FCC SAR TEST REPORT

FCC ID	:	**PY322300575**
Equipment	:	**Netgear 5G MHS Travel Router**
Brand Name	:	**Netgear**
Model Name	:	**MR6550**
Applicant	:	**Netgear Inc** **350 E. Plumeria Drive, San Jose, CA 95134, United States**
Standard	:	**FCC 47 CFR Part 2 (2.1093)**

The product was received on Sep. 19, 2022 and testing was started from Sep. 16, 2022 and completed on Oct. 07, 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
No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan

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History of this test report

Report No.	Version	Description	Issued Date
FA190614-06B	01	Initial issue of report	Nov. 01, 2022

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) for Netgear Inc, Netgear 5G MHS Travel Router, MR6550, are as follows.

Equipment Class	Frequency Band		Highest SAR Summary (Separation 10mm) 1g SAR (W/kg)	Highest Simultaneous Transmission 1g SAR (W/kg)
Licensed	LTE	LTE Band 2	1.19	1.45
		LTE Band 5	1.07	
		LTE Band 7	1.18	
		LTE Band 12	0.72	
		LTE Band 13	1.19	
		LTE Band 14	0.97	
		LTE Band 25	1.29	
		LTE Band 26	1.05	
		LTE Band 30	1.29	
		LTE Band 41	1.18	
		LTE Band 48	1.06	
		LTE Band 4 / 66	1.24	
		LTE Band 71	0.80	
	FR1	FR1 n2	1.30	
		FR1 n5	0.96	
		FR1 n12	0.76	
		FR1 n14	1.06	
		FR1 n25	1.18	
		FR1 n30	1.19	
		FR1 n41	1.29	
		FR1 n48	1.29	
		FR1 n66	1.18	
		FR1 n71	0.78	
		FR1 n77	1.28	
DTS	WLAN	2.4GHz WLAN	0.10	1.45
NII		5GHz WLAN	0.10	1.45
6XD		6GHz WLAN	0.06	1.45
Date of Testing:			2022/9/16 ~ 2022/10/7	

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 1190) and 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) and power density for general population/uncontrolled exposure limits (1.6 W/kg for Partial-Body 1g SAR) specified in FCC 47 CFR part 2 (2.1093), Human Exposure to RF Radiation Limits (1.0 mW/cm^2=10 W/m^2) specified in FCC 47 CFR part 1.1310 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. Data Reuse Approach

Since the same design are identical between parent model and variant model, data reuse is requested and spot check data in this report is used to justify the data reuse.
The applicant has received FCC's pre-approval for the data-reuse, and in this report the guidance in KDB inquiry has been followed.

All of SAR results: The reference model's highest SAR does not exceed 75% of the applicable SAR limit, and the spot check results do not exceed 30% from the associated worst-case SAR, and the max SAR summary are identical with parent model, and SAR data reuse is justified. For LTE B5/13/66 and NR n71/77, due to SAR increase more than 30%, full SAR results for these bands are provided in section 18.

3. Model Difference Information

PY321100529 / PY322100558 / PY322100564 and PY322300575 use the identical internal printed circuit board layout, and the major differences which may relate to RF are listed below:

- PY322300575 vs PY321100529: they are identical in hardware including the hardware components population. On PY322300575, software change to enable FR2 n261
- PY322300575 vs PY321100529: on PY322300575, software change to enable some LTE bands and FR1 bands. While those newly enabled bands are also enabled on PY322100558.
- PY322300575 vs PY321100529: on PY322300575, software change to enable HPUE in n77. While the n77 in HPUE is also implemented on PY322100564.
- PY322300575 vs PY321100529: on PY322300575, a software feature is enabled to increase WLAN power level in the 2.4GHz, 5GHz and 6GHz bands when the device connects to AC mains. This feature is also implemented on PY322100564 for 2.4GHz and 5GHz WLAN.

The detail of similarity and difference is illustrated in the operational description. Based on the information, spot check of conducted power and emission level was performed and presented in this report to justify the data referencing.

4. Reference detail Section

Rule Part	Equipment Class	Wireless Technology	Frequency Band (MHz)	Reference FCC ID (Parent)	Type Grant/ Permissive Change	Reference Title	FCC ID Filling (Variant)	Spot Check Required
Part 2.1093 SAR	DTS	Wi-Fi	2400~2483.5	PY321100529	Original Grant	FA190614D	PY322300575	Spot check Ant 3 / 4
	NII	Wi-Fi	5150~5250 5250~5350 5470~5725 5725~5850	PY321100529	Original Grant	FA190614D	PY322300575	Spot check Ant 3 / 4
	6XD	Wi-Fi	5925 ~7125	PY321100529	Original Grant	FA190614D	PY322300575	Spot check Ant 3 / 4
	PCB CBE	LTE	B2 / 4 / 5 / 7 / 12 / 14 / 30 / 48 / 66	PY321100529	Original Grant	FA190614D	PY322300575	Spot Check Ant 1 / 2
			B13 / 25 / 26 / 41 / 71	PY322100558	Original Grant	FA190614-03B	PY322300575	Spot Check Ant 1 / 2
			B7	PY322100564	Original Grant	FA190614-04B	PY322300575	Spot Check Ant 2
		5G FR1	n2 / 5 / 12 / 14 / 30 / 66	PY321100529	Original Grant	FA190614D	PY322300575	Spot Check Ant 1 / 2
			n25 / 41 / 48 / 71	PY322100558	Original Grant	FA190614-03B	PY322300575	Spot Check Ant 1 / 2
			n77	PY322100564	Original Grant	FA190614-04B	PY322300575	Spot Check Ant 1 / 2 / 5 / 6

5. 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 941225 D05 SAR for LTE Devices v02r05
- FCC KDB 941225 D05A Rel.10 LTE SAR Test Guidance v01r02
- FCC KDB 941225 D06 Hotspot Mode SAR v02r01

6. Equipment Under Test (EUT) Information

6.1 General Information

Product Feature & Specification	
Equipment Name	Netgear 5G MHS Travel Router
Brand Name	Netgear
Model Name	MR6550
FCC ID	PY322300575
Wireless Technology and Frequency Range	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 30: 2305 MHz ~ 2315 MHz LTE Band 41: 2496 MHz ~ 2690 MHz LTE Band 48: 3550 MHz ~ 3700 MHz LTE Band 66: 1710 MHz ~ 1780 MHz LTE Band 71: 663 MHz ~ 698 MHz 5G NR n2 : 1850 MHz ~ 1910 MHz 5G NR n5 : 824 MHz ~ 849 MHz 5G NR n12 : 699 MHz ~ 716 MHz 5G NR n14 : 788 MHz ~ 798 MHz 5G NR n25 : 1850 MHz ~ 1915 MHz 5G NR n30 : 2305 MHz ~ 2315 MHz 5G NR n41 : 2496 MHz ~ 2690 MHz 5G NR n48 : 3550 MHz ~ 3700 MHz 5G NR n66 : 1710 MHz ~ 1780 MHz 5G NR n71 : 663 MHz ~ 698 MHz 5G NR n77: 3700 MHz ~ 3980 MHz, 3450MHz ~ 3550MHz 5G NR n260: 37GHz ~ 40GHz 5G NR n261: 27.5GHz ~ 28.35GHz WLAN 2.4 GHz Band: 2400 MHz ~ 2483.5 MHz WLAN 5.2 GHz Band: 5150 MHz ~ 5250 MHz WLAN 5.3 GHz Band: 5250 MHz ~ 5350 MHz WLAN 5.6 GHz Band: 5470 MHz ~ 5725 MHz WLAN 5.8 GHz Band: 5725 MHz ~ 5850 MHz WLAN 6E: 5925 MHz ~ 6425 MHz, 6425 MHz ~ 6525 MHz, 6525 MHz ~ 6875 MHz, 6875 MHz ~ 7125 MHz
Mode	LTE: QPSK, 16QAM, 64QAM, 256QAM 5G NR: DFT-s-OFDM/CP-OFDM, Pi/2 BPSK/QPSK/16QAM/64QAM/256QAM 5G FR2: DFT-s-OFDM/CP-OFDM, Pi/2 BPSK/QPSK/16QAM/64QAM WLAN: 802.11a/b/g/n/ac/ax HT20/HT40/VHT20/VHT40/VHT80/VHT160/HE20/HE40/HE80/HE160
EUT Stage	Identical Prototype

6.2 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>PY322300575</td></tr>
<tr><td>Equipment Name</td><td>Netgear 5G MHS Travel Router</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 30: 2305 MHz ~ 2315 MHz
LTE Band 41: 2496 MHz ~ 2690 MHz
LTE Band 48: 3550 MHz ~ 3700 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 30: 5MHz, 10MHz
LTE Band 41: 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 48: 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 / 64QAM / 256QAM</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>LTE Carrier Aggregation Combinations</td><td>Inter-Band and Intra-Band DL CA possible combinations and the detail power measurement please refer to section12, and the intra band UL CA refer to FCC SAR Report: FA190614-03B section 14 and FA190614D section 12.</td></tr>
<tr><td>LTE Carrier Aggregation Additional Information</td><td>This device supports maximum of 7carriers in the downlink and 2 carriers in the uplink. Additional following LTE Release features are not supported: Relay, HetNet, Enhanced MIMO, eICI, WiFi Offloading, MDH, eMBMA, Cross-Carrier Scheduling, Enhanced SC-FDMA.</td></tr>
</table>

Transmission (H, M, L) channel numbers and frequencies in each LTE band												
LTE Band 2												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	18607	1850.7	18615	1851.5	18625	1852.5	18650	1855	18675	1857.5	18700	1860
M	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880
H	19193	1909.3	19185	1908.5	19175	1907.5	19150	1905	19125	1902.5	19100	1900
LTE Band 4												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	19957	1710.7	19965	1711.5	19975	1712.5	20000	1715	20025	1717.5	20050	1720
M	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5
H	20393	1754.3	20385	1753.5	20375	1752.5	20350	1750	20325	1747.5	20300	1745
LTE Band 5								
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	20407	824.7	20415	825.5	20425	826.5	20450	829
M	20525	836.5	20525	836.5	20525	836.5	20525	836.5
H	20643	848.3	20635	847.5	20625	846.5	20600	844
LTE Band 7								
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	20775	2502.5	20800	2505	20825	2507.5	20850	2510
M	21100	2535	21100	2535	21100	2535	21100	2535
H	21425	2567.5	21400	2565	21375	2562.5	21350	2560
LTE Band 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 30				
	Bandwidth 5 MHz		Bandwidth 10 MHz	
	Channel #	Freq.(MHz)	Channel #	Freq.(MHz)
L	27685	2307.5	27710	2310
M	27710	2310		
H	27735	2312.5		

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

LTE Band 48								
	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	55265	3552.5	55290	3555	55315	3557.5	55340	3560
LM	55810	3607	55815	3607.5	55820	3608	55830	3609
MH	56170	3643	56165	3642.5	56160	3642	56150	3641
H	56715	3697.5	56690	3695	56665	3692.5	56640	3690

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

6.3 General 5G NR SAR Test and Reporting Considerations

5G NR Information	
FCC ID	PY322300575
Equipment Name	Netgear 5G MHS Travel Router
Operating Frequency Range of each 5G NR transmission band	5G NR n2 : 1850 MHz ~ 1910 MHz 5G NR n5 : 824 MHz ~ 849 MHz 5G NR n12 : 699 MHz ~ 716 MHz 5G NR n14 : 788 MHz ~ 798 MHz 5G NR n25 : 1850 MHz ~ 1915 MHz 5G NR n30 : 2305 MHz ~ 2315 MHz 5G NR n41 : 2496 MHz ~ 2690 MHz 5G NR n48 : 3550 MHz ~ 3700 MHz 5G NR n66 : 1710 MHz ~ 1780 MHz 5G NR n71 : 663 MHz ~ 698 MHz 5G NR n77: 3700 MHz ~ 3980 MHz, 3450MHz ~ 3550MHz
Channel Bandwidth	5G NR n2: 5MHz, 10MHz, 15MHz, 20MHz 5G NR n5: 5MHz, 10MHz, 15MHz, 20MHz 5G NR n12: 5MHz, 10MHz, 15MHz 5G NR n14: 5MHz, 10MHz 5G NR n25: 5MHz, 10MHz, 15MHz, 20MHz 5G NR n30: 5MHz, 10MHz 5G NR n41: 20MHz, 30MHz, 40MHz, 50MHz, 60MHz, 70MHz, 80MHz, 90MHz, 100MHz 5G NR n48: 10MHz, 20MHz 5G NR n66: 5MHz, 10MHz, 15MHz, 20MHz,30MHz, 40MHz 5G NR n71: 5MHz, 10MHz, 15MHz, 20MHz 5G NR n77: 10MHz, 15MHz, 20MHz, 30MHz, 40MHz, 50MHz, 60MHz, 70MHz, 80MHz, 90MHz, 100MHz
SCS	FDD: SCS15KHz, TDD: SCS30KHz
uplink modulations used	DFT-s-OFDM: PI/2 BPSK / QPSK / 16QAM / 64QAM / 256QAM CP-OFDM QPSK / 16QAM / 64QAM / 256QAM
A-MPR (Additional MPR) disabled for SAR Testing?	Yes
LTE Anchor Bands for n2	LTE B5/12/13/14/30/66
LTE Anchor Bands for n5	LTE B2/12/30/66
LTE Anchor Bands for n25	LTE B12/66
LTE Anchor Bands for n30	LTE B2/5/12/14/66
LTE Anchor Bands for n41	LTE B2
LTE Anchor Bands for n48	LTE B2/66
LTE Anchor Bands for n66	LTE B2/5/12/13/14/30
LTE Anchor Bands for n71	LTE B2/66
LTE Anchor Bands for n77	LTE B2/5/12/13/14/30/66

NR Band 2

	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	370500	1852.5	371000	1855	371500	1857.5	372000	1860
M	376000	1880	376000	1880	376000	1880	376000	1880
H	381500	1907.5	381000	1905	380500	1902.5	380000	1900

NR Band 5

	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	165300	826.5	165800	829	166300	831.5	166800	834
M	167300	836.5	167300	836.5	167300	836.5	167300	836.5
H	169300	846.5	168800	844	168300	841.5	167800	839

NR Band 12

	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	140300	701.5	140800	704	141300	706.5
M	141500	707.5	141500	707.5	141500	707.5
H	142700	713.5	142200	711	141700	708.5

NR Band 14

	Bandwidth 5MHz		Bandwidth 10MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	158100	790.5	158600	793
M	158600	793		
H	159100	795.5		

NR Band 25								
	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	370500	1852.5	371000	1855	371500	1857.5	372000	1860
M	376500	1882.5	376500	1882.5	376500	1882.5	376500	1882.5
H	382500	1912.5	382000	1910	381500	1907.5	381000	1905

NR Band 30				
	Bandwidth 5MHz		Bandwidth 10MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	461500	2307.5	462000	2310
M	462000	2310		
H	462500	2312.5		

NR Band 41																		
	Bandwidth20MHz		Bandwidth30MHz		Bandwidth 40MHz		Bandwidth 50MHz		Bandwidth 60MHz		Bandwidth70MHz		Bandwidth 80MHz		Bandwidth 90MHz		Bandwidth100MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	501204	2506.02	502200	2511	503202	2516.01	504204	2521.02	505200	2526	506202	2531.01	507204	2536.02	508200	2541	509202	2546.01
M	518598	2592.99	518598	2592.99	518598	2592.99	518598	2592.99	518598	2592.99	518598	2592.99	518598	2592.99	518598	2592.99	518598	2592.99
H	535998	2679.99	534996	2674.98	534000	2670	532998	2664.99	531996	2659.98	531000	2655	529998	2649.99	528996	2644.98	528000	2640

NR Band 48				
	Bandwidth10MHz		Bandwidth20MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	637000	3555	637334	3560.01
M	641666	3624.99	641666	3624.99
H	646332	3694.98	646000	3690

NR Band 66												
	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz		Bandwidth 30MHz		Bandwidth 40MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	342500	1712.5	343000	1715	343500	1717.5	344000	1720	345000	1725	346000	1730
M	349000	1745	349000	1745	349000	1745	349000	1745	349000	1745	349000	1745
H	355500	1777.5	355000	1775	354500	1772.5	354000	1770	353000	1765	352000	1760

NR Band 71								
	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	133100	665.5	133600	668	13410	670.5	134600	673
M	136100	680.5	136100	680.5	136100	680.5	136100	680.5
H	139100	695.5	138600	693	13810	690.5	137600	688

NR Band 77(3700 MHz ~ 3980 MHz)																				
	Bandwidth10MHz		Bandwidth15MHz		Bandwidth 20MHz		Bandwidth30MHz		Bandwidth 40MHz		Bandwidth 50MHz		Bandwidth 60MHz		Bandwidth 70MHz		Bandwidth 80MHz		Bandwidth 90MHz		Bandwidth100MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	647000	3705	647168	3707.52	647334	3710.01	647668	3715.02	648000	3720	648334	3725.01	648668	3730.02	649000	3735	649334	3740.01	649668	3745.02	650000	3750
M	656000	3840	656000	3840	656000	3840	656000	3840	656000	3840	656000	3840	656000	3840	656000	3840	656000	3840	656000	3840	656000	3840
H	665000	3975	664832	3972.48	664666	3969.99	664332	3964.98	664000	3960	663666	3954.99	663332	3949.98	663000	3945	662666	3939.99	662332	3934.98	662000	3930

NR Band 77(3450MHz ~ 3550MHz)																				
	Bandwidth10MHz		Bandwidth15MHz		Bandwidth 20MHz		Bandwidth30MHz		Bandwidth 40MHz		Bandwidth 50MHz		Bandwidth 60MHz		Bandwidth 70MHz		Bandwidth 80MHz		Bandwidth 90MHz		Bandwidth100MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	630334	3455.01	630500	3457.5	630668	3460.02	631000	3465	631334	3470.01	631668	3475.02	632000	3480	632334	3485.01	632668	3490.02	633000	3495	633334	3500.01
M	633332	3499.98	633332	3499.98	633332	3499.98	633332	3499.98	633332	3499.98	633332	3499.98	633332	3499.98	633332	3499.98	633332	3499.98	633332	3499.98	633332	3499.98
H	636332	3544.98	636166	3542.49	636000	3540	635666	3534.99	635332	3529.98	635000	3525	634666	3519.99	634332	3514.98	634000	3510	633666	3504.99	633332	3499.98

7. Smart Transmit feature for RF Exposure compliance

The FCC RF exposure limit is defined based on time-averaged RF exposure. The product implements Qualcomm Smart Transmit feature which controls the instantaneous transmitting power for WWAN transmitter to ensure the product in compliance with FCC RF exposure limit over a defined time window, for SAR (transmit frequency ≤ 6GHz). To control and manage transmitting power in real time and to ensure at all times the time-averaged RF exposure is compliant to the regulation requirement.

This report describes the procedures for the SAR char generation, and the parameters obtained from SAR characterization (referred to as SAR char, respectively) will be used as input for Smart Transmit. SAR char will be entered via the Embedded File System (EFS) to enable the Smart Transmit Feature.

<Terminologies in this report>

P_{limit}	The time-averaged RF power which corresponds to SAR_design_targer.
P_{max}	Maximum target power level
SAR_design_target:	The design target for SAR compliance. It should be less than regulatory power density limit to account for all device design related uncertainties.
SAR char	P_{limit} for all the technologies/bands for all applicable DSI

<SAR Characterization>

SAR char must be generated to cover all radio configurations and usage scenarios that the wireless device supports for operating at 6 GHz or below. It will then be used as input for Smart Transmit to control and manage RF exposure for f < 6 GHz.

The Smart Transmit algorithm maintains the time-averaged transmit power, in turn, time-averaged RF exposure of SAR_design_target or PD_design_target, below the predefined time-averaged power limit (i.e., input.power.limit for 5G mmW NR), for each characterized technology and band (refer to RF exposure part0 report)

Smart Transmit allows the device to transmit at higher power instantaneously, as high as Pmax, when needed, but enforces power limiting to maintain time-averaged transmit power to Plimit. Below table shows Plimit EFS settings and maximum tune up output power Pmax configured for this EUT for various transmit conditions (Device State Index DSI).

