FCC SAR TEST REPORT

FCC ID	:	**2AJN7-TP00135AL**
Equipment	:	**Notebook Computer**
Brand Name	:	**Lenovo**
Model Name	:	**TP00135B**
Applicant	:	**LC Future Center Limited Taiwan Branch 7F., No.780, Beian Rd., Zhongshan Dist., Taipei 104, Taiwan**
Manufacturer	:	**LCFC (HeFei) Electronics Technology Co., Ltd. No. 3188-1, Yungu Road (Hefei Export Processing Zone), Hefei Economics & Technology Development Area, Anhui, CHINA**
Standard	:	**FCC 47 CFR Part 2 (2.1093)**

Equipment: Quectel EM05-G, MediaTeK MT7922A12L and Qualcomm QCNFA725 tested inside of Lenovo Notebook Computer.

The product was received on Mar. 15, 2022 and testing was started from Mar. 15, 2022 and completed on Apr. 02, 2022. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample provide by manufacturer and the test data has been evaluated in accordance with the test procedures given in 47 CFR Part 2.1093 and FCC KDB and has been pass the FCC requirement.

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

Approved by: Cona Huang / Deputy Manager

Sporton International Inc. EMC & Wireless Communications Laboratory

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History of this test report

Report No.	Version	Description	Issued Date
FA1O1602-03	01	Initial issue of report	Apr. 11, 2022

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for LC Future Center Limited Taiwan Branch, Notebook Computer, TP00135B, are as follows.

Equipment Class	Frequency Band		Highest SAR Summary Body (Separation 0mm) 1g SAR (W/kg)	Highest Simultaneous Transmission 1g SAR (W/kg)
Licensed	WCDMA	WCDMA II	0.96	1.17
		WCDMA IV	1.05	
		WCDMA V	1.17	
	LTE	LTE Band 7	1.12	
		LTE Band 12	0.97	
		LTE Band 13	1.10	
		LTE Band 14	1.10	
		LTE Band 2 / 25	1.12	
		LTE Band 5 / 26	1.10	
		LTE Band 38 / 41	1.07	
		LTE Band 4 / 66	1.08	
		LTE Band 71	1.02	
Date of Testing:			2022/3/15 ~ 2022/4/2	

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundationand the FCC designation No. TW1190 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC test. This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg for Partial-Body 1g SAR) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992 and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013 and FCC KDB publications.

Reviewed by: Jason Wang
Report Producer: Paula Chen

2. Guidance Applied

The Specific Absorption Rate (SAR) testing specification, method, and procedure for this device is in accordance with the following standards, the below KDB standard may not including in the TAF code without accreditation.

- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- IEEE 1528-2013
- FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
- FCC KDB 865664 D02 SAR Reporting v01r02
- FCC KDB 447498 D01 General RF Exposure Guidance v06
- FCC KDB 248227 D01 802.11 Wi-Fi SAR v02r02
- FCC KDB 616217 D04 SAR for laptop and tablets v01r02
- FCC KDB 941225 D01 3G SAR Procedures v03r01
- FCC KDB 941225 D05 SAR for LTE Devices v02r05

3. Equipment Under Test (EUT) Information

3.1 General Information

Product Feature & Specification	
Equipment Name	Notebook Computer
Brand Name	Lenovo
Model Name	TP00135B
FCC ID	2AJN7-TP00135AL
Integrated WWAN Module	Brand Name: Quectel Model Name: EM05-G
Wireless Technology and Frequency Range	WCDMA Band II: 1850 MHz ~ 1910 MHz WCDMA Band IV: 1710 MHz ~ 1755 MHz WCDMA Band V: 824 MHz ~ 849 MHz LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2500 MHz ~ 2570 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 13: 777 MHz ~ 787 MHz LTE Band 14: 788 MHz ~ 798 MHz LTE Band 25: 1850 MHz ~ 1915 MHz LTE Band 26: 814 MHz ~ 849 MHz LTE Band 38: 2570 MHz ~ 2620 MHz LTE Band 41: 2496 MHz ~ 2690 MHz LTE Band 66: 1710 MHz ~ 1780 MHz LTE Band 71: 663 MHz ~ 698 MHz
Mode	RMC/AMR 12.2Kbps HSDPA HSUPA DC-HSDPA LTE: QPSK, 16QAM
EUT Stage	Production Unit

Remark:

1. Based original report to change AMD platform and spot check each band worst case from FCC ID: 2AJN7-TP00135AL, Sporton Report no.: FA1O1602, in this report max SAR summary and Sim-Tx is selected worse SAR result between original report and this report to show compliance.
2. This device has NFC/RFID operations, the NFC antenna is integrated into the device for this model, therefore, all SAR test were performed with the device which already incorporates the NFC/RFID antenna. A diagram showing the location of the antenna can be found in the operational description.
3. According to FCC KDB publication 447498 D01v06, transmitters are consider to be operating simultaneously when there is overlapping transmission, with the exception of transmission during network hand-offs with maximum hand-off duration less than 30 seconds.

WWAN Antenna Information				
Main Antenna	Manufacturer	Amphenol	Peak gain(dBi)	1.86
	Part number	DC33001YA00	Type	PIFA
	Manufacturer	Speed	Peak gain(dBi)	1.86
	Part number	DC33001Y900	Type	PIFA

WLAN Module Information	
Equipment Name	Notebook Computer
Brand Name	Lenovo
Model Name	TP00135B
Integrated WLAN Module 1	Brand Name: MediaTeK Model Name: MT7922A12L
Integrated WLAN Module 2	Brand Name: Qualcomm Model Name: QCNFA725
Integrated NFC Module	Brand Name: Foxconn Model Name: T77H747
Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2400 MHz ~ 2483.5 MHz WLAN 5.2GHz Band: 5150 MHz ~ 5250 MHz WLAN 5.3GHz Band: 5250 MHz ~ 5350 MHz WLAN 5.6GHz Band: 5470 MHz ~ 5725 MHz WLAN 5.8GHz Band: 5725 MHz ~ 5850 MHz WLAN 6GHz: 5925 MHz ~ 6425 MHz, 6425 MHz ~ 6525 MHz, 6525 MHz ~ 6875 MHz, 6875 MHz ~ 7125 MHz Bluetooth: 2400 MHz ~ 2483.5 MHz NFC: 13.56MHz
Mode	WLAN: 802.11a/b/g/n/ac/ax HT20/HT40/VHT20/VHT40/VHT80/VHT160/HE20/HE40/HE80/HE160 Bluetooth BR/EDR/LE NFC: ASK
Remark: 1. The MediaTeK MT7922A12L WLAN/BT module is integrated into this host. The WLAN 2.4GHz/5GHz/6GHz maximum output power referenced from Bureau Veritas SAR report, report No.: SFBARR-WTW-P21060023 (FCC ID: RAS-MT7922A12L), due to the WLAN/BT transmit antenna to bottom of laptop is higher than 200mm, these output power is using calculated power density to do Sim-Tx analysis. 2. The Qualcomm QCNFA725 WLAN/BT module is integrated into this host. The WLAN 2.4GHz/5GHz/6GHz maximum output power referenced from Qualcomm Tune-up document (FCC ID: A5M-QCNFA725), due to the WLAN/BT transmit antenna to bottom of laptop is higher than 200mm, these output power is using calculated power density to do Sim-Tx analysis. 3. WLAN/BT module only either one is integrated into the host platform	

3.2 General LTE SAR Test and Reporting Considerations

<table>
<tr><th colspan="2">Summarized necessary items addressed in KDB 941225 D05 v02r05</th></tr>
<tr><td>FCC ID</td><td>2AJN7-TP00135AL</td></tr>
<tr><td>Equipment Name</td><td>Notebook Computer</td></tr>
<tr><td>Operating Frequency Range of each LTE transmission band</td><td>LTE Band 2: 1850 MHz ~ 1910 MHz
LTE Band 4: 1710 MHz ~ 1755 MHz
LTE Band 5: 824 MHz ~ 849 MHz
LTE Band 7: 2500 MHz ~ 2570 MHz
LTE Band 12: 699 MHz ~ 716 MHz
LTE Band 13: 777 MHz ~ 787 MHz
LTE Band 14: 788 MHz ~ 798 MHz
LTE Band 25: 1850 MHz ~ 1915 MHz
LTE Band 26: 814 MHz ~ 849 MHz
LTE Band 38: 2570 MHz ~ 2620 MHz
LTE Band 41: 2496 MHz ~ 2690 MHz
LTE Band 66: 1710 MHz ~ 1780 MHz
LTE Band 71: 663 MHz ~ 698 MHz</td></tr>
<tr><td>Channel Bandwidth</td><td>LTE Band 2:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 4:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 5:1.4MHz, 3MHz, 5MHz, 10MHz
LTE Band 7: 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 12:1.4MHz, 3MHz, 5MHz, 10MHz
LTE Band 13: 5MHz, 10MHz
LTE Band 14: 5MHz, 10MHz
LTE Band 25:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 26:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz
LTE Band 38: 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 41: 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 66:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 71: 5MHz, 10MHz, 15MHz, 20MHz</td></tr>
<tr><td>uplink modulations used</td><td>QPSK / 16QAM</td></tr>
<tr><td>LTE Voice / Data requirements</td><td>Data only</td></tr>
<tr><td>LTE MPR permanently built-in by design</td><td>
Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3
<table>
<tr><th rowspan="2">Modulation</th><th colspan="6">Channel bandwidth / Transmission bandwidth (N_{RB})</th><th rowspan="2">MPR (dB)</th></tr>
<tr><th>1.4 MHz</th><th>3.0 MHz</th><th>5 MHz</th><th>10 MHz</th><th>15 MHz</th><th>20 MHz</th></tr>
<tr><td>QPSK</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 1</td></tr>
<tr><td>16 QAM</td><td>≤ 5</td><td>≤ 4</td><td>≤ 8</td><td>≤ 12</td><td>≤ 16</td><td>≤ 18</td><td>≤ 1</td></tr>
<tr><td>16 QAM</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 2</td></tr>
<tr><td>64 QAM</td><td>≤ 5</td><td>≤ 4</td><td>≤ 8</td><td>≤ 12</td><td>≤ 16</td><td>≤ 18</td><td>≤ 2</td></tr>
<tr><td>64 QAM</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 3</td></tr>
<tr><td>256 QAM</td><td colspan="6">≥ 1</td><td>≤ 5</td></tr>
</table>
</td></tr>
<tr><td>LTE A-MPR</td><td>In the base station simulator configuration, Network Setting value is set to NS_01 to disable A-MPR during SAR testing and the LTE SAR tests was transmitting on all TTI frames (Maximum TTI)</td></tr>
<tr><td>Spectrum plots for RB configuration</td><td>A properly configured base station simulator was used for the SAR and power measurement; therefore, spectrum plots for each RB allocation and offset configuration are not included in the SAR report.</td></tr>
<tr><td>Power reduction applied to satisfy SAR compliance</td><td>Yes, G-Sensor and P-Sensor.</td></tr>
</table>

