.04	0.851	0.491	0.973	0.561
T51	LTE B4	QPSK20M	20050	1	0	Right Side	0	21	20.41	0.11	1.100	0.561	1.260	0.643
T52	LTE B4	QPSK20M	20300	1	0	Right Side	0	21	20.42	0.01	**1.220**	**0.624**	**1.394**	**0.713**
T53	LTE B4	QPSK20M	20050	50	0	Right Side	0	20	19.33	-0.03	0.934	0.457	1.090	0.533
T164	LTE B4	QPSK20M	20300	50	0	Right Side	0	20	19.27	0.19	0.928	0.442	1.098	0.523
T165	LTE B4	QPSK20M	20050	100	0	Right Side	0	20	19.36	0.01	0.908	0.427	1.052	0.495
T166	LTE B4	QPSK20M	20300	1	0	Right Side (1st Repeated)	0	21	20.42	0.05	1.170	0.611	1.337	0.698
T54	LTE B5	QPSK10M	20600	1	0	Rear Face	0	24	23.55	0.05	0.455	0.356	0.505	0.395
T55	LTE B5	QPSK10M	20600	1	0	Left Side	0	24	23.55	0.07	0.078	0.06	0.087	0.067
T56	LTE B5	QPSK10M	20600	1	0	Right Side	0	24	23.55	-0.09	0.508	0.37	0.563	0.410
T57	LTE B5	QPSK10M	20600	1	0	Top Side	0	24	23.55	-0.01	0.136	0.109	0.151	0.121
T58	LTE B5	QPSK10M	20600	1	0	Bottom Side	0	24	23.55	0.12	0.265	0.201	0.294	0.223
T59	LTE B5	QPSK10M	20600	25	12	Rear Face	0	23	22.49	-0.04	0.393	0.309	0.442	0.348
T60	LTE B5	QPSK10M	20600	25	12	Left Side	0	23	22.49	0.08	0.064	0.05	0.072	0.056
T61	LTE B5	QPSK10M	20600	25	12	Right Side	0	23	22.49	0.01	0.374	0.277	0.421	0.312
T62	LTE B5	QPSK10M	20600	25	12	Top Side	0	23	22.49	-0.07	0.084	0.068	0.094	0.076
T63	LTE B5	QPSK10M	20600	25	12	Bottom Side	0	23	22.49	-0.01	0.267	0.197	0.300	0.222
T64	LTE B5	QPSK10M	20450	1	0	Right Side	0	24	23.37	-0.14	**0.527**	**0.379**	**0.609**	**0.438**
T65	LTE B5	QPSK10M	20525	1	0	Right Side	0	24	23.43	0.07	0.530	0.382	0.604	0.436

