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 Jan. 17, 2023 and testing was started from Jan. 19, 2023 and completed on Jan. 19, 2023. 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
FA190614-07B	01	Initial issue of report	Apr. 10, 2023
FA190614-07B	02	1. Update section 2.3, section 11 and section 13.1 2. Update appendix B	Apr. 13, 2023

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 n7	1.29	
		FR1 n12	0.76	
		FR1 n14	1.06	
		FR1 n25	1.18	
		FR1 n30	1.19	
		FR1 n38 / n41	1.29	
		FR1 n48	1.29	
		FR1 n66	1.18	
		FR1 n71	0.78	
		FR1 n77 / n78	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:			2023/1/19	

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. Equipment Under Test (EUT) Information

2.1 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 n7 : 2500 MHz ~ 2570 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 n38 : 2570 MHz ~ 2620 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 n78: 3700 MHz ~ 3800 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

Remark:

1. Based on the original filing Sporton SAR report No.: FA190614-06B to SW enable FR1 n7/n38/n78, in this report only perform n7 SAR result, the n/38/n78 was not perform due to the maximum power and bandwidth was cover by n41/n77.
2. And also enable 4CC carrier aggregation for FR2 n260/n261 and there is no change in HW, Tx path, and FR2 input power limit is same as what reported in the original Part0 Report no.: FA190614-06A, and the device implements Qualcomm Smart Transmit which treats intra-band UL CA as single Tx power control for RF exposure management, and as documented in original Part 1 PD test report no.: FA190614-06C and original Part 2 validation Report No.: FA190614-06E.

2.2 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 the original report: FA190614-06 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

2.3 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 n7 : 2500 MHz ~ 2570 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 n38 : 2570 MHz ~ 2620 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 n78: 3700 MHz ~ 3800 MHz, 3450MHz ~ 3550MHz
Channel Bandwidth	5G NR n2: 5MHz, 10MHz, 15MHz, 20MHz 5G NR n5: 5MHz, 10MHz, 15MHz, 20MHz 5G NR n7: 5MHz, 10MHz, 15MHz, 20MHz, 25 MHz, 30MHz, 40MHz 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 n38: 10MHz, 15MHz, 20MHz, 30MHz, 40MHz 5G NR n41: 20MHz, 30MHz, 40MHz, 50MHz, 60MHz, 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, 80MHz, 90MHz, 100MHz 5G NR n78: 10MHz, 15MHz, 20MHz, 30MHz, 40MHz, 50MHz, 60MHz, 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 n7	LTE B2/5/12/13/66/71
LTE Anchor Bands for n25	LTE B12/66
LTE Anchor Bands for n30	LTE B2/5/12/14/66
LTE Anchor Bands for n38	LTE B2
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
LTE Anchor Bands for n78	LTE B2/5/12/13/66/71

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 7														
	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz		Bandwidth 25MHz		Bandwidth 30MHz		Bandwidth 40MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	500500	2502.5	501000	2505	501500	2507.5	502000	2510	502500	2512.5	503000	2515	504000	2520
M	507000	2535	507000	2535	507000	2535	507000	2535	507000	2535	507000	2535	507000	2535
H	513500	2567.5	513000	2565	512500	2562.5	512000	2560	511500	2557.5	511000	2555	510000	2550

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 38										
	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)
L	515004	2575.02	515502	2577.51	516000	2580	517002	2585.01	518004	2590.02
M	519000	2595	519000	2595	519000	2595	519000	2595	519000	2595
H	522996	2614.98	522498	2612.49	522000	2610	520998	2604.99	519996	2599.98

NR Band 41																
	Bandwidth20MHz		Bandwidth30MHz		Bandwidth 40MHz		Bandwidth 50MHz		Bandwidth 60MHz		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)
L	501204	2506.02	502200	2511	503202	2516.01	504204	2521.02	505200	2526	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
H	535998	2679.99	534996	2674.98	534000	2670	532998	2664.99	531996	2659.98	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 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)
L	647000	3705	647168	3707.52	647334	3710.01	647668	3715.02	648000	3720	648334	3725.01	648668	3730.02	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
H	665000	3975	664832	3972.48	664666	3969.99	664332	3964.98	664000	3960	663666	3954.99	663332	3949.98	662666	3939.99	662332	3934.98	662000	3930