Transmission (H, M, L) channel numbers and frequencies in each LTE band												
LTE Band 2												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	18607	1850.7	18615	1851.5	18625	1852.5	18650	1855	18675	1857.5	18700	1860
M	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880
H	19193	1909.3	19185	1908.5	19175	1907.5	19150	1905	19125	1902.5	19100	1900
LTE Band 4												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	19957	1710.7	19965	1711.5	19975	1712.5	20000	1715	20025	1717.5	20050	1720
M	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5
H	20393	1754.3	20385	1753.5	20375	1752.5	20350	1750	20325	1747.5	20300	1745
LTE Band 5								
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	20407	824.7	20415	825.5	20425	826.5	20450	829
M	20525	836.5	20525	836.5	20525	836.5	20525	836.5
H	20643	848.3	20635	847.5	20625	846.5	20600	844
LTE Band 7								
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	20775	2502.5	20800	2505	20825	2507.5	20850	2510
M	21100	2535	21100	2535	21100	2535	21100	2535
H	21425	2567.5	21400	2565	21375	2562.5	21350	2560
LTE Band 12								
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	23017	699.7	23025	700.5	23035	701.5	23060	704
M	23095	707.5	23095	707.5	23095	707.5	23095	707.5
H	23173	715.3	23165	714.5	23155	713.5	23130	711
LTE Band 13				
	Bandwidth 5 MHz		Bandwidth 10 MHz	
	Channel #	Freq.(MHz)	Channel #	Freq.(MHz)
L	23205	779.5	23230	782
M	23230	782		
H	23255	784.5		
LTE Band 14				
	Bandwidth 5 MHz		Bandwidth 10 MHz	
	Channel #	Channel #	Channel #	Freq.(MHz)
L	23305	790.5	23330	793
M	23330	793		
H	23355	795.5		

LTE Band 25												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	26047	1850.7	26055	1851.5	26065	1852.5	26090	1855	26115	1857.5	26140	1860
M	26340	1880	26340	1880	26340	1880	26340	1880	26340	1880	26340	1880
H	26683	1914.3	26675	1913.5	26665	1912.5	26640	1910	26615	1907.5	26590	1905

LTE Band 26										
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	26697	814.7	26705	815.5	26715	816.5	26740	819	26765	821.5
M	26865	831.5	26865	831.5	26865	831.5	26865	831.5	26865	831.5
H	27033	848.3	27025	847.5	27015	846.5	26990	844	26965	841.5

LTE Band 38								
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	37775	2572.5	37800	2575	37825	2577.5	37850	2580
M	38000	2595	38000	2595	38000	2595	38000	2595
H	38225	2617.5	38200	2615	38175	2612.5	38150	2610

LTE Band 41								
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	39675	2498.5	39700	2501	39725	2503.5	39750	2506
L M	40148	2545.8	40160	2547	40173	2548.3	40185	2549.5
M	40620	2593	40620	2593	40620	2593	40620	2593
H M	41093	2640.3	41080	2639	41068	2637.8	41055	2636.5
H	41565	2687.5	41540	2685	41515	2682.5	41490	2680

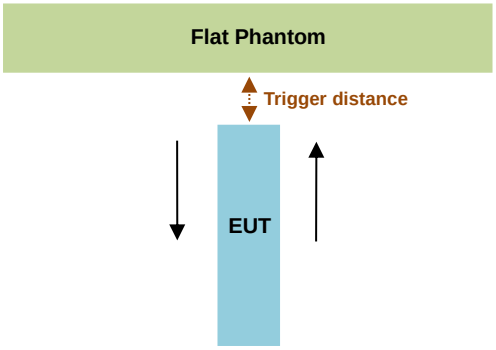
LTE Band 66												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	131979	1710.7	131987	1711.5	131997	1712.5	132022	1715	132047	1717.5	132072	1720
M	132322	1745	132322	1745	132322	1745	132322	1745	132322	1745	132322	1745
H	132665	1779.3	132657	1778.5	132647	1777.5	132622	1775	132597	1772.5	132572	1770

LTE Band 71								
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	133147	665.5	133172	668	133197	670.5	133222	673
M	133297	680.5	133297	680.5	133297	680.5	133297	680.5
H	133447	695.5	133422	693	133397	690.5	133372	688

4. Proximity Sensor Triggering Test

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

For the device is fully integrated, touch sensing capacitive sensor. It uses a charge transfer capacitive acquisition method that is capable of near range proximity detection. In this device offers a state of the art capacitive sensing engine with an embedded sampling capacitor and voltage regulator allowing the overall solution cost to be reduced and improving system immunity in noisy environments.
Proximity sensor triggering distance testing was performed according to the procedures outlined in KDB 616217 D04 section 6.2, and EUT moving further away from the flat phantom and EUT moving toward the flat phantom were both assessed. The details are illustrated as following, and the shortest triggering distances were reported and used for SAR assessment.
In the preliminary triggering distance testing, the tissue-equivalent medium for different frequency bands were used for verification; no other frequency bands tissue-equivalent medium was found to result in shortest triggering distance than that for 1900MHz, and the tissue-equivalent medium for 1900MHz was used for formal proximity sensor triggering testing.



Proximity Sensor Trigger Distance (mm)		
Bottom of Laptop		
Position	moving toward	moving away
Minimum	11	14

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

Since the antenna and sensor are collocated and all of the peak SAR location is overlapping with the sensor pad for this device, therefore, According to KDB 616217 section6.3, these procedures do not apply and are not required for Bottom of Laptop, due to the antenna and sensor are collocated and the peak SAR location is overlapping with the sensor on this device.

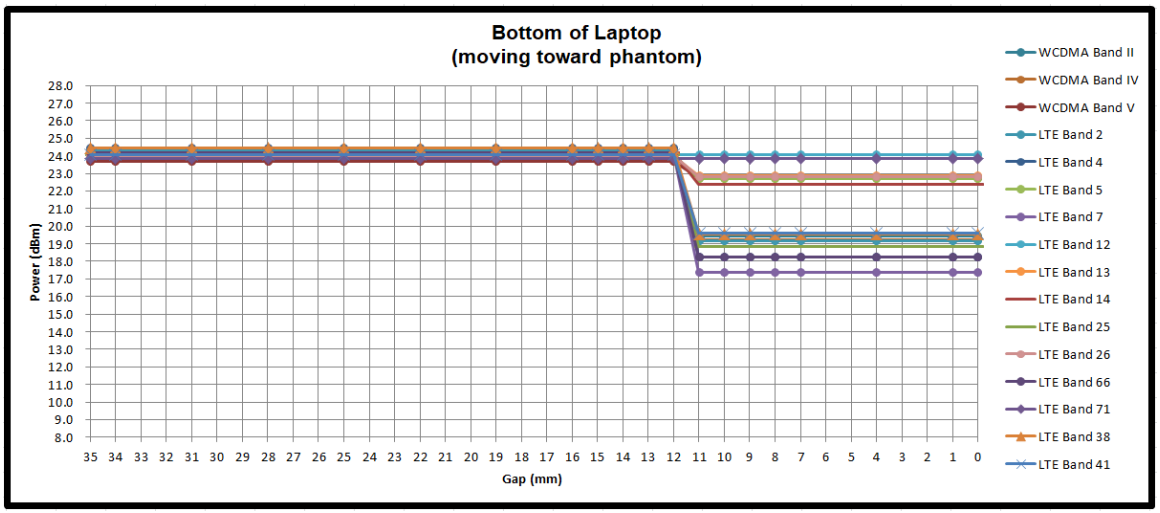
Proximity sensor power reduction

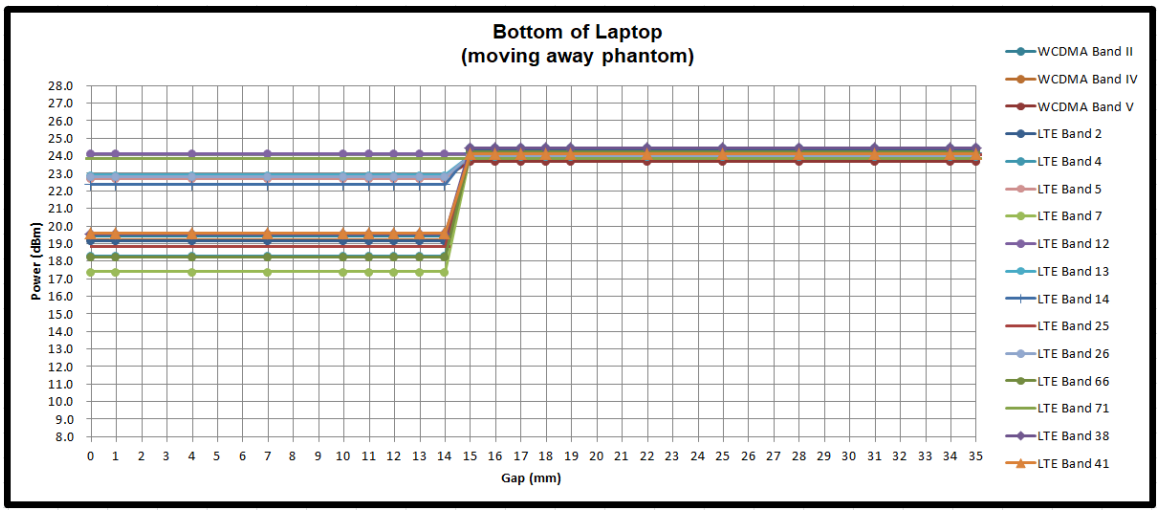
Exposure Position / wireless mode	Bottom of Laptop (1)
WCDMA Band II	5.5 dB
WCDMA Band IV	5.5 dB
WCDMA Band V	2.0 dB
LTE Band 7	7.5 dB
LTE Band 12	0.0 dB
LTE Band 13	1.5 dB
LTE Band 14	2.0 dB
LTE Band 2 / 25	5.5 dB
LTE Band 5 / 26	1.5 dB
LTE Band 38 / 41	5.5 dB
LTE Band 4 / 66	6.5 dB
LTE Band 71	0.0 dB

Remark:

1. (1): Reduced maximum limit applied by activation of proximity sensor + G-sensor.
2. Tests were performed in accordance with KDB 616217 D04 section 6.1, 6.2, 6.3, 6.4 and 6.5 and compliant results are shown as below.
3. For verification of compliance of power reduction scheme, additional SAR testing with EUT transmitting at full RF power at a conservative trigger distance was performed:
   - Bottom of Laptop: 10 mm

Power Measurement during Sensor Trigger distance testing





5. RF Exposure Limits

5.1 Uncontrolled Environment

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

5.2 Controlled Environment

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

Limits for Occupational/Controlled Exposure (W/kg)

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

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

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

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

6. Specific Absorption Rate (SAR)

6.1 Introduction

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

6.2 SAR Definition

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

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

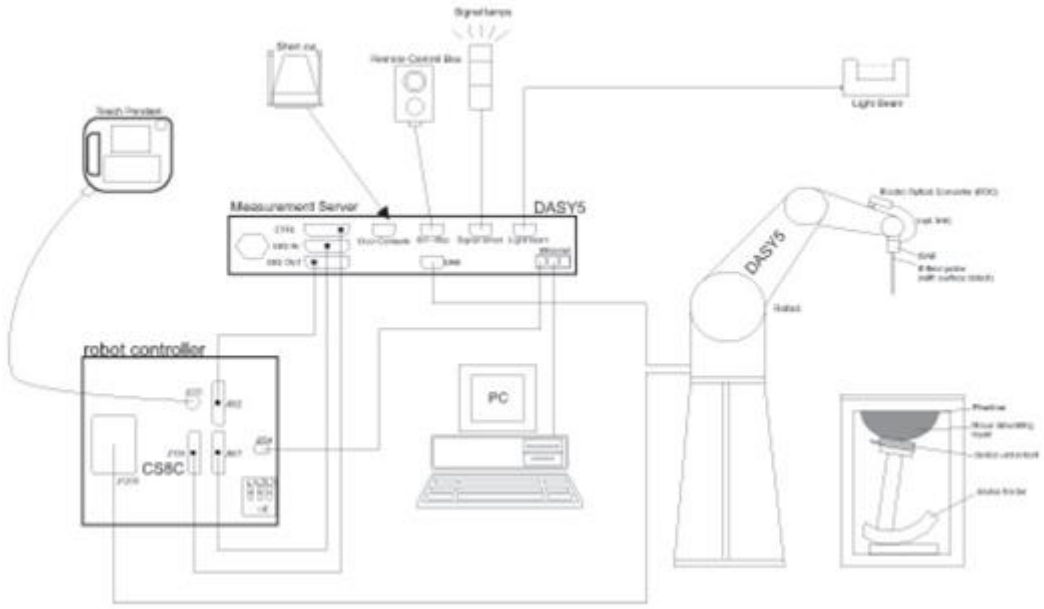
SAR is expressed in units of Watts per kilogram (W/kg)

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

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

7. System Description and Setup

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



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

7.1 Test Site Location

The SAR measurement facilities used to collect data are within both Sporton Lab list below test site location are accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 1190 and 3786) and the FCC designation No. TW1190 and TW3786 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC test.