Test No.	Band	Mode	Channel	RB	offset	Test Position	Separation Distance (cm)	Maximum Tune-up (dBm)	Conducted Power (dBm)	Power Drift (dB)	SAR 1g (W/kg)	SAR 10g (W/kg)	Reported 1g SAR	Reported 10g SAR
T66	LTE B7	QPSK20M	21350	1	50	Rear Face	0	23	22.46	0.01	0.366	0.209	0.414	0.237
T67	LTE B7	QPSK20M	21350	1	50	Right Side	0	23	22.46	-0.05	1.090	0.513	1.234	0.581
T68	LTE B7	QPSK20M	21350	1	50	Bottom Side	0	23	22.46	0.08	0.098	0.057	0.111	0.065
T69	LTE B7	QPSK20M	21350	50	0	Rear Face	0	22	21.49	0.04	0.382	0.206	0.430	0.232
T70	LTE B7	QPSK20M	21350	50	0	Right Side	0	22	21.49	-0.1	0.947	0.440	1.065	0.495
T71	LTE B7	QPSK20M	21350	50	0	Bottom Side	0	22	21.49	-0.15	0.081	0.046	0.091	0.052
T72	LTE B7	QPSK20M	20850	1	50	Right Side	0	23	22.11	0.11	1.070	0.517	1.313	0.635
T73	LTE B7	QPSK20M	21100	1	50	Right Side	0	23	22.42	0.1	**1.260**	**0.592**	**1.440**	**0.677**
T74	LTE B7	QPSK20M	20850	50	0	Right Side	0	22	21.29	-0.08	0.908	0.417	1.069	0.491
T167	LTE B7	QPSK20M	21100	50	0	Right Side	0	22	21.41	0.15	0.931	0.433	1.066	0.496
T168	LTE B7	QPSK20M	21350	100	0	Right Side	0	22	21.41	0.04	0.895	0.409	1.025	0.469
T169	LTE B7	QPSK20M	21100	1	50	Right Side (1st Repeated)	0	23	22.42	0.07	1.220	0.585	1.394	0.669
T76	LTE B12	QPSK10M	23095	1	0	Rear Face	0	24	23.8	0.01	0.369	0.279	0.386	0.292
T77	LTE B12	QPSK10M	23095	1	0	Left Side	0	24	23.8	0.09	0.045	0.032	0.047	0.034
T78	LTE B12	QPSK10M	23095	1	0	Right Side	0	24	23.8	-0.03	**0.494**	**0.325**	**0.517**	**0.340**
T79	LTE B12	QPSK10M	23095	1	0	Top Side	0	24	23.8	0.04	0.093	0.079	0.097	0.083
T80	LTE B12	QPSK10M	23095	1	0	Bottom Side	0	24	23.8	0.12	0.171	0.121	0.179	0.127
T81	LTE B12	QPSK10M	23060	25	12	Rear Face	0	23	22.8	0.07	0.306	0.230	0.320	0.241
T82	LTE B12	QPSK10M	23060	25	12	Left Side	0	23	22.8	-0.01	0.043	0.029	0.045	0.030
T83	LTE B12	QPSK10M	23060	25	12	Right Side	0	23	22.8	-0.18	0.374	0.248	0.392	0.260
T84	LTE B12	QPSK10M	23060	25	12	Top Side	0	23	22.8	0.01	0.012	0.003	0.013	0.003
T85	LTE B12	QPSK10M	23060	25	12	Bottom Side	0	23	22.8	-0.08	0.143	0.100	0.150	0.105
T86	LTE B12	QPSK10M	23060	1	24	Right Side	0	24	23.76	0.15	0.404	0.256	0.427	0.271
T87	LTE B12	QPSK10M	23130	1	0	Right Side	0	24	23.68	0.1	0.368	0.235	0.396	0.253
T89	LTE B13	QPSK10M	23230	1	24	Rear Face	0	24	23.74	0.01	0.569	0.426	0.604	0.452
T90	LTE B13	QPSK10M	23230	1	24	Left Side	0	24	23.74	0.08	0.129	0.090	0.137	0.096
T91	LTE B13	QPSK10M	23230	1	24	Right Side	0	24	23.74	0.06	**0.669**	**0.479**	**0.710**	**0.509**
T92	LTE B13	QPSK10M	23230	1	24	Top Side	0	24	23.74	0.08	0.141	0.098	0.150	0.104
T93	LTE B13	QPSK10M	23230	1	24	Bottom Side	0	24	23.74	-0.02	0.224	0.169	0.238	0.179
T94	LTE B13	QPSK10M	23230	25	12	Rear Face	0	23	22.56	-0.14	0.465	0.348	0.515	0.385
T95	LTE B13	QPSK10M	23230	25	12	Left Side	0	23	22.56	0.03	0.131	0.082	0.145	0.091
T96	LTE B13	QPSK10M	23230	25	12	Right Side	0	23	22.56	0.1	0.614	0.439	0.679	0.486
T97	LTE B13	QPSK10M	23230	25	12	Top Side	0	23	22.56	0.01	0.137	0.095	0.152	0.105
T98	LTE B13	QPSK10M	23230	25	12	Bottom Side	0	23	22.56	-0.05	0.186	0.136	0.206	0.151
T100	LTE B14	QPSK10M	23330	1	24	Rear Face	0	24	23.69	0.01	0.460	0.350	0.494	0.376
T101	LTE B14	QPSK10M	23330	1	24	Left Side	0	24	23.69	0.06	0.111	0.077	0.119	0.083
T102	LTE B14	QPSK10M	23330	1	24	Right Side	0	24	23.69	-0.08	0.513	0.378	0.551	0.406
T103	LTE B14	QPSK10M	23330	1	24	Top Side	0	24	23.69	0.1	0.048	0.039	0.052	0.042
T104	LTE B14	QPSK10M	23330	1	24	Bottom Side	0	24	23.69	0.17	0.168	0.123	0.180	0.132
T105	LTE B14	QPSK10M	23330	25	12	Rear Face	0	23	22.53	-0.14	0.376	0.282	0.419	0.314
T106	LTE B14	QPSK10M	23330	25	12	Left Side	0	23	22.53	-0.05	0.193	0.137	0.215	0.153
T107	LTE B14	QPSK10M	23330	25	12	Right Side	0	23	22.53	0.09	**0.533**	**0.388**	**0.594**	**0.432**
T108	LTE B14	QPSK10M	23330	25	12	Top Side	0	23	22.53	0.05	0.157	0.111	0.175	0.124
T109	LTE B14	QPSK10M	23330	25	12	Bottom Side	0	23	22.53	0.01	0.143	0.106	0.159	0.118