NR Band 78(3700 MHz ~ 3800 MHz)																				
	Bandwidth10MHz		Bandwidth15MHz		Bandwidth 20MHz		Bandwidth30MHz		Bandwidth 40MHz		Bandwidth 50MHz		Bandwidth 60MHz		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)
L	647000	3705	647168	3707.52	647334	3710.01	647668	3715.02	648000	3720	648334	3725.01	648668	3730.02	649334	3740.01	649668	3745.02	650000	3750
M	650000	3750	650000	3750	650000	3750	650000	3750	650000	3750	650000	3750	650000	3750	650000	3750	650000	3750		
H	653000	3795	652832	3792.48	652666	3789.99	652332	3784.98	652000	3780	651666	3774.99	651332	3769.98	650666	3759.99	650332	3754.98		

NR Band 77/78(3450MHz ~ 3550MHz)																				
	Bandwidth10MHz		Bandwidth15MHz		Bandwidth 20MHz		Bandwidth30MHz		Bandwidth 40MHz		Bandwidth 50MHz		Bandwidth 60MHz		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)
L	630334	3455.01	630500	3457.5	630668	3460.02	631000	3465	631334	3470.01	631668	3475.02	632000	3480	632668	3490.02	633000	3495		
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
H	636332	3544.98	636166	3542.49	636000	3540	635666	3534.99	635332	3529.98	635000	3525	634666	3519.99	634000	3510	633666	3504.99		

3. 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 n77/78	1	22.21	3.840	1.030	100.00%	1.00	19.40	22.00
FR1 n77/78_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 n7	2	22.35	1.060	1.030	100.00%	1.00	22.20	22.50
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 n38	2	22.97	1.070	1.030	100.00%	1.00	22.80	22.50
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 n77/78	2	22.14	3.380	1.030	100.00%	1.00	19.90	22.00
FR1 n77/78_HPUE	2	25.14	3.380	1.030	100.00%	1.00	19.90	25.00
FR1 n77/78_(SRS)	5	20.33	2.880	1.030	100.00%	1.00	19.70	20.50
FR1 n77/78_HPUE (SRS)	5	24.23	2.880	1.030	100.00%	1.00	19.70	25.00
FR1 n77/78_ (SRS)	6	19.98	1.700	1.030	100.00%	1.00	17.80	19.50
FR1 n77/78_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:

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

4. 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

5. RF Exposure Limits

5.1 Uncontrolled Environment

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

5.2 Controlled Environment

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

Limits for Occupational/Controlled Exposure (W/kg)

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

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

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

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

6. Specific Absorption Rate (SAR)

6.1 Introduction

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

6.2 SAR Definition

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

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

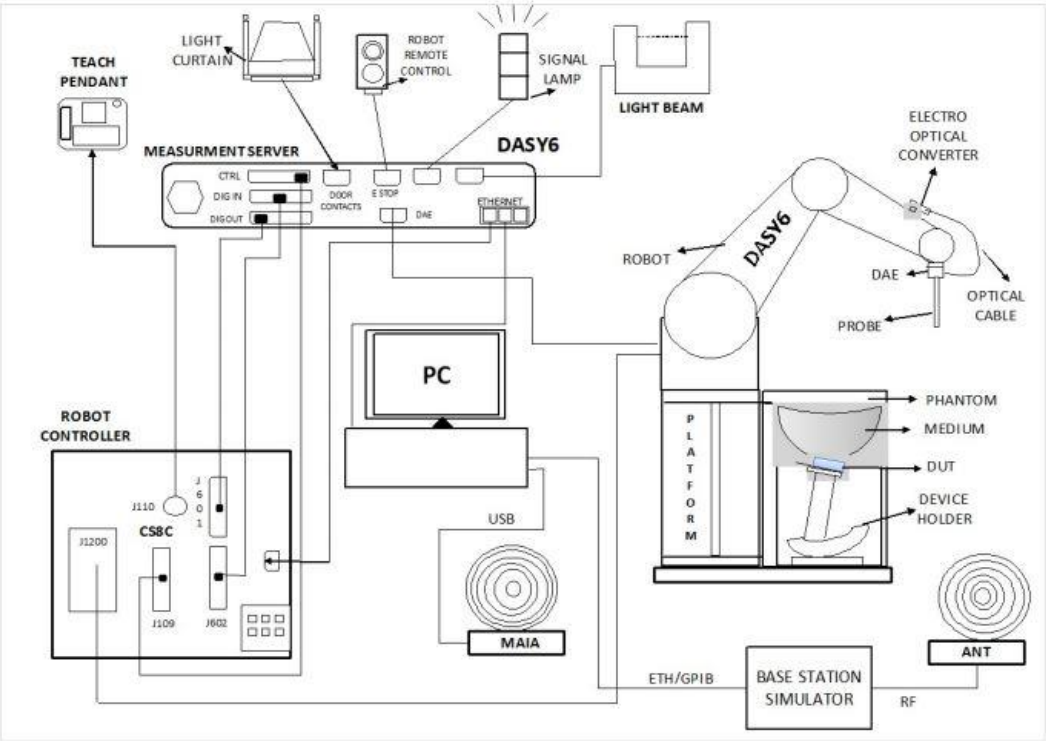
SAR is expressed in units of Watts per kilogram (W/kg)