Test Site	EMC & Wireless Communications Laboratory		Wensan Laboratory		
Test Site Location	TW1190 No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan		TW3786 No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan		
Test Site No.	SAR01-HY	SAR03-HY	SAR08-HY	SAR09-HY	SAR15-HY
	SAR04-HY	SAR05-HY	SAR11-HY	SAR12-HY	
	SAR06-HY	SAR10-HY	SAR13-HY	SAR14-HY	

7.2 E-Field Probe

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

<ES3DV3 Probe>

Construction	Symmetric design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Frequency	10 MHz – 4 GHz; Linearity: ±0.2 dB (30 MHz – 4 GHz)	
Directivity	±0.2 dB in TSL (rotation around probe axis) ±0.3 dB in TSL (rotation normal to probe axis)	
Dynamic Range	5 µW/g – >100 mW/g; Linearity: ±0.2 dB	
Dimensions	Overall length: 337 mm (tip: 20 mm) Tip diameter: 3.9 mm (body: 12 mm) Distance from probe tip to dipole centers: 3.0 mm	

<EX3DV4 Probe>

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

7.3 Data Acquisition Electronics (DAE)

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

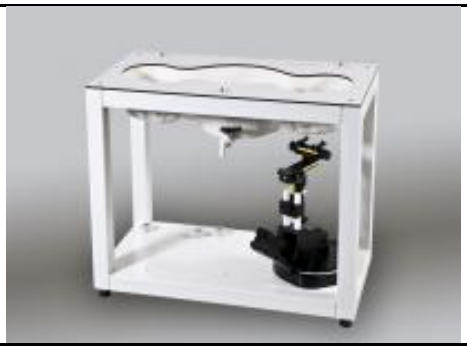
The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

Fig 5.1 Photo of DAE

7.4 Phantom

<SAM Twin Phantom>

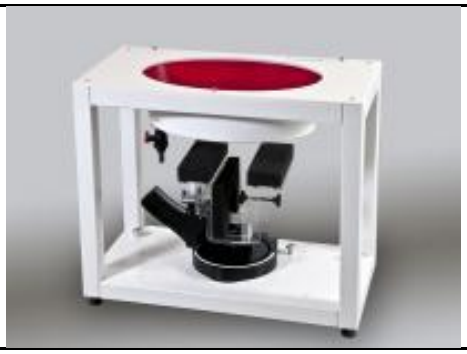
Shell Thickness	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm
Filling Volume	Approx. 25 liters
Dimensions	Length: 1000 mm; Width: 500 mm; Height: adjustable feet
Measurement Areas	Left Hand, Right Hand, Flat Phantom



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

<ELI Phantom>

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



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

7.5 Device Holder

<Mounting Device for Hand-Held Transmitter>

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

Mounting Device for Hand-Held Transmitters

Mounting Device Adaptor for Wide-Phones

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

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

Mounting Device for Laptops

8. Measurement Procedures

The measurement procedures are as follows:

<Conducted power measurement>

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

<SAR measurement>

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

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

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

8.1 Spatial Peak SAR Evaluation

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

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

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

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

8.2 Power Reference Measurement

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

8.3 Area Scan

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

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

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

8.4 Zoom Scan

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

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

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

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

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

8.5 Volume Scan Procedures

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

8.6 Power Drift Monitoring

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

9. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	750MHz System Validation Kit	D750V3	1012	Aug. 18, 2021	Aug. 17, 2022
SPEAG	835MHz System Validation Kit	D835V2	499	Aug. 18, 2021	Aug. 17, 2022
SPEAG	835MHz System Validation Kit(2)	D835V2	4d167	Nov. 25, 2019	Nov. 22, 2022
SPEAG	1750MHz System Validation Kit	D1750V2	1068	Nov. 25, 2021	Nov. 24, 2022
SPEAG	1900MHz System Validation Kit	D1900V2	5d041	Aug. 19, 2021	Aug. 18, 2022
SPEAG	2600MHz System Validation Kit	D2600V2	1008	Aug. 17, 2021	Aug. 16, 2022
SPEAG	Data Acquisition Electronics	DAE4	376	Nov. 22, 2021	Nov. 21, 2022
SPEAG	Data Acquisition Electronics	DAE4	854	Aug. 19, 2021	Aug. 18, 2022
SPEAG	Dosimetric E-Field Probe	EX3DV4	3642	Apr. 26, 2021	Apr. 25, 2022
SPEAG	Dosimetric E-Field Probe	EX3DV4	7625	Jan. 27, 2022	Jan. 26, 2023
RCPTWN	Thermometer	HTC-1	TM685-1	Oct. 28, 2021	Oct. 27, 2022
RCPTWN	Thermometer	HTC-1	TM560-2	Oct. 28, 2021	Oct. 27, 2022
Anritsu	Radio Communication Analyzer	MT8821C	6201341950	Oct. 21, 2021	Oct. 20, 2022
Keysight	Wireless Communication Test Set	E5515C	MY50266977	May. 12, 2021	May. 11, 2022
SPEAG	Device Holder	N/A	N/A	N/A	N/A
Anritsu	Signal Generator	MG3710A	6201502524	Oct. 24, 2021	Oct. 23, 2022
Keysight	ENA Network Analyzer	E5071C	MY46104758	Sep. 19, 2021	Sep. 18, 2022
SPEAG	Dielectric Probe Kit	DAK-3.5	1126	Sep. 24, 2021	Sep. 23, 2022
LINE SEIKI	Digital Thermometer	DTM3000-spezial	2942	Oct. 26, 2021	Oct. 25, 2022
Anritsu	Power Meter	ML2495A	1419002	Aug. 18, 2021	Aug. 17, 2022
Anritsu	Power Sensor	MA2411B	1911176	Aug. 18, 2021	Aug. 17, 2022
Anritsu	Power Meter	ML2495A	1804003	Oct. 09, 2021	Oct. 08, 2022
Anritsu	Power Sensor	MA2411B	1726150	Oct. 09, 2021	Oct. 08, 2022
Anritsu	Spectrum Analyzer	MS2830A	6201396378	Jul. 16, 2021	Jul. 15, 2022
Anritsu	Spectrum Analyzer	N9010A	MY53470118	Jan. 12, 2022	Jan. 11, 2023
Mini-Circuits	Power Amplifier	ZVE-8G+	6418	Oct. 12, 2021	Oct. 11, 2022
Mini-Circuits	Power Amplifier	ZVE-8G+	479102029	Sep. 06, 2021	Sep. 05, 2022
ATM	Dual Directional Coupler	C122H-10	P610410z-02	Note 1	
Woken	Attenuator 1	WK0602-XX	N/A	Note 1	
PE	Attenuator 2	PE7005-10	N/A	Note 1	
PE	Attenuator 3	PE7005- 3	N/A	Note 1	

General Note:

1. Prior to system verification and validation, the path loss from the signal generator to the system check source and the power meter, which includes the amplifier, cable, attenuator and directional coupler, was measured by the network analyzer. The reading of the power meter was offset by the path loss difference between the path to the power meter and the path to the system check source to monitor the actual power level fed to the system check source.
2. The dipole calibration interval can be extended to 3 years with justification according to KDB 865664 D01. The dipoles are also not physically damaged, or repaired during the interval. The justification data in appendix C can be found which the return loss is < -20dB, within 20% of prior calibration, the impedance is within 5 ohm of prior calibration for each dipole.

10. System Verification

10.1 Tissue Verification

The tissue dielectric parameters of tissue-equivalent media used for SAR measurements must be characterized within a temperature range of 18℃ to 25℃, measured with calibrated instruments and apparatuses, such as network analyzers and temperature probes. The temperature of the tissue-equivalent medium during SAR measurement must also be within 18℃ to 25℃ and within ± 2℃ of the temperature when the tissue parameters are characterized. The tissue dielectric measurement system must be calibrated before use. The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements.
The liquid tissue depth was at least 15cm in the phantom for all SAR testing

<Tissue Dielectric Parameter Check Results>

Frequency (MHz)	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
750	22.7	0.897	42.676	0.89	41.90	0.79	1.85	±5	2022/3/15
750	22.5	0.884	42.888	0.89	41.90	-0.67	2.36	±5	2022/3/21
750	22.5	0.891	41.867	0.89	41.90	0.11	-0.08	±5	2022/4/2
835	22.7	0.920	42.380	0.90	41.50	2.22	2.12	±5	2022/3/15
835	22.5	0.917	42.592	0.90	41.50	1.89	2.63	±5	2022/3/21
835	22.5	0.925	41.571	0.90	41.50	2.78	0.17	±5	2022/4/2
1750	22.7	1.381	40.804	1.37	40.10	0.80	1.76	±5	2022/3/15
1750	22.5	1.350	40.531	1.37	40.10	-1.46	1.07	±5	2022/3/21
1750	22.5	1.363	40.667	1.37	40.10	-0.51	1.41	±5	2022/4/2
1900	22.7	1.397	40.552	1.40	40.00	-0.21	1.38	±5	2022/3/15
1900	22.5	1.425	38.983	1.40	40.00	1.79	-2.54	±5	2022/3/21
1900	22.5	1.440	39.119	1.40	40.00	2.86	-2.20	±5	2022/4/2
2600	22.7	1.947	38.037	1.96	39.00	-0.66	-2.47	±5	2022/3/16
2600	22.5	1.945	37.895	1.96	39.00	-0.77	-2.83	±5	2022/3/21
2600	22.5	1.987	37.644	1.96	39.00	1.38	-3.48	±5	2022/4/2