Note: The value with boldface is the maximum SAR Value of each test band.

4. SAR measurement result of BT

Test No.	Band	Channel	Test Position	Separation Distance (cm)	Ant	Data Rate	Maximum Tune-up (dBm)	Conducted Power (dBm)	Power Drift (dB)	SAR 1g (W/kg)	SAR 10g (W/kg)	Reported 1g SAR	Reported 10g SAR
T126	BT DH5	0	Rear Face	0	-	1	10	9.62	0	<0.001	<0.001	<0.001	<0.001
T127	BT DH5	0	Left Side	0	-	1	10	9.62	0.04	0.002	0.000	0.002	<0.001
T170	BT DH5	0	Right Side	0	-	1	10	9.62	0	<0.001	<0.001	<0.001	<0.001
T171	BT DH5	0	Bottom Side	0	-	1	10	9.62	0	<0.001	<0.001	<0.001	<0.001
T128	BT DH5	0	Top Side	0	-	1	10	9.62	0.01	0.005	0.002	**0.006**	**0.002**
T129	BT DH5	39	Top Side	0	-	1	10	8.57	0	0.004	0.001	0.006	0.001
T130	BT DH5	79	Top Side	0	-	1	10	9.35	0	0.004	0.001	0.005	0.001

Note: The value with boldface is the maximum SAR Value of each test band.