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

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

7. System Description and Setup

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



- 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.

7.1 Test Site Location

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

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

7.2 E-Field Probe

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

<ES3DV3 Probe>

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

<EX3DV4 Probe>

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

7.3 Data Acquisition Electronics (DAE)

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

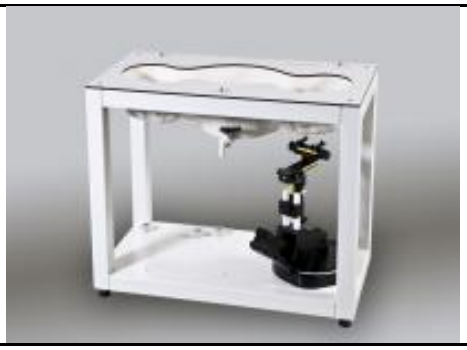
The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

Fig 5.1 Photo of DAE

7.4 Phantom

<SAM Twin Phantom>

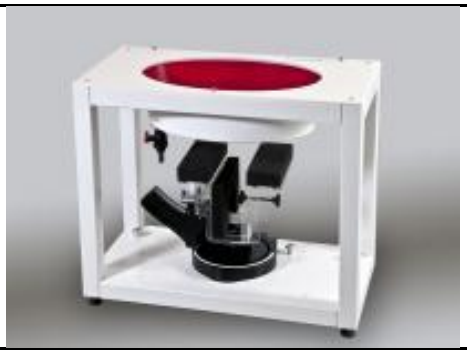
Shell Thickness	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm
Filling Volume	Approx. 25 liters
Dimensions	Length: 1000 mm; Width: 500 mm; Height: adjustable feet
Measurement Areas	Left Hand, Right Hand, Flat Phantom



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

<ELI Phantom>

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



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

7.5 Device Holder

<Mounting Device for Hand-Held Transmitter>

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

Mounting Device for Hand-Held Transmitters

Mounting Device Adaptor for Wide-Phones

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

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

Mounting Device for Laptops

8. Measurement Procedures

The measurement procedures are as follows:

<Conducted power measurement>

(a) For WWAN power measurement, use base station simulator to configure EUT WWAN transmission in conducted connection with RF cable, at maximum power in each supported wireless interface and frequency band.
(b) Read the WWAN RF power level from the base station simulator.
(c) For WLAN 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

8.1 Spatial Peak SAR Evaluation

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

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

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

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

8.2 Power Reference Measurement

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

8.3 Area Scan

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

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

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

8.4 Zoom Scan

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

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

			≤ 3 GHz	> 3 GHz
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$	
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.