10.2 System Performance Check Results

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

Test Site	Date	Frequency (MHz)	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 1g SAR (W/kg)	Targeted 1g SAR (W/kg)	Normalized 1g SAR (W/kg)	Deviation (%)
SAR01	2022/3/15	750	50	D750V3-1012	EX3DV4 - SN7625	DAE4 Sn376	0.393	8.56	7.86	-8.18
SAR06	2022/3/21	750	250	D750V3-1012	EX3DV4 - SN3642	DAE4 Sn854	2.070	8.56	8.28	-3.27
SAR06	2022/4/2	750	250	D750V3-1012	EX3DV4 - SN3642	DAE4 Sn854	2.090	8.56	8.36	-2.34
SAR01	2022/3/15	835	250	D835V2-499	EX3DV4 - SN7625	DAE4 Sn376	2.390	9.68	9.56	-1.24
SAR06	2022/3/21	835	250	D835V2-4d167	EX3DV4 - SN3642	DAE4 Sn854	2.520	9.55	10.08	5.55
SAR06	2022/4/2	835	250	D835V2-4d167	EX3DV4 - SN3642	DAE4 Sn854	2.540	9.55	10.16	6.39
SAR01	2022/3/15	1750	250	D1750V2-1068	EX3DV4 - SN7625	DAE4 Sn376	9.100	36.60	36.4	-0.55
SAR06	2022/3/21	1750	250	D1750V2-1068	EX3DV4 - SN3642	DAE4 Sn854	8.440	36.60	33.76	-7.76
SAR06	2022/4/2	1750	50	D1750V2-1068	EX3DV4 - SN3642	DAE4 Sn854	1.680	36.60	33.6	-8.20
SAR01	2022/3/15	1900	250	D1900V2-5d041	EX3DV4 - SN7625	DAE4 Sn376	9.430	40.60	37.72	-7.09
SAR06	2022/3/21	1900	250	D1900V2-5d041	EX3DV4 - SN3642	DAE4 Sn854	9.490	40.60	37.96	-6.50
SAR06	2022/4/2	1900	250	D1900V2-5d041	EX3DV4 - SN3642	DAE4 Sn854	9.590	40.60	38.36	-5.52
SAR01	2022/3/16	2600	250	D2600V2-1008	EX3DV4 - SN7625	DAE4 Sn376	13.400	58.00	53.6	-7.59
SAR06	2022/3/21	2600	250	D2600V2-1008	EX3DV4 - SN3642	DAE4 Sn854	13.600	58.00	54.4	-6.21
SAR06	2022/4/2	2600	250	D2600V2-1008	EX3DV4 - SN3642	DAE4 Sn854	13.900	58.00	55.6	-4.14

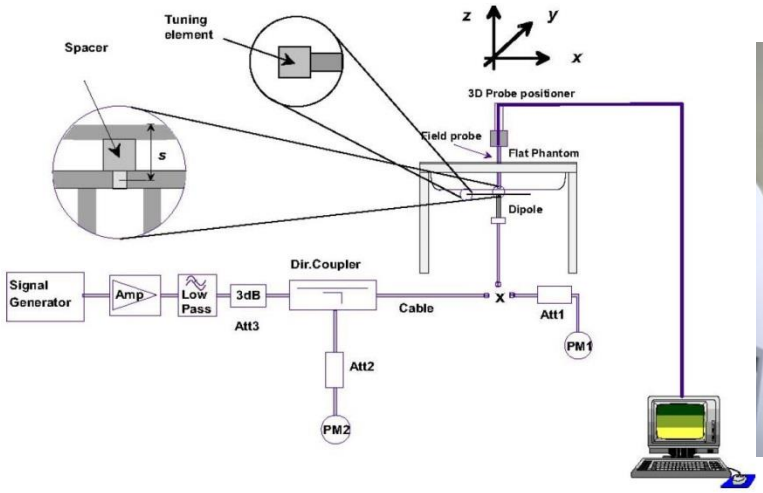


Fig 8.3.1 System Performance Check Setup

Fig 8.3.2 Setup Photo

11. UMTS/LTE Output Power (Unit: dBm)

<WCDMA Conducted Power>

Default Power Mode

Band		WCDMA II			Tune-up Limit (dBm)	WCDMA IV			Tune-up Limit (dBm)	WCDMA V			Tune-up Limit (dBm)
TX Channel		9262	9400	9538		1312	1413	1513		4132	4182	4233	
Rx Channel		9662	9800	9938		1537	1638	1738		4357	4407	4458	
Frequency (MHz)		1852.4	1880	1907.6		1712.4	1732.6	1752.6		826.4	836.4	846.6	
3GPP Rel 99	RMC 12.2Kbps	24.64	24.41	24.73	25.50	24.83	24.64	24.58	25.50	24.35	24.57	24.52	25.50

Reduced Power Mode

Band		WCDMA II			Tune-up Limit (dBm)	WCDMA IV			Tune-up Limit (dBm)	WCDMA V			Tune-up Limit (dBm)
TX Channel		9262	9400	9538		1312	1413	1513		4132	4182	4233	
Rx Channel		9662	9800	9938		1537	1638	1738		4357	4407	4458	
Frequency (MHz)		1852.4	1880	1907.6		1712.4	1732.6	1752.6		826.4	836.4	846.6	
3GPP Rel 99	RMC 12.2Kbps	19.11	19.23	19.18	20.00	19.53	19.59	19.76	20.00	22.71	22.76	22.83	23.50

<LTE Conducted Power>

<LTE Band 2>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				18700	18900	19100	
Frequency (MHz)				1860	1880	1900	
20	QPSK	1	0	24.80	24.83	24.70	25.5
20	QPSK	1	49	24.71	24.52	24.60	
20	QPSK	1	99	24.36	24.42	24.05	
20	QPSK	50	0	23.62	23.55	23.92	24.5
20	QPSK	50	24	23.53	23.58	23.93	
20	QPSK	50	50	23.60	23.56	23.76	
20	QPSK	100	0	23.65	23.54	23.76	
20	16QAM	1	0	23.47	23.32	23.68	24.5
20	16QAM	1	49	24.00	23.34	23.74	
20	16QAM	1	99	23.41	23.48	23.33	
20	16QAM	50	0	22.60	22.72	22.89	23.5
20	16QAM	50	24	22.54	22.54	22.89	
20	16QAM	50	50	22.79	22.58	22.95	
20	16QAM	100	0	22.61	22.58	22.74	
Channel				18675	18900	19125	Tune-up limit (dBm)
Frequency (MHz)				1857.5	1880	1902.5	
15	QPSK	1	0	24.74	24.79	24.63	25.5
Channel				18650	18900	19150	Tune-up limit (dBm)
Frequency (MHz)				1855	1880	1905	
10	QPSK	1	0	24.73	24.75	24.63	25.5
Channel				18625	18900	19175	Tune-up limit (dBm)
Frequency (MHz)				1852.5	1880	1907.5	
5	QPSK	1	0	24.77	24.71	24.64	25.5
Channel				18615	18900	19185	Tune-up limit (dBm)
Frequency (MHz)				1851.5	1880	1908.5	
3	QPSK	1	0	24.77	24.81	24.65	25.5
Channel				18607	18900	19193	Tune-up limit (dBm)
Frequency (MHz)				1850.7	1880	1909.3	
1.4	QPSK	1	0	24.79	24.75	24.68	25.5

<LTE Band 4>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				20050	20175	20300	
Frequency (MHz)				1720	1732.5	1745	
20	QPSK	1	0	25.08	25.21	25.05	25.5
20	QPSK	1	49	25.11	24.90	24.72	
20	QPSK	1	99	24.83	25.15	24.40	
20	QPSK	50	0	24.12	24.00	23.98	24.5
20	QPSK	50	24	23.88	24.03	23.98	
20	QPSK	50	50	23.92	24.10	23.95	
20	QPSK	100	0	23.93	24.02	23.85	
20	16QAM	1	0	23.75	23.89	23.88	24.5
20	16QAM	1	49	24.34	23.74	23.73	
20	16QAM	1	99	23.83	24.10	23.50	
20	16QAM	50	0	23.02	23.08	22.94	23.5
20	16QAM	50	24	22.95	23.03	23.18	
20	16QAM	50	50	22.99	23.03	23.12	
20	16QAM	100	0	22.84	23.02	23.13	
Channel				20025	20175	20325	Tune-up limit (dBm)
Frequency (MHz)				1717.5	1732.5	1747.5	
15	QPSK	1	0	25.02	25.20	25.11	25.5
Channel				20000	20175	20350	Tune-up limit (dBm)
Frequency (MHz)				1715	1732.5	1750	
10	QPSK	1	0	25.10	25.17	25.14	25.5
Channel				19975	20175	20375	Tune-up limit (dBm)
Frequency (MHz)				1712.5	1732.5	1752.5	
5	QPSK	1	0	25.07	25.16	25.14	25.5
Channel				19965	20175	20385	Tune-up limit (dBm)
Frequency (MHz)				1711.5	1732.5	1753.5	
3	QPSK	1	0	25.06	25.14	25.07	25.5
Channel				19957	20175	20393	Tune-up limit (dBm)
Frequency (MHz)				1710.7	1732.5	1754.3	
1.4	QPSK	1	0	25.04	25.18	25.10	25.5

<LTE Band 5>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				20450	20525	20600	
Frequency (MHz)				829	836.5	844	
10	QPSK	1	0	24.38	24.82	24.46	25.5
10	QPSK	1	25	24.55	24.68	24.72	
10	QPSK	1	49	24.48	24.76	24.39	
10	QPSK	25	0	23.73	23.68	23.72	24.5
10	QPSK	25	12	23.69	23.76	23.69	
10	QPSK	25	25	23.52	23.79	23.65	
10	QPSK	50	0	23.54	23.87	23.67	
10	16QAM	1	0	23.32	23.43	23.65	24.5
10	16QAM	1	25	23.47	23.61	23.38	
10	16QAM	1	49	23.40	23.55	23.44	
10	16QAM	25	0	22.85	22.64	22.65	23.5
10	16QAM	25	12	22.63	22.85	22.73	
10	16QAM	25	25	22.47	22.80	22.63	
10	16QAM	50	0	22.65	22.75	22.86	
Channel				20425	20525	20625	Tune-up limit (dBm)
Frequency (MHz)				826.5	836.5	846.5	
5	QPSK	1	0	24.40	24.80	24.48	25.5
Channel				20415	20525	20635	Tune-up limit (dBm)
Frequency (MHz)				825.5	836.5	847.5	
3	QPSK	1	0	24.39	24.78	24.41	25.5
Channel				20407	20525	20643	Tune-up limit (dBm)
Frequency (MHz)				824.7	836.5	848.3	
1.4	QPSK	1	0	24.44	24.80	24.47	25.5

<LTE Band 7>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				20850	21100	21350	
Frequency (MHz)				2510	2535	2560	
20	QPSK	1	0	25.10	24.62	24.56	25.5
20	QPSK	1	49	24.75	24.63	24.67	
20	QPSK	1	99	24.95	24.50	24.72	
20	QPSK	50	0	23.90	23.80	23.57	24.5
20	QPSK	50	24	24.01	23.70	23.54	
20	QPSK	50	50	23.94	23.60	23.66	
20	QPSK	100	0	23.88	23.62	23.58	
20	16QAM	1	0	23.69	23.50	23.47	24.5
20	16QAM	1	49	23.55	23.45	23.59	
20	16QAM	1	99	23.11	23.04	23.41	
20	16QAM	50	0	22.86	22.88	22.63	23.5
20	16QAM	50	24	23.04	22.69	22.63	
20	16QAM	50	50	22.95	22.78	22.46	
20	16QAM	100	0	22.85	22.68	22.57	
Channel				20825	21100	21375	Tune-up limit (dBm)
Frequency (MHz)				2507.5	2535	2562.5	
15	QPSK	1	0	25.01	24.54	24.50	25.5
Channel				20800	21100	21400	Tune-up limit (dBm)
Frequency (MHz)				2505	2535	2565	
10	QPSK	1	0	25.09	24.52	24.56	25.5
Channel				20775	21100	21425	Tune-up limit (dBm)
Frequency (MHz)				2502.5	2535	2567.5	
5	QPSK	1	0	25.02	24.53	24.46	25.5