5. SAR measurement result of WiFi

Test No.	Band	Channel	Test Position	Separation Distance (cm)	Ant	Data Rate	Maximum Tune-up (dBm)	Conducted Power (dBm)	Power Drift (dB)	SAR 1g (W/kg)	SAR 10g (W/kg)	Reported 1g SAR	Reported 10g SAR
T112	802.11b	1	Rear Face	0	1	1	15	14.94	0.03	0.020	0.012	0.020	0.012
T113	802.11b	1	Left Side	0	1	1	15	14.94	-0.04	0.054	0.026	0.055	0.026
T117	802.11b	1	Right Side	0	1	1	15	14.94	0	<0.001	<0.001	<0.001	<0.001
T118	802.11b	1	Bottom Side	0	1	1	15	14.94	0	<0.001	<0.001	<0.001	<0.001
T114	802.11b	1	Top Side	0	1	1	15	14.94	0.01	**0.086**	**0.042**	**0.087**	**0.042**
T115	802.11b	6	Top Side	0	1	1	15	14.01	0.08	0.068	0.033	0.085	0.041
T116	802.11b	11	Top Side	0	1	1	15	14.45	-0.14	0.067	0.032	0.076	0.036
T119	802.11b	6	Rear Face	0	2	1	15	14.9	0.03	0.006	0.002	0.006	0.002
T124	802.11b	6	Left Side	0	2	1	15	14.9	0	<0.001	<0.001	<0.001	<0.001
T120	802.11b	6	Right Side	0	2	1	15	14.9	0.09	**0.033**	**0.015**	**0.034**	**0.015**
T125	802.11b	6	Bottom Side	0	2	1	15	14.9	0	<0.001	<0.001	<0.001	<0.001
T160	802.11b	6	Top Side	0	2	1	15	14.9	0	<0.001	<0.001	<0.001	<0.001
T122	802.11b	1	Right Side	0	2	1	15	14.31	-0.02	0.029	0.012	0.033	0.014
T123	802.11b	11	Right Side	0	2	1	15	14.52	0.01	0.029	0.012	0.033	0.014
T131	802.11a	60	Rear Face	0	1	1	14	13.84	0	<0.001	<0.001	<0.001	<0.001
T132	802.11a	60	Left Side	0	1	1	14	13.84	0	<0.001	<0.001	<0.001	<0.001
T133	802.11a	60	Right Side	0	1	1	14	13.84	0	<0.001	<0.001	<0.001	<0.001
T134	802.11a	60	Bottom Side	0	1	1	14	13.84	0	<0.001	<0.001	<0.001	<0.001
T135	802.11a	60	Top Side	0	1	1	14	13.84	0	<0.001	<0.001	<0.001	<0.001
T136	802.11a	56	Rear Face	0	2	1	14	13.89	0	<0.001	<0.001	<0.001	<0.001
T137	802.11a	56	Left Side	0	2	1	14	13.89	0	<0.001	<0.001	<0.001	<0.001
T138	802.11a	56	Right Side	0	2	1	14	13.89	0	<0.001	<0.001	<0.001	<0.001
T139	802.11a	56	Bottom Side	0	2	1	14	13.89	0	<0.001	<0.001	<0.001	<0.001
T140	802.11a	56	Top Side	0	2	1	14	13.89	0	<0.001	<0.001	<0.001	<0.001
T141	802.11a	140	Rear Face	0	1	1	13	12.82	0	<0.001	<0.001	<0.001	<0.001
T142	802.11a	140	Left Side	0	1	1	13	12.82	0	<0.001	<0.001	<0.001	<0.001
T143	802.11a	140	Right Side	0	1	1	13	12.82	0	<0.001	<0.001	<0.001	<0.001
T144	802.11a	140	Bottom Side	0	1	1	13	12.82	0	<0.001	<0.001	<0.001	<0.001
T145	802.11a	140	Top Side	0	1	1	13	12.82	0	<0.001	<0.001	<0.001	<0.001
T172	802.11a	100	Rear Face	0	2	1	13	12.91	0	<0.001	<0.001	<0.001	<0.001
T173	802.11a	100	Left Side	0	2	1	13	12.91	0	<0.001	<0.001	<0.001	<0.001
T174	802.11a	100	Right Side	0	2	1	13	12.91	0	<0.001	<0.001	<0.001	<0.001
T175	802.11a	100	Bottom Side	0	2	1	13	12.91	0	<0.001	<0.001	<0.001	<0.001
T176	802.11a	100	Top Side	0	2	1	13	12.91	0	<0.001	<0.001	<0.001	<0.001
T177	802.11a	153	Rear Face	0	1	1	13	12.58	0	<0.001	<0.001	<0.001	<0.001
T178	802.11a	153	Left Side	0	1	1	13	12.58	0	<0.001	<0.001	<0.001	<0.001
T179	802.11a	153	Right Side	0	1	1	13	12.58	0	<0.001	<0.001	<0.001	<0.001
T180	802.11a	153	Bottom Side	0	1	1	13	12.58	0	<0.001	<0.001	<0.001	<0.001
T181	802.11a	153	Top Side	0	1	1	13	12.58	0	<0.001	<0.001	<0.001	<0.001
T182	802.11a	153	Rear Face	0	2	1	13	12.95	0	<0.001	<0.001	<0.001	<0.001
T183	802.11a	153	Left Side	0	2	1	13	12.95	0	<0.001	<0.001	<0.001	<0.001
T184	802.11a	153	Right Side	0	2	1	13	12.95	0	<0.001	<0.001	<0.001	<0.001
T185	802.11a	153	Bottom Side	0	2	1	13	12.95	0	<0.001	<0.001	<0.001	<0.001
T186	802.11a	153	Top Side	0	2	1	13	12.95	0	<0.001	<0.001	<0.001	<0.001

Note: The value with boldface is the maximum SAR Value of each test band.