<Plimit for supported technologies and bands (Plimit in EFS file)>

Band	Antenna	Measured Power (dBm)	Measured 1g SAR (W/kg)	SAR design Target (W/kg)	Duty cycle	Total Uncertainty (dB)	P limit (dBm) time-average power	P Max* time-average power
LTE B2	1	23.48	0.899	1.030	100.00%	1.00	24.00	22.50
LTE B5	1	23.27	0.607	1.030	100.00%	1.00	25.50	23.00
LTE B12	1	23.07	0.575	1.030	100.00%	1.00	25.60	23.00
LTE B13	1	23.04	0.572	1.030	100.00%	1.00	25.50	23.00
LTE B14	1	23.09	0.632	1.030	100.00%	1.00	25.20	23.00
LTE B26	1	22.51	0.594	1.030	100.00%	1.00	24.90	23.00
LTE B48	1	22.78	0.800	1.030	63.30%	1.00	21.80	20.00
LTE B66	1	23.63	0.797	1.030	100.00%	1.00	24.70	23.00
LTE B71	1	22.90	0.491	1.030	100.00%	1.00	26.10	23.00
FR1 n2	1	23.25	0.876	1.030	100.00%	1.00	23.90	22.50
FR1 n5	1	23.50	0.673	1.030	100.00%	1.00	25.30	23.00
FR1 n12	1	23.42	0.591	1.030	100.00%	1.00	25.80	23.00
FR1 n14	1	23.17	0.680	1.030	100.00%	1.00	24.90	23.00
FR1 n25	1	23.22	0.786	1.030	100.00%	1.00	24.30	23.00
FR1 n48	1	22.00	1.360	1.030	100.00%	1.00	20.70	22.00
FR1 n66	1	23.88	0.897	1.030	100.00%	1.00	24.40	23.00
FR1 n71	1	23.30	0.432	1.030	100.00%	1.00	27.00	23.00
FR1 n77	1	22.21	3.840	1.030	100.00%	1.00	19.40	22.00
FR1 n77_HPUE	1	25.21	3.840	1.030	100.00%	1.00	19.40	25.00

Band	Antenna	Measured Power (dBm)	Measured 1g SAR (W/kg)	SAR design Target (W/kg)	Duty cycle	Total Uncertainty (dB)	P limit (dBm) time-average power	P Max* time-average power
LTE B2	2	23.13	0.956	1.030	100.00%	1.00	23.40	23.00
LTE B7	2	22.72	1.250	1.030	100.00%	1.00	21.80	22.50
LTE B25	2	22.79	0.842	1.030	100.00%	1.00	23.60	23.00
LTE B30	2	21.97	1.020	1.030	100.00%	1.00	22.00	22.00
LTE B41	2	22.85	0.900	1.030	63.30%	1.00	21.40	21.00
LTE B66/4	2	23.22	0.830	1.030	100.00%	1.00	24.10	23.00
FR1 n2	2	23.41	0.984	1.030	100.00%	1.00	23.60	23.00
FR1 n5	2	23.60	0.541	1.030	100.00%	1.00	26.30	23.00
FR1 n25	2	22.96	0.760	1.030	100.00%	1.00	24.20	23.00
FR1 n30	2	22.21	0.986	1.030	100.00%	1.00	22.30	22.00
FR1 n41	2	23.19	1.100	1.030	100.00%	1.00	22.90	22.50
FR1 n48	2	22.99	1.700	1.030	100.00%	1.00	20.80	22.00
FR1 n66	2	23.75	0.643	1.030	100.00%	1.00	25.70	23.00
FR1 n77	2	22.14	3.380	1.030	100.00%	1.00	19.90	22.00
FR1 n77_HPUE	2	25.14	3.380	1.030	100.00%	1.00	19.90	25.00
FR1 n77_(SRS)	5	20.33	2.880	1.030	100.00%	1.00	19.70	20.50
FR1 n77_HPUE (SRS)	5	24.23	2.880	1.030	100.00%	1.00	19.70	25.00
FR1 n77_ (SRS)	6	19.98	1.700	1.030	100.00%	1.00	17.80	19.50
FR1 n77_HPUE (SRS)	6	19.98	1.700	1.030	100.00%	1.00	17.80	25.00

*P_{max} is used for RF tune up procedure. The maximum allowed output power is equal to Pmax + 1dB uncertainty.

**All P_{limit} power levels entered in the Table correspond to average power levels after accounting for duty cycle in the case TDD modulation schemes (for e.g., GSM & LTE TDD & NR TDD).

The max allowed output power is the P_{limit} + 1dB device uncertainty, and if P_{limit} is higher than P_{max}, the device output power will be P_{max} instead.

To account for total uncertainty, SAR_design_target should be determined as:

$$SAR\_design\_target < SAR_{regulatory\_limit} \times 10^{\frac{-total\ uncertainty}{10}}$$

8. RF Exposure Limits

8.1 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.

8.2 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.

9. Specific Absorption Rate (SAR)

9.1 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.

9.2 SAR Definition

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

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

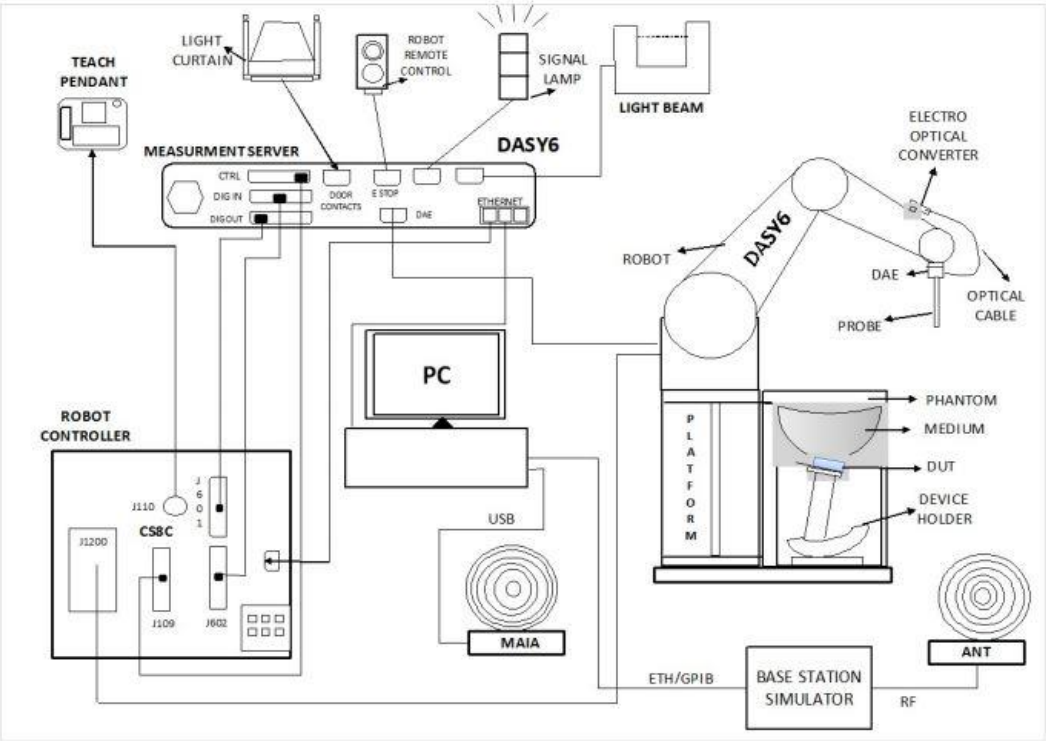
SAR is expressed in units of Watts per kilogram (W/kg)

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

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

10. System Description and Setup

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



- The DASY system in DASY6/DASY5 V5.2 SAR Configuration is shown above
- 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 windows software and the DASY5/DASY6 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.

10.1 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	

10.2 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

10.3 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.

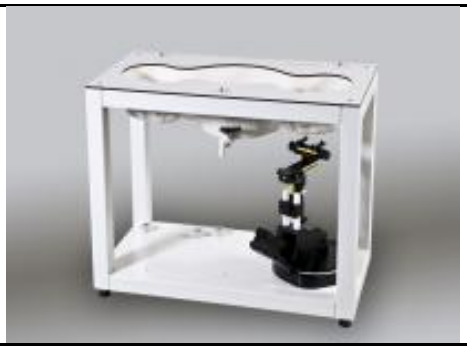
The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

Fig 5.1 Photo of DAE

10.4 Phantom

<SAM Twin Phantom>

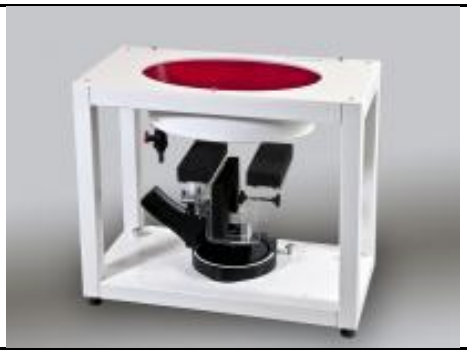
Shell Thickness	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm
Filling Volume	Approx. 25 liters
Dimensions	Length: 1000 mm; Width: 500 mm; Height: adjustable feet
Measurement Areas	Left Hand, Right Hand, Flat Phantom



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.

10.5 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

11. 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 power measurement, use engineering software to configure EUT WLAN 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 output power

<SAR measurement>

(a) Use base station simulator to configure EUT WWAN transmission in radiated connection, and engineering software to configure EUT WLAN 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

11.1 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

11.2 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.

11.3 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.	

11.4 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	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$	
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.

11.5 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.

11.6 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.

12. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	750MHz System Validation Kit(2)	D750V3	1012	Aug. 18, 2021	Aug. 16, 2023
SPEAG	835MHz System Validation Kit(2)	D835V2	499	Aug. 18, 2021	Aug. 16, 2023
SPEAG	1750MHz System Validation Kit	D1750V2	1120	Mar. 25, 2022	Mar. 24, 2023
SPEAG	1750MHz System Validation Kit	D1750V2	1068	Nov. 25, 2021	Nov. 24, 2022
SPEAG	1900MHz System Validation Kit	D1900V2	5d185	Jun. 17, 2022	Jun. 16, 2023
SPEAG	2300MHz System Validation Kit	D2300V2	1006	Jan. 18, 2022	Jan. 17, 2023
SPEAG	2300MHz System Validation Kit(2)	D2300V2	1088	Jul. 13, 2021	Jul. 11, 2023
SPEAG	2450MHz System Validation Kit(2)	D2450V2	736	Aug. 17, 2021	Aug. 15, 2023
SPEAG	2600MHz System Validation Kit(2)	D2600V2	1008	Aug. 17, 2021	Aug. 15, 2023
SPEAG	3500MHz System Validation Kit	D3500V2	1014	Jan. 17, 2022	Jan. 16, 2023
SPEAG	3500MHz System Validation Kit	D3500V2	1036	Mar. 23, 2022	Mar. 22, 2023
SPEAG	3900MHz System Validation Kit	D3900V2	1017	Apr. 22, 2022	Apr. 21, 2023
SPEAG	5GHz System Validation Kit(2)	D5GHzV2	1171	Apr. 20, 2021	Apr. 18, 2023
SPEAG	6500MHz System Validation Kit(2)	D6.5GHzV2	1003	Sep. 24, 2021	Sep. 22, 2023
SPEAG	Data Acquisition Electronics	DAE4	778	May. 30, 2022	May. 29, 2023
SPEAG	Data Acquisition Electronics	DAE4	1694	Nov. 03, 2021	Nov. 02, 2022
SPEAG	Dosimetric E-Field Probe	EX3DV4	3925	Apr. 29, 2022	Apr. 28, 2023
SPEAG	Dosimetric E-Field Probe	EX3DV4	7692	Nov. 03, 2021	Nov. 02, 2022
RCPTWN	Thermometer	HTC-1	TM685-1	Jun. 27, 2022	Jun. 26, 2023
RCPTWN	Thermometer	HTC-1	TM560-2	Mar. 15, 2022	Mar. 14, 2023
Anritsu	Radio Communication Analyzer	MT8821C	6201341950	Oct. 21, 2021	Oct. 20, 2022
Keysight	Wireless Communication Test Set	E5515C	MY50267236	Mar. 02, 2022	Mar. 01, 2023
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	MY46316648	Jul. 25, 2022	Jul. 24, 2023
SPEAG	Dielectric Probe Kit	DAK-3.5	1146	Jul. 25, 2022	Jul. 24, 2023
LINE SEIKI	Digital Thermometer	DTM3000-spezial	3252	Jul. 25, 2022	Jul. 24, 2023
Anritsu	Power Meter	ML2495A	1419002	Aug. 16, 2022	Aug. 15, 2023
Anritsu	Power Sensor	MA2411B	1911176	Aug. 16, 2022	Aug. 15, 2023
Anritsu	Power Meter	ML2496A	2119003	Jun. 22, 2022	Jun. 21, 2023
Anritsu	Power Sensor	MA2411B	1911334	Jun. 22, 2022	Jun. 21, 2023
Anritsu	Spectrum Analyzer	MS2830A	6201396378	Jul. 21, 2022	Jul. 20, 2023
Agilent	Spectrum Analyzer	E4408B	MY44211028	Aug. 19, 2021	Aug. 17, 2023
Mini-Circuits	Power Amplifier	ZVE-8G+	6418	Oct. 12, 2021	Oct. 11, 2022
Mini-Circuits	Power Amplifier	ZHL-42W+	715701915	May. 12, 2022	May. 11, 2023
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.

13. System Verification

13.1 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	22.5	0.882	41.700	0.89	41.90	-0.90	-0.48	±5	2022/9/16
750	22.5	0.883	41.700	0.89	41.90	-0.79	-0.48	±5	2022/10/7
835	22.5	0.915	41.400	0.90	41.50	1.67	-0.24	±5	2022/9/16
1750	22.5	1.370	40.600	1.37	40.10	0.00	1.25	±5	2022/9/16
1750	22.8	1.389	40.296	1.37	40.10	1.39	0.49	±5	2022/9/26
1900	22.5	1.450	39.100	1.40	40.00	3.57	-2.25	±5	2022/9/16
2300	22.5	1.680	39.000	1.67	39.50	0.60	-1.27	±5	2022/9/16
2300	22.8	1.692	40.151	1.67	39.50	1.32	1.65	±5	2022/9/26
2450	22.8	1.818	39.796	1.80	39.20	1.00	1.52	±5	2022/9/28
2600	22.5	2.000	37.900	1.96	39.00	2.04	-2.82	±5	2022/9/16
3500	22.5	2.920	37.400	2.91	37.90	0.34	-1.32	±5	2022/9/17
3500	22.8	2.996	38.487	2.91	37.90	2.96	1.55	±5	2022/9/26
3500	22.5	2.916	38.043	2.91	37.90	0.21	0.38	±5	2022/9/26
3900	22.8	3.428	38.117	3.33	37.51	2.94	1.62	±5	2022/9/26
5250	22.8	4.660	36.379	4.71	35.95	-1.06	1.19	±5	2022/9/28
5600	22.8	4.996	35.910	5.07	35.50	-1.46	1.15	±5	2022/9/28
5750	22.8	5.159	35.674	5.22	35.35	-1.17	0.92	±5	2022/9/28
6500	22.7	6.000	34.400	6.07	34.50	-1.15	-0.29	±5	2022/9/29

13.2 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)2	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 (%)
SAR10	2022/9/16	750	50	D750V3-1012	EX3DV4 - SN7692	DAE4 Sn1694	0.417	8.56	8.34	-2.57
SAR10	2022/10/7	750	50	D750V3-1012	EX3DV4 - SN7692	DAE4 Sn1694	0.421	8.56	8.42	-1.64
SAR10	2022/9/16	835	50	D835V2-499	EX3DV4 - SN7692	DAE4 Sn1694	0.487	9.68	9.74	0.62
SAR10	2022/9/16	1750	50	D1750V2-1120	EX3DV4 - SN7692	DAE4 Sn1694	1.84	36.4	36.8	1.10
SAR06	2022/9/26	1750	50	D1750V2-1068	EX3DV4 - SN3925	DAE4 Sn778	1.73	36.6	34.6	-5.46
SAR10	2022/9/16	1900	50	D1900V2-5d185	EX3DV4 - SN7692	DAE4 Sn1694	2.03	39.0	40.6	4.10
SAR10	2022/9/16	2300	50	D2300V2-1006	EX3DV4 - SN7692	DAE4 Sn1694	2.25	48.3	45	-6.83
SAR06	2022/9/26	2300	50	D2300V2-1088	EX3DV4 - SN3925	DAE4 Sn778	2.34	49.7	46.8	-5.84
SAR06	2022/9/28	2450	50	D2450V2-736	EX3DV4 - SN3925	DAE4 Sn778	2.58	54.2	51.6	-4.80
SAR10	2022/9/16	2600	50	D2600V2-1008	EX3DV4 - SN7692	DAE4 Sn1694	2.61	58.0	52.2	-10.00
SAR10	2022/9/17	3500	50	D3500V2-1014	EX3DV4 - SN7692	DAE4 Sn1694	3.22	67.2	64.4	-4.17
SAR06	2022/9/26	3500	50	D3500V2-1036	EX3DV4 - SN3925	DAE4 Sn778	3.11	67.4	62.2	-7.72
SAR06	2022/9/26	3500	50	D3500V2-1036	EX3DV4 - SN3925	DAE4 Sn778	3.43	67.4	68.6	1.78
SAR06	2022/9/26	3900	50	D3900V2-1017-3900	EX3DV4 - SN3925	DAE4 Sn778	3.33	68.7	66.6	-3.06
SAR06	2022/9/28	5250	50	D5GHzV2-1171-5250	EX3DV4 - SN3925	DAE4 Sn778	3.91	80.3	78.2	-2.62
SAR06	2022/9/28	5600	50	D5GHzV2-1171-5600	EX3DV4 - SN3925	DAE4 Sn778	4.02	83.4	80.4	-3.60
SAR06	2022/9/28	5750	50	D5GHzV2-1171-5750	EX3DV4 - SN3925	DAE4 Sn778	4	80.4	80	-0.50
SAR06	2022/9/29	6500	50	D6.5GHzV2-1003	EX3DV4 - SN3925	DAE4 Sn778	13.7	292	274	-6.16

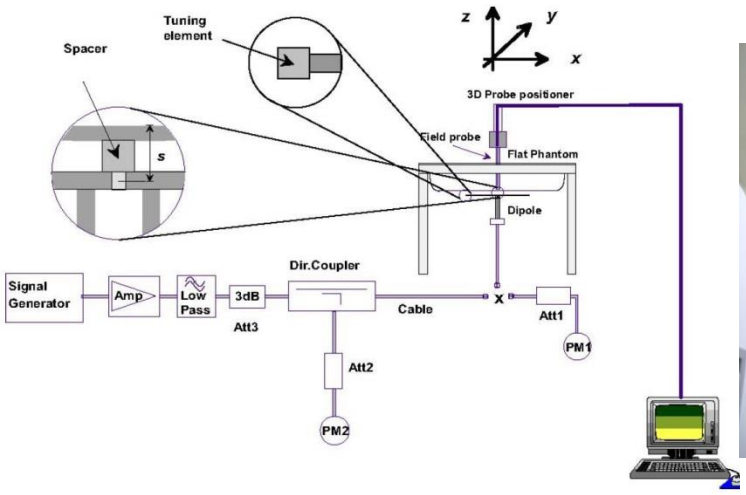


Fig 8.3.1 System Performance Check Setup

Fig 8.3.2 Setup Photo

14. LTE Output Power (Unit: dBm)

<LTE Conducted Power>

General Note:

1. Anritsu MT8820C base station simulator was used to setup the connection with EUT; the frequency band, channel bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.
2. Per KDB 941225 D05v02r05, when a properly configured base station simulator is used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration is not required.
3. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
4. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05v02r05, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
6. Per KDB 941225 D05v02r05, 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM SAR testing is not required.
7. Per KDB 941225 D05v02r05, Smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
8. For LTE B5 the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 D05v02r05, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