<LTE Band 12>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				23060	23095	23130	
Frequency (MHz)				704	707.5	711	
10	QPSK	1	0	24.88	24.48	24.58	25.5
10	QPSK	1	25	24.87	24.41	24.52	
10	QPSK	1	49	24.34	24.40	24.56	
10	QPSK	25	0	23.70	23.83	23.88	24.5
10	QPSK	25	12	23.72	23.86	23.81	
10	QPSK	25	25	23.65	23.65	23.76	
10	QPSK	50	0	23.60	23.80	23.86	
10	16QAM	1	0	22.94	23.51	23.62	24.5
10	16QAM	1	25	23.83	23.94	23.75	
10	16QAM	1	49	23.49	23.42	23.53	
10	16QAM	25	0	22.71	22.89	23.05	23.5
10	16QAM	25	12	22.79	22.97	22.89	
10	16QAM	25	25	22.80	22.84	22.80	
10	16QAM	50	0	22.57	22.86	22.91	
Channel				23035	23095	23155	Tune-up limit (dBm)
Frequency (MHz)				701.5	707.5	713.5	
5	QPSK	1	0	24.84	24.42	24.53	25.5
Channel				23025	23095	23165	Tune-up limit (dBm)
Frequency (MHz)				700.5	707.5	714.5	
3	QPSK	1	0	24.78	24.44	24.50	25.5
Channel				23017	23095	23173	Tune-up limit (dBm)
Frequency (MHz)				699.7	707.5	715.3	
1.4	QPSK	1	0	24.81	24.47	24.49	25.5

<LTE Band 13>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel					23230		
Frequency (MHz)					782		
10	QPSK	1	0		25.02		25.5
10	QPSK	1	25		24.68		
10	QPSK	1	49		24.67		
10	QPSK	25	0		24.10		24.5
10	QPSK	25	12		24.10		
10	QPSK	25	25		24.10		
10	QPSK	50	0		24.11		
10	16QAM	1	0		23.72		24.5
10	16QAM	1	25		24.11		
10	16QAM	1	49		23.73		
10	16QAM	25	0		23.03		23.5
10	16QAM	25	12		23.13		
10	16QAM	25	25		23.03		
10	16QAM	50	0		22.97		
Channel				23205	23230	23255	Tune-up limit (dBm)
Frequency (MHz)				779.5	782	784.5	
5	QPSK	1	0	24.96	24.95	24.94	25.5

<LTE Band 14>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel					23330		
Frequency (MHz)					793		
10	QPSK	1	0		25.49		25.5
10	QPSK	1	25		25.44		
10	QPSK	1	49		25.18		
10	QPSK	25	0		24.39		24.5
10	QPSK	25	12		24.37		
10	QPSK	25	25		24.30		
10	QPSK	50	0		24.24		
10	16QAM	1	0		24.28		24.5
10	16QAM	1	25		24.44		
10	16QAM	1	49		24.24		
10	16QAM	25	0		23.27		23.5
10	16QAM	25	12		23.46		
10	16QAM	25	25		23.47		
10	16QAM	50	0		23.42		
Channel				23305	23330	23355	Tune-up limit (dBm)
Frequency (MHz)				790.5	793	795.5	
5	QPSK	1	0	25.39	25.41	25.43	25.5

<LTE Band 25>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				26140	26340	26590	
Frequency (MHz)				1860	1880	1905	
20	QPSK	1	0	24.83	24.85	24.71	25.5
20	QPSK	1	49	24.77	24.59	24.62	
20	QPSK	1	99	24.38	24.44	24.07	
20	QPSK	50	0	23.72	23.59	23.98	24.5
20	QPSK	50	24	23.58	23.61	23.93	
20	QPSK	50	50	23.66	23.63	23.78	
20	QPSK	100	0	23.68	23.55	23.85	
20	16QAM	1	0	23.52	23.33	23.71	24.5
20	16QAM	1	49	24.05	23.36	23.80	
20	16QAM	1	99	23.44	23.54	23.38	
20	16QAM	50	0	22.67	22.77	22.91	23.5
20	16QAM	50	24	22.56	22.57	22.89	
20	16QAM	50	50	22.84	22.61	22.95	
20	16QAM	100	0	22.67	22.62	22.75	
Channel				26115	26340	26615	Tune-up limit (dBm)
Frequency (MHz)				1857.5	1880	1907.5	
15	QPSK	1	0	24.80	24.80	24.66	25.5
Channel				26090	26340	26640	Tune-up limit (dBm)
Frequency (MHz)				1855	1880	1910	
10	QPSK	1	0	24.81	24.77	24.69	25.5
Channel				26065	26340	26665	Tune-up limit (dBm)
Frequency (MHz)				1852.5	1880	1912.5	
5	QPSK	1	0	24.80	24.77	24.69	25.5
Channel				26055	26340	26675	Tune-up limit (dBm)
Frequency (MHz)				1851.5	1880	1913.5	
3	QPSK	1	0	24.78	24.77	24.62	25.5
Channel				26047	26340	26683	Tune-up limit (dBm)
Frequency (MHz)				1850.7	1880	1914.3	
1.4	QPSK	1	0	24.79	24.75	24.63	25.5

<LTE Band 26>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				26765	26865	26965	
Frequency (MHz)				821.5	831.5	841.5	
15	QPSK	1	0	24.47	24.85	24.48	25.5
15	QPSK	1	37	24.61	24.71	24.75	
15	QPSK	1	74	24.52	24.79	24.41	
15	QPSK	36	0	23.81	23.73	23.81	24.5
15	QPSK	36	20	23.75	23.82	23.78	
15	QPSK	36	39	23.59	23.83	23.68	
15	QPSK	75	0	23.63	23.87	23.71	
15	16QAM	1	0	23.36	23.45	23.69	24.5
15	16QAM	1	37	23.50	23.67	23.39	
15	16QAM	1	74	23.49	23.61	23.49	
15	16QAM	36	0	22.90	22.73	22.74	23.5
15	16QAM	36	20	22.68	22.91	22.78	
15	16QAM	36	39	22.52	22.85	22.71	
15	16QAM	75	0	22.74	22.77	22.89	
Channel				26740	26865	26990	Tune-up limit (dBm)
Frequency (MHz)				819	831.5	844	
10	QPSK	1	0	24.40	24.78	24.39	25.5
Channel				26715	26865	27015	Tune-up limit (dBm)
Frequency (MHz)				816.5	831.5	846.5	
5	QPSK	1	0	24.42	24.78	24.41	25.5
Channel				26705	26865	27025	Tune-up limit (dBm)
Frequency (MHz)				815.5	831.5	847.5	
3	QPSK	1	0	24.41	24.80	24.41	25.5
Channel				26697	26865	27033	Tune-up limit (dBm)
Frequency (MHz)				814.7	831.5	848.3	
1.4	QPSK	1	0	24.39	24.77	24.42	25.5

<LTE Band 66>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				132072	132322	132572	
Frequency (MHz)				1720	1745	1770	
20	QPSK	1	0	25.12	25.23	25.14	25.5
20	QPSK	1	49	25.20	24.93	24.82	
20	QPSK	1	99	24.92	25.22	24.45	
20	QPSK	50	0	24.18	24.07	24.07	24.5
20	QPSK	50	24	23.98	24.05	23.98	
20	QPSK	50	50	23.97	24.11	23.97	
20	QPSK	100	0	23.99	24.08	23.90	
20	16QAM	1	0	23.82	23.89	23.93	24.5
20	16QAM	1	49	24.43	23.82	23.82	
20	16QAM	1	99	23.89	24.10	23.51	
20	16QAM	50	0	23.07	23.15	22.98	24
20	16QAM	50	24	23.04	23.13	23.26	
20	16QAM	50	50	23.00	23.09	23.13	
20	16QAM	100	0	22.94	23.12	23.16	
Channel				132047	132322	132597	Tune-up limit (dBm)
Frequency (MHz)				1717.5	1745	1772.5	
15	QPSK	1	0	25.02	25.17	25.12	25.5
Channel				132022	132322	132622	Tune-up limit (dBm)
Frequency (MHz)				1715	1745	1775	
10	QPSK	1	0	25.08	25.19	25.07	25.5
Channel				131997	132322	132647	Tune-up limit (dBm)
Frequency (MHz)				1712.5	1745	1777.5	
5	QPSK	1	0	25.09	25.13	25.09	25.5
Channel				131987	132322	132657	Tune-up limit (dBm)
Frequency (MHz)				1711.5	1745	1778.5	
3	QPSK	1	0	25.03	25.19	25.13	25.5
Channel				131979	132322	132665	Tune-up limit (dBm)
Frequency (MHz)				1710.7	1745	1779.3	
1.4	QPSK	1	0	25.09	25.22	25.13	25.5

<LTE Band 71>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				133222	133322	133372	
Frequency (MHz)				673	683	688	
20	QPSK	1	0	25.37	25.23	24.86	25.5
20	QPSK	1	49	25.36	25.22	25.08	
20	QPSK	1	99	25.27	25.14	25.20	
20	QPSK	50	0	24.23	24.24	24.24	24.5
20	QPSK	50	24	24.22	24.25	24.21	
20	QPSK	50	50	24.08	24.24	24.19	
20	QPSK	100	0	24.20	24.10	24.21	
20	16QAM	1	0	24.08	24.35	24.03	24.5
20	16QAM	1	49	23.92	23.99	24.16	
20	16QAM	1	99	23.87	23.97	23.88	
20	16QAM	50	0	23.25	23.24	23.24	23.5
20	16QAM	50	24	23.16	23.27	23.37	
20	16QAM	50	50	23.00	23.24	23.28	
20	16QAM	100	0	23.04	23.11	23.23	
Channel				133197	133297	133397	Tune-up limit (dBm)
Frequency (MHz)				670.5	680.5	690.5	
15	QPSK	1	0	25.27	25.17	24.80	25.5
Channel				133172	133272	133422	Tune-up limit (dBm)
Frequency (MHz)				668	678	693	
10	QPSK	1	0	25.34	25.16	24.85	25.5
Channel				133147	133247	133447	Tune-up limit (dBm)
Frequency (MHz)				665.5	675.5	695.5	
5	QPSK	1	0	25.27	25.23	24.85	25.5

Reduced Power Mode

<LTE Band 2>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				18700	18900	19100	
Frequency (MHz)				1860	1880	1900	
20	QPSK	1	0	19.81	19.67	19.74	20
20	QPSK	1	49	19.70	19.59	19.65	
20	QPSK	1	99	19.62	19.51	19.47	
20	QPSK	50	0	18.65	18.49	18.49	19
20	QPSK	50	24	18.57	18.49	18.47	
20	QPSK	50	50	18.54	18.40	18.47	
20	QPSK	100	0	18.40	18.40	18.31	
20	16QAM	1	0	18.35	18.33	18.19	19
20	16QAM	1	49	18.24	18.23	18.23	
20	16QAM	1	99	18.28	18.13	18.13	
20	16QAM	50	0	17.26	17.16	17.06	18
20	16QAM	50	24	17.23	17.06	17.06	
20	16QAM	50	50	17.11	17.06	17.04	
20	16QAM	100	0	17.09	16.97	17.00	
Channel				18675	18900	19125	Tune-up limit (dBm)
Frequency (MHz)				1857.5	1880	1902.5	
15	QPSK	1	0	19.74	19.62	19.67	20
Channel				18650	18900	19150	Tune-up limit (dBm)
Frequency (MHz)				1855	1880	1905	
10	QPSK	1	0	19.80	19.68	19.68	20
Channel				18625	18900	19175	Tune-up limit (dBm)
Frequency (MHz)				1852.5	1880	1907.5	
5	QPSK	1	0	19.79	19.63	19.67	20
Channel				18615	18900	19185	Tune-up limit (dBm)
Frequency (MHz)				1851.5	1880	1908.5	
3	QPSK	1	0	19.75	19.61	19.67	20
Channel				18607	18900	19193	Tune-up limit (dBm)
Frequency (MHz)				1850.7	1880	1909.3	
1.4	QPSK	1	0	19.74	19.61	19.65	20