8.5 Volume Scan Procedures

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

8.6 Power Drift Monitoring

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

9. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	2600MHz System Validation Kit(2)	D2600V2	1008	Aug. 17, 2021	Aug. 15, 2023
SPEAG	Data Acquisition Electronics	DAE4	1311	Aug. 25, 2022	Aug. 24, 2023
SPEAG	Dosimetric E-Field Probe	EX3DV4	7306	Jul. 28, 2022	Jul. 27, 2023
RCPTWN	Thermometer	HTC-1	TM560-2	Mar. 15, 2022	Mar. 14, 2023
SPEAG	Device Holder	N/A	N/A	N/A	N/A
Anritsu	Signal Generator	MG3710A	6201502524	Oct. 12, 2022	Oct. 11, 2023
Keysight	ENA Network Analyzer	E5071C	MY46104758	Sep. 22, 2022	Sep. 21, 2023
SPEAG	Dielectric Probe Kit	DAK-3.5	1126	Sep. 28, 2022	Sep. 27, 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 Meter	ML2495A	1804003	Oct. 17, 2022	Oct. 16, 2023
Anritsu	Power Sensor	MA2411B	1726150	Oct. 17, 2022	Oct. 16, 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. 14, 2022	Oct. 13, 2023
Mini-Circuits	Power Amplifier	ZVE-8G+	479102029	Sep. 15, 2022	Sep. 14, 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.

10. System Verification

10.1 Tissue Verification

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

<Tissue Dielectric Parameter Check Results>

Frequency (MHz)	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
2600	22.5	1.980	38.100	1.96	39.00	1.02	-2.31	±5	2023/1/19

10.2 System Performance Check Results

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

Test Site	Date	Frequency (MHz)	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 1g SAR (W/kg)	Targeted 1g SAR (W/kg)	Normalized 1g SAR (W/kg)	Deviation (%)
SAR10	2023/1/19	2600	50	D2600V2-1008	EX3DV4 - SN7306	DAE4 Sn1311	2.690	58.000	53.8	-7.24

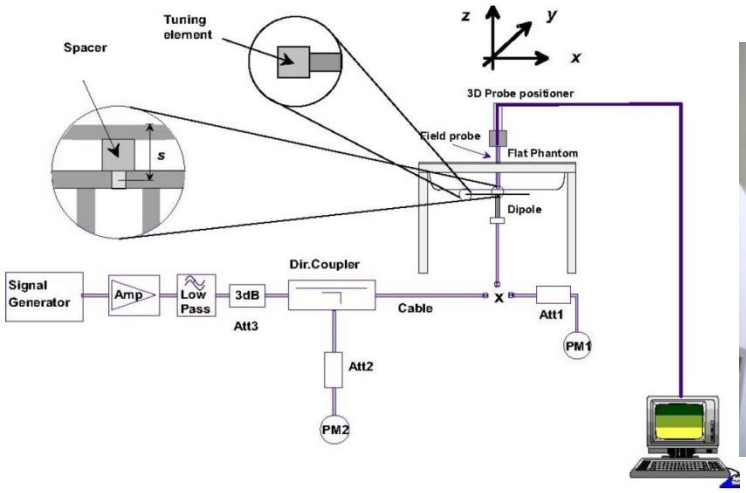


Fig 8.3.1 System Performance Check Setup

Fig 8.3.2 Setup Photo

11. 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.

<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.