6. SAR measurement result of RFID

Test No.	Band	Channel	Test Position	Separation Distance (cm)	Module	Maximum Tune-up (dBm)	Conducted Power (dBm)	Power Drift (dB)	SAR 1g (W/kg)	SAR 10g (W/kg)	Reported 10g SAR
T146	RFID	3	Rear Face	0	Micro	25.5	25.49	-0.02	**2.270**	**1.150**	**1.153**
T147	RFID	3	Left Side	0	Micro	25.5	25.49	-0.05	0.295	0.184	0.184
T148	RFID	3	Right Side	0	Micro	25.5	25.49	0.01	0.417	0.261	0.262
T149	RFID	3	Top Side	0	Micro	25.5	25.49	0.15	1.640	1.070	1.072
T150	RFID	3	Bottom Side	0	Micro	25.5	25.49	-0.09	0.058	0.039	0.039
T151	RFID	1	Rear Face	0	Micro	24.5	24.13	-0.03	2.090	1.020	1.111
T152	RFID	2	Rear Face	0	Micro	23.5	23.34	-0.06	1.590	0.960	0.996
T153	RFID	1	Rear Face	0	NANO	21.5	21.03	-0.14	2.080	1.080	1.203
T154	RFID	1	Left Side	0	NANO	21.5	21.03	-0.03	0.236	0.148	0.165
T155	RFID	1	Right Side	0	NANO	21.5	21.03	0.01	0.056	0.040	0.045
T156	RFID	1	Top Side	0	NANO	21.5	21.03	0.05	0.166	0.119	0.133
T157	RFID	1	Bottom Side	0	NANO	21.5	21.03	0.09	0.050	0.036	0.040
T158	RFID	2	Rear Face	0	NANO	21	20.54	-0.05	**2.470**	**1.280**	**1.423**
T159	RFID	3	Rear Face	0	NANO	18	17.98	-0.04	2.660	1.340	1.346

Note: The value with boldface is the maximum SAR Value of each test band.

8. MULTIPLE TRANSMITTER EVALUATION

The following tables list information which is relevant for the decision if a simultaneous transmit evaluation is necessary according to FCC KDB 447498D01 General RF Exposure Guidance v06.

The location of the antenna inside EUT and standalone SAR test exclusion, please refer to Appendix E.

8.1 STAND-ALONE SAR TEST EXCLUSION

Per FCC KDB 447498D01, SAR compliance for simultaneous transmission must be considered when the maximum duration of overlapping transmissions, including network hand-offs, is greater than 30 seconds. This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis.

The Simultaneous Transmission Possibilities of this device are as below:

NO.	Simultaneous Tx Combination	Body
1	GSM/UMTS/LTE+WiFi (ANT 1)	Yes
2	GSM/UMTS/LTE+WiFi (ANT 2)	Yes
3	GSM/UMTS/LTE+RFID	Yes
4	WiFi (ANT 1)+WiFi (ANT 2)	Yes
5	WiFi (ANT 1)+RFID	Yes
6	WiFi (ANT 2)+RFID	Yes
7	GSM/UMTS/LTE+WiFi (ANT 1)+WiFi (ANT 2)	Yes
8	GSM/UMTS/LTE+WiFi (ANT 1)+RFID	Yes
9	GSM/UMTS/LTE+WiFi (ANT 2)+RFID	Yes
10	WiFi (ANT 1)+WiFi (ANT 2)+RFID	Yes
11	GSM/UMTS/LTE+WiFi (ANT 1)+WiFi (ANT 2)+RFID	Yes

Note:
1. For Body SAR, there is no synchronous transmission with RFID. The scene of synchronous transmission with RFID is only for Limb SAR.
2. For Body SAR, since the combination of GSM/WCMDA/LTE+WiFi (ANT1)+WiFi (ANT2) is the worst case and can cover all synchronous transmission scenarios of Body SAR, Body SAR only evaluates the synchronous transmission of three antennas.
3. For Limb SAR, since the combination of four antennas is the worst case and can cover all synchronous transmission combinations, only four antennas are added for synchronous transmission calculation.