<LTE Band 4>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				20050	20175	20300	
Frequency (MHz)				1720	1732.5	1745	
20	QPSK	1	0	18.14	18.27	18.25	19
20	QPSK	1	49	18.10	18.20	18.26	
20	QPSK	1	99	17.98	18.21	18.16	
20	QPSK	50	0	17.02	17.15	17.11	18
20	QPSK	50	24	17.07	17.18	17.23	
20	QPSK	50	50	17.00	17.13	17.17	
20	QPSK	100	0	17.03	17.05	17.20	
20	16QAM	1	0	17.14	17.18	17.27	18
20	16QAM	1	49	17.07	17.10	17.21	
20	16QAM	1	99	17.14	17.02	17.10	
20	16QAM	50	0	16.12	16.14	16.26	17
20	16QAM	50	24	16.14	16.01	16.15	
20	16QAM	50	50	16.09	15.99	16.11	
20	16QAM	100	0	16.03	16.20	16.22	
Channel				20025	20175	20325	Tune-up limit (dBm)
Frequency (MHz)				1717.5	1732.5	1747.5	
15	QPSK	1	0	18.14	18.24	18.25	19
Channel				20000	20175	20350	Tune-up limit (dBm)
Frequency (MHz)				1715	1732.5	1750	
10	QPSK	1	0	18.13	18.23	18.29	19
Channel				19975	20175	20375	Tune-up limit (dBm)
Frequency (MHz)				1712.5	1732.5	1752.5	
5	QPSK	1	0	18.11	18.26	18.25	19
Channel				19965	20175	20385	Tune-up limit (dBm)
Frequency (MHz)				1711.5	1732.5	1753.5	
3	QPSK	1	0	18.10	18.19	18.26	19
Channel				19957	20175	20393	Tune-up limit (dBm)
Frequency (MHz)				1710.7	1732.5	1754.3	
1.4	QPSK	1	0	18.14	18.25	18.29	19

<LTE Band 5>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				20450	20525	20600	
Frequency (MHz)				829	836.5	844	
10	QPSK	1	0	22.55	22.52	22.45	24
10	QPSK	1	25	22.50	22.51	22.45	
10	QPSK	1	49	22.42	22.47	22.33	
10	QPSK	25	0	21.32	21.50	21.32	23
10	QPSK	25	12	21.38	21.43	21.20	
10	QPSK	25	25	21.39	21.34	21.18	
10	QPSK	50	0	21.34	21.30	21.07	
10	16QAM	1	0	21.30	21.21	21.01	23
10	16QAM	1	25	21.34	21.20	21.03	
10	16QAM	1	49	21.20	21.12	20.95	
10	16QAM	25	0	20.15	20.06	20.14	22
10	16QAM	25	12	20.18	20.01	19.93	
10	16QAM	25	25	20.16	19.96	20.17	
10	16QAM	50	0	20.03	20.03	19.99	
Channel				20425	20525	20625	Tune-up limit (dBm)
Frequency (MHz)				826.5	836.5	846.5	
5	QPSK	1	0	22.53	22.54	22.44	24
Channel				20415	20525	20635	Tune-up limit (dBm)
Frequency (MHz)				825.5	836.5	847.5	
3	QPSK	1	0	22.46	22.50	22.44	24
Channel				20407	20525	20643	Tune-up limit (dBm)
Frequency (MHz)				824.7	836.5	848.3	
1.4	QPSK	1	0	22.52	22.48	22.43	24

<LTE Band 7>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				20850	21100	21350	
Frequency (MHz)				2510	2535	2560	
20	QPSK	1	0	17.53	17.43	17.47	18
20	QPSK	1	49	16.82	16.72	16.70	
20	QPSK	1	99	16.81	16.68	16.70	
20	QPSK	50	0	15.71	15.61	15.64	17
20	QPSK	50	24	15.67	15.55	15.57	
20	QPSK	50	50	15.62	15.52	15.57	
20	QPSK	100	0	15.57	15.51	15.56	
20	16QAM	1	0	15.55	15.49	15.50	17
20	16QAM	1	49	15.55	15.49	15.47	
20	16QAM	1	99	15.46	15.46	15.45	
20	16QAM	50	0	14.46	14.44	14.40	16
20	16QAM	50	24	14.46	14.35	14.31	
20	16QAM	50	50	14.37	14.34	14.24	
20	16QAM	100	0	14.30	14.26	14.16	
Channel				20825	21100	21375	Tune-up limit (dBm)
Frequency (MHz)				2507.5	2535	2562.5	
15	QPSK	1	0	16.79	16.64	16.76	18
Channel				20800	21100	21400	Tune-up limit (dBm)
Frequency (MHz)				2505	2535	2565	
10	QPSK	1	0	16.72	16.58	16.76	18
Channel				20775	21100	21425	Tune-up limit (dBm)
Frequency (MHz)				2502.5	2535	2567.5	
5	QPSK	1	0	16.69	16.56	16.72	18

<LTE Band 13>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				23230			
Frequency (MHz)				782			
10	QPSK	1	0		23.12		24
10	QPSK	1	25		23.05		
10	QPSK	1	49		22.98		
10	QPSK	25	0		21.97		23
10	QPSK	25	12		21.96		
10	QPSK	25	25		21.93		
10	QPSK	50	0		21.89		
10	16QAM	1	0		21.89		23
10	16QAM	1	25		21.88		
10	16QAM	1	49		21.79		
10	16QAM	25	0		20.74		22
10	16QAM	25	12		20.73		
10	16QAM	25	25		20.68		
10	16QAM	50	0		20.62		
Channel				23205	23230	23255	Tune-up limit (dBm)
Frequency (MHz)				779.5	782	784.5	
5	QPSK	1	0	23.09	23.10	23.11	24

<LTE Band 14>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel					23330		
Frequency (MHz)					793		
10	QPSK	1	0		21.77		23.5
10	QPSK	1	25		21.67		
10	QPSK	1	49		21.57		
10	QPSK	25	0		20.52		22.5
10	QPSK	25	12		20.51		
10	QPSK	25	25		20.50		
10	QPSK	50	0		20.50		
10	16QAM	1	0		20.54		22.5
10	16QAM	1	25		20.53		
10	16QAM	1	49		20.50		
10	16QAM	25	0		19.60		21.5
10	16QAM	25	12		19.64		
10	16QAM	25	25		19.60		
10	16QAM	50	0		19.55		
Channel				23305	23330	23355	Tune-up limit (dBm)
Frequency (MHz)				790.5	793	795.5	
5	QPSK	1	0	21.60	21.76	21.74	23.5

<LTE Band 25>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				26140	26340	26590	
Frequency (MHz)				1860	1880	1905	
20	QPSK	1	0	19.84	19.70	19.75	20
20	QPSK	1	49	19.76	19.62	19.66	
20	QPSK	1	99	19.68	19.59	19.56	
20	QPSK	50	0	18.65	18.55	18.55	19
20	QPSK	50	24	18.65	18.50	18.47	
20	QPSK	50	50	18.57	18.40	18.47	
20	QPSK	100	0	18.50	18.40	18.38	
20	16QAM	1	0	18.41	18.37	18.28	19
20	16QAM	1	49	18.34	18.31	18.25	
20	16QAM	1	99	18.33	18.23	18.15	
20	16QAM	50	0	17.33	17.17	17.15	18
20	16QAM	50	24	17.23	17.09	17.11	
20	16QAM	50	50	17.16	17.07	17.10	
20	16QAM	100	0	17.15	17.04	17.05	
Channel				26115	26340	26615	Tune-up limit (dBm)
Frequency (MHz)				1857.5	1880	1907.5	
15	QPSK	1	0	19.74	19.68	19.69	20
Channel				26090	26340	26640	Tune-up limit (dBm)
Frequency (MHz)				1855	1880	1910	
10	QPSK	1	0	19.65	19.64	19.63	20
Channel				26065	26340	26665	Tune-up limit (dBm)
Frequency (MHz)				1852.5	1880	1912.5	
5	QPSK	1	0	19.59	19.56	19.53	20
Channel				26055	26340	26675	Tune-up limit (dBm)
Frequency (MHz)				1851.5	1880	1913.5	
3	QPSK	1	0	19.58	19.55	19.48	20
Channel				26047	26340	26683	Tune-up limit (dBm)
Frequency (MHz)				1850.7	1880	1914.3	
1.4	QPSK	1	0	19.57	19.48	19.44	20

<LTE Band 26>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				26765	26865	26965	
Frequency (MHz)				821.5	831.5	841.5	
15	QPSK	1	0	22.55	22.57	22.53	24
15	QPSK	1	37	22.50	22.52	22.49	
15	QPSK	1	74	22.42	22.51	22.41	
15	QPSK	36	0	21.40	21.51	21.32	23
15	QPSK	36	20	21.39	21.46	21.26	
15	QPSK	36	39	21.39	21.41	21.19	
15	QPSK	75	0	21.38	21.33	21.17	
15	16QAM	1	0	21.36	21.30	21.11	23
15	16QAM	1	37	21.34	21.23	21.03	
15	16QAM	1	74	21.28	21.18	21.00	
15	16QAM	36	0	20.21	20.11	20.16	22
15	16QAM	36	20	20.18	20.06	20.00	
15	16QAM	36	39	20.18	20.03	20.19	
15	16QAM	75	0	20.12	20.11	20.07	
Channel				26740	26865	26990	Tune-up limit (dBm)
Frequency (MHz)				819	831.5	844	
10	QPSK	1	0	22.53	22.47	22.49	24
Channel				26715	26865	27015	Tune-up limit (dBm)
Frequency (MHz)				816.5	831.5	846.5	
5	QPSK	1	0	22.46	22.38	22.41	24
Channel				26705	26865	27025	Tune-up limit (dBm)
Frequency (MHz)				815.5	831.5	847.5	
3	QPSK	1	0	22.43	22.35	22.34	24
Channel				26697	26865	27033	Tune-up limit (dBm)
Frequency (MHz)				814.7	831.5	848.3	
1.4	QPSK	1	0	22.41	22.34	22.29	24

<LTE Band 66>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				132072	132322	132572	
Frequency (MHz)				1720	1745	1770	
20	QPSK	1	0	18.19	18.29	18.33	19
20	QPSK	1	49	18.15	18.27	18.27	
20	QPSK	1	99	18.05	18.27	18.21	
20	QPSK	50	0	17.07	17.23	17.17	18
20	QPSK	50	24	17.10	17.22	17.28	
20	QPSK	50	50	17.04	17.13	17.27	
20	QPSK	100	0	17.03	17.05	17.24	
20	16QAM	1	0	17.18	17.24	17.28	18
20	16QAM	1	49	17.17	17.18	17.24	
20	16QAM	1	99	17.14	17.12	17.20	
20	16QAM	50	0	16.18	16.19	16.28	17
20	16QAM	50	24	16.18	16.11	16.20	
20	16QAM	50	50	16.14	16.08	16.17	
20	16QAM	100	0	16.12	16.29	16.29	
Channel				132047	132322	132597	Tune-up limit (dBm)
Frequency (MHz)				1717.5	1745	1772.5	
15	QPSK	1	0	18.18	18.26	18.23	19
Channel				132022	132322	132622	Tune-up limit (dBm)
Frequency (MHz)				1715	1745	1775	
10	QPSK	1	0	18.17	18.25	18.16	19
Channel				131997	132322	132647	Tune-up limit (dBm)
Frequency (MHz)				1712.5	1745	1777.5	
5	QPSK	1	0	18.07	18.19	18.09	19
Channel				131987	132322	132657	Tune-up limit (dBm)
Frequency (MHz)				1711.5	1745	1778.5	
3	QPSK	1	0	18.10	18.19	18.30	19
Channel				131979	132322	132665	Tune-up limit (dBm)
Frequency (MHz)				1710.7	1745	1779.3	
1.4	QPSK	1	0	18.00	18.09	18.21	19