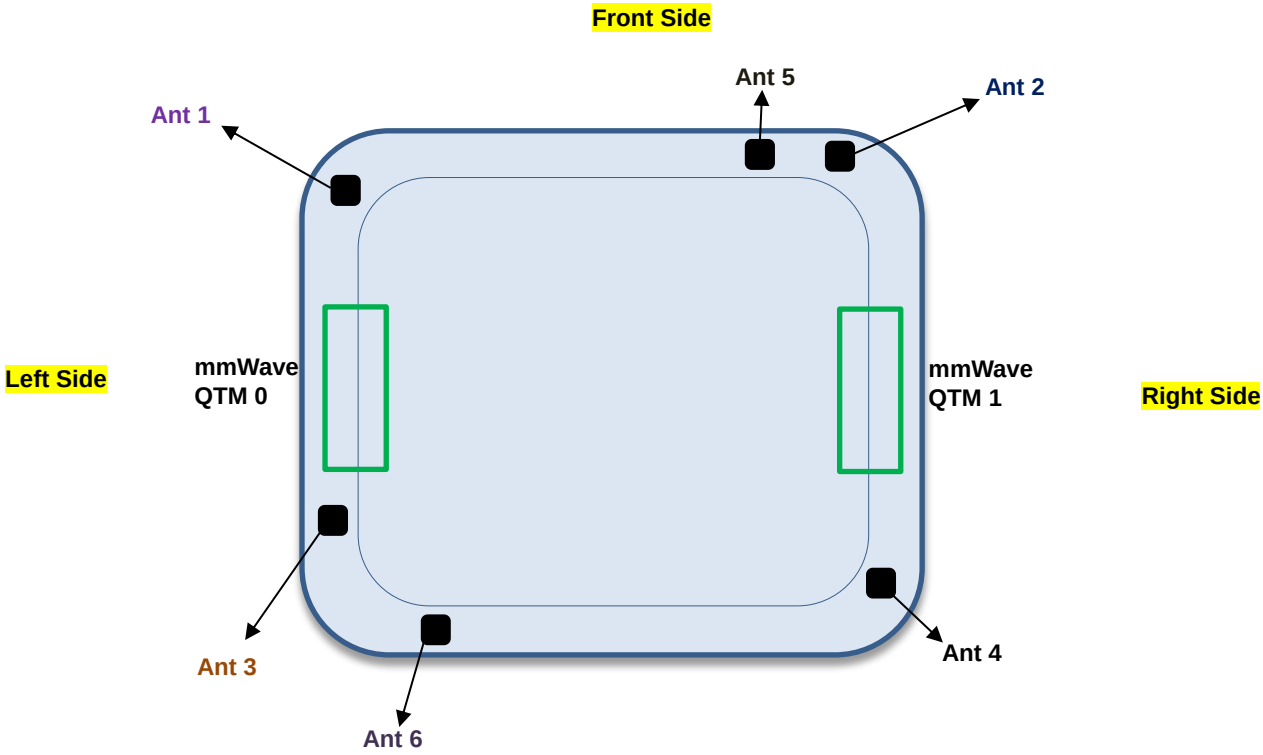
Table 6.2.2-2 Maximum power reduction (MPR) for power class 2

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		

<n7_Ant 2>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				504000	507000	510000	
Frequency (MHz)				2520	2535	2550	
40	PI/2 BPSK	1	1	22.30	22.35	22.30	23.2
40	PI/2 BPSK	1	108	22.14	22.32	22.22	
40	PI/2 BPSK	1	214	22.12	22.24	22.13	
40	PI/2 BPSK	108	0	21.75	21.82	21.59	23.0
40	PI/2 BPSK	108	54	21.81	21.89	21.64	23.2
40	PI/2 BPSK	108	108	21.76	21.83	21.64	23.0
40	PI/2 BPSK	216	0	21.71	21.76	21.80	
40	QPSK	1	1	22.04	22.16	21.98	23.2
40	QPSK	1	108	22.09	22.23	22.07	
40	QPSK	1	214	22.16	22.20	21.97	
40	QPSK	108	0	21.31	21.34	21.26	22.5
40	QPSK	108	54	22.08	22.29	22.31	23.2
40	QPSK	108	108	21.21	21.41	21.20	22.5
40	QPSK	216	0	21.16	21.32	21.09	
40	16QAM	1	1	21.10	21.09	21.00	22.5
40	64QAM	1	1	19.41	19.44	19.43	21.0
40	256QAM	1	1	17.59	17.70	17.62	19.0
Channel				503000	507000	511000	Tune-up limit (dBm)
Frequency (MHz)				2515	2535	2555	
30	PI/2 BPSK	1	1	22.09	22.27	22.16	23.2
Channel				502500	507000	511500	Tune-up limit (dBm)
Frequency (MHz)				2512.5	2535	2557.5	
25	PI/2 BPSK	1	1	22.25	22.28	22.31	23.2
Channel				502000	507000	512000	Tune-up limit (dBm)
Frequency (MHz)				2510	2535	2560	
20	PI/2 BPSK	1	1	22.09	22.20	22.12	23.2
Channel				501500	507000	512500	Tune-up limit (dBm)
Frequency (MHz)				2507.5	2535	2562.5	
15	PI/2 BPSK	1	1	22.21	22.15	22.16	23.2
Channel				501000	507000	513000	Tune-up limit (dBm)
Frequency (MHz)				2505	2535	2565	
10	PI/2 BPSK	1	1	22.05	22.26	22.16	23.2
Channel				500500	507000	513500	Tune-up limit (dBm)
Frequency (MHz)				2502.5	2535	2567.5	
5	PI/2 BPSK	1	1	22.07	22.26	22.13	23.2

12. Antenna Location



Top View

Antenna	Support Band-SA mode
Ant 1	Ant. Tx: LTE:5/12/13/14/26/71 FR1:5/12/14/25/48/71/77/78
Ant 2	Ant. Tx: LTE 2/4/7/25/30/41/48/66 FR1:2/7/25/30/38/41/48/66/77/78
Ant 3	Ant. Tx:WLAN2.4G & WLAN5G & 6E
Ant 4	Ant. Tx:WLAN2.4G & WLAN5G & 6E
Ant 5	FR1:n77/78(SRS only)
Ant 6	FR1:n77/78(SRS only)

13. 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.