8.2 SAR SUMMATION SCENARIO

1. GSM/UMTS/LTE and WIFI antenna (SAR-1g)

Position		Body(SAR-1g)					
		Front Face (0cm)	Rear Face (0cm)	Left Side (0cm)	Right Side (0cm)	Top Side (0cm)	Bottom Side (0cm)
GSM 850		/	0.426	0.040	0.619	0.117	0.241
GSM 1900		/	0.320	0.083	1.256	0.065	0.057
UMTS B2		/	0.370	0.400	1.271	0.400	0.023
UMTS B4		/	1.019	0.400	1.496	0.400	0.114
UMTS B5		/	0.685	0.057	0.765	0.125	0.424
LTE B2		/	0.575	0.400	1.431	0.400	0.040
LTE B4		/	0.975	0.400	1.394	0.400	0.094
LTE B5		/	0.505	0.087	0.609	0.151	0.300
LTE B7		/	0.430	0.400	1.440	0.400	0.111
LTE B12		/	0.386	0.047	0.517	0.097	0.179
LTE B13		/	0.604	0.145	0.710	0.152	0.238
LTE B14		/	0.494	0.215	0.594	0.175	0.180
ANT 1	802.11b/g	/	0.020	0.055	<0.001	0.087	<0.001
	5.2G&5.3G	/	<0.001	<0.001	<0.001	<0.001	<0.001
	5.6G	/	<0.001	<0.001	<0.001	<0.001	<0.001
	5.8G	/	<0.001	<0.001	<0.001	<0.001	<0.001
	Bluetooth	/	<0.001	0.002	<0.001	0.006	<0.001
ANT 2	802.11b/g	/	0.006	<0.001	0.034	<0.001	<0.001
	5.2G&5.3G	/	<0.001	<0.001	<0.001	<0.001	<0.001
	5.6G	/	<0.001	<0.001	<0.001	<0.001	<0.001
	5.8G	/	<0.001	<0.001	<0.001	<0.001	<0.001
MAX $\sum SAR_{1g}$		**/**	**1.045**	**0.455**	**1.530**	**0.487**	**0.424**

Note: $SAR_{MAX.total}$= 1.530 W/kg. Thus $SAR_{MAX.total}$=1.530 W/kg<1.6 W/kg, it is compliant with 1999/519/EC, so Simultaneous SAR are not required for GSM/UMTS/LTE and WIFI antenna.