<TDD LTE SAR Measurement>

TDD LTE configuration setup for SAR measurement

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

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

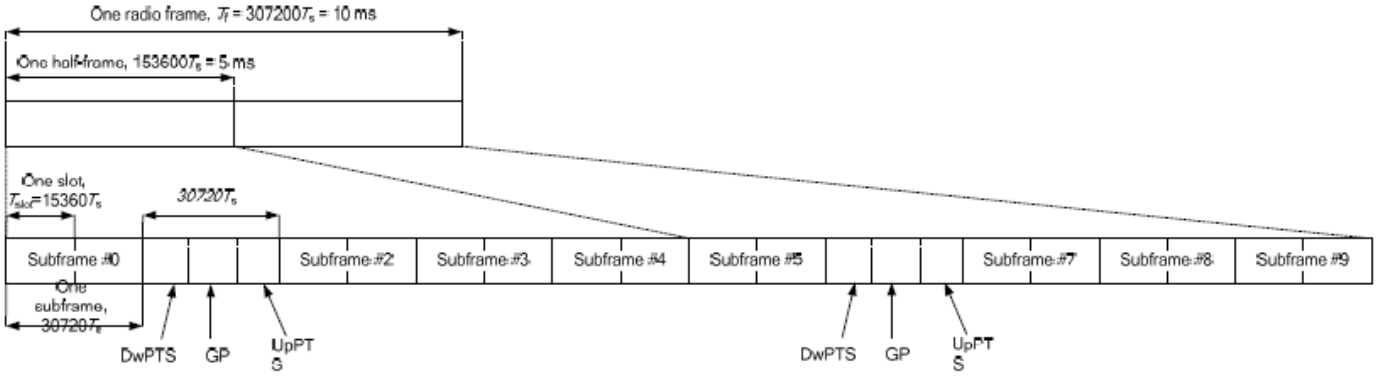


Figure 4.2-1: Frame structure type 2 (for 5 ms switch-point periodicity).

Table 4.2-2: Uplink-downlink configurations.

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

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

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

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

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

The highest duty factor is resulted from:

i. Uplink-downlink configuration: 0. In a half-frame consisted of 5 subfames, uplink operation is in 3 uplink subframes and 1 special subframe.

ii. special subframe configuration: 5-9 for normal cyclic prefix in downlink, 4-7 for extended cyclic prefix in downlink

iii. for special subframe with extended cyclic prefix in uplink, the total uplink duty factor in one half-frame is: (3+0.167)/5 = 63.3%

iv. for special subframe with normal cyclic prefix in uplink, the total uplink duty factor in one half-frame is: (3+0.143)/5 = 62.9%

v. For TDD LTE SAR measurement, the duty cycle 1:1.59 (62.9 %) was used perform testing and considering the theoretical duty cycle of 63.3% for extended cyclic prefix in the uplink, and the theoretical duty cycle of 62.9% for normal cyclic prefix in uplink, a scaling factor of extended cyclic prefix 63.3%/62.9% = 1.006 is applied to scale-up the measured SAR result. The scaled TDD LTE SAR = measured SAR (W/kg)* Tune-up Scaling Factor* scaling factor for extended cyclic prefix.

Default Power Mode

<LTE Band 38>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				37850	38000	38150	
Frequency (MHz)				2580	2595	2610	
20	QPSK	1	0	24.45	24.95	24.52	25.5
20	QPSK	1	49	24.71	24.62	24.63	
20	QPSK	1	99	24.79	24.88	24.41	
20	QPSK	50	0	23.48	23.81	23.79	24.5
20	QPSK	50	24	23.43	24.08	23.63	
20	QPSK	50	50	23.52	23.93	23.54	
20	QPSK	100	0	23.59	23.83	23.65	
20	16QAM	1	0	23.38	23.57	23.36	24.5
20	16QAM	1	49	23.53	23.57	23.44	
20	16QAM	1	99	23.38	23.11	22.99	
20	16QAM	50	0	22.59	22.85	22.81	23.5
20	16QAM	50	24	22.48	23.04	22.76	
20	16QAM	50	50	22.45	22.90	22.74	
20	16QAM	100	0	22.41	22.74	22.70	
Channel				37825	38000	38175	Tune-up limit (dBm)
Frequency (MHz)				2577.5	2595	2612.5	
15	QPSK	1	0	24.44	24.90	24.55	25.5
Channel				37800	38000	38200	Tune-up limit (dBm)
Frequency (MHz)				2575	2595	2615	
10	QPSK	1	0	24.48	24.92	24.48	25.5
Channel				37775	38000	38225	Tune-up limit (dBm)
Frequency (MHz)				2572.5	2595	2617.5	
5	QPSK	1	0	24.41	24.87	24.48	25.5

<LTE Band 41>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Low Middle Ch. / Freq.	Power Middle Ch. / Freq.	Power High Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				39750	40185	40620	41055	41490	
Frequency (MHz)				2506	2549.5	2593	2636.5	2680	
20	QPSK	1	0	24.65	24.51	25.03	24.56	24.60	25.5
20	QPSK	1	49	24.60	24.72	24.68	24.67	24.75	
20	QPSK	1	99	24.53	24.81	24.93	24.45	24.66	
20	QPSK	50	0	23.78	23.53	23.85	23.84	23.53	24.5
20	QPSK	50	24	23.60	23.53	24.09	23.63	23.48	
20	QPSK	50	50	23.69	23.59	24.03	23.56	23.56	
20	QPSK	100	0	23.65	23.59	23.91	23.72	23.68	
20	16QAM	1	0	23.43	23.40	23.65	23.43	23.50	24.5
20	16QAM	1	49	23.45	23.61	23.58	23.47	23.67	
20	16QAM	1	99	23.09	23.44	23.21	23.09	23.34	
20	16QAM	50	0	22.90	22.65	22.89	22.91	22.61	23.5
20	16QAM	50	24	22.72	22.55	23.09	22.78	22.62	
20	16QAM	50	50	22.72	22.48	22.97	22.84	22.38	
20	16QAM	100	0	22.58	22.50	22.80	22.75	22.54	
Channel				39725	40173	40620	41068	41515	Tune-up limit (dBm)
Frequency (MHz)				2503.5	2548.3	2593	2637.8	2682.5	
15	QPSK	1	0	24.58	24.50	24.95	24.46	24.58	25.50
Channel				39700	40160	40620	41080	41540	Tune-up limit (dBm)
Frequency (MHz)				2501	2547	2593	2639	2685	
10	QPSK	1	0	24.61	24.41	24.94	24.50	24.54	25.50
Channel				39675	40148	40620	41093	41565	Tune-up limit (dBm)
Frequency (MHz)				2498.5	2545.8	2593	2640.30	2687.5	
5	QPSK	1	0	24.61	24.43	24.94	24.56	24.51	25.50

Reduced Power Mode

<LTE Band 38>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				37850	38000	38150	
Frequency (MHz)				2580	2595	2610	
20	QPSK	1	0	19.63	19.87	19.21	20
20	QPSK	1	49	19.02	19.25	19.22	
20	QPSK	1	99	19.01	19.25	19.09	
20	QPSK	50	0	17.89	18.17	17.96	19
20	QPSK	50	24	18.00	18.32	18.13	
20	QPSK	50	50	17.87	18.18	18.12	
20	QPSK	100	0	18.03	18.29	18.24	
20	16QAM	1	0	17.93	18.25	18.14	19
20	16QAM	1	49	17.77	18.19	18.02	
20	16QAM	1	99	17.99	18.24	18.18	
20	16QAM	50	0	16.90	17.22	17.04	18
20	16QAM	50	24	16.86	17.14	16.94	
20	16QAM	50	50	16.94	17.28	17.16	
20	16QAM	100	0	16.92	17.24	17.09	
Channel				37825	38000	38175	Tune-up limit (dBm)
Frequency (MHz)				2577.5	2595	2612.5	
15	QPSK	1	0	19.58	19.76	19.20	20
Channel				37800	38000	38200	Tune-up limit (dBm)
Frequency (MHz)				2575	2595	2615	
10	QPSK	1	0	19.62	19.75	19.19	20
Channel				37775	38000	38225	Tune-up limit (dBm)
Frequency (MHz)				2572.5	2595	2617.5	
5	QPSK	1	0	19.64	19.79	19.25	20

<LTE Band 41>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Low Middle Ch. / Freq.	Power Middle Ch. / Freq.	Power High Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				39750	40185	40620	41055	41490	
Frequency (MHz)				2506	2549.5	2593	2636.5	2680	
20	QPSK	1	0	19.52	19.66	19.89	19.28	19.75	20
20	QPSK	1	49	18.85	19.09	19.32	19.23	19.69	
20	QPSK	1	99	18.84	19.04	19.32	19.15	19.67	
20	QPSK	50	0	17.76	17.97	18.24	18.06	18.58	19
20	QPSK	50	24	17.87	18.03	18.33	18.19	18.65	
20	QPSK	50	50	17.85	17.97	18.24	18.17	18.59	
20	QPSK	100	0	17.92	18.04	18.33	18.26	18.67	
20	16QAM	1	0	17.86	17.94	18.28	18.18	18.60	19
20	16QAM	1	49	17.80	17.86	18.19	18.10	18.51	
20	16QAM	1	99	17.85	18.00	18.30	18.19	18.71	
20	16QAM	50	0	16.79	16.98	17.29	17.13	17.70	18
20	16QAM	50	24	16.69	16.89	17.22	17.03	17.67	
20	16QAM	50	50	16.93	17.01	17.30	17.21	17.73	
20	16QAM	100	0	16.88	16.92	17.29	17.13	17.70	
Channel				39725	40173	40620	41068	41515	Tune-up limit (dBm)
Frequency (MHz)				2503.5	2548.3	2593	2637.8	2682.5	
15	QPSK	1	0	18.87	19.03	19.33	19.19	19.65	20.00
Channel				39700	40160	40620	41080	41540	Tune-up limit (dBm)
Frequency (MHz)				2501	2547	2593	2639	2685	
10	QPSK	1	0	18.85	18.97	19.24	19.17	19.59	20.00
Channel				39675	40148	40620	41093	41565	Tune-up limit (dBm)
Frequency (MHz)				2498.5	2545.8	2593	2640.30	2687.5	
5	QPSK	1	0	18.81	18.97	19.16	19.13	19.51	20.00

12. SAR Test Results

General Note:

1. Per KDB 447498 D01v06, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
   a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
   b. For WWAN: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
   c. For TDD LTE SAR measurement, the duty cycle 1:1.59 (62.9 %) was used perform testing and considering the theoretical duty cycle of 63.3% for extended cyclic prefix in the uplink, and the theoretical duty cycle of 62.9% for normal cyclic prefix in uplink, a scaling factor of extended cyclic prefix 63.3%/62.9% = 1.006 is applied to scale-up the measured SAR result. The Reported TDD LTE SAR = measured SAR (W/kg)* Tune-up Scaling Factor* scaling factor for extended cyclic prefix.