<LTE Band 5_Ant 1>

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	22.56	22.66	22.48	24
10	QPSK	1	25	22.41	22.43	22.37	
10	QPSK	1	49	22.39	22.41	22.35	
10	QPSK	25	0	21.53	21.72	21.60	23
10	QPSK	25	12	21.57	21.70	21.61	
10	QPSK	25	25	21.63	21.64	21.64	
10	QPSK	50	0	21.61	21.62	21.43	
10	16QAM	1	0	21.55	21.75	21.60	23
10	16QAM	1	25	21.71	21.73	21.66	
10	16QAM	1	49	21.54	21.69	21.63	
10	16QAM	25	0	20.62	20.67	20.62	22
10	16QAM	25	12	20.69	20.75	20.71	
10	16QAM	25	25	20.55	20.63	20.58	
10	16QAM	50	0	20.48	20.52	20.41	
10	64QAM	1	0	20.43	20.63	20.46	22
10	64QAM	1	25	20.52	20.66	20.50	
10	64QAM	1	49	20.47	20.54	20.47	
10	64QAM	25	0	19.45	19.56	19.44	21
10	64QAM	25	12	19.48	19.65	19.57	
10	64QAM	25	25	19.30	19.47	19.32	
10	64QAM	50	0	19.63	19.66	19.49	
10	256QAM	1	0	17.54	17.69	17.57	19
10	256QAM	1	25	17.69	17.73	17.58	
10	256QAM	1	49	17.57	17.63	17.60	
10	256QAM	25	0	17.47	17.47	17.35	19
10	256QAM	25	12	17.41	17.52	17.35	
10	256QAM	25	25	17.48	17.55	17.44	
10	256QAM	50	0	17.41	17.55	17.47	
Channel				20425	20525	20625	Tune-up limit (dBm)
Frequency (MHz)				826.5	836.5	846.5	
5	QPSK	1	0	22.55	22.47	22.35	24
5	QPSK	1	12	22.27	22.27	22.31	
5	QPSK	1	24	22.30	22.23	22.30	
5	QPSK	12	0	21.46	21.61	21.56	23
5	QPSK	12	7	21.37	21.64	21.49	
5	QPSK	12	13	21.51	21.49	21.62	
5	QPSK	25	0	21.51	21.61	21.35	
5	16QAM	1	0	21.39	21.72	21.44	23
5	16QAM	1	12	21.71	21.61	21.53	
5	16QAM	1	24	21.54	21.56	21.57	
5	16QAM	12	0	20.55	20.54	20.56	22
5	16QAM	12	7	20.59	20.70	20.71	
5	16QAM	12	13	20.55	20.43	20.47	
5	16QAM	25	0	20.41	20.50	20.41	
5	64QAM	1	0	20.32	20.50	20.43	22
5	64QAM	1	12	20.39	20.50	20.40	
5	64QAM	1	24	20.36	20.41	20.38	
5	64QAM	12	0	19.45	19.54	19.41	21
5	64QAM	12	7	19.41	19.64	19.56	
5	64QAM	12	13	19.11	19.39	19.24	
5	64QAM	25	0	19.44	19.66	19.29	
5	256QAM	1	0	17.49	17.60	17.38	19
5	256QAM	1	12	17.57	17.55	17.38	
5	256QAM	1	24	17.53	17.55	17.42	
5	256QAM	12	0	17.29	17.40	17.25	19
5	256QAM	12	7	17.39	17.49	17.22	
5	256QAM	12	13	17.38	17.50	17.34	

5	256QAM	25	0	17.30	17.39	17.33	
Channel				20415	20525	20635	Tune-up limit (dBm)
Frequency (MHz)				825.5	836.5	847.5	
3	QPSK	1	0	22.47	22.53	22.34	24
3	QPSK	1	8	22.34	22.29	22.17	
3	QPSK	1	14	22.29	22.28	22.34	
3	QPSK	8	0	21.42	21.60	21.43	23
3	QPSK	8	4	21.46	21.65	21.50	
3	QPSK	8	7	21.59	21.62	21.56	
3	QPSK	15	0	21.54	21.50	21.24	
3	16QAM	1	0	21.50	21.65	21.53	23
3	16QAM	1	8	21.64	21.57	21.52	
3	16QAM	1	14	21.39	21.63	21.60	
3	16QAM	8	0	20.54	20.62	20.43	22
3	16QAM	8	4	20.67	20.67	20.63	
3	16QAM	8	7	20.40	20.60	20.43	
3	16QAM	15	0	20.28	20.41	20.22	
3	64QAM	1	0	20.30	20.52	20.34	22
3	64QAM	1	8	20.33	20.56	20.36	
3	64QAM	1	14	20.43	20.38	20.38	
3	64QAM	8	0	19.27	19.51	19.29	21
3	64QAM	8	4	19.34	19.48	19.57	
3	64QAM	8	7	19.13	19.40	19.20	
3	64QAM	15	0	19.55	19.61	19.48	
3	256QAM	1	0	17.46	17.64	17.57	19
3	256QAM	1	8	17.56	17.59	17.46	
3	256QAM	1	14	17.47	17.47	17.48	
3	256QAM	8	0	17.40	17.41	17.22	19
3	256QAM	8	4	17.28	17.46	17.27	
3	256QAM	8	7	17.32	17.51	17.37	
3	256QAM	15	0	17.32	17.48	17.36	
Channel				20407	20525	20643	Tune-up limit (dBm)
Frequency (MHz)				824.7	836.5	848.3	
1.4	QPSK	1	0	22.37	22.34	22.34	24
1.4	QPSK	1	3	22.22	22.28	22.24	
1.4	QPSK	1	5	22.36	22.32	22.30	
1.4	QPSK	3	0	22.27	22.57	22.43	
1.4	QPSK	3	1	22.33	22.56	22.48	
1.4	QPSK	3	3	22.47	22.50	22.50	
1.4	QPSK	6	0	21.56	21.59	21.34	23
1.4	16QAM	1	0	21.42	21.61	21.41	23
1.4	16QAM	1	3	21.69	21.67	21.59	
1.4	16QAM	1	5	21.52	21.60	21.59	
1.4	16QAM	3	0	21.61	21.59	21.43	
1.4	16QAM	3	1	21.53	21.68	21.55	
1.4	16QAM	3	3	21.53	21.52	21.47	
1.4	16QAM	6	0	20.35	20.36	20.36	22
1.4	64QAM	1	0	20.42	20.47	20.46	22
1.4	64QAM	1	3	20.48	20.53	20.36	
1.4	64QAM	1	5	20.27	20.40	20.42	
1.4	64QAM	3	0	20.30	20.40	20.42	
1.4	64QAM	3	1	20.35	20.57	20.47	
1.4	64QAM	3	3	20.10	20.37	20.13	
1.4	64QAM	6	0	19.63	19.53	19.43	21
1.4	256QAM	1	0	17.45	17.61	17.38	19
1.4	256QAM	1	3	17.64	17.63	17.51	
1.4	256QAM	1	5	17.37	17.48	17.41	
1.4	256QAM	3	0	17.39	17.46	17.35	
1.4	256QAM	3	1	17.23	17.50	17.22	
1.4	256QAM	3	3	17.42	17.52	17.38	
1.4	256QAM	6	0	17.39	17.50	17.33	19

<LTE Band 13_Ant 1>

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		22.46		24
10	QPSK	1	25		22.21		
10	QPSK	1	49		22.20		
10	QPSK	25	0		21.57		23
10	QPSK	25	12		21.52		
10	QPSK	25	25		21.53		
10	QPSK	50	0		21.50		
10	16QAM	1	0		21.74		23
10	16QAM	1	25		21.53		
10	16QAM	1	49		21.50		
10	16QAM	25	0		20.43		22
10	16QAM	25	12		20.60		
10	16QAM	25	25		20.57		
10	16QAM	50	0		20.48		
10	64QAM	1	0		20.60		22
10	64QAM	1	25		20.76		
10	64QAM	1	49		20.55		
10	64QAM	25	0		19.48		21
10	64QAM	25	12		19.47		
10	64QAM	25	25		19.41		
10	64QAM	50	0		19.36		
10	256QAM	1	0		17.52		19
10	256QAM	1	25		17.72		
10	256QAM	1	49		17.45		
10	256QAM	25	0		17.58		19
10	256QAM	25	12		17.57		
10	256QAM	25	25		17.57		
10	256QAM	50	0		17.52		
Channel				23205	23230	23255	Tune-up limit (dBm)
Frequency (MHz)				779.5	782	784.5	
5	QPSK	1	0	22.03	22.03	22.00	24
5	QPSK	1	12	22.01	22.00	22.03	
5	QPSK	1	24	22.00	22.01	22.02	
5	QPSK	12	0	21.33	21.47	21.47	23
5	QPSK	12	7	21.07	21.43	21.35	
5	QPSK	12	13	21.32	21.51	21.40	
5	QPSK	25	0	21.07	21.36	21.18	
5	16QAM	1	0	21.46	21.70	21.55	23
5	16QAM	1	12	21.40	21.33	21.39	
5	16QAM	1	24	21.25	21.31	21.28	
5	16QAM	12	0	20.29	20.31	20.33	22
5	16QAM	12	7	20.08	20.53	20.38	
5	16QAM	12	13	20.14	20.42	20.42	
5	16QAM	25	0	20.22	20.46	20.26	
5	64QAM	1	0	20.07	20.53	20.41	22
5	64QAM	1	12	20.51	20.71	20.64	
5	64QAM	1	24	20.28	20.50	20.25	
5	64QAM	12	0	19.16	19.35	19.39	21
5	64QAM	12	7	19.07	19.40	19.30	
5	64QAM	12	13	19.02	19.35	19.25	
5	64QAM	25	0	19.20	19.34	19.16	
5	256QAM	1	0	17.22	17.38	17.44	19
5	256QAM	1	12	17.38	17.56	17.43	
5	256QAM	1	24	17.07	17.30	17.14	
5	256QAM	12	0	17.18	17.45	17.43	19
5	256QAM	12	7	17.29	17.55	17.36	
5	256QAM	12	13	17.34	17.44	17.34	
5	256QAM	25	0	17.20	17.41	17.20	

<LTE Band 66_Ant 1>

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	23.20	23.28	23.26	24
20	QPSK	1	49	22.20	22.58	22.40	
20	QPSK	1	99	22.37	22.46	22.18	
20	QPSK	50	0	21.43	21.48	21.58	23
20	QPSK	50	24	21.42	21.39	21.57	
20	QPSK	50	50	21.41	21.40	21.48	
20	QPSK	100	0	21.42	21.44	21.48	
20	16QAM	1	0	21.37	21.55	21.76	23
20	16QAM	1	49	21.23	21.50	21.60	
20	16QAM	1	99	21.48	21.58	21.58	
20	16QAM	50	0	20.41	20.42	20.49	22
20	16QAM	50	24	20.53	20.31	20.45	
20	16QAM	50	50	20.53	20.38	20.54	
20	16QAM	100	0	20.47	20.54	20.43	
20	64QAM	1	0	20.33	20.67	20.61	22
20	64QAM	1	49	20.50	20.54	20.89	
20	64QAM	1	99	20.38	20.56	20.59	
20	64QAM	50	0	19.38	19.47	19.57	21
20	64QAM	50	24	19.50	19.42	19.53	
20	64QAM	50	50	19.45	19.55	19.40	
20	64QAM	100	0	19.38	19.55	19.38	
20	256QAM	1	0	17.50	17.62	17.59	19
20	256QAM	1	49	17.49	17.69	17.70	
20	256QAM	1	99	17.52	17.67	17.65	
20	256QAM	50	0	17.37	17.56	17.37	19
20	256QAM	50	24	17.43	17.53	17.62	
20	256QAM	50	50	17.41	17.65	17.47	
20	256QAM	100	0	17.31	17.46	17.43	
Channel				132047	132322	132597	Tune-up limit (dBm)
Frequency (MHz)				1717.5	1745	1772.5	
15	QPSK	1	0	23.03	23.18	23.20	24
15	QPSK	1	37	22.25	22.60	22.38	
15	QPSK	1	74	22.36	22.47	22.19	
15	QPSK	36	0	21.37	21.40	21.46	23
15	QPSK	36	20	21.50	21.34	21.52	
15	QPSK	36	39	21.58	21.49	21.41	
15	QPSK	75	0	21.43	21.41	21.36	
15	16QAM	1	0	21.35	21.53	21.60	23
15	16QAM	1	37	21.29	21.48	21.62	
15	16QAM	1	74	21.31	21.65	21.47	
15	16QAM	36	0	20.30	20.53	20.50	22
15	16QAM	36	20	20.58	20.30	20.45	
15	16QAM	36	39	20.55	20.52	20.39	
15	16QAM	75	0	20.52	20.35	20.48	
15	64QAM	1	0	20.33	20.58	20.79	22
15	64QAM	1	37	20.44	20.59	20.89	
15	64QAM	1	74	20.45	20.62	20.42	
15	64QAM	36	0	19.38	19.54	19.47	21
15	64QAM	36	20	19.43	19.48	19.54	
15	64QAM	36	39	19.54	19.55	19.36	
15	64QAM	75	0	19.51	19.54	19.49	
15	256QAM	1	0	17.40	17.48	17.73	19
15	256QAM	1	37	17.52	17.73	17.70	
15	256QAM	1	74	17.50	17.78	17.60	
15	256QAM	36	0	17.43	17.43	17.36	19
15	256QAM	36	20	17.41	17.47	17.56	
15	256QAM	36	39	17.52	17.56	17.63	
15	256QAM	75	0	17.45	17.43	17.49	

Channel				132022	132322	132622	Tune-up limit (dBm)
Frequency (MHz)				1715	1745	1775	
10	QPSK	1	0	23.11	23.22	23.13	24
10	QPSK	1	25	22.30	22.64	22.37	
10	QPSK	1	49	22.34	22.41	22.27	
10	QPSK	25	0	21.39	21.34	21.55	23
10	QPSK	25	12	21.46	21.34	21.50	
10	QPSK	25	25	21.57	21.40	21.38	
10	QPSK	50	0	21.38	21.35	21.47	
10	16QAM	1	0	21.27	21.55	21.57	23
10	16QAM	1	25	21.28	21.54	21.46	
10	16QAM	1	49	21.38	21.54	21.47	
10	16QAM	25	0	20.39	20.55	20.48	22
10	16QAM	25	12	20.40	20.40	20.48	
10	16QAM	25	25	20.53	20.37	20.44	
10	16QAM	50	0	20.37	20.38	20.38	
10	64QAM	1	0	20.40	20.67	20.77	22
10	64QAM	1	25	20.50	20.60	20.92	
10	64QAM	1	49	20.55	20.49	20.47	
10	64QAM	25	0	19.39	19.45	19.51	21
10	64QAM	25	12	19.52	19.55	19.64	
10	64QAM	25	25	19.62	19.36	19.49	
10	64QAM	50	0	19.54	19.45	19.36	
10	256QAM	1	0	17.52	17.52	17.67	19
10	256QAM	1	25	17.61	17.68	17.71	
10	256QAM	1	49	17.63	17.64	17.64	
10	256QAM	25	0	17.39	17.39	17.41	19
10	256QAM	25	12	17.49	17.60	17.51	
10	256QAM	25	25	17.45	17.65	17.66	
10	256QAM	50	0	17.37	17.45	17.49	
Channel				131997	132322	132647	Tune-up limit (dBm)
Frequency (MHz)				1712.5	1745	1777.5	
5	QPSK	1	0	23.03	23.22	23.20	24
5	QPSK	1	12	22.23	22.55	22.50	
5	QPSK	1	24	22.45	22.38	22.31	
5	QPSK	12	0	21.42	21.46	21.43	23
5	QPSK	12	7	21.45	21.36	21.58	
5	QPSK	12	13	21.46	21.42	21.46	
5	QPSK	25	0	21.47	21.37	21.36	
5	16QAM	1	0	21.40	21.61	21.66	23
5	16QAM	1	12	21.26	21.46	21.51	
5	16QAM	1	24	21.46	21.54	21.65	
5	16QAM	12	0	20.43	20.56	20.60	22
5	16QAM	12	7	20.52	20.34	20.46	
5	16QAM	12	13	20.54	20.51	20.40	
5	16QAM	25	0	20.42	20.45	20.43	
5	64QAM	1	0	20.33	20.66	20.72	22
5	64QAM	1	12	20.41	20.73	20.91	
5	64QAM	1	24	20.51	20.52	20.42	
5	64QAM	12	0	19.50	19.59	19.38	21
5	64QAM	12	7	19.51	19.43	19.51	
5	64QAM	12	13	19.59	19.49	19.46	
5	64QAM	25	0	19.37	19.47	19.51	
5	256QAM	1	0	17.40	17.52	17.61	19
5	256QAM	1	12	17.51	17.75	17.66	
5	256QAM	1	24	17.53	17.66	17.64	
5	256QAM	12	0	17.41	17.47	17.49	19
5	256QAM	12	7	17.43	17.50	17.62	
5	256QAM	12	13	17.60	17.65	17.62	
5	256QAM	25	0	17.34	17.39	17.57	
Channel				131987	132322	132657	Tune-up limit (dBm)
Frequency (MHz)				1711.5	1745	1778.5	
3	QPSK	1	0	23.02	23.10	23.12	24
3	QPSK	1	8	22.38	22.72	22.46	

3	QPSK	1	14	22.48	22.55	22.24	
3	QPSK	8	0	21.29	21.43	21.38	23
3	QPSK	8	4	21.50	21.36	21.55	
3	QPSK	8	7	21.57	21.49	21.36	
3	QPSK	15	0	21.50	21.52	21.43	
3	16QAM	1	0	21.25	21.57	21.60	23
3	16QAM	1	8	21.31	21.60	21.46	
3	16QAM	1	14	21.31	21.65	21.54	
3	16QAM	8	0	20.42	20.42	20.46	22
3	16QAM	8	4	20.54	20.34	20.54	
3	16QAM	8	7	20.55	20.52	20.48	
3	16QAM	15	0	20.45	20.46	20.35	
3	64QAM	1	0	20.45	20.61	20.63	22
3	64QAM	1	8	20.52	20.64	20.88	
3	64QAM	1	14	20.47	20.53	20.39	
3	64QAM	8	0	19.35	19.53	19.37	21
3	64QAM	8	4	19.53	19.47	19.46	
3	64QAM	8	7	19.61	19.36	19.42	
3	64QAM	15	0	19.45	19.38	19.33	
3	256QAM	1	0	17.55	17.59	17.59	19
3	256QAM	1	8	17.43	17.61	17.63	
3	256QAM	1	14	17.52	17.77	17.54	
3	256QAM	8	0	17.45	17.43	17.38	19
3	256QAM	8	4	17.37	17.43	17.45	
3	256QAM	8	7	17.57	17.59	17.61	
3	256QAM	15	0	17.32	17.50	17.45	
Channel				131979	132322	132665	Tune-up limit (dBm)
Frequency (MHz)				1710.7	1745	1779.3	
1.4	QPSK	1	0	23.14	23.15	23.15	24
1.4	QPSK	1	3	22.27	22.64	22.42	
1.4	QPSK	1	5	22.32	22.42	22.29	
1.4	QPSK	3	0	23.12	23.09	23.09	
1.4	QPSK	3	1	22.20	22.64	22.44	
1.4	QPSK	3	3	22.47	22.38	22.24	
1.4	QPSK	6	0	21.29	21.35	21.48	23
1.4	16QAM	1	0	21.49	21.42	21.50	23
1.4	16QAM	1	3	21.58	21.54	21.52	
1.4	16QAM	1	5	21.36	21.33	21.36	
1.4	16QAM	3	0	21.36	21.35	21.49	
1.4	16QAM	3	1	21.49	21.47	21.52	
1.4	16QAM	3	3	21.43	21.45	21.39	
1.4	16QAM	6	0	21.28	21.55	21.75	22
1.4	64QAM	1	0	21.33	21.57	21.61	22
1.4	64QAM	1	3	21.29	21.47	21.57	
1.4	64QAM	1	5	21.50	21.51	21.62	
1.4	64QAM	3	0	21.35	21.58	21.68	
1.4	64QAM	3	1	21.31	21.62	21.48	
1.4	64QAM	3	3	21.41	21.56	21.52	
1.4	64QAM	6	0	20.38	20.43	20.62	21
1.4	256QAM	1	0	19.43	19.31	19.45	19
1.4	256QAM	1	3	19.48	19.48	19.45	
1.4	256QAM	1	5	19.50	19.40	19.40	
1.4	256QAM	3	0	19.48	19.30	19.47	
1.4	256QAM	3	1	19.33	19.50	19.46	
1.4	256QAM	3	3	19.36	19.39	19.42	
1.4	256QAM	6	0	17.50	17.54	17.62	19

<LTE Carrier Aggregation combinations>

General Note:

1. This device supports Carrier Aggregation on downlink only for inter and intra band. For the device supports combination bands and configurations are according to 3GPP.
2. In applying the existing power measurement procedure of KDB 941225 D05A for DL CA SAR test exclusion, only the subset with the largest number of combinations of the frequency band and CCs in each row need consideration, and that configurations require power measurement should be highlighted in the below table.