2. GSM/UMTS/LTE, WIFI and RFID (Micro) antenna (SAR-10g)

Position		Limb (SAR-10g)					
		Front Face (0cm)	Rear Face (0cm)	Left Side (0cm)	Right Side (0cm)	Top Side (0cm)	Bottom Side (0cm)
GSM 850		/	0.343	0.033	0.433	0.094	0.176
GSM 1900		/	0.203	0.039	0.664	0.019	0.014
UMTS B2		/	0.216	1.000	0.642	1.000	0.010
UMTS B4		/	0.636	1.000	0.815	1.000	0.066
UMTS B5		/	0.516	0.044	0.533	0.095	0.303
LTE B2		/	0.345	1.000	0.704	1.000	0.022
LTE B4		/	0.565	1.000	0.713	1.000	0.055
LTE B5		/	0.395	0.067	0.438	0.121	0.223
LTE B7		/	0.237	1.000	0.677	1.000	0.065
LTE B12		/	0.292	0.034	0.340	0.083	0.127
LTE B13		/	0.452	0.096	0.509	0.105	0.179
LTE B14		/	0.376	0.153	0.432	0.124	0.132
ANT 1	802.11b/g	/	0.012	0.026	<0.001	0.042	<0.001
	5.2G&5.3G	/	<0.001	<0.001	<0.001	<0.001	<0.001
	5.6G	/	<0.001	<0.001	<0.001	<0.001	<0.001
	5.8G	/	<0.001	<0.001	<0.001	<0.001	<0.001
	Bluetooth	/	<0.001	<0.001	<0.001	0.002	<0.001
ANT 2	802.11b/g	/	0.002	<0.001	0.015	<0.001	<0.001
	5.2G&5.3G	/	<0.001	<0.001	<0.001	<0.001	<0.001
	5.6G	/	<0.001	<0.001	<0.001	<0.001	<0.001
	5.8G	/	<0.001	<0.001	<0.001	<0.001	<0.001
RFID (Micro)		/	1.153	0.184	0.262	1.072	0.039
MAX $\sum SAR_{10g}$		**/**	**1.803**	**1.210**	**1.092**	**2.114**	**0.342**

Note: $SAR_{MAX.total}$= 2.114 W/kg. Thus $SAR_{MAX.total}$=2.114 W/kg<4.0 W/kg, it is compliant with 1999/519/EC, so Simultaneous SAR are not required for GSM/UMTS/LTE, WIFI and RFID (Micro) antenna.

3. GSM/UMTS/LTE, WIFI and RFID (NANO) antenna (SAR-10g)

Position		Limb (SAR-10g)					
		Front Face (0cm)	Rear Face (0cm)	Left Side (0cm)	Right Side (0cm)	Top Side (0cm)	Bottom Side (0cm)
GSM 850		/	0.343	0.033	0.433	0.094	0.176
GSM 1900		/	0.203	0.039	0.664	0.019	0.014
UMTS B2		/	0.216	1.000	0.642	1.000	0.010
UMTS B4		/	0.636	1.000	0.815	1.000	0.066
UMTS B5		/	0.516	0.044	0.533	0.095	0.303
LTE B2		/	0.345	1.000	0.704	1.000	0.022
LTE B4		/	0.565	1.000	0.713	1.000	0.055
LTE B5		/	0.395	0.067	0.438	0.121	0.223
LTE B7		/	0.237	1.000	0.677	1.000	0.065
LTE B12		/	0.292	0.034	0.340	0.083	0.127
LTE B13		/	0.452	0.096	0.509	0.105	0.179
LTE B14		/	0.376	0.153	0.432	0.124	0.132
ANT 1	802.11b/g	/	0.012	0.026	<0.001	0.042	<0.001
	5.2G&5.3G	/	<0.001	<0.001	<0.001	<0.001	<0.001
	5.6G	/	<0.001	<0.001	<0.001	<0.001	<0.001
	5.8G	/	<0.001	<0.001	<0.001	<0.001	<0.001
	Bluetooth	/	<0.001	<0.001	<0.001	0.002	<0.001
ANT 2	802.11b/g	/	0.002	<0.001	0.015	<0.001	<0.001
	5.2G&5.3G	/	<0.001	<0.001	<0.001	<0.001	<0.001
	5.6G	/	<0.001	<0.001	<0.001	<0.001	<0.001
	5.8G	/	<0.001	<0.001	<0.001	<0.001	<0.001
RFID (NANO)		/	1.423	0.165	0.045	0.133	0.040
MAX $\sum SAR_{10g}$		/	**2.073**	**1.191**	**0.875**	**1.175**	**0.343**

Note: $SAR_{MAX.total}$= 2.073 W/kg. Thus $SAR_{MAX.total}$=2.073 W/kg<4.0 W/kg, it is compliant with 1999/519/EC, so Simultaneous SAR are not required for GSM/UMTS/LTE, WIFI and RFID (NANO) antenna.