12.1 Body SAR

<WCDMA SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna Vendor	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
01	WCDMA II	RMC 12.2Kbps	Bottom of Laptop	0mm	Speed	ON	9262	1852.4	19.11	20.00	1.227	0.03	0.549	0.674
	WCDMA II	RMC 12.2Kbps	Bottom of Laptop	10mm	Speed	OFF	9538	1907.6	24.73	25.50	1.194	-0.03	0.285	0.340
02	WCDMA IV	RMC 12.2Kbps	Bottom of Laptop	0mm	Amphenol	ON	1312	1712.4	19.53	20.00	1.114	-0.09	0.844	0.940
	WCDMA IV	RMC 12.2Kbps	Bottom of Laptop	0mm	Amphenol	ON	1413	1732.6	19.59	20.00	1.099	-0.06	0.841	0.924
	WCDMA IV	RMC 12.2Kbps	Bottom of Laptop	0mm	Amphenol	ON	1513	1752.6	19.76	20.00	1.057	0.02	0.832	0.879
	WCDMA IV	RMC 12.2Kbps	Bottom of Laptop	10mm	Amphenol	OFF	1312	1712.4	24.83	25.50	1.167	-0.01	0.589	0.687
03	WCDMA V	RMC 12.2Kbps	Bottom of Laptop	0mm	Speed	ON	4233	846.6	22.83	23.50	1.167	0.05	0.922	1.076
	WCDMA V	RMC 12.2Kbps	Bottom of Laptop	0mm	Speed	ON	4132	826.4	22.71	23.50	1.199	0.05	0.894	1.072
	WCDMA V	RMC 12.2Kbps	Bottom of Laptop	0mm	Speed	ON	4182	836.4	22.76	23.50	1.186	0.05	0.901	1.068
	WCDMA V	RMC 12.2Kbps	Bottom of Laptop	10mm	Speed	OFF	4182	836.4	24.57	25.50	1.239	-0.05	0.213	0.264

<FDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Antenna Vendor	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
04	LTE Band 7	20M	QPSK	1	0	Bottom of Laptop	0mm	Speed	ON	20850	2510	17.53	18.00	1.114	0.05	0.849	0.946
	LTE Band 7	20M	QPSK	1	0	Bottom of Laptop	0mm	Speed	ON	21100	2535	17.43	18.00	1.140	-0.04	0.810	0.924
	LTE Band 7	20M	QPSK	1	0	Bottom of Laptop	0mm	Speed	ON	21350	2560	17.47	18.00	1.130	0.06	0.828	0.935
	LTE Band 7	20M	QPSK	1	0	Bottom of Laptop	10mm	Speed	OFF	21100	2535	24.62	25.50	1.225	-0.05	0.552	0.676
05	LTE Band 12	10M	QPSK	1	0	Bottom of Laptop	0mm	Amphenol	OFF	23095	707.5	24.48	25.50	1.265	0.05	0.729	0.922
06	LTE Band 13	10M	QPSK	1	0	Bottom of Laptop	0mm	Speed	ON	23230	782	23.12	24.00	1.225	-0.07	0.769	0.942
	LTE Band 13	10M	QPSK	1	0	Bottom of Laptop	10mm	Speed	OFF	23230	782	25.02	25.50	1.117	-0.04	0.238	0.266
07	LTE Band 14	10M	QPSK	1	0	Bottom of Laptop	0mm	Amphenol	ON	23330	793	21.77	23.50	1.489	0.13	0.571	0.850
	LTE Band 14	10M	QPSK	1	0	Bottom of Laptop	10mm	Amphenol	OFF	23330	793	25.49	25.50	1.002	-0.09	0.284	0.285
08	LTE Band 25	20M	QPSK	1	0	Bottom of Laptop	0mm	Speed	ON	26140	1860	19.84	20.00	1.038	0.06	0.612	0.635
	LTE Band 25	20M	QPSK	1	0	Bottom of Laptop	10mm	Speed	OFF	26340	1880	24.85	25.50	1.161	-0.04	0.076	0.088
09	LTE Band 26	15M	QPSK	1	0	Bottom of Laptop	0mm	Speed	ON	26865	831.5	22.57	24.00	1.390	0.02	0.748	1.040
	LTE Band 26	15M	QPSK	1	0	Bottom of Laptop	10mm	Speed	OFF	26865	831.5	24.85	25.50	1.161	-0.01	0.155	0.180
10	LTE Band 66	20M	QPSK	1	0	Bottom of Laptop	0mm	Amphenol	ON	132072	1720	18.19	19.00	1.205	-0.11	0.694	0.836
	LTE Band 66	20M	QPSK	1	0	Bottom of Laptop	0mm	Amphenol	ON	132322	1745	18.29	19.00	1.178	0.08	0.701	0.826
	LTE Band 66	20M	QPSK	1	0	Bottom of Laptop	0mm	Amphenol	ON	132572	1770	18.33	19.00	1.167	0.03	0.707	0.825
	LTE Band 66	20M	QPSK	1	0	Bottom of Laptop	10mm	Amphenol	OFF	132322	1745	25.23	25.50	1.064	-0.04	0.159	0.169
11	LTE Band 71	20M	QPSK	1	0	Bottom of Laptop	0mm	Amphenol	OFF	133322	683	25.23	25.50	1.064	-0.12	0.583	0.620

<TDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Antenna Vendor	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	LTE Band 41	20M	QPSK	1	0	Bottom of Laptop	0mm	Speed	ON	39750	2506	19.52	20.00	1.117	62.9	1.006	0.03	0.926	1.040
12	LTE Band 41	20M	QPSK	1	0	Bottom of Laptop	0mm	Speed	ON	40185	2549.5	19.66	20.00	1.081	62.9	1.006	0.04	0.980	1.066
	LTE Band 41	20M	QPSK	1	0	Bottom of Laptop	0mm	Speed	ON	40620	2593	19.89	20.00	1.026	62.9	1.006	0.03	0.935	0.965
	LTE Band 41	20M	QPSK	1	0	Bottom of Laptop	0mm	Speed	ON	41055	2636.5	19.28	20.00	1.180	62.9	1.006	0.02	0.624	0.741
	LTE Band 41	20M	QPSK	1	0	Bottom of Laptop	0mm	Speed	ON	41490	2680	19.75	20.00	1.059	62.9	1.006	0	0.559	0.596
	LTE Band 41	20M	QPSK	1	0	Bottom of Laptop	10mm	Speed	OFF	40620	2593	25.03	25.50	1.114	62.9	1.006	-0.03	0.156	0.175

12.2 Repeated SAR Measurement

No.	Band	Mode	Test Position	Gap (mm)	Antenna Vendor	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Ratio	Reported 1g SAR (W/kg)
1st	WCDMA IV	RMC 12.2Kbps	Bottom of Laptop	0mm	Amphenol	ON	1312	1712.4	19.53	20.00	1.114			-0.09	0.844	-	0.940
2nd	WCDMA IV	RMC 12.2Kbps	Bottom of Laptop	0mm	Amphenol	ON	1312	1712.4	19.59	20.00	1.099			-0.06	0.833	1.013	0.915
1st	WCDMA V	RMC 12.2Kbps	Bottom of Laptop	0mm	Speed	ON	4233	846.6	22.83	23.50	1.167			0.05	0.922	-	1.076
2nd	WCDMA V	RMC 12.2Kbps	Bottom of Laptop	0mm	Speed	ON	4233	846.6	22.83	23.50	1.167			0.05	0.917	1.005	1.070
1st	LTE Band 41	20M_QPSK_1_0	Bottom of Laptop	0mm	Speed	ON	40185	2549.5	19.66	20.00	1.081	62.9	1.006	0.04	0.980	-	1.066
2nd	LTE Band 41	20M_QPSK_1_0	Bottom of Laptop	0mm	Speed	ON	40185	2549.5	19.66	20.00	1.081	62.9	1.006	0.09	0.964	1.017	1.049

General Note:

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

13. WLAN Power Density Calculation

General Note:

1. The MediaTek MT7922A12L WLAN/BT module is integrated into this host, the WLAN 2.4GHz/5GHz/6GHz maximum output power is referenced from Bureau Veritas SAR report, report no.: SFBARR-WTW-P21060023 (FCC ID: RAS-MT7922A12L), due to the WLAN/BT transmit antenna to bottom of laptop is higher than 200mm; these output power is using calculated power density to do Sim-Tx analysis.
2. The Qualcomm QCNFA725 WLAN/BT module is integrated into this host. The WLAN 2.4GHz/5GHz/6GHz maximum output power referenced from Qualcomm Tune-up document (FCC ID: A5M-QCNFA725), due to the WLAN/BT transmit antenna to bottom of laptop is higher than 200mm, these output power is using calculated power density to do Sim-Tx analysis.

<MT7922A12L>

Band	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm^2)	Limit (mW/cm^2)	Power Density / Limit
WLAN2.4GHz Band Ant 1	1.91	18.50	20.4	0.11	109.90	0.022	1.000	0.022
WLAN5GHz Band Ant 1	1.68	19.00	20.7	0.12	116.95	0.023	1.000	0.023
WLAN6GHz Band Ant 1	2.62	13.00	15.6	0.04	36.48	0.007	1.000	0.007
Bluetooth Ant 2	1.30	13.00	14.3	0.03	26.92	0.005	1.000	0.005

<QCNFA725>

Band	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm^2)	Limit (mW/cm^2)	Power Density / Limit
WLAN2.4GHz Band Ant 1+2	1.91	22.50	24.4	0.28	276.06	0.055	1.000	0.055
WLAN5GHz Band Ant 1+2	1.68	22.00	23.7	0.23	233.35	0.046	1.000	0.046
WLAN6GHz Band Ant 1+2	2.62	19.00	21.6	0.15	145.21	0.029	1.000	0.029
Bluetooth Ant 1	1.30	16.00	17.3	0.05	53.70	0.011	1.000	0.011

14. Simultaneous Transmission Analysis

<MT7922A12L>	NO.	Simultaneous Transmission Configurations	Body
	1.	WWAN + 2.4GHz WLAN Ant 1+2	Yes
	2.	WWAN + 5G/6GHz WLAN Ant 1+2 + Bluetooth Ant 2	Yes

<QCNFA725>	NO.	Simultaneous Transmission Configurations	Body
	1.	WWAN + 2.4GHz WLAN Ant 1+2 + 5G/6GHz WLAN Ant 1+2	Yes
	2.	WWAN + 5G/6GHz WLAN Ant 1+2 + Bluetooth Ant 2	Yes

General Note:

1. WLAN/BT power density / limit ratio according to section 13 are using for Sim-Tx analysis with highest WWAN SAR result to show the total Sim-Tx ratio is less than 1.

14.1 Body Exposure Conditions

<MT7922A12L>

Exposure Position	0	1	2	3	4	1+2 Summed Ratio	1+3+4 Summed Ratio
	Maximum WWAN	Maximum WWAN	Maximum 2.4GHz WLAN Ant 1+2	Maximum 5G/6GHz WLAN1+2	Maximum Bluetooth		
	1g SAR (W/kg)	SAR Ratio	PD Ratio	PD Ratio	PD Ratio		
Bottom of Laptop at 0mm	1.172	0.733	0.022	0.023	0.005	**0.755**	**0.761**

<QCNFA725>

Exposure Position	0	1	2	3	4	1+2+3 Summed Ratio	1+3+4 Summed Ratio
	Maximum WWAN	Maximum WWAN	2.4GHz WLAN Ant 1+2	5G/6GHz WLAN Ant 1+2	Bluetooth Ant 2		
	1g SAR (W/kg)	SAR Ratio	PD Ratio	PD Ratio	PD Ratio		
Bottom of Laptop at 0mm	1.172	0.733	0.055	0.046	0.011	**0.834**	**0.790**

Test Engineer： Randy Lin

15. Uncertainty Assessment

Per KDB 865664 D01 SAR measurement 100MHz to 6GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg and the measured 10-g SAR within a frequency band is < 3.75 W/kg. The expanded SAR measurement uncertainty must be ≤ 30%, for a confidence interval of k = 2. If these conditions are met, extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval. For this device, the highest measured 1-g SAR is less 1.5W/kg. Therefore, the measurement uncertainty table is not required in this report.

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

16. References

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

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

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

[4] SPEAG DASY System Handbook

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

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

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

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

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

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

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