2 CC			3 CC			4 CC		
Number	Combination	Covered by Measurement Superset	Number	Combination	Covered by Measurement Superset	Number	Combination	Covered by Measurement Superset
1	CA_2A-2A	38	38	CA_2A-2A-5A	162	127	CA_2A-46D	232
2	CA_2A-5A	38	39	CA_2A-2A-12A	164	128	CA_2A-2A-66A-66A	144
3	CA_2A-12A	39	40	CA_2A-2A-14A	166	129	CA_2A-66A-2A-66A	144
4	CA_2A-14A	40	41	CA_2A-2A-30A	166	130	CA_2A-2A-66C	144
5	CA_2A-29A	91	42	CA_2A-2A-46A	145	131	CA_2C-66A-66A	144
6	CA_2A-30A	91	43	CA_2A-2A-66A	128	132	CA_4A-46A-46C	132
7	CA_2A-46A	47	44	CA_2A-2A-71A	144	133	CA_4A-46D	
8	CA_2A-66A	43	45	CA_2A-4A-4A	142	134	CA_5B-66A-66A	239
9	CA_5B	46	46	CA_2A-5B	146	135	CA_25A-41D	
10	CA_5A-2A	53	47	CA_2A-46C	127	136	CA_46A-46C-66A	237
11	CA_5A-12A		48	CA_2A-48A-48A	214	137	CA_48D-66A	238
12	CA_5A-30A	54	49	CA_2A-48C	214	138	CA_66A-2A-2A-66A	239
13	CA_5A-66A	55	50	CA_4A-4A-12A	142	139	CA_66A-5B-66A	239
14	CA_12A-2A	63	51	CA_4A-4A-71A	143	140	CA_66A-46C-66A	237
15	CA_12A-5A	11	52	CA_5A-66B	101	141	CA_66A-46D	237
16	CA_12A-30A	103	53	CA_5B-2A	85	142	CA_2A-2A-4A-12A	
17	CA_12A-66A	104	54	CA_5B-30A	84	143	CA_2A-2A-4A-71A	
18	CA_14A-2A	89	55	CA_5B-66A	85	144	CA_2A-2A-66A-71A	153
19	CA_14A-30A	89	56	CA_30A-5B	84	145	CA_2A-2A-46C	232
20	CA_14A-66A	90	57	CA_66A-5B	85	146	CA_2A-5B-30A	239
21	CA_25A-25A	135	58	CA_66A-46C	93	147	CA_2A-5B-66A	240
22	CA_30A-2A	112	59	CA_2A-66A-2A	85	148	CA_2A-12A-66C	240
23	CA_30A-5A	110	60	CA_2A-66A-66A	85	149	CA_2A-46A-46A-66A	248
24	CA_30A-12A	111	61	CA_5A-2A-2A	82	150	CA_2A-46C-66A	248
25	CA_30A-14A	112	62	CA_5A-66A-66A	85	151	CA_2A-66A-46C	248
26	CA_30A-29A	113	63	CA_12A-2A-2A	86	152	CA_2A-66A-66A-71A	153
27	CA_30A-66A	115	64	CA_12A-66A-66A	88	153	CA_2A-66C-71A	
28	CA_48A-48A	72	65	CA_13A-46A-46A		154	CA_5B-2A-30A	239
29	CA_66A-2A	73	66	CA_13A-66C	216	155	CA_5B-2A-66A	239
30	CA_66A-5A	57	67	CA_13A-66C	216	156	CA_5B-30A-66A	239
31	CA_66A-12A	75	68	CA_14A-2A-2A	89	157	CA_30A-2A-5B	239
32	CA_66A-14A	76	69	CA_14A-66A-66A	90	158	CA_30A-5B-66A	239
33	CA_66A-30A	77	70	CA_30A-2A-2A	84	159	CA_66A-2A-5B	239
34	CA_66A-46A	78	71	CA_30A-66A-66A	92	160	CA_66A-2A-46C	248
35	CA_66A-66A	52	72	CA_48A-48A-66A	94	161	CA_66A-5B-30A	239
36	CA_66B	52	73	CA_66A-2A-2A	85	162	CA_2A-2A-5A-30A	243
37	CA_66C	52	74	CA_66A-2A-66A	85	163	CA_2A-2A-5A-66A	239
			75	CA_66A-12A-66A	88	164	CA_2A-2A-12A-30A	240
			76	CA_66A-14A-66A	89	165	CA_2A-2A-12A-66A	240
			77	CA_66A-30A-66A	92	166	CA_2A-2A-14A-30A	241
			78	CA_66A-46A-66A	93	167	CA_2A-2A-14A-66A	241
			79	CA_66A-66A-71A	99	168	CA_2A-2A-30A-66A	239
			80	CA_48D	238	169	CA_2A-5A-66A-66A	239
			81	CA_41A-41C	135	170	CA_2A-12A-2A-30A	240
			82	CA_2A-4A-5A		171	CA_2A-12A-2A-66A	240

			83	CA_2A-4A-71A	143	172	CA_2A-12A-30A-66A	240
			84	CA_2A-5A-30A	162	173	CA_2A-12A-66A-66A	240
			85	CA_2A-5A-66A	183	174	CA_2A-14A-66A-66A	241
			86	CA_2A-12A-2A	164	175	CA_2A-30A-66A-66A	239
			87	CA_2A-12A-30A	164	176	CA_2A-66A-2A-5A	239
			88	CA_2A-12A-66A	165	177	CA_2A-66A-2A-12A	240
			89	CA_2A-14A-30A	166	178	CA_2A-66A-2A-30A	239
			90	CA_2A-14A-66A	167	179	CA_2A-66A-5A-66A	239
			91	CA_2A-29A-30A		180	CA_2A-66A-12A-66A	240
			92	CA_2A-30A-66A	168	181	CA_2A-66A-30A-66A	239
			93	CA_2A-46A-66A	149	182	CA_5A-2A-2A-30A	239
			94	CA_2A-48A-66A	248	183	CA_5A-2A-2A-66A	239
			95	CA_2A-66A-5A	147	184	CA_5A-2A-66A-66A	239
			96	CA_2A-66A-12A	148	185	CA_5A-30A-66A-66A	239
			97	CA_2A-66A-30A	169	186	CA_12A-2A-2A-30A	240
			98	CA_2A-66A-46A	149	187	CA_12A-2A-2A-66A	240
			99	CA_2A-66A-71A	144	188	CA_12A-2A-66A-66A	240
			100	CA_5A-2A-30A	146	189	CA_12A-30A-66A-66A	240
			101	CA_5A-2A-66A	147	190	CA_14A-2A-2A-30A	241
			102	CA_5A-30A-66A	156	191	CA_14A-2A-2A-66A	241
			103	CA_12A-2A-30A	164	192	CA_14A-2A-66A-66A	241
			104	CA_12A-2A-66A	148	193	CA_14A-30A-66A-66A	241
			105	CA_12A-30A-66A	172	194	CA_30A-2A-2A-5A	239
			106	CA_12A-66A-66A	172	195	CA_30A-2A-2A-12A	240
			107	CA_14A-2A-30A	166	196	CA_30A-2A-2A-14A	241
			108	CA_14A-2A-66A	174	197	CA_30A-2A-2A-66A	239
			109	CA_14A-30A-66A	193	198	CA_30A-2A-66A-66A	239
			110	CA_30A-2A-5A	162	199	CA_30A-5A-66A-66A	239
			111	CA_30A-2A-12A	164	200	CA_30A-12A-66A-66A	240
			112	CA_30A-2A-14A	166	201	CA_30A-14A-66A-66A	241
			113	CA_30A-2A-29A	91	202	CA_46C-48A-66A	248
			114	CA_30A-2A-66A	181	203	CA_66A-2A-2A-5A	239
			115	CA_30A-5A-66A	185	204	CA_66A-2A-2A-12A	240
			116	CA_30A-12A-66A	189	205	CA_66A-2A-2A-14A	241
			117	CA_30A-14A-66A	193	206	CA_66A-2A-2A-30A	239
			118	CA_66A-2A-5A	155	207	CA_66A-2A-5A-66A	239
			119	CA_66A-2A-12A	171	208	CA_66A-2A-12A-66A	240
			120	CA_66A-2A-14A	191	209	CA_66A-2A-14A-66A	241
			121	CA_66A-2A-30A	172	210	CA_66A-2A-30A-66A	239
			122	CA_66A-2A-46A	248	211	CA_66A-5A-30A-66A	239
			123	CA_66A-5A-30A	211	212	CA_66A-12A-30A-66A	240
			124	CA_66A-5A-66A	211	213	CA_66A-14A-30A-66A	241
			125	CA_66A-12A-30A	212	214	CA_2A-5A-48C	
			126	CA_66A-14A-30A	213	215	CA_2A-13A-48C	
						216	CA_2A-13A-66B	
						217	CA_5A-48C-66A	
						218	CA_13A-48C-66A	
						219	CA_2A-5A-30A-66A	239
						220	CA_2A-14A-30A-66A	241
						221	CA_2A-66A-5A-30A	239
						222	CA_2A-66A-12A-30A	240
						223	CA_5A-2A-30A-66A	239
						224	CA_12A-2A-30A-66A	240
						225	CA_14A-2A-30A-66A	241
						226	CA_30A-2A-5A-66A	239
						227	CA_30A-2A-12A-66A	240

						228	CA_30A-2A-14A-66A	241
						229	CA_66A-2A-5A-30A	239
						230	CA_66A-2A-12A-30A	240
						231	CA_66A-2A-14A-30A	241

5 CC			6 CC			7 CC		
Number	Combination	Covered by Measurement Superset	Number	Combination	Covered by Measurement Superset	Number	Combination	Covered by Measurement Superset
232	CA_2A-2A-46D	275	274	CA_46C-48E	283	283	CA_2A-46C-48E	288
233	CA_2A-46A-46C	275	275	CA_2A-46A-48E	283	284	CA_46C-48E-66A	288
234	CA_13A-48E		276	CA_2A-46A-48E	283	285	CA_46E-48C-66A	288
235	CA_46C-48D	274	277	CA_2A-46E-48A	283	286	CA_2A-46C-48D-66A	288
236	CA_46D-48C	274	278	CA_2A-48E-66A	286	287	CA_2A-46D-48C-66A	288
237	CA_46D-66A-66A	279	279	CA_46C-48D-66A	286	288	CA_2A-46E-48A-66A	
238	CA_48E-66A	279	280	CA_2A-46A-48D-66A	286			
239	CA_2A-2A-5A-30A-66A		281	CA_2A-46C-48C-66A	286			
240	CA_2A-2A-12A-30A-66A		282	CA_2A-46D-48A-66A	286			
241	CA_2A-2A-14A-30A-66A							
242	CA_2A-5A-30A-66A-66A	239						
243	CA_2A-5B-30A-66A	239						
244	CA_2A-5B-66A-66A	239						
245	CA_2A-12A-2A-30A-66A	240						
246	CA_2A-12A-30A-66A-66A	240						
247	CA_2A-14A-30A-66A-66A	241						
248	CA_2A-46A-48C-66A	275						
249	CA_2A-46C-48A-66A	280						
250	CA_2A-66A-2A-5A-30A	239						
251	CA_2A-66A-2A-12A-30A	240						
252	CA_2A-66A-12A-30A-66A	240						
253	CA_5A-2A-2A-30A-66A	239						
254	CA_5A-2A-30A-66A-66A	239						
255	CA_5B-2A-30A-66A	239						
256	CA_12A-2A-2A-30A-66A	240						
257	CA_12A-2A-30A-66A-66A	240						
258	CA_14A-2A-2A-30A-66A	241						
259	CA_14A-2A-30A-66A-66A	241						
260	CA_30A-2A-2A-5A-66A	239						
261	CA_30A-2A-2A-12A-66A	240						
262	CA_30A-2A-2A-14A-66A	241						
263	CA_30A-2A-5A-66A-66A	239						
264	CA_30A-2A-5B-66A	239						
265	CA_30A-2A-12A-66A-66A	240						
266	CA_30A-2A-14A-66A-66A	241						
267	CA_66A-2A-2A-5A-30A	239						
268	CA_66A-2A-2A-12A-30A	240						
269	CA_66A-2A-2A-14A-30A	241						
270	CA_66A-2A-5A-30A-66A	239						
271	CA_66A-2A-5B-30A	239						
272	CA_66A-2A-12A-30A-66A	240						
273	CA_66A-2A-14A-30A-66A	241						

<Power verification when LTE Carrier Aggregation Active>

General Note:

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

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

iii. The device supports downlink two carrier aggregation. For power measurement were control and acknowledge data is sent on uplink channels that operate identical to specifications when downlink carrier aggregation is inactive.

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

v. For non-contiguous intra-band CA, the SCC selected to provide maximum separation from the PCC and must remain fully within the downlink transmission band.

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

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

<Two Carrier power verification>

Configure	PCC							SCC				Power	
	LTE Band	BW (MHz)	UL Freq. (MHz)	UL Channel	Mod.	UL# RB	UL RB Offset	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	With CA Tx.Power (dBm)	W/O CA Tx.Power (dBm)
Inter-Band	5	10	836.5	20525	QPSK	1	0	12	10	737.5	5095	22.58	22.66

<Three Carrier power verification>

Configure	PCC							SCC1				SCC2				Power	
	LTE Band	BW (MHz)	UL Freq. (MHz)	UL Channel	Mod.	UL# RB	UL RB Offset	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	With CA Tx.Power (dBm)	W/O CA Tx.Power (dBm)
Inter-Band	13	10	782	23230	QPSK	1	0	46	20	5537.5	50665	46	20	5925	54539	22.43	22.46
	2	20	1900	19100	QPSK	1	0	4	20	2132.5	2175	5	20	881.5	2525	22.35	23.37
	2	20	1900	19100	QPSK	1	0	29	10	722.5	9715	30	10	2355	9820	22.34	23.37

<Four Carrier power verification>

Configure	PCC							SCC1				SCC2				SCC3				Power	
	LTE Band	BW (MHz)	UL Freq. (MHz)	UL Channel	Mod.	UL# RB	UL RB Offset	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	With CA Tx.Power (dBm)	W/O CA Tx.Power (dBm)
Inter-Band	4	20	1745	20300	QPSK	1	0	46	20	5537.5	50665	46	20	5557.3	50863	46	20	5577.1	51061	22.09	22.14
	25	20	1905	26590	QPSK	1	0	41	20	2593	40620	41	20	2636.5	41055	41	20	2549.5	40185	22.99	23.01
	2	20	1900	19100	QPSK	1	0	2	20	900	1960	4	20	2132.5	2175	12	10	737.5	5095	23.31	23.37
	2	20	1900	19100	QPSK	1	0	2	20	900	1960	4	20	2132.5	2175	71	20	634.5	68761	23.32	23.37
	2	20	1900	19100	QPSK	1	0	66	20	2155	66886	66	20	2174.8	67084	71	20	634.5	68761	23.36	23.37
	2	20	1880	18900	QPSK	1	0	5	20	881.5	2525	48	20	3690	55990	48	20	3709.8	56188	23.33	23.37
	2	20	1880	18900	QPSK	1	0	13	10	751	5230	48	20	3690	55990	48	20	3709.8	56188	23.31	23.37
	2	20	1880	18900	QPSK	1	0	13	10	751	5230	66	15	2155	66886	66	5	2164.3	66979	23.35	23.37
	5	10	836.5	20525	QPSK	1	0	48	20	3690	55990	48	20	3709.8	56188	66	15	2155	66886	22.58	22.66
	13	10	782	23230	QPSK	1	0	48	20	3690	55990	48	20	3709.8	56188	66	15	2155	66886	22.44	22.46

<Five Carrier power verification>

Configure	PCC							SCC1				SCC2				SCC3				SCC4				Power	
	LTE Band	BW (MHz)	UL Freq. (MHz)	UL Channel	Mod.	UL# RB	UL RB Offset	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	With CA Tx.Power (dBm)	W/O CA Tx.Power (dBm)
Inter-Band	13	10	782	23230	QPSK	1	0	48	20	3690	55990	48	20	3709.8	56188	48	20	3729.6	56386	48	20	3749.4	56584	22.41	22.46
	2	20	1900	19100	QPSK	1	0	2	20	900	1960	5	20	881.5	2525	30	10	2355	9820	66	15	2155	66886	22.29	23.37
	2	20	1900	19100	QPSK	1	0	2	20	900	1960	12	10	737.5	5095	30	10	2355	9820	66	15	2155	66886	22.28	23.37
	2	20	1900	19100	QPSK	1	0	2	20	900	1960	14	10	763	5330	30	10	2355	9820	66	15	2155	66886	22.29	23.37

<Seven Carrier power verification>

Configure	PCC							SCC1				SCC2				SCC3				SCC4				SCC5				SCC6				Power	
	LTE Band	BW (MHz)	UL Freq. (MHz)	UL Channel	Mod.	UL# RB	UL RB Offset	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	With CA Tx.Power (dBm)	W/O CA Tx.Power (dBm)
Inter-Band	2	20	1880	18900	QPSK	1	0	46	20	5537.5	50665	46	20	5557.3	50863	46	20	5577.1	51061	46	20	5596.9	51259	48	20	3709.8	56188	66	15	2155	66886	23.21	23.37

15. 5G NR Output Power (Unit: dBm)

General Note:

1. Referencing the procedure in KDB 941225, the test procedures are outlined as below
   a. For DFT-OFDM output power measurement, full measurement was done for Pi/2 BPSK and QPSK and for the largest supported bandwidth, repeat test for 16QAM/64QAM/256QAM under 1RB 1Offset configuration. For smaller bandwidth, measure conducted power for Pi/2 BPSK and 1RB 1Offset configuration.
   b. According to the tune-up, CP-OFDM output power is not ½ dB higher than DFT-OFDM mode, and the reported SAR of DFT-OFDM mode reported SAR is ≤ 1.45 W/kg, SAR test and thus conducted power for CP-OFDM mode is not required.
   c. To start SAR test for the largest channel bandwidth for PI/2 BPSK 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. Also do SAR test for 50% RB allocation for PI/2 BPSK SAR testing using 1RB PI/2 BPSK allocation procedure
   d. For PI/2 BPSK with 100% RB allocation, SAR test is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
   e. For higher modulation QPSK/16QAM/64QAM/256QAM, according to tune-up document the power level is not ½ dB higher than the same configuration in PI/2 BPSK, also reported SAR for the PI/2 BPSK configuration is less than 1.45 W/kg, QPSK/16QAM/64QAM/256QAM SAR testing are not required.
   f. Smaller bandwidth output power for each RB allocation configuration for this device is not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg, smaller bandwidth SAR testing is not required for this device
2. Due to test setup limitations, SAR testing for NR was performed using Factory Test Mode software to establish the connection and perform SAR with 100% transmission.
3. Ant 5 and Ant 6 dedicated is used for SRS only, different from Tx antennas, then the SAR measurement at Plimit for SRS dedicated antenna(s) can be performed using FTM mode with CW modulation with 100% duty cycle(as SRS operates at very low duty cycle in online mode).

<3GPP 38.101 MPR for EN-DC>

Table 6.2.2-1 Maximum power reduction (MPR) for power class 3

Modulation		MPR (dB)		
		Edge RB allocations	Outer RB allocations	Inner RB allocations
DFT-s-OFDM	Pi/2 BPSK	≤ 3.5[1]	≤ 1.2[1]	≤ 0.2[1]
		≤ 0.5[2]	≤ 0.5[2]	0[2]
	QPSK	≤ 1		0
	16 QAM	≤ 2		≤ 1
	64 QAM	≤ 2.5		
	256 QAM	≤ 4.5		
CP-OFDM	QPSK	≤ 3		≤ 1.5
	16 QAM	≤ 3		≤ 2
	64 QAM	≤ 3.5		
	256 QAM	≤ 6.5		

NOTE 1: Applicable for UE operating in TDD mode with Pi/2 BPSK modulation and UE indicates support for UE capability *powerBoosting-pi2BPSK* and if the IE *powerBoostPi2BPSK* is set to 1 and 40 % or less slots in radio frame are used for UL transmission for bands n40, n41, n77, n78 and n79. The reference power of 0 dB MPR is 26 dBm.

NOTE 2: Applicable for UE operating in FDD mode, or in TDD mode in bands other than n40, n41, n77, n78 and n79 with Pi/2 BPSK modulation and if the IE *powerBoostPi2BPSK* is set to 0 and if more than 40 % of slots in radio frame are used for UL transmission for bands n40, n41, n77, n78 and n79.