5G NR Note:

1. Based on original report no.: FA190614-06, FCC ID: PY322300575 to enable n7/n38/n78, according to tune-up limit for n38/78 SAR was cover by n41/77, due to the maximum power include tolerance and the channel bandwidth for smaller band is ≤ the larger band to qualify for the SAR test exclusion
2. 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 n7, 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.

13.1 Hotspot SAR

<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)
	FR1 n7	40M	BPSK	1	1	Top Surface	10mm	Ant 2	507000	2535	22.35	23.20	1.216	0.01	0.480	0.584
	FR1 n7	40M	BPSK	108	54	Top Surface	10mm	Ant 2	507000	2535	21.89	23.20	1.352	-0.12	0.423	0.572
	FR1 n7	40M	BPSK	1	1	Bottom Surface	10mm	Ant 2	507000	2535	22.35	23.20	1.216	-0.08	0.467	0.568
	FR1 n7	40M	BPSK	108	54	Bottom Surface	10mm	Ant 2	507000	2535	21.89	23.20	1.352	0.01	0.409	0.553
	FR1 n7	40M	BPSK	1	1	Left Side	10mm	Ant 2	507000	2535	22.35	23.20	1.216	-0.02	0.001	0.001
	FR1 n7	40M	BPSK	108	54	Left Side	10mm	Ant 2	507000	2535	21.89	23.20	1.352	0.08	0.001	0.001
01	FR1 n7	40M	BPSK	1	1	Right Side	10mm	Ant 2	507000	2535	22.35	23.20	1.216	0.03	1.060	1.289
	FR1 n7	40M	BPSK	108	54	Right Side	10mm	Ant 2	507000	2535	21.89	23.20	1.352	-0.09	0.925	1.251
	FR1 n7	40M	BPSK	216	0	Right Side	10mm	Ant 2	507000	2535	21.76	23.00	1.330	0.06	0.906	1.205
	FR1 n7	40M	BPSK	1	1	Front Side	10mm	Ant 2	507000	2535	22.35	23.20	1.216	-0.18	0.184	0.224
	FR1 n7	40M	BPSK	108	54	Front Side	10mm	Ant 2	507000	2535	21.89	23.20	1.352	0.02	0.151	0.204

14. 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.: FA190614-07A.
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.

14.1 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.

14.2 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)	5/6GHz WLAN Ant 3 1g SAR (W/kg)	5/6GHz 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)	5/6GHz WLAN Ant 3 1g SAR (W/kg)	5/6GHz 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 n77/78_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)	5/6GHz WLAN Ant 3 1g SAR (W/kg)	5/6GHz 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	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)	5/6GHz WLAN Ant 3 1g SAR (W/kg)	5/6GHz WLAN Ant 4 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 n7_Ant 2	Top Surface	0.584	0.041	0.082	0.071	0.066	**0.707**	**0.721**	**0.691**	**0.737**
	Bottom Surface	0.568	0.052	0.035	0.058	0.062	**0.655**	**0.688**	**0.682**	**0.661**
	Left Side	0.001	0.097		0.098		**0.098**	**0.099**	**0.098**	**0.099**
	Right Side	1.289		0.042		0.073	**1.331**	**1.362**	**1.362**	**1.331**
	Front Side	0.224					**0.224**	**0.224**	**0.224**	**0.224**
	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 n38/41_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)	5/6GHz WLAN Ant 3 1g SAR (W/kg)	5/6GHz WLAN Ant 4 1g SAR (W/kg)				
FR1 n77/78_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 n77/78_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 n77/78_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

15. 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%

16. References

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

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

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

[4] SPEAG DASY System Handbook

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

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

[7] FCC KDB 941225 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.