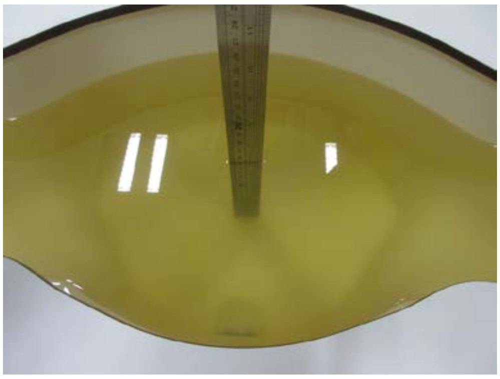
APPENDIX

1. TEST LAYOUT

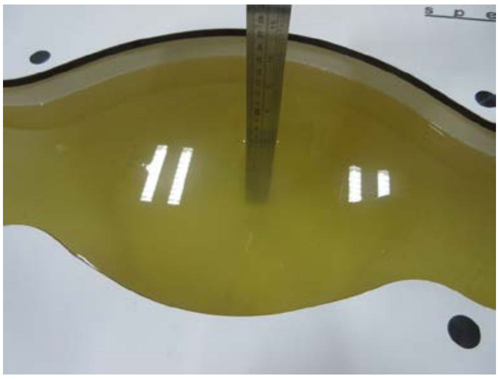
Specific Absorption Rate Test Layout

Liquid depth in the flat Phantom (≥15cm depth)

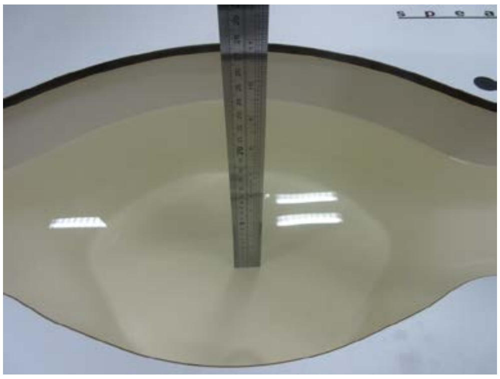
HSL750MHz_Body_15.5cm



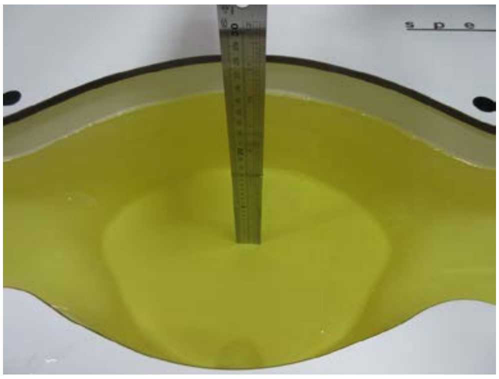
HSL835MHz_Body_16.4cm



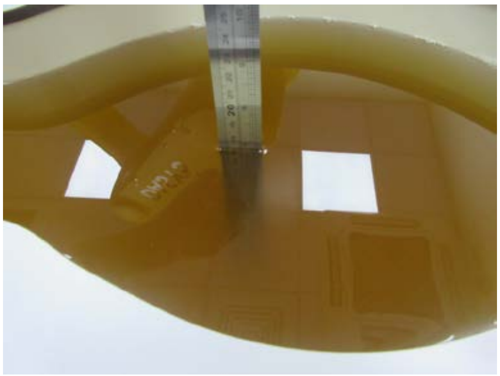
HSL1750MHz_Body_15.5cm



HSL1900MHz-2600MHz_Body_15.2cm



HSL5GHz_Body_17.5cm



Appendix A. SAR Plots of System Verification

(Pls See BTL-FCC SAR-1-1907H013_Appendix A.)

Appendix B. SAR Plots of SAR Measurement

(Pls See BTL-FCC SAR-1-1907H013_Appendix B.)

Appendix C. Calibration Certificate

(Pls See BTL-FCC SAR-1-1907H013_Appendix C.)

Appendix D. Photographs of the Test Set-Up

(Pls See BTL-FCC SAR-1-1907H013_Appendix D.)

Appendix E. Antenna location and standalone SAR test exclusion

(Pls See BTL-FCC SAR-1-1907H013_Appendix E.)

End of Test Report