Table 6.2.2-2 Maximum power reduction (MPR) for power class 2

Modulation		MPR (dB)		
		Edge RB allocations	Outer RB allocations	Inner RB allocations
DFT-s-OFDM	Pi/2 BPSK	≤ 3.5	≤ 0.5	0
	QPSK	≤ 3.5	≤ 1	0
	16 QAM	≤ 3.5	≤ 2	≤ 1
	64 QAM	≤ 3.5	≤ 2.5	
	256 QAM	≤ 4.5		
CP-OFDM	QPSK	≤ 3.5	≤ 3	≤ 1.5
	16 QAM	≤ 3.5	≤ 3	≤ 2
	64 QAM	≤ 3.5		
	256 QAM	≤ 6.5		

<n71_Ant 1>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				134600	136100	137600	
Frequency (MHz)				673	680.5	688	
20	PI/2 BPSK	1	1	23.13	23.15	23.29	24.0
20	PI/2 BPSK	1	53	23.13	23.13	23.21	
20	PI/2 BPSK	1	104	23.07	23.15	23.10	
20	PI/2 BPSK	50	0	22.59	22.61	22.87	23.5
20	PI/2 BPSK	50	28	23.26	23.30	23.21	24.0
20	PI/2 BPSK	50	56	22.60	22.58	22.93	23.5
20	PI/2 BPSK	100	0	22.57	22.66	22.80	
20	QPSK	1	1	23.09	23.07	23.26	24.0
20	QPSK	1	53	23.24	23.14	23.25	
20	QPSK	1	104	23.20	23.14	23.23	
20	QPSK	50	0	22.14	22.24	22.22	23.0
20	QPSK	50	28	23.10	23.12	23.22	24.0
20	QPSK	50	56	22.17	22.23	22.38	23.0
20	QPSK	100	0	22.26	22.24	22.41	
20	16QAM	1	1	22.43	22.35	22.35	23.0
20	64QAM	1	1	20.90	20.69	20.84	21.5
20	256QAM	1	1	18.64	18.55	18.58	19.5
Channel				134100	136100	138100	Tune-up limit (dBm)
Frequency (MHz)				670.5	680.5	690.5	
15	PI/2 BPSK	1	1	23.24	23.01	23.27	24.0
Channel				133600	136100	138600	Tune-up limit (dBm)
Frequency (MHz)				668	680.5	693	
10	PI/2 BPSK	1	1	23.20	23.20	23.21	24.0
Channel				133100	136100	139100	Tune-up limit (dBm)
Frequency (MHz)				665.5	680.5	695.5	
5	PI/2 BPSK	1	1	23.17	23.12	23.20	24.0

<n77 (3700MHz ~3980 MHz)_Ant 1>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				650000	656000	662000	
Frequency (MHz)				3750	3840	3930	
100	PI/2 BPSK	1	1	19.93	19.68	19.84	
100	PI/2 BPSK	1	137	19.76	19.83	19.92	20.4
100	PI/2 BPSK	1	271	19.64	19.66	19.85	
100	PI/2 BPSK	135	0	19.21	19.32	19.40	19.9
100	PI/2 BPSK	135	69	19.89	19.68	19.78	20.4
100	PI/2 BPSK	135	138	19.21	19.31	19.39	19.9
100	PI/2 BPSK	270	0	19.27	19.32	19.35	
100	QPSK	1	1	19.87	19.87	19.91	
100	QPSK	1	137	19.88	19.92	19.76	20.4
100	QPSK	1	271	19.81	19.68	19.65	
100	QPSK	135	0	19.82	19.91	19.88	
100	QPSK	135	69	19.85	19.86	19.76	20.4
100	QPSK	135	138	19.90	19.88	19.91	
100	QPSK	270	0	18.95	18.91	18.66	19.4
100	16QAM	1	1	18.85	19.02	18.92	19.4
100	64QAM	1	1	17.22	17.32	17.18	17.9
100	256QAM	1	1	15.30	15.46	15.38	15.9
Channel				649668	656000	662332	Tune-up limit (dBm)
Frequency (MHz)				3745.02	3840	3934.98	
90	PI/2 BPSK	1	1	19.85	19.67	19.77	20.4
Channel				649334	656000	662666	Tune-up limit (dBm)
Frequency (MHz)				3740.01	3840	3939.99	
80	PI/2 BPSK	1	1	19.89	19.48	19.75	20.4
Channel				649000	656000	663000	Tune-up limit (dBm)
Frequency (MHz)				3735	3840	3945	
70	PI/2 BPSK	1	1	19.82	19.56	19.70	20.4
Channel				648668	656000	663332	Tune-up limit (dBm)
Frequency (MHz)				3730.02	3840	3949.98	
60	PI/2 BPSK	1	1	19.86	19.49	19.65	20.4
Channel				648334	656000	663666	Tune-up limit (dBm)
Frequency (MHz)				3725.01	3840	3954.99	
50	PI/2 BPSK	1	1	19.85	19.66	19.78	20.4
Channel				648000	656000	664000	Tune-up limit (dBm)
Frequency (MHz)				3720	3840	3960	
40	PI/2 BPSK	1	1	19.80	19.60	19.69	20.4
Channel				647668	656000	664332	Tune-up limit (dBm)
Frequency (MHz)				3715.02	3840.00	3964.98	
30	PI/2 BPSK	1	1	19.85	19.63	19.67	20.4
Channel				647500	656000	664500	Tune-up limit (dBm)
Frequency (MHz)				3712.5	3840.00	3967.50	
25	PI/2 BPSK	1	1	19.88	19.64	19.84	20.4
Channel				647334	656000	664666	Tune-up limit (dBm)
Frequency (MHz)				3710.01	3840	3969.99	
20	PI/2 BPSK	1	1	19.91	19.56	19.82	20.4
Channel				647168	656000	664832	Tune-up limit (dBm)
Frequency (MHz)				3707.52	3840	3972.48	
15	PI/2 BPSK	1	1	19.81	19.56	19.75	20.4
Channel				647000	656000	665000	Tune-up limit (dBm)
Frequency (MHz)				3705	3840	3975	
10	PI/2 BPSK	1	1	19.73	19.55	19.67	20.4

<n77 (3450MHz ~3550 MHz)_Ant 1>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel					633332		
Frequency (MHz)					3499.98		
100	PI/2 BPSK	1	1		20.21		20.4
100	PI/2 BPSK	1	137		20.13		
100	PI/2 BPSK	1	271		20.03		
100	PI/2 BPSK	135	0		19.56		19.9
100	PI/2 BPSK	135	69		20.08		20.4
100	PI/2 BPSK	135	138		19.49		19.9
100	PI/2 BPSK	270	0		19.60		
100	QPSK	1	1		20.03		20.4
100	QPSK	1	137		20.08		
100	QPSK	1	271		19.98		
100	QPSK	135	0		19.14		20.4
100	QPSK	135	69		20.01		
100	QPSK	135	138		19.03		
100	QPSK	270	0		19.13		19.4
100	16QAM	1	1		19.24		19.4
100	64QAM	1	1		17.39		17.9
100	256QAM	1	1		15.65		15.9
Channel				633000	633332	633666	Tune-up limit (dBm)
Frequency (MHz)				3495	3499.98	3504.99	
90	PI/2 BPSK	1	1	20.09	20.14	20.15	20.4
Channel				632668	633332	634000	Tune-up limit (dBm)
Frequency (MHz)				3490.02	3499.98	3510	
80	PI/2 BPSK	1	1	19.99	20.01	20.13	20.4
Channel				632334	633332	634332	Tune-up limit (dBm)
Frequency (MHz)				3485.01	3499.98	3514.98	
70	PI/2 BPSK	1	1	19.97	20.02	20.10	20.4
Channel				632000	633332	634666	Tune-up limit (dBm)
Frequency (MHz)				3480	3499.98	3519.99	
60	PI/2 BPSK	1	1	20.01	20.11	20.03	20.4
Channel				631668	633332	635000	Tune-up limit (dBm)
Frequency (MHz)				3475.02	3499.98	3525	
50	PI/2 BPSK	1	1	20.07	20.02	20.11	20.4
Channel				631334	633332	635332	Tune-up limit (dBm)
Frequency (MHz)				3470.01	3499.98	3529.98	
40	PI/2 BPSK	1	1	19.98	20.17	20.01	20.4
Channel				631000	633332	635666	Tune-up limit (dBm)
Frequency (MHz)				3465	3499.98	3534.99	
30	PI/2 BPSK	1	1	20.01	20.16	20.14	20.4
Channel				630834	633332	635832	Tune-up limit (dBm)
Frequency (MHz)				3462.51	3499.98	3537.48	
25	PI/2 BPSK	1	1	20.03	20.09	20.02	20.4
Channel				630668	633332	636000	Tune-up limit (dBm)
Frequency (MHz)				3460.02	3499.98	3540	
20	PI/2 BPSK	1	1	20.13	20.15	20.12	20.4
Channel				630500	633332	636166	Tune-up limit (dBm)
Frequency (MHz)				3457.5	3499.98	3542.49	
15	PI/2 BPSK	1	1	19.99	20.07	20.13	20.4
Channel				630334	633332	636332	Tune-up limit (dBm)
Frequency (MHz)				3455.01	3499.98	3544.98	
10	PI/2 BPSK	1	1	20.09	20.02	20.04	20.4

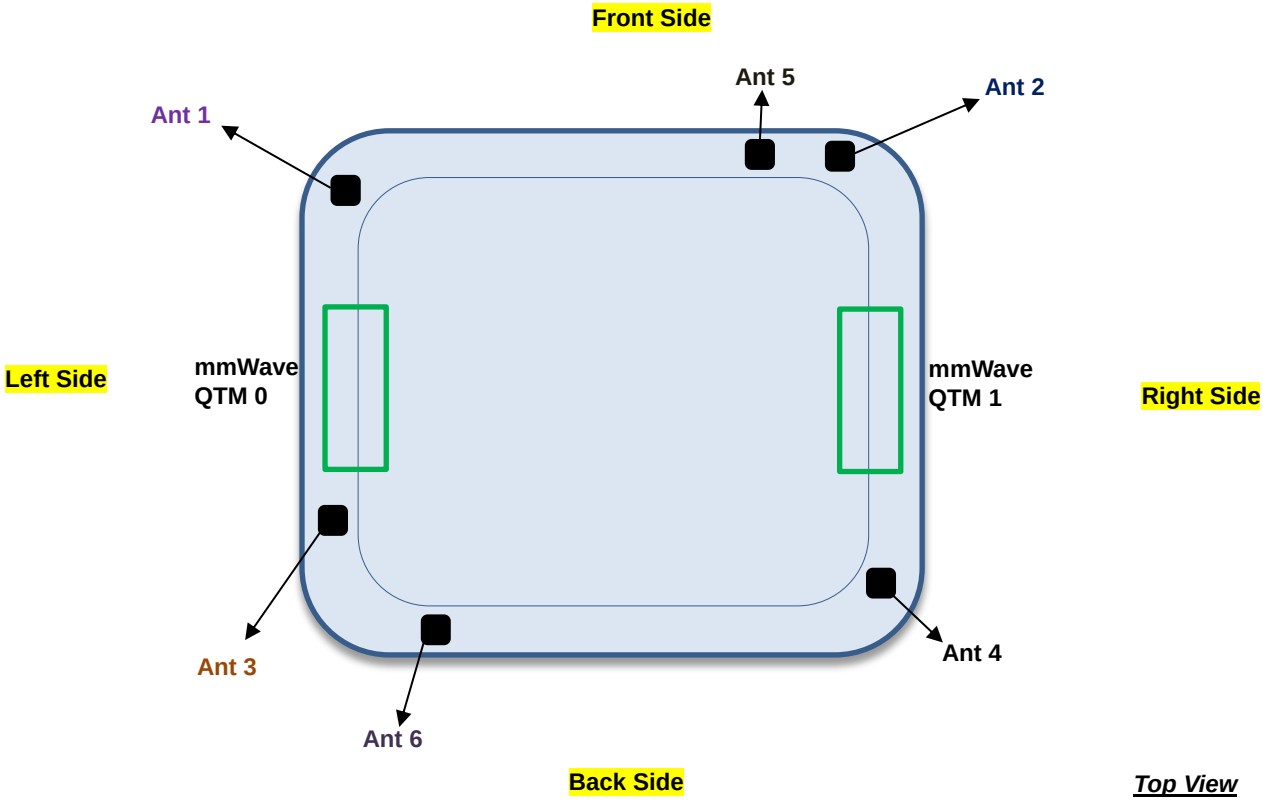
<n77 (3700MHz ~3980 MHz)_Ant 6>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				650000	656000	662000	
Frequency (MHz)				3750	3840	3930	
-	CW	-	-	18.05	18.13	18.21	18.8

<n77 (3450MHz ~3550 MHz)_Ant 6>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel					633332		
Frequency (MHz)					3499.98		
-	CW	-	-		18.23		18.8

16. Antenna Location



Antenna	Support Band-SA mode
Ant 1	Ant. Tx: LTE:5/12/13/14/26/71 FR1:5/12/14/25/48/71/77
Ant 2	Ant. Tx: LTE 2/4/7/25/30/41/48/66 FR1:2/25/30/41/48/66
Ant 3	Ant. Tx:WLAN2.4G & WLAN5G & 6E
Ant 4	Ant. Tx:WLAN2.4G & WLAN5G & 6E
Ant 5	FR1:n77(SRS only)
Ant 6	FR1:n77(SRS only)

17. Spot Check SAR Results

General Note:

1. SAR spot check verification on the worst cases from the original model was performed to demonstrate the test data from original model remains representative for the variant model.
2. If the 1-g SAR spot check result “does not exceed 30%, but larger than 1.2 W/kg”, more spot check on the next-higher exposure position until the spot check result does not exceed 1.2 W/kg.
3. The spot check results don’t show the SAR increase more than 30%, except LTE B25/30 and FR1 n2/n41/n48/n77 of Ant 2, therefore referring to the guidance in the KDB inquiry, SAR data reuse is justified.
4. For LTE B5/13/66 of Ant 1, FR1 n71 of Ant 1 and n77 of Ant 1 and 6, due to SAR increase more than 30%, full SAR result include in the report section 18.

1st as parent model

2nd as variant model

<FDD LTE SAR>

Plot No.	No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Antenna	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Deviation %
	1st	LTE Band 2_Ant 1	20M	QPSK	1	0	Top Surface	10mm	Ant 1	18900	1880	23.48	23.50	1.005	-0.11	0.899	0.903	11%
	2nd	LTE Band 2_Ant 1	20M	QPSK	1	0	Top Surface	10mm	Ant 1	18900	1880	22.36	23.50	1.300	0	0.768	0.999	
	1st	LTE Band 2_Ant 2	20M	QPSK	1	0	Top Surface	10mm	Ant 2	19100	1900	23.13	24.00	1.222	-0.19	0.956	1.168	2%
01	2nd	LTE Band 2_Ant 2	20M	QPSK	1	0	Top Surface	10mm	Ant 2	19100	1900	23.37	24.00	1.156	-0.07	1.030	1.191	
	1st	LTE Band 7_Ant 2	20M	QPSK	1	49	Right Side	10mm	Ant 2	21100	2535	22.90	22.80	1.086	-0.06	1.090	1.184	-8%
02	2nd	LTE Band 7_Ant 2	20M	QPSK	1	49	Right Side	10mm	Ant 2	21100	2535	22.41	22.80	1.094	-0.07	0.993	1.086	
	1st	LTE Band 12_Ant 1	10M	QPSK	1	25	Top Surface	10mm	Ant 1	23095	707.5	23.07	24.00	1.239	0.13	0.575	0.712	2%
03	2nd	LTE Band 12_Ant 1	10M	QPSK	1	0	Top Surface	10mm	Ant 1	23095	707.5	23.61	24.00	1.094	-0.04	0.661	0.723	
	1st	LTE Band 14_Ant 1	10M	QPSK	1	0	Top Surface	10mm	Ant 1	23330	793	23.09	24.00	1.233	-0.18	0.632	0.779	24%
04	2nd	LTE Band 14_Ant 1	10M	QPSK	1	0	Top Surface	10mm	Ant 1	23330	793.0	23.75	24.00	1.059	0.01	0.911	0.965	
	1st	LTE Band 25_Ant 2	20M	QPSK	1	0	Top Surface	10mm	Ant 2	26590	1905	22.79	24.00	1.321	0.09	0.842	1.113	16%
05	2nd	LTE Band 25_Ant 2	20M	QPSK	1	0	Top Surface	10mm	Ant 2	26590	1905	23.01	24.00	1.256	-0.03	1.030	1.294	
	1st	LTE Band 25_Ant 2	20M	QPSK	1	0	Bottom Surface	10mm	Ant 2	26140	1860	23.02	24.00	1.253	-0.18	0.634	0.794	14%
	2nd	LTE Band 25_Ant 2	20M	QPSK	1	0	Bottom Surface	10mm	Ant 2	26140	1860	23.00	24.00	1.259	-0.17	0.721	0.908	
	1st	LTE Band 26_Ant 1	15M	QPSK	1	0	Top Surface	10mm	Ant 1	26865	831.5	22.64	24.00	1.368	-0.09	0.598	0.818	28%
06	2nd	LTE Band 26_Ant 1	15M	QPSK	1	0	Top Surface	10mm	Ant 1	26865	831.5	22.78	24.00	1.324	-0.02	0.790	1.046	
	1st	LTE Band 30_Ant 2	10M	QPSK	1	0	Right Side	10mm	Ant 2	27710	2310	21.97	23.00	1.268	-0.18	1.020	1.293	0%
07	2nd	LTE Band 30_Ant 2	10M	QPSK	1	0	Right Side	10mm	Ant 2	27710	2310	22.41	23.00	1.146	-0.04	1.130	1.294	
	1st	LTE Band 30_Ant 2	10M	QPSK	1	0	Bottom Surface	10mm	Ant 2	27710	2310	21.97	23	1.268	-0.1	0.841	1.066	2%
	2nd	LTE Band 30_Ant 2	10M	QPSK	1	0	Bottom Surface	10mm	Ant 2	27710	2310	22.41	23.00	1.146	-0.11	0.948	1.086	
	1st	LTE Band 66_Ant 2	20M	QPSK	1	0	Top Surface	10mm	Ant 2	132572	1770	23.22	24.00	1.197	-0.09	0.830	0.993	20%
08	2nd	LTE Band 66_Ant 2	20M	QPSK	1	0	Top Surface	10mm	Ant 2	132572	1770	22.44	24.00	1.432	-0.07	0.830	1.189	
	1st	LTE Band 71_Ant 1	20M	QPSK	1	0	Top Surface	10mm	Ant 1	133297	680.5	22.90	24.00	1.288	0.1	0.491	0.633	26%
09	2nd	LTE Band 71_Ant 1	20M	QPSK	1	0	Top Surface	10mm	Ant 1	133297	680.5	22.81	24.00	1.315	-0.01	0.607	0.798	

<TDD LTE SAR>

Plot No.	No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Antenna	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)	Deviation %
	1st	LTE Band 41_Ant 2	20M	QPSK	1	0	Right Side	10mm	Ant 2	41055	2636.5	22.85	24.00	1.303	62.9	1.006	0.06	0.900	1.180	-21%
10	2nd	LTE Band 41_Ant 2	20M	QPSK	1	0	Right Side	10mm	Ant 2	41055	2636.5	22.14	24.00	1.535	62.9	1.006	-0.06	0.606	0.936	
	1st	LTE Band 48_Ant 1	20M	QPSK	1	49	Top Surface	10mm	Ant 1	55340	3560	22.48	23.00	1.127	62.9	1.006	0.07	0.799	0.906	17%
11	2nd	LTE Band 48_Ant 1	20M	QPSK	1	49	Top Surface	10mm	Ant 1	55340	3560.0	21.94	23.00	1.276	62.9	1.006	0.01	0.828	1.063	

<5G NR SAR>

Plot No.	No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Antenna	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Deviation %
	1st	FR1 n2_Ant 1	20M	BPSK	50	28	Top Surface	10mm	Ant 1	380000	1900	23.25	23.50	1.059	0.05	0.876	0.928	10%
	2nd	FR1 n2_Ant 1	20M	BPSK	50	28	Top Surface	10mm	Ant 1	380000	1900	22.52	23.50	1.253	-0.01	0.818	1.025	
	1st	FR1 n2_Ant 2	20M	BPSK	1	1	Top Surface	10mm	Ant 2	380000	1900	23.41	24.00	1.146	-0.04	0.984	1.127	15%
12	2nd	FR1 n2_Ant 2	20M	BPSK	1	1	Top Surface	10mm	Ant 2	380000	1900	23.08	24.00	1.236	0.01	1.050	1.298	
	1st	FR1 n2_Ant 2	20M	BPSK	1	1	Bottom Surface	10mm	Ant 2	380000	1900	23.41	24.00	1.146	-0.17	0.965	1.105	11%
	2nd	FR1 n2_Ant 2	20M	BPSK	1	1	Bottom Surface	10mm	Ant 2	380000	1900	23.08	24.00	1.236	0.06	0.991	1.225	
	1st	FR1 n5_Ant 1	20M	BPSK	50	28	Top Surface	10mm	Ant 1	167300	836.5	23.50	24.00	1.122	-0.17	0.673	0.755	27%
13	2nd	FR1 n5_Ant 1	20M	BPSK	50	28	Top Surface	10mm	Ant 1	167300	836.5	23.35	24.00	1.161	0.03	0.824	0.957	
	1st	FR1 n5_Ant 2	20M	BPSK	1	1	Top Surface	10mm	Ant 2	167300	836.5	23.60	24.00	1.096	-0.1	0.541	0.593	25%
	2nd	FR1 n5_Ant 2	20M	BPSK	1	1	Top Surface	10mm	Ant 2	167300	836.5	23.25	24.00	1.189	-0.01	0.622	0.739	
	1st	FR1 n12_Ant 1	15M	BPSK	36	22	Top Surface	10mm	Ant 1	141500	707.5	23.42	24.00	1.143	0.02	0.591	0.675	12%
14	2nd	FR1 n12_Ant 1	15M	BPSK	36	22	Top Surface	10mm	Ant 1	141500	707.5	23.36	24.00	1.159	0.02	0.655	0.759	
	1st	FR1 n14_Ant 1	10M	BPSK	1	1	Top Surface	10mm	Ant 1	158600	793	23.17	24.00	1.211	0.16	0.680	0.823	29%
15	2nd	FR1 n14_Ant 1	10M	BPSK	1	1	Top Surface	10mm	Ant 1	158600	793.0	23.20	24.00	1.202	-0.01	0.885	1.064	
	1st	FR1 n25_Ant 1	20M	BPSK	50	28	Top Surface	10mm	Ant 1	381000	1905	23.22	24.00	1.197	-0.16	0.763	0.913	25%
	2nd	FR1 n25_Ant 1	20M	BPSK	50	28	Top Surface	10mm	Ant 1	381000	1905	22.85	24.00	1.303	-0.03	0.873	1.138	
	1st	FR1 n25_Ant 2	20M	BPSK	50	28	Top Surface	10mm	Ant 2	376500	1882.5	23.13	24.00	1.222	-0.14	0.750	0.916	29%
16	2nd	FR1 n25_Ant 2	25M	BPSK	50	28	Top Surface	10mm	Ant 2	376500	1882.5	22.98	24.00	1.265	-0.04	0.932	1.179	
	1st	FR1 n30_Ant 2	10M	BPSK	25	14	Right Side	10mm	Ant 2	462000	2310	22.21	23.00	1.199	-0.16	0.986	1.183	0%
17	2nd	FR1 n30_Ant 2	10M	BPSK	25	14	Right Side	10mm	Ant 2	462000	2310	22.75	23.00	1.059	0	1.120	1.186	
	1st	FR1 n66_Ant 1	40M	BPSK	1	1	Top Surface	10mm	Ant 1	349000	1745	23.88	24.00	1.028	-0.17	0.897	0.922	28%
18	2nd	FR1 n66_Ant 1	40M	BPSK	1	1	Top Surface	10mm	Ant 1	349000	1745	23.40	24.00	1.148	0.12	1.030	1.183	
	1st	FR1 n66_Ant 2	40M	BPSK	1	1	Top Surface	10mm	Ant 2	349000	1745	23.75	24.00	1.059	0.02	0.643	0.681	22%
	2nd	FR1 n66_Ant 2	40M	BPSK	1	1	Top Surface	10mm	Ant 2	349000	1745	23.01	24.00	1.256	0.01	0.661	0.830	
	1st	FR1 n41_Ant 2	100M	BPSK	135	69	Right Side	10mm	Ant 2	518598	2592.99	23.20	23.50	1.072	0	1.050	1.262	2%
19	2nd	FR1 n41_Ant 2	100M	BPSK	135	69	Right Side	10mm	Ant 2	518598	2592.99	23.18	23.50	1.076	-0.03	1.200	1.292	
	1st	FR1 n41_Ant 2	100M	BPSK	135	69	Top Surface	10mm	Ant 2	518598	2592.99	23.20	23.50	1.202	-0.14	0.387	0.465	8%
	2nd	FR1 n41_Ant 2	100M	BPSK	135	69	Top Surface	10mm	Ant 2	518598	2592.99	23.18	23.50	1.076	-0.1	0.468	0.504	
	1st	FR1 n48_Ant 1	40M	BPSK	50	28	Top Surface	10mm	Ant 1	638000	3570	20.05	21.70	1.462	-0.14	0.811	1.186	9%
20	2nd	FR1 n48_Ant 1	40M	BPSK	50	28	Top Surface	10mm	Ant 1	638000	3570	21.64	21.70	1.014	0.02	1.270	1.288	
	1st	FR1 n48_Ant 1	40M	BPSK	1	1	Left Side	10mm	Ant 1	638000	3570	20.39	21.70	1.352	0.09	0.580	0.784	-29%
	2nd	FR1 n48_Ant 1	40M	BPSK	1	1	Left Side	10mm	Ant 1	638000	3570	21.64	21.70	1.014	0.06	0.548	0.556	
	1st	FR1 n48_Ant 2	40M	BPSK	1	1	Top Surface	10mm	Ant 2	638000	3570	20.91	21.80	1.227	-0.11	1.030	1.264	0%
	2nd	FR1 n48_Ant 2	40M	BPSK	1	1	Top Surface	10mm	Ant 2	638000	3570	21.76	21.80	1.009	-0.1	1.250	1.262	
	1st	FR1 n48_Ant 2	40M	BPSK	1	1	Right Side	10mm	Ant 2	638000	3570	20.91	21.80	1.227	-0.12	0.730	0.896	-21%
	2nd	FR1 n48_Ant 2	40M	BPSK	1	1	Right Side	10mm	Ant 2	638000	3570	21.76	21.80	1.009	-0.09	0.705	0.712	
	1st	FR1 n77_Ant 2	100M	BPSK	135	69	Top Surface	10mm	Ant 2	656000	3840	20.70	20.90	1.047	-0.02	1.070	1.120	-25%
	2nd	FR1 n77_Ant 2	100M	BPSK	135	69	Top Surface	10mm	Ant 2	656000	3840	20.23	20.90	1.167	-0.19	0.717	0.837	
	1st	FR1 n77_Ant 2	100M	BPSK	135	69	Top Surface	10mm	Ant 2	633332	3499.98	20.43	20.90	1.114	0.1	1.030	1.148	11%
21	2nd	FR1 n77_Ant 2	100M	BPSK	135	69	Top Surface	10mm	Ant 2	633332	3499.98	20.36	20.90	1.132	0.08	1.130	1.280	
	1st	FR1 n77_Ant 2	100M	BPSK	135	69	Bottom Surface	10mm	Ant 2	656000	3840	20.70	20.90	1.047	0.01	0.738	0.773	-4%
	2nd	FR1 n77_Ant 2	100M	BPSK	135	69	Bottom Surface	10mm	Ant 2	656000	3840	20.36	20.90	1.132	0.15	0.658	0.745	
	1st	FR1 n77_Ant 5	-	CW	-	-	Top Surface	10mm	Ant 5	656000	3840	20.43	20.70	1.064	0.08	1.140	1.213	-1%
	2nd	FR1 n77_Ant 5	-	CW	-	-	Top Surface	10mm	Ant 5	656000	3840	19.84	20.70	1.219	0.1	0.984	1.199	
	1st	FR1 n77_Ant 5	-	CW	-	-	Top Surface	10mm	Ant 5	633332	3499.98	20.37	20.70	1.079	0.12	0.620	0.669	4%
	2nd	FR1 n77_Ant 5	-	CW	-	-	Top Surface	10mm	Ant 5	633332	3499.98	20.34	20.70	1.086	-0.12	0.640	0.695	

<WLAN SAR>

Plot No.	No.	Band	Mode	Test Position	Gap (mm)	Antenna	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)	Deviation %
	1st	WLAN2.4GHz_Ant 3	802.11b 1Mbps	Left Side	10mm	Ant 3	6	2437	9.90	10.00	1.023	98.2	1.018	-0.19	0.087	0.091	7%
22	2nd	WLAN2.4GHz_Ant 3	802.11b 1Mbps	Left Side	10mm	Ant 3	6	2437	10.00	10.00	1.000	98.4	1.016	0.19	0.095	0.097	
	1st	WLAN2.4GHz_Ant 4	802.11b 1Mbps	Top Surface	10mm	Ant 4	6	2437	9.50	10.00	1.122	98.2	1.018	-0.06	0.056	0.064	28%
	2nd	WLAN2.4GHz_Ant 4	802.11b 1Mbps	Top Surface	10mm	Ant 4	6	2437	9.70	10.00	1.072	98.4	1.016	0	0.075	0.082	
	1st	WLAN5GHz_Ant 3	802.11ac-VHT160 MCS0	Left Side	10mm	Ant 3	50	5250	9.70	10.00	1.072	99.5	1.005	-0.13	0.075	0.081	21%
23	2nd	WLAN5GHz_Ant 3	802.11ac-VHT160 MCS0	Left Side	10mm	Ant 3	50	5250	10.00	10.00	1.000	99.3	1.007	-0.16	0.097	0.098	
	1st	WLAN5GHz_Ant 4	802.11ac-VHT160 MCS0	Right Side	10mm	Ant 4	50	5250	9.60	10.00	1.096	99.3	1.007	-0.02	0.039	0.043	-26%
	2nd	WLAN5GHz_Ant 4	802.11ac-VHT160 MCS0	Right Side	10mm	Ant 4	50	5250	10.00	10.00	1.000	99.3	1.007	0	0.032	0.032	
	1st	WLAN5GHz_Ant 3	802.11ac-VHT160 MCS0	Left Side	10mm	Ant 3	114	5570	9.70	10.00	1.072	99.3	1.007	-0.03	0.063	0.068	28%
24	2nd	WLAN5GHz_Ant 3	802.11ac-VHT160 MCS0	Left Side	10mm	Ant 3	114	5570	10.00	10.00	1.000	99.3	1.007	0.03	0.086	0.087	
	1st	WLAN5GHz_Ant 4	802.11ac-VHT160 MCS0	Back Side	10mm	Ant 4	114	5570	9.50	10.00	1.122	99.3	1.007	-0.17	0.073	0.082	2%
	2nd	WLAN5GHz_Ant 4	802.11ac-VHT160 MCS0	Back Side	10mm	Ant 4	114	5570	10.00	10.00	1.000	99.3	1.007	-0.14	0.083	0.084	
	1st	WLAN5GHz_Ant 3	802.11ac-VHT80 MCS0	Left Side	10mm	Ant 3	155	5775	9.70	10.00	1.072	99.5	1.005	0.13	0.070	0.075	9%
25	2nd	WLAN5GHz_Ant 3	802.11ac-VHT80 MCS0	Left Side	10mm	Ant 3	155	5775	10.00	10.00	1.000	99.5	1.005	-0.18	0.082	0.082	
	1st	WLAN5GHz_Ant 4	802.11ac-VHT80 MCS0	Back Side	10mm	Ant 4	155	5775	9.30	10.00	1.175	99.5	1.005	-0.11	0.072	0.085	-6%
	2nd	WLAN5GHz_Ant 4	802.11ac-VHT80 MCS0	Back Side	10mm	Ant 4	155	5775	9.80	10.00	1.047	99.5	1.005	0.11	0.076	0.080	
	1st	WLAN6GHz_Ant 3	802.11ax-HE160 MCS0	Bottom Surface	10mm	Ant 3	15	6025	9.40	9.50	1.023	99	1.010	0.14	0.058	0.060	-22%
	2nd	WLAN6GHz_Ant 3	802.11ax-HE160 MCS0	Bottom Surface	10mm	Ant 3	15	6025	9.50	9.50	1.000	99	1.010	0.01	0.047	0.047	
	1st	WLAN6GHz_Ant 4	802.11ax-HE160 MCS0	Top Surface	10mm	Ant 4	15	6025	8.70	9.50	1.202	99	1.010	0.05	0.049	0.060	-5%
26	2nd	WLAN6GHz_Ant 4	802.11ax-HE160 MCS0	Top Surface	10mm	Ant 4	15	6025	9.40	9.50	1.023	99	1.010	0.14	0.055	0.057	

18. 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
2. Per KDB 447498 D01v06, for each exposure position, testing of other required channels within the operating mode of a frequency band is not required when the *reported* 1-g or 10-g SAR for the mid-band or highest output power channel is:
   - ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
   - ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
   - ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
3. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.

LTE Note:

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

5G NR Note:

1. Referencing the procedure in KDB 941225, the test procedures are outlined as below:
   a. To start SAR test for the largest channel bandwidth for PI/2 BPSK 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. Also do SAR test for 50% RB allocation for PI/2 BPSK SAR testing using 1RB PI/2 BPSK allocation procedure
   b. For PI/2 BPSK with 100% RB allocation, SAR test is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
   c. For higher modulation QPSK/16QAM/64QAM/256QAM, according to tune-up document the power level is not ½ dB higher than the same configuration in PI/2 BPSK, also reported SAR for the PI/2 BPSK configuration is less than 1.45 W/kg, QPSK/16QAM/64QAM/256QAM SAR testing are not required.
   d. Smaller bandwidth output power for each RB allocation configuration for this device is not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg, smaller bandwidth SAR testing is not required for this device
   e. For 5G FR1 n5, the maximum channel bandwidth does not support three non-overlapping channels in the frequency band, the middle channel of the group of overlapping channels were selected for testing.
   f. Due to test setup limitations, SAR testing for NR was performed using Factory Test Mode software to establish the connection and perform SAR with 100% transmission.

18.1 Hotspot SAR

<FDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Antenna	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
27	LTE Band 5_Ant 1	10M	QPSK	1	0	Top Surface	10mm	Ant 1	20525	836.5	22.66	24.00	1.361	-0.01	0.788	1.073
	LTE Band 5_Ant 1	10M	QPSK	25	0	Top Surface	10mm	Ant 1	20525	836.5	21.72	23.00	1.343	0.12	0.603	0.810
	LTE Band 5_Ant 1	10M	QPSK	50	0	Top Surface	10mm	Ant 1	20525	836.5	21.62	23.00	1.374	0.07	0.587	0.807
	LTE Band 5_Ant 1	10M	QPSK	1	0	Bottom Surface	10mm	Ant 1	20525	836.5	22.66	24.00	1.361	0.04	0.713	0.971
	LTE Band 5_Ant 1	10M	QPSK	25	0	Bottom Surface	10mm	Ant 1	20525	836.5	21.72	23.00	1.343	0.07	0.551	0.740
	LTE Band 5_Ant 1	10M	QPSK	50	0	Bottom Surface	10mm	Ant 1	20525	836.5	21.62	23.00	1.374	0	0.525	0.721
	LTE Band 5_Ant 1	10M	QPSK	1	0	Left Side	10mm	Ant 1	20525	836.5	22.66	24.00	1.361	0	0.331	0.451
	LTE Band 5_Ant 1	10M	QPSK	25	0	Left Side	10mm	Ant 1	20525	836.5	21.72	23.00	1.343	-0.11	0.249	0.334
	LTE Band 5_Ant 1	10M	QPSK	1	0	Front Side	10mm	Ant 1	20525	836.5	22.66	24.00	1.361	0.01	0.161	0.219
	LTE Band 5_Ant 1	10M	QPSK	25	0	Front Side	10mm	Ant 1	20525	836.5	21.72	23.00	1.343	-0.02	0.122	0.164
28	LTE Band 13_Ant 1	10M	QPSK	1	0	Top Surface	10mm	Ant 1	23230	782	22.46	24.00	1.426	-0.01	0.831	1.185
	LTE Band 13_Ant 1	10M	QPSK	25	0	Top Surface	10mm	Ant 1	23230	782	21.57	23.00	1.390	-0.1	0.652	0.906
	LTE Band 13_Ant 1	10M	QPSK	50	0	Top Surface	10mm	Ant 1	23230	782	21.50	23.00	1.413	0.13	0.625	0.883
	LTE Band 13_Ant 1	10M	QPSK	1	0	Bottom Surface	10mm	Ant 1	23230	782	22.46	24.00	1.426	0.04	0.737	1.051
	LTE Band 13_Ant 1	10M	QPSK	25	0	Bottom Surface	10mm	Ant 1	23230	782	21.57	23.00	1.390	0.02	0.601	0.835
	LTE Band 13_Ant 1	10M	QPSK	50	0	Bottom Surface	10mm	Ant 1	23230	782	21.50	23.00	1.413	0.04	0.588	0.831
	LTE Band 13_Ant 1	10M	QPSK	1	0	Left Side	10mm	Ant 1	23230	782	22.46	24.00	1.426	0.12	0.279	0.398
	LTE Band 13_Ant 1	10M	QPSK	25	0	Left Side	10mm	Ant 1	23230	782	21.57	23.00	1.390	0.14	0.220	0.306
	LTE Band 13_Ant 1	10M	QPSK	1	0	Front Side	10mm	Ant 1	23230	782	22.46	24.00	1.426	0.11	0.308	0.439
	LTE Band 13_Ant 1	10M	QPSK	25	0	Front Side	10mm	Ant 1	23230	782	21.57	23.00	1.390	0.19	0.256	0.356
	LTE Band 66_Ant 1	20M	QPSK	1	0	Top Surface	10mm	Ant 1	132322	1745	23.20	24.00	1.202	0.01	0.901	1.083
29	LTE Band 66_Ant 1	20M	QPSK	1	0	Top Surface	10mm	Ant 1	132072	1720	23.18	24.00	1.208	-0.05	1.030	1.244
	LTE Band 66_Ant 1	20M	QPSK	1	0	Top Surface	10mm	Ant 1	132572	1770	23.19	24.00	1.205	0.18	0.894	1.077
	LTE Band 66_Ant 1	20M	QPSK	50	0	Top Surface	10mm	Ant 1	132322	1745	21.48	23.00	1.419	0.15	0.630	0.894
	LTE Band 66_Ant 1	20M	QPSK	50	0	Top Surface	10mm	Ant 1	132072	1720	21.43	23.00	1.435	0.15	0.717	1.029
	LTE Band 66_Ant 1	20M	QPSK	50	0	Top Surface	10mm	Ant 1	132572	1770	21.58	23.00	1.387	-0.03	0.627	0.869
	LTE Band 66_Ant 1	20M	QPSK	100	0	Top Surface	10mm	Ant 1	132322	1745	21.44	23.00	1.432	0.18	0.604	0.865
	LTE Band 66_Ant 1	20M	QPSK	1	0	Bottom Surface	10mm	Ant 1	132322	1745	23.20	24.00	1.202	-0.04	0.790	0.950
	LTE Band 66_Ant 1	20M	QPSK	1	0	Bottom Surface	10mm	Ant 1	132072	1720	23.18	24.00	1.208	0.17	0.812	0.981
	LTE Band 66_Ant 1	20M	QPSK	1	0	Bottom Surface	10mm	Ant 1	132572	1770	23.19	24.00	1.205	-0.05	0.766	0.923
	LTE Band 66_Ant 1	20M	QPSK	50	0	Bottom Surface	10mm	Ant 1	132572	1770	21.48	23.00	1.419	-0.19	0.554	0.786
	LTE Band 66_Ant 1	20M	QPSK	100	0	Bottom Surface	10mm	Ant 1	132572	1770	21.44	23.00	1.432	-0.12	0.519	0.743
	LTE Band 66_Ant 1	20M	QPSK	1	0	Left Side	10mm	Ant 1	132322	1745	23.20	24.00	1.202	-0.07	0.645	0.775
	LTE Band 66_Ant 1	20M	QPSK	50	0	Left Side	10mm	Ant 1	132572	1770	21.48	23.00	1.419	-0.03	0.479	0.680
	LTE Band 66_Ant 1	20M	QPSK	1	0	Front Side	10mm	Ant 1	132322	1745	23.20	24.00	1.202	0	0.473	0.569
	LTE Band 66_Ant 1	20M	QPSK	50	0	Front Side	10mm	Ant 1	132572	1770	21.48	23.00	1.419	0.13	0.357	0.507

<5G NR SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Antenna	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
30	FR1 n71_Ant 1	20M	BPSK	50	28	Top Surface	10mm	Ant 1	136100	680.5	23.30	24.00	1.175	-0.04	0.663	0.779
	FR1 n71_Ant 1	20M	BPSK	50	28	Bottom Surface	10mm	Ant 1	136100	680.5	23.30	24.00	1.175	-0.04	0.466	0.548
	FR1 n71_Ant 1	20M	BPSK	50	28	Left Side	10mm	Ant 1	136100	680.5	23.30	24.00	1.175	0.03	0.417	0.490
	FR1 n71_Ant 1	20M	BPSK	50	28	Front Side	10mm	Ant 1	136100	680.5	23.30	24.00	1.175	-0.09	0.199	0.234
31	FR1 n77_Ant 1	100M	BPSK	1	1	Top Surface	10mm	Ant 1	633332	3499.98	20.21	20.40	1.045	0.06	1.190	1.243
	FR1 n77_Ant 1	100M	BPSK	1	1	Bottom Surface	10mm	Ant 1	633332	3499.98	20.21	20.40	1.045	-0.16	0.431	0.450
	FR1 n77_Ant 1	100M	BPSK	1	1	Left Side	10mm	Ant 1	633332	3499.98	20.21	20.40	1.045	-0.04	0.317	0.331
	FR1 n77_Ant 1	100M	BPSK	1	1	Front Side	10mm	Ant 1	633332	3499.98	20.21	20.40	1.045	0.03	0.133	0.139
	FR1 n77_Ant 1	100M	BPSK	1	1	Top Surface	10mm	Ant 1	656000	3840	19.68	20.40	1.180	-0.03	0.797	0.941
	FR1 n77_Ant 1	100M	BPSK	1	1	Bottom Surface	10mm	Ant 1	656000	3840	19.68	20.40	1.180	0.03	0.641	0.757
	FR1 n77_Ant 1	100M	BPSK	1	1	Left Side	10mm	Ant 1	656000	3840	19.68	20.40	1.180	-0.11	0.317	0.374
	FR1 n77_Ant 1	100M	BPSK	1	1	Front Side	10mm	Ant 1	656000	3840	19.68	20.40	1.180	-0.01	0.220	0.260
	FR1 n77_Ant 6	-	CW	-	-	Top Surface	10mm	Ant 6	633332	3499.98	18.23	18.80	1.140	0.08	1.040	1.186
	FR1 n77_Ant 6	-	CW	-	-	Bottom Surface	10mm	Ant 6	633332	3499.98	18.23	18.80	1.140	0.01	0.299	0.341
	FR1 n77_Ant 6	-	CW	-	-	Left Side	10mm	Ant 6	633332	3499.98	18.23	18.80	1.140	0.03	0.101	0.115
	FR1 n77_Ant 6	-	CW	-	-	Right Side	10mm	Ant 6	633332	3499.98	18.23	18.80	1.140	0.04	0.001	0.001
	FR1 n77_Ant 6	-	CW	-	-	Back Side	10mm	Ant 6	633332	3499.98	18.23	18.80	1.140	0.11	0.626	0.714
	FR1 n77_Ant 6	-	CW	-	-	Top Surface	10mm	Ant 6	656000	3840	18.13	18.80	1.167	0.08	0.784	0.915
	FR1 n77_Ant 6	-	CW	-	-	Bottom Surface	10mm	Ant 6	656000	3840	18.13	18.80	1.167	-0.05	0.218	0.254
	FR1 n77_Ant 6	-	CW	-	-	Left Side	10mm	Ant 6	656000	3840	18.13	18.80	1.167	0.18	0.039	0.046
	FR1 n77_Ant 6	-	CW	-	-	Right Side	10mm	Ant 6	656000	3840	18.13	18.80	1.167	0.06	0.001	0.001
	FR1 n77_Ant 6	-	CW	-	-	Back Side	10mm	Ant 6	656000	3840	18.13	18.80	1.167	-0.18	0.554	0.646

18.2 Repeated SAR Measurement

<Spotcheck SAR>

No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Antenna	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Ratio	Reported 1g SAR (W/kg)
1st	LTE Band 14_Ant 1	10M	QPSK	1	0	Top Surface	10mm	Ant 1	23330	793.0	23.75	24.00	1.059	0.01	0.911	-	0.965
2nd	LTE Band 14_Ant 1	10M	QPSK	1	0	Top Surface	10mm	Ant 1	23330	793.0	23.75	24.00	1.059	0.05	0.892	1.021	0.945
1st	LTE Band 30_Ant 2	10M	QPSK	1	0	Right Side	10mm	Ant 2	27710	2310	22.41	23.00	1.146	-0.04	1.130	-	1.294
2nd	LTE Band 30_Ant 2	10M	QPSK	1	0	Right Side	10mm	Ant 2	27710	2310	22.41	23.00	1.146	0.06	1.080	1.046	1.237
1st	FR1 n2_Ant 2	20M	BPSK	1	1	Top Surface	10mm	Ant 2	380000	1900	23.08	24.00	1.236	0.01	1.050	-	1.298
2nd	FR1 n2_Ant 2	20M	BPSK	1	1	Top Surface	10mm	Ant 2	380000	1900	23.08	24.00	1.236	0.06	1.010	1.040	1.248
1st	FR1 n5_Ant 1	20M	BPSK	50	28	Top Surface	10mm	Ant 1	167300	836.5	23.35	24.00	1.161	0.03	0.824	-	0.957
2nd	FR1 n5_Ant 1	20M	BPSK	50	28	Top Surface	10mm	Ant 1	167300	836.5	23.35	24.00	1.161	-0.06	0.811	1.016	0.942
1st	FR1 n66_Ant 1	40M	BPSK	1	1	Top Surface	10mm	Ant 1	349000	1745	23.40	24.00	1.148	0.12	1.030	-	1.183
2nd	FR1 n66_Ant 1	40M	BPSK	1	1	Top Surface	10mm	Ant 1	349000	1745	23.40	24.00	1.148	0.14	0.984	1.047	1.130
1st	FR1 n41_Ant 2	100M	BPSK	135	69	Right Side	10mm	Ant 2	518598	2592.99	23.18	23.50	1.076	-0.03	1.200	-	1.292
2nd	FR1 n41_Ant 2	100M	BPSK	135	69	Right Side	10mm	Ant 2	518598	2592.99	23.18	23.50	1.076	0.06	1.140	1.053	1.227
1st	FR1 n48_Ant 1	40M	BPSK	50	28	Top Surface	10mm	Ant 1	638000	3570	21.64	21.70	1.014	0.02	1.270	-	1.288
2nd	FR1 n48_Ant 1	40M	BPSK	50	28	Top Surface	10mm	Ant 1	638000	3570	21.64	21.70	1.014	0.09	1.220	1.041	1.237
1st	FR1 n77_Ant 5	-	CW	-	-	Top Surface	10mm	Ant 5	656000	3840	19.84	20.70	1.219	0.1	0.984	-	1.199
2nd	FR1 n77_Ant 5	-	CW	-	-	Top Surface	10mm	Ant 5	656000	3840	19.84	20.70	1.219	0.05	0.977	1.007	1.191

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.

19. Simultaneous Transmission Analysis

Exposure condition	NO.	Simultaneous Transmission Configurations	Support
Body condition	1	WWAN + 2.4GHz Ant3 + 2.4GHz Ant4	V
	2	WWAN + 5GHz Ant3 + 5GHz Ant4	V
	3	WWAN + 2.4GHz Ant3 + 5GHz Ant4	V
	4	WWAN + 2.4GHz Ant4 + 5GHz Ant3	V
	5	LTE + FR1 + 2.4GHz Ant3 + 2.4GHz Ant4	V
	6	LTE + FR1+ 5GHz Ant3 + 5GHz Ant4	V
	7	LTE + FR1+ 2.4GHz Ant3 + 5GHz Ant4	V
	8	LTE + FR1+ 2.4GHz Ant4 + 5GHz Ant3	V
	9	LTE + FR2 + 2.4GHz Ant3 + 2.4GHz Ant4	V
	10	LTE + FR2 + 5GHz Ant3 + 5GHz Ant4	V
	11	LTE + FR2+ 2.4GHz Ant3 + 5GHz Ant4	V
	12	LTE + FR2+ 2.4GHz Ant4 + 5GHz Ant3	V
	13(1)	WWAN + 6GHz Ant3 + 6GHz Ant4	V
	14(1)	WWAN + 2.4GHz Ant3 + 6GHz Ant4	V
	15(1)	WWAN + 2.4GHz Ant4 + 6GHz Ant3	V
	16(1)	LTE + FR1+ 6GHz Ant3 + 6GHz Ant4	V
	17(1)	LTE + FR1+ 2.4GHz Ant3 + 6GHz Ant4	V
	18(1)	LTE + FR1+ 2.4GHz Ant4 + 6GHz Ant3	V
	19(1)	LTE + FR2 + 2.4GHz Ant3 + 2.4GHz Ant4	V
	20(1)	LTE + FR2 + 6GHz Ant3 + 6GHz Ant4	V
	21(1)	LTE + FR2+ 2.4GHz Ant3 + 6GHz Ant4	V
	22(1)	LTE + FR2+ 2.4GHz Ant4 + 6GHz Ant3	V

General Note:

1. WiFi 6E AP mode is enabled only when it's connected to AC mains, the compliance is justified in MPE evaluation report No.: FA190614-06D.
2. When device is connected to the PC, 2.4GHz and 6GHz simultaneous transmission is possible while the device supports AP mode in 2.4GHz and client mode in WiFi 6E.
3. When the device connects to the PC and enable WiFi to offload WWAN traffics, WiFi 2.4GHz/5GHz/6GHz at antenna 3 acts as the client, and WiFi 2.4GHz/5GHz at antenna 4 acts as the AP.
4. The data reuse results from FCC ID: PY321100529 / PY322100558 / PY322100564 are used for Sim-Tx analysis, except LTE B5/13/66 and 5G NR n71/n77.
5. The worst case eported SAR for each antenna combination was used for SAR summation. Therefore, the following summations represent the absolute worst cases for simultaneous transmission.
6. The device support uplink MIMO for 5G FR1 n48, the Smart Transmit will control the device to transmit at higher power instantaneously, as high as Pmax, when needed, but enforces power limiting to maintain time-averaged transmit power to Plimit.
7. The 1g SAR summation is calculated based on the same configuration and test position.
8. Per KDB 447498 D01v06, simultaneous transmission SAR is compliant if,
   i) 1g SAR summation SAR summation < 1.6W/kg.
   ii) SPLSR = (SAR1 + SAR2)^1.5 / (min. separation distance, mm), and the peak separation distance is determined from the square root of $[(x1-x2)^2 + (y1-y2)^2 + (z1-z2)^2]$, where (x1, y1, z1) and (x2, y2, z2) are the coordinates of the extrapolated peak SAR locations in the zoom scan.
   iii) If SPLSR ≤ 0.04, simultaneously transmission SAR measurement is not necessary.
   iv) Simultaneously transmission SAR measurement, and the reported multi-band SAR < 1.6W/kg.

19.1 5G NR + LTE + WLAN Sim-Tx analysis

In 5G NR + LTE + WLAN or LTE inter band uplink CA +WLAN simultaneous transmission, 5G NR and LTE or LTE inter band uplink PCC and SCC transmission are managed and controlled by Qualcomm® Smart Transmit, while the RF exposure from WLAN radios is managed using legacy approach, i.e., through a fixed power back-off if needed.
Since WLAN do not employ time-averaging, 1gSAR and 10gSAR measurement for WLAN need to be conducted at their corresponding rated power following current FCC test procedures to determine reported SAR values.
Smart Transmit current implementation assumes hotspots from 5G NR and LTE are collocated. Therefore, for a total of 100% exposure margin, if LTE or LTE PCC uses x%, then the exposure margin left for 5G NR or LTE SCC is capped to (100-x)%. Thus, the compliance equation for LTE + 5G NR or LTE PCC + LTE SCC is

*x% * A + (100-x)% * B ≤ 1.0,*

Where, A is normalized reported time-averaged SAR exposure ratio from LTE or LTE PCC, and A ≤ 1.0; B is normalized reported time-averaged exposure ratio from LTE PCC or 5G NR (i.e., PD exposure for mmW NR or SAR exposure for sub6 NR), and B ≤1.0.

Let C = normalized reported SAR exposure ratio from WLAN, then for compliance,
*x% * A + (100-x)% * B + C ≤ 1.0* (1)

x% * A + (100-x)% * B ≤ x% * max(A, B) + (100-x)% * max(A, B) ≤ max(A, B)

*x% * A + (100-x)% * B + C ≤ max(A, B) + C ≤ 1.0* (2)

if A + C ≤ 1.0 and B + C ≤ 1.0 can be proven, then “x% * A + (100-x)% * B + C ≤ 1.0”. Therefore simultaneous transmission analysis for 5G NR + LTE + WLAN or LTE inter band Uplink CA+ WLAN can be performed in two steps

Step 1: Prove total exposure ratio (TER) of LTE + WLAN < 1 or LTE PCC+ WLAN<1
Step 2: Prove total exposure ratio (TER) of 5G NR + WLAN < 1or LTE SCC+WLAN<1

Else, if A + C > 1.0 and/or B + C > 1.0, then the followings need to hold true for compliance:
i. Since A and C are decoupled based on the SAR distribution, and
ii. (100-x)% * B + C ≤ 1.0, and
iii. x% * A + (100-x)% * B ≤ 1.0

Note iii. is covered in Part 2 report; i. and ii. is addressed in Part 1 report.

19.2 Hotspot Exposure Conditions

WWAN Band	Exposure Position	1	2	3	4	5	1+2+3 Summed 1g SAR (W/kg)	1+4+5 Summed 1g SAR (W/kg)	1+2+5 Summed 1g SAR (W/kg)	1+3+4 Summed 1g SAR (W/kg)
		WWAN 1g SAR (W/kg)	2.4GHz WLAN Ant 3 1g SAR (W/kg)	2.4GHz WLAN Ant 4 1g SAR (W/kg)	5GHz WLAN Ant 3 1g SAR (W/kg)	5GHz WLAN Ant 4 1g SAR (W/kg)				
LTE Band 2_Ant 1	Top Surface	0.999	0.041	0.082	0.071	0.066	**1.122**	**1.136**	**1.106**	**1.152**
	Bottom Surface	0.677	0.052	0.035	0.058	0.062	**0.764**	**0.797**	**0.791**	**0.770**
	Left Side	0.656	0.097		0.098		**0.753**	**0.754**	**0.753**	**0.754**
	Right Side			0.042		0.073	**0.042**	**0.073**	**0.073**	**0.042**
	Front Side	0.400					**0.400**	**0.400**	**0.400**	**0.400**
	Back Side		0.018	0.024	0.052	0.084	**0.042**	**0.136**	**0.102**	**0.076**
LTE Band 5_Ant 1	Top Surface	1.073	0.041	0.082	0.071	0.066	**1.196**	**1.210**	**1.180**	**1.226**
	Bottom Surface	0.971	0.052	0.035	0.058	0.062	**1.058**	**1.091**	**1.085**	**1.064**
	Left Side	0.451	0.097		0.098		**0.548**	**0.549**	**0.548**	**0.549**
	Right Side			0.042		0.073	**0.042**	**0.073**	**0.073**	**0.042**
	Front Side	0.219					**0.219**	**0.219**	**0.219**	**0.219**
	Back Side		0.018	0.024	0.052	0.084	**0.042**	**0.136**	**0.102**	**0.076**
LTE Band 12_Ant 1	Top Surface	0.723	0.041	0.082	0.071	0.066	**0.846**	**0.860**	**0.830**	**0.876**
	Bottom Surface	0.687	0.052	0.035	0.058	0.062	**0.774**	**0.807**	**0.801**	**0.780**
	Left Side	0.344	0.097		0.098		**0.441**	**0.442**	**0.441**	**0.442**
	Right Side			0.042		0.073	**0.042**	**0.073**	**0.073**	**0.042**
	Front Side	0.263					**0.263**	**0.263**	**0.263**	**0.263**
	Back Side		0.018	0.024	0.052	0.084	**0.042**	**0.136**	**0.102**	**0.076**
LTE Band 13_Ant 1	Top Surface	1.185	0.041	0.082	0.071	0.066	**1.308**	**1.322**	**1.292**	**1.338**
	Bottom Surface	1.051	0.052	0.035	0.058	0.062	**1.138**	**1.171**	**1.165**	**1.144**
	Left Side	0.398	0.097		0.098		**0.495**	**0.496**	**0.495**	**0.496**
	Right Side			0.042		0.073	**0.042**	**0.073**	**0.073**	**0.042**
	Front Side	0.439					**0.439**	**0.439**	**0.439**	**0.439**
	Back Side		0.018	0.024	0.052	0.084	**0.042**	**0.136**	**0.102**	**0.076**
LTE Band 14_Ant 1	Top Surface	0.965	0.041	0.082	0.071	0.066	**1.088**	**1.102**	**1.072**	**1.118**
	Bottom Surface	0.769	0.052	0.035	0.058	0.062	**0.856**	**0.889**	**0.883**	**0.862**
	Left Side	0.292	0.097		0.098		**0.389**	**0.390**	**0.389**	**0.390**
	Right Side			0.042		0.073	**0.042**	**0.073**	**0.073**	**0.042**
	Front Side	0.291					**0.291**	**0.291**	**0.291**	**0.291**
	Back Side		0.018	0.024	0.052	0.084	**0.042**	**0.136**	**0.102**	**0.076**
LTE Band 26_Ant 1	Top Surface	1.046	0.041	0.082	0.071	0.066	**1.169**	**1.183**	**1.153**	**1.199**
	Bottom Surface	0.728	0.052	0.035	0.058	0.062	**0.815**	**0.848**	**0.842**	**0.821**
	Left Side	0.312	0.097		0.098		**0.409**	**0.410**	**0.409**	**0.410**
	Right Side			0.042		0.073	**0.042**	**0.073**	**0.073**	**0.042**
	Front Side	0.211					**0.211**	**0.211**	**0.211**	**0.211**
	Back Side		0.018	0.024	0.052	0.084	**0.042**	**0.136**	**0.102**	**0.076**
LTE Band 48_Ant 1	Top Surface	1.063	0.041	0.082	0.071	0.066	**1.186**	**1.200**	**1.170**	**1.216**
	Bottom Surface	0.423	0.052	0.035	0.058	0.062	**0.510**	**0.543**	**0.537**	**0.516**
	Left Side	0.432	0.097		0.098		**0.529**	**0.530**	**0.529**	**0.530**
	Right Side			0.042		0.073	**0.042**	**0.073**	**0.073**	**0.042**
	Front Side	0.160					**0.160**	**0.160**	**0.160**	**0.160**
	Back Side		0.018	0.024	0.052	0.084	**0.042**	**0.136**	**0.102**	**0.076**
LTE Band 66_Ant 1	Top Surface	1.244	0.041	0.082	0.071	0.066	**1.367**	**1.381**	**1.351**	**1.397**
	Bottom Surface	0.981	0.052	0.035	0.058	0.062	**1.068**	**1.101**	**1.095**	**1.074**
	Left Side	0.775	0.097		0.098		**0.872**	**0.873**	**0.872**	**0.873**
	Right Side			0.042		0.073	**0.042**	**0.073**	**0.073**	**0.042**
	Front Side	0.569					**0.569**	**0.569**	**0.569**	**0.569**
	Back Side		0.018	0.024	0.052	0.084	**0.042**	**0.136**	**0.102**	**0.076**
LTE Band 71_Ant 1	Top Surface	0.798	0.041	0.082	0.071	0.066	**0.921**	**0.935**	**0.905**	**0.951**
	Bottom Surface	0.526	0.052	0.035	0.058	0.062	**0.613**	**0.646**	**0.640**	**0.619**
	Left Side	0.459	0.097		0.098		**0.556**	**0.557**	**0.556**	**0.557**
	Right Side			0.042		0.073	**0.042**	**0.073**	**0.073**	**0.042**
	Front Side	0.182					**0.182**	**0.182**	**0.182**	**0.182**
	Back Side		0.018	0.024	0.052	0.084	**0.042**	**0.136**	**0.102**	**0.076**

WWAN Band	Exposure Position	1	2	3	4	5	1+2+3 Summed 1g SAR (W/kg)	1+4+5 Summed 1g SAR (W/kg)	1+2+5 Summed 1g SAR (W/kg)	1+3+4 Summed 1g SAR (W/kg)
		WWAN 1g SAR (W/kg)	2.4GHz WLAN Ant 3 1g SAR (W/kg)	2.4GHz WLAN Ant 4 1g SAR (W/kg)	5GHz WLAN Ant 3 1g SAR (W/kg)	5GHz WLAN Ant 4 1g SAR (W/kg)				
FR1 n2_Ant 1	Top Surface	1.025	0.041	0.082	0.071	0.066	**1.148**	**1.162**	**1.132**	**1.178**
	Bottom Surface	0.671	0.052	0.035	0.058	0.062	**0.758**	**0.791**	**0.785**	**0.764**
	Left Side	0.663	0.097		0.098		**0.760**	**0.761**	**0.760**	**0.761**
	Right Side			0.042		0.073	**0.042**	**0.073**	**0.073**	**0.042**
	Front Side	0.405					**0.405**	**0.405**	**0.405**	**0.405**
	Back Side		0.018	0.024	0.052	0.084	**0.042**	**0.136**	**0.102**	**0.076**
FR1 n5_Ant 1	Top Surface	0.957	0.041	0.082	0.071	0.066	**1.080**	**1.094**	**1.064**	**1.110**
	Bottom Surface	0.741	0.052	0.035	0.058	0.062	**0.828**	**0.861**	**0.855**	**0.834**
	Left Side	0.349	0.097		0.098		**0.446**	**0.447**	**0.446**	**0.447**
	Right Side			0.042		0.073	**0.042**	**0.073**	**0.073**	**0.042**
	Front Side	0.184					**0.184**	**0.184**	**0.184**	**0.184**
	Back Side		0.018	0.024	0.052	0.084	**0.042**	**0.136**	**0.102**	**0.076**
FR1 n12_Ant 1	Top Surface	0.759	0.041	0.082	0.071	0.066	**0.882**	**0.896**	**0.866**	**0.912**
	Bottom Surface	0.513	0.052	0.035	0.058	0.062	**0.600**	**0.633**	**0.627**	**0.606**
	Left Side	0.358	0.097		0.098		**0.455**	**0.456**	**0.455**	**0.456**
	Right Side			0.042		0.073	**0.042**	**0.073**	**0.073**	**0.042**
	Front Side	0.255					**0.255**	**0.255**	**0.255**	**0.255**
	Back Side		0.018	0.024	0.052	0.084	**0.042**	**0.136**	**0.102**	**0.076**
FR1 n14_Ant 1	Top Surface	1.064	0.041	0.082	0.071	0.066	**1.187**	**1.201**	**1.171**	**1.217**
	Bottom Surface	0.722	0.052	0.035	0.058	0.062	**0.809**	**0.842**	**0.836**	**0.815**
	Left Side	0.305	0.097		0.098		**0.402**	**0.403**	**0.402**	**0.403**
	Right Side			0.042		0.073	**0.042**	**0.073**	**0.073**	**0.042**
	Front Side	0.301					**0.301**	**0.301**	**0.301**	**0.301**
	Back Side		0.018	0.024	0.052	0.084	**0.042**	**0.136**	**0.102**	**0.076**
FR1 n25_Ant 1	Top Surface	1.138	0.041	0.082	0.071	0.066	**1.261**	**1.275**	**1.245**	**1.291**
	Bottom Surface	0.900	0.052	0.035	0.058	0.062	**0.987**	**1.020**	**1.014**	**0.993**
	Left Side	0.692	0.097		0.098		**0.789**	**0.790**	**0.789**	**0.790**
	Right Side			0.042		0.073	**0.042**	**0.073**	**0.073**	**0.042**
	Front Side	0.555					**0.555**	**0.555**	**0.555**	**0.555**
	Back Side		0.018	0.024	0.052	0.084	**0.042**	**0.136**	**0.102**	**0.076**
FR1 n48_Ant 1	Top Surface	1.288	0.041	0.082	0.071	0.066	**1.411**	**1.425**	**1.395**	**1.441**
	Bottom Surface	0.697	0.052	0.035	0.058	0.062	**0.784**	**0.817**	**0.811**	**0.790**
	Left Side	0.784	0.097		0.098		**0.881**	**0.882**	**0.881**	**0.882**
	Right Side			0.042		0.073	**0.042**	**0.073**	**0.073**	**0.042**
	Front Side	0.183					**0.183**	**0.183**	**0.183**	**0.183**
	Back Side		0.018	0.024	0.052	0.084	**0.042**	**0.136**	**0.102**	**0.076**
FR1 n66_Ant 1	Top Surface	1.183	0.041	0.082	0.071	0.066	**1.306**	**1.320**	**1.290**	**1.336**
	Bottom Surface	0.790	0.052	0.035	0.058	0.062	**0.877**	**0.910**	**0.904**	**0.883**
	Left Side	0.591	0.097		0.098		**0.688**	**0.689**	**0.688**	**0.689**
	Right Side			0.042		0.073	**0.042**	**0.073**	**0.073**	**0.042**
	Front Side	0.472					**0.472**	**0.472**	**0.472**	**0.472**
	Back Side		0.018	0.024	0.052	0.084	**0.042**	**0.136**	**0.102**	**0.076**
FR1 n71_Ant 1	Top Surface	0.779	0.041	0.082	0.071	0.066	**0.902**	**0.916**	**0.886**	**0.932**
	Bottom Surface	0.548	0.052	0.035	0.058	0.062	**0.635**	**0.668**	**0.662**	**0.641**
	Left Side	0.490	0.097		0.098		**0.587**	**0.588**	**0.587**	**0.588**
	Right Side			0.042		0.073	**0.042**	**0.073**	**0.073**	**0.042**
	Front Side	0.234					**0.234**	**0.234**	**0.234**	**0.234**
	Back Side		0.018	0.024	0.052	0.084	**0.042**	**0.136**	**0.102**	**0.076**
FR1 n77_Ant 1	Top Surface	1.243	0.041	0.082	0.071	0.066	**1.366**	**1.380**	**1.350**	**1.396**
	Bottom Surface	0.757	0.052	0.035	0.058	0.062	**0.844**	**0.877**	**0.871**	**0.850**
	Left Side	0.374	0.097		0.098		**0.471**	**0.472**	**0.471**	**0.472**
	Right Side			0.042		0.073	**0.042**	**0.073**	**0.073**	**0.042**
	Front Side	0.260					**0.260**	**0.260**	**0.260**	**0.260**
	Back Side		0.018	0.024	0.052	0.084	**0.042**	**0.136**	**0.102**	**0.076**

WWAN Band	Exposure Position	1	2	3	4	5	1+2+3 Summed 1g SAR (W/kg)	1+4+5 Summed 1g SAR (W/kg)	1+2+5 Summed 1g SAR (W/kg)	1+3+4 Summed 1g SAR (W/kg)
		WWAN 1g SAR (W/kg)	2.4GHz WLAN Ant 3 1g SAR (W/kg)	2.4GHz WLAN Ant 4 1g SAR (W/kg)	5GHz WLAN Ant 3 1g SAR (W/kg)	5GHz WLAN Ant 4 1g SAR (W/kg)				
LTE Band 2_Ant 2	Top Surface	1.191	0.041	0.082	0.071	0.066	**1.314**	**1.328**	**1.298**	**1.344**
	Bottom Surface	1.156	0.052	0.035	0.058	0.062	**1.243**	**1.276**	**1.270**	**1.249**
	Left Side		0.097		0.098		**0.097**	**0.098**	**0.097**	**0.098**
	Right Side	1.024		0.042		0.073	**1.066**	**1.097**	**1.097**	**1.066**
	Front Side	0.550					**0.550**	**0.550**	**0.550**	**0.550**
	Back Side		0.018	0.024	0.052	0.084	**0.042**	**0.136**	**0.102**	**0.076**
LTE Band 7_Ant 2	Top Surface	0.665	0.041	0.082	0.071	0.066	**0.788**	**0.802**	**0.772**	**0.818**
	Bottom Surface	0.419	0.052	0.035	0.058	0.062	**0.506**	**0.539**	**0.533**	**0.512**
	Left Side		0.097		0.098		**0.097**	**0.098**	**0.097**	**0.098**
	Right Side	1.184		0.042		0.073	**1.226**	**1.257**	**1.257**	**1.226**
	Front Side	0.309					**0.309**	**0.309**	**0.309**	**0.309**
	Back Side		0.018	0.024	0.052	0.084	**0.042**	**0.136**	**0.102**	**0.076**
LTE Band 25_Ant 2	Top Surface	1.294	0.041	0.082	0.071	0.066	**1.417**	**1.431**	**1.401**	**1.447**
	Bottom Surface	0.908	0.052	0.035	0.058	0.062	**0.995**	**1.028**	**1.022**	**1.001**
	Left Side		0.097		0.098		**0.097**	**0.098**	**0.097**	**0.098**
	Right Side	0.605		0.042		0.073	**0.647**	**0.678**	**0.678**	**0.647**
	Front Side	0.415					**0.415**	**0.415**	**0.415**	**0.415**
	Back Side		0.018	0.024	0.052	0.084	**0.042**	**0.136**	**0.102**	**0.076**
LTE Band 30_Ant 2	Top Surface	0.924	0.041	0.082	0.071	0.066	**1.047**	**1.061**	**1.031**	**1.077**
	Bottom Surface	1.086	0.052	0.035	0.058	0.062	**1.173**	**1.206**	**1.200**	**1.179**
	Left Side		0.097		0.098		**0.097**	**0.098**	**0.097**	**0.098**
	Right Side	1.294		0.042		0.073	**1.336**	**1.367**	**1.367**	**1.336**
	Front Side	0.389					**0.389**	**0.389**	**0.389**	**0.389**
	Back Side		0.018	0.024	0.052	0.084	**0.042**	**0.136**	**0.102**	**0.076**
LTE Band 41_Ant 2	Top Surface	0.361	0.041	0.082	0.071	0.066	**0.484**	**0.498**	**0.468**	**0.514**
	Bottom Surface	0.421	0.052	0.035	0.058	0.062	**0.508**	**0.541**	**0.535**	**0.514**
	Left Side		0.097		0.098		**0.097**	**0.098**	**0.097**	**0.098**
	Right Side	1.180		0.042		0.073	**1.222**	**1.253**	**1.253**	**1.222**
	Front Side	0.173					**0.173**	**0.173**	**0.173**	**0.173**
	Back Side		0.018	0.024	0.052	0.084	**0.042**	**0.136**	**0.102**	**0.076**
LTE Band 66_Ant 2	Top Surface	1.189	0.041	0.082	0.071	0.066	**1.312**	**1.326**	**1.296**	**1.342**
	Bottom Surface	0.895	0.052	0.035	0.058	0.062	**0.982**	**1.015**	**1.009**	**0.988**
	Left Side		0.097		0.098		**0.097**	**0.098**	**0.097**	**0.098**
	Right Side	0.689		0.042		0.073	**0.731**	**0.762**	**0.762**	**0.731**
	Front Side	0.410					**0.410**	**0.410**	**0.410**	**0.410**
	Back Side		0.018	0.024	0.052	0.084	**0.042**	**0.136**	**0.102**	**0.076**

WWAN Band	Exposure Position	1 WWAN 1g SAR (W/kg)	2 2.4GHz WLAN Ant 3 1g SAR (W/kg)	3 2.4GHz WLAN Ant 4 1g SAR (W/kg)	4 5GHz WLAN Ant 3 1g SAR (W/kg)	5 5GHz WLAN Ant 4 1g SAR (W/kg)	1+2+3 Summed 1g SAR (W/kg)	1+4+5 Summed 1g SAR (W/kg)	1+2+5 Summed 1g SAR (W/kg)	1+3+4 Summed 1g SAR (W/kg)
FR1 n2_Ant 2	Top Surface	1.298	0.041	0.082	0.071	0.066	**1.421**	**1.435**	**1.405**	**1.451**
	Bottom Surface	1.225	0.052	0.035	0.058	0.062	**1.312**	**1.345**	**1.339**	**1.318**
	Left Side		0.097		0.098		**0.097**	**0.098**	**0.097**	**0.098**
	Right Side	0.710		0.042		0.073	**0.752**	**0.783**	**0.783**	**0.752**
	Front Side	0.419					**0.419**	**0.419**	**0.419**	**0.419**
	Back Side		0.018	0.024	0.052	0.084	**0.042**	**0.136**	**0.102**	**0.076**
FR1 n5_Ant 2	Top Surface	0.739	0.041	0.082	0.071	0.066	**0.862**	**0.876**	**0.846**	**0.892**
	Bottom Surface	0.568	0.052	0.035	0.058	0.062	**0.655**	**0.688**	**0.682**	**0.661**
	Left Side		0.097		0.098		**0.097**	**0.098**	**0.097**	**0.098**
	Right Side	0.255		0.042		0.073	**0.297**	**0.328**	**0.328**	**0.297**
	Front Side	0.204					**0.204**	**0.204**	**0.204**	**0.204**
	Back Side		0.018	0.024	0.052	0.084	**0.042**	**0.136**	**0.102**	**0.076**
FR1 n25_Ant 2	Top Surface	1.179	0.041	0.082	0.071	0.066	**1.302**	**1.316**	**1.286**	**1.332**
	Bottom Surface	0.764	0.052	0.035	0.058	0.062	**0.851**	**0.884**	**0.878**	**0.857**
	Left Side		0.097		0.098		**0.097**	**0.098**	**0.097**	**0.098**
	Right Side	0.570		0.042		0.073	**0.612**	**0.643**	**0.643**	**0.612**
	Front Side	0.421					**0.421**	**0.421**	**0.421**	**0.421**
	Back Side		0.018	0.024	0.052	0.084	**0.042**	**0.136**	**0.102**	**0.076**
FR1 n30_Ant 2	Top Surface	0.848	0.041	0.082	0.071	0.066	**0.971**	**0.985**	**0.955**	**1.001**
	Bottom Surface	0.991	0.052	0.035	0.058	0.062	**1.078**	**1.111**	**1.105**	**1.084**
	Left Side		0.097		0.098		**0.097**	**0.098**	**0.097**	**0.098**
	Right Side	1.186		0.042		0.073	**1.228**	**1.259**	**1.259**	**1.228**
	Front Side	0.363					**0.363**	**0.363**	**0.363**	**0.363**
	Back Side		0.018	0.024	0.052	0.084	**0.042**	**0.136**	**0.102**	**0.076**
FR1 n41_Ant 2	Top Surface	0.504	0.041	0.082	0.071	0.066	**0.627**	**0.641**	**0.611**	**0.657**
	Bottom Surface	0.334	0.052	0.035	0.058	0.062	**0.421**	**0.454**	**0.448**	**0.427**
	Left Side		0.097		0.098		**0.097**	**0.098**	**0.097**	**0.098**
	Right Side	1.292		0.042		0.073	**1.334**	**1.365**	**1.365**	**1.334**
	Front Side	0.239					**0.239**	**0.239**	**0.239**	**0.239**
	Back Side		0.018	0.024	0.052	0.084	**0.042**	**0.136**	**0.102**	**0.076**
FR1 n48_Ant 2	Top Surface	1.264	0.041	0.082	0.071	0.066	**1.387**	**1.401**	**1.371**	**1.417**
	Bottom Surface	0.854	0.052	0.035	0.058	0.062	**0.941**	**0.974**	**0.968**	**0.947**
	Left Side		0.097		0.098		**0.097**	**0.098**	**0.097**	**0.098**
	Right Side	0.896		0.042		0.073	**0.938**	**0.969**	**0.969**	**0.938**
	Front Side	0.192					**0.192**	**0.192**	**0.192**	**0.192**
	Back Side		0.018	0.024	0.052	0.084	**0.042**	**0.136**	**0.102**	**0.076**
FR1 n66_Ant 2	Top Surface	0.830	0.041	0.082	0.071	0.066	**0.953**	**0.967**	**0.937**	**0.983**
	Bottom Surface	0.616	0.052	0.035	0.058	0.062	**0.703**	**0.736**	**0.730**	**0.709**
	Left Side		0.097		0.098		**0.097**	**0.098**	**0.097**	**0.098**
	Right Side	0.540		0.042		0.073	**0.582**	**0.613**	**0.613**	**0.582**
	Front Side	0.373					**0.373**	**0.373**	**0.373**	**0.373**
	Back Side		0.018	0.024	0.052	0.084	**0.042**	**0.136**	**0.102**	**0.076**

WWAN Band	Exposure Position	1	2	3	4	5	1+2+3 Summed 1g SAR (W/kg)	1+4+5 Summed 1g SAR (W/kg)	1+2+5 Summed 1g SAR (W/kg)	1+3+4 Summed 1g SAR (W/kg)
		WWAN 1g SAR (W/kg)	2.4GHz WLAN Ant 3 1g SAR (W/kg)	2.4GHz WLAN Ant 4 1g SAR (W/kg)	5GHz WLAN Ant 3 1g SAR (W/kg)	5GHz WLAN Ant 4 1g SAR (W/kg)				
FR1 n77_Ant 2	Top Surface	1.280	0.041	0.082	0.071	0.066	**1.403**	**1.417**	**1.387**	**1.433**
	Bottom Surface	0.773	0.052	0.035	0.058	0.062	**0.860**	**0.893**	**0.887**	**0.866**
	Left Side		0.097		0.098		**0.097**	**0.098**	**0.097**	**0.098**
	Right Side	0.686		0.042		0.073	**0.728**	**0.759**	**0.759**	**0.728**
	Front Side	0.260					**0.260**	**0.260**	**0.260**	**0.260**
	Back Side		0.018	0.024	0.052	0.084	**0.042**	**0.136**	**0.102**	**0.076**
FR1 n77_Ant 5	Top Surface	1.213	0.041	0.082	0.071	0.066	**1.336**	**1.350**	**1.320**	**1.366**
	Bottom Surface	0.665	0.052	0.035	0.058	0.062	**0.752**	**0.785**	**0.779**	**0.758**
	Left Side	0.063	0.097		0.098		**0.160**	**0.161**	**0.160**	**0.161**
	Right Side	0.142		0.042		0.073	**0.184**	**0.215**	**0.215**	**0.184**
	Front Side	0.761					**0.761**	**0.761**	**0.761**	**0.761**
	Back Side		0.018	0.024	0.052	0.084	**0.042**	**0.136**	**0.102**	**0.076**
FR1 n77_Ant 6	Top Surface	1.186	0.041	0.082	0.071	0.066	**1.309**	**1.323**	**1.293**	**1.339**
	Bottom Surface	0.341	0.052	0.035	0.058	0.062	**0.428**	**0.461**	**0.455**	**0.434**
	Left Side	0.115	0.097		0.098		**0.212**	**0.213**	**0.212**	**0.213**
	Right Side	0.001		0.042		0.073	**0.043**	**0.074**	**0.074**	**0.043**
	Front Side						**0.000**	**0.000**	**0.000**	**0.000**
	Back Side	0.714	0.018	0.024	0.052	0.084	**0.756**	**0.850**	**0.816**	**0.790**

Test Engineer：Bevis Chang, Jay Chien, Hank Chiang and Jocelyn Huang

20. Uncertainty Assessment

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.

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

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

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

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

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

(b) κ is the coverage factor

Standard Uncertainty for Assumed Distribution

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

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

The judgment of conformity in the report is based on the measurement results excluding the measurement uncertainty.

Applicable for SAR Measurements:

Uncertainty Budget (4 MHz - 10 GHz range)							
Error Description	**Uncertainty Value (±%)**	**Probability**	**Divisor**	**(Ci) 1g**	**(Ci) 10g**	**Standard Uncertainty (1g) (±%)**	**Standard Uncertainty (10g) (±%)**
Measurement System							
Probe Calibration	18.60	N	2	1	1	9.3	9.3
Axial Isotropy	4.70	R	1.732	0.7	0.7	1.9	1.9
Hemispherical Isotropy	9.60	R	1.732	0.7	0.7	3.9	3.9
Linearity	4.70	R	1.732	1	1	2.7	2.7
Modulation Response	4.68	R	1.732	1	1	2.7	2.7
System Detection Limits	1.00	R	1.732	1	1	0.6	0.6
Boundary Effects	2.00	R	1.732	1	1	1.2	1.2
Readout Electronics	0.30	N	1	1	1	0.3	0.3
Response Time	0.00	R	1.732	1	1	0.0	0.0
Integration Time	2.60	R	1.732	1	1	1.5	1.5
RF Ambient Noise	3.00	R	1.732	1	1	1.7	1.7
RF Ambient Reflections	3.00	R	1.732	1	1	1.7	1.7
Probe Positioner	0.40	R	1.732	1	1	0.2	0.2
Probe Positioning	6.70	R	1.732	1	1	3.9	3.9
Post-processing	4.00	R	1.732	1	1	2.3	2.3
Test Sample Related							
Device Holder	3.60	N	1	1	1	3.6	3.6
Test sample Positioning	3.03	N	1	1	1	3.0	3.0
Power Scaling	0.00	R	1.732	1	1	0.0	0.0
Power Drift	5.00	R	1.732	1	1	2.9	2.9
Phantom and Setup							
Phantom Uncertainty	7.60	R	1.732	1	1	4.4	4.4
SAR correction	0.00	R	1.732	1	0.84	0.0	0.0
Liquid Conductivity Repeatability	0.03	N	1	0.78	0.77	0.0	0.0
Liquid Conductivity (target)	5.00	R	1.732	0.78	0.77	2.3	2.2
Liquid Conductivity (mea.)	2.50	R	1.732	0.78	0.77	1.1	1.1
Temp. unc. - Conductivity	3.68	R	1.732	0.78	0.77	1.7	1.6
Liquid Permittivity Repeatability	0.02	N	1	0.23	0.26	0.0	0.0
Liquid Permittivity (target)	5.00	R	1.732	0.23	0.26	0.7	0.8
Liquid Permittivity (mea.)	2.50	R	1.732	0.23	0.26	0.3	0.4
Temp. unc. - Permittivity	0.84	R	1.732	0.23	0.26	0.1	0.1
Combined Std. Uncertainty						14.5%	14.2%
Coverage Factor for 95 %						K=2	K=2
Expanded STD Uncertainty						29.0%	28.4%

21. 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 D05 v02r05, “SAR Evaluation Considerations for LTE Devices”, Dec 2015

